County of Los Angeles

Draft
Environmental Impact Report
SCH No. 2005051143
Volume IX
Appendix 4.8 (continued)

# MISSION VILLAGE

Prepared for:

Los Angeles County
Department of Regional Planning
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Prepared by:

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NEWHALL RANCH
Newhall Ranch Company

OCTOBER 2010

County of Los Angeles

# Draft Environmental Impact Report

SCH No. 2005051143

Volume IX
Appendix 4.8 (continued)

# MISSION VILLAGE

| | |
|---|---|
| Project No. | 04-181 |
| Vesting Tentative Tract Map No. | 61105 |
| SEA Conditional Use Permit No. | RCUP200500080 |
| Oak Tree Permit No. | ROAK200500032 |
| Oak Tree Permit No. | T200500043 |
| Conditional Use Permit (Off-Site Improvements) | RCUP200500081 |

Substantial Conformance Determinations for Grading and Hillside Management Guidelines

NEWHALL RANCH
Newhall Ranch Company

Prepared for:

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OCTOBER 2010

# DRAFT
# ENVIRONMENTAL IMPACT REPORT
# for
# MISSION VILLAGE

## SCH No. 2005051143

**County Project No. 04-181**
**Vesting Tentative Tract Map No. 61105**
**SEA Conditional Use Permit No. RCUP200500080**
**Oak Tree Permit No. ROAK200500032**

**Oak Tree Permit No. T200500043**
**Conditional Use Permit RCUP200500081**
**(Off-Site Improvements)**

## Volume IX
## Appendix 4.8 (continued)

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**October 2010**

# TABLE OF CONTENTS

**Volume I**


Section Page

Introduction ..... I-1

Executive Summary ..... ES-1

1.0 Project Description ..... 1.0-1

2.0 Environmental and Regulatory Setting ..... 2.0-1

3.0 Cumulative Impact Analysis Methodology ..... 3.0-1

4.0 Environmental Impact Analysis ..... 4.0-1
- 4.1 Geotechnical and Soil Resources ..... 4.1-1
- 4.2 Hydrology ..... 4.2-1
- 4.3 Biota ..... 4.3-1
- 4.4 Visual Qualities ..... 4.4-1

**Volume II**

- 4.5 Traffic/Access ..... 4.5-1
- 4.6 Noise ..... 4.6-1
- 4.7 Air Quality ..... 4.7-1
- 4.8 Water Service ..... 4.8-1
- 4.9 Wastewater Disposal ..... 4.9-1
- 4.10 Solid Waste Services ..... 4.10-1
- 4.11 Sheriff Services ..... 4.11-1
- 4.12 Fire Protection Services ..... 4.12-1
- 4.13 Education ..... 4.13-1
- 4.14 Parks and Recreation ..... 4.14-1
- 4.15 Library Services ..... 4.15-1
- 4.16 Agricultural Resources ..... 4.16-1
- 4.17 Utilities ..... 4.17-1
- 4.18 Mineral Resources ..... 4.18-1
- 4.19 Environmental Safety ..... 4.19-1
- 4.20 Cultural/Paleontological Resources ..... 4.20-1
- 4.21 Floodplain Modifications ..... 4.21-1
- 4.22 Water Quality ..... 4.22-1
- 4.23 Global Climate Change ..... 4.23-1

5.0 Project Alternatives ..... 5.0-1

6.0 Significant Irreversible Environmental Changes ..... 6.0-1

7.0 Growth-Inducing Impacts ..... 7.0-1

8.0 List of EIR Preparers, and Organizations/Persons Consulted ..... 9.0-1

9.0 References ..... 10.0-1

# LIST OF APPENDICES

**Volume III**


Appendix I Initial Study/Notice of Preparation (NOP), and NOP Comment Letters
Initial Study/Notice of Preparation (NOP)
NOP Comment Letters

Appendix 1.0 Project Description Documentation
Vesting Tentative Tract Map No. 61105
Newhall Ranch Fiscal Impact Analysis, September 2006
Selected Exhibits and Tables from the Newhall Ranch Specific Plan

Appendix 2.0 Specific Plan Consistency Analysis, September 20, 2010

Appendix 3.0 Cumulative Impact Analysis Methodology
Development Monitoring System Database

Appendix 4.1 Geologic Reports
Geologic Report – Fault Investigation for Airport Mesa Area, Portion of Mesas East VTTM 61105, Newhall Ranch
Geologic and Geotechnical Report, Review of Vesting Tentative Tract Map 61105


**Volume IV**


Appendix 4.1 Geologic Reports (continued)
Geologic and Geotechnical Report, Review of Vesting Tentative Tract Map 61105 (continued)
Geologic and Geotechnical Report – Addendum No. 1, Response to Los Angeles County Geologic Review Sheet
Geologic and Geotechnical Report – Addendum No. 2, Response to Los Angeles County Geologic Review Sheet, January 26, 2005
Preliminary Geologic/Geotechnical Report, Review of Utility Corridor Plans (30% Submittal), Utility Corridor Along Highway 126, Newhall Ranch WRP Site to Travel Village, Castaic, May 25, 2007
Geologic and Geotechnical Report – Addendum No. 3, Response to Los Angeles County Geologic Review Sheet, September 17, 2007
Geologic and Geotechnical Report – Addendum No. 4, Response to Los Angeles County Geologic Review Sheet date January 16, 2008; March 13, 2008
Geologic and Geotechnical Report, Review Revised Vesting Tentative Tract Map 53108, December 21, 2009


**Volume V**


Appendix 4.1 Geologic Reports (continued)
Leighton and Associates, Inc., Geotechnical Report, Off-Site Grading for Proposed Southern California Edison Substation Alternatives, Responses to County of Los Angeles, Department of Public Works Geologic and Soils Engineering Review Sheets for TTM No. 61105 (Mission Village Project), November 26, 2007

# LIST OF APPENDICES (continued)

**Volume V (continued)**

Appendix 4.1 Geologic Reports (continued)

Leighton and Associates, Inc., Responses to County of Los Angeles, Department of Public Works Geologic and Soils Engineering Review Sheets for Leighton's Geotechnical Report Off-Site Grading for Proposed Southern California Edison Substation Alternatives, March 11, 2008

Leighton and Associates, Inc., 100-Scale Grading Plan Review of Offsite Grading for Proposed Southern California Edison Substation Alternatives 1 and 2 March 2010, Vesting Tentative Tract Map 61105, County of Los Angeles March 16, 2010

R.T. Frankian & Associates, Evaluation of Building Setbacks, Airport Mesa (Area E1), Vesting Tentative Tract 61105, Newhall Ranch, Los Angeles County, California. October 14, 2009

R.T. Frankian & Associates, 100-Scale Plan Review, Revised Vesting Tentative Tract Map No. 61105, Mission Village, Newhall Ranch, December 21, 2009

R.T. Frankian & Associates, Response to County of Los Angeles Review Sheets and Geotechnical Plan Review, Revised Vesting Tentative Tract Map No. 61105, Mission Village, Newhall Ranch. March 30, 2010

Geologic/Geotechnical Report – EIR-Level Review of Preliminary Grading Study for Western Access Roads to Proposed Mission Village Development (VTTM 61105)

Geologic and Geotechnical Report – Review of Revised VTTM 61105 (Dated 12/21/05) for Screencheck Purposes

Geologic/Geotechnical Evaluation for Environmental Impact Report, Vesting Tentative Tracted Map No. 61105, March 31, 2010

R.T. Frankian & Associates, *Response to County of Los Angeles Review Sheets and Geotechnical Plan Review, Revised Tentative Tract Map No. 61105,* Mission Village, Newhall Ranch. April 29, 2010

Appendix 4.2 Hydrological Reports

Drainage Concept for Mesas VTTM 61105

Flood Technical Report – Santa Clara River, February 2007

Drainage Concept Report for Mission Village Santa Clara River Bank Protection, July 2007

**Volume VI**

Appendix 4.2 Hydrological Reports (continued)

California Regional Water Quality Control Board, Los Angeles Region, Review of Newhall Ranch Specific Plan Subregional Stormwater Mitigation Plan Letter, May 2008

Request for Conditional Letter of Map Revision, July 2007

Balance Hydrologics, Inc., "Assessment of Potential Impacts Resulting From Cumulative Hydromodification Effects, Selected Reaches of the Santa Clara River, Los Angeles County, California," (October 2005)

Newhall Ranch Santa Clara River Phase I River Fluvial Study, March 2006

# LIST OF APPENDICES (continued)

**Volume VI (continued)**


Appendix 4.3 Biological Reports
California Native Plant Society, Inventory of Rare and Endangered Plants
California Natural Diversity Data Base
Compliance Biology, Inc., "Results of the Focused Western Spadefoot Toad Surveys on the Mission Village Project Site" (2006)
Entrix, Inc., "Focused Special-Status Aquatic Species Assessment – Santa Clara River, Mission Village Project, Newhall Ranch, California" (2006)
Impact Sciences, Inc., "Oak Tree Report: Mission Village VTTM 61105 Los Angeles County, California, March 2010 update" (2010)
Impact Sciences, Inc., "Mission Village VTTM 61105 Project Oak Tree Report, Los Angeles County, California" (2006)
Lemons, P., "Focused California Gnatcatcher Surveys for Mission Village, Los Angeles County, California" (January 26, 2008)
Dudek, "2007 Sensitive Plant Survey Results for the Newhall Ranch Specific Plan Area, Los Angeles County, California" (December 2007)

Appendix 4.5 Traffic Analysis
Mission Village Revised Traffic Impact Analysis, Austin-Foust Associates, Inc., October 2010
Westside Roadway Santa Clarita Valley Phasing Analysis, Austin-Foust Associates, Inc., November 2006
Westside Santa Clarita Valley Phasing Analysis for the City of Santa Clarita, Austin-Foust Associates, Inc., July 2006


**Volume VII**


Appendix 4.5 Traffic Analysis (continued)
Caltrans EIR/EIS Excerpts
City of Santa Clarita Department of Public Works and Los Angeles County Department of Public Works, Valencia B&T District Report Update, March 2008
City of Santa Clarita Transportation and Engineering Services, Via Princessa Bridge and Major Thoroughfare Construction Fee District Update Report, March 2002

Appendix 4.6 Noise Calculations
Noise Measurement Output Data and Analysis

Appendix 4.7 Air Quality Calculations
SCAQMD Santa Clarita Subregional Analysis, November 2004
Grading, Trenching, and Paving Emissions
Building Construction Emissions
Operational Emissions
CO Hotspots

# LIST OF APPENDICES (continued)

**Volume VII (continued)**


Appendix 4.7 Air Quality Calculations (continued)
Localized Significance Thresholds Analysis
Health Risk Assessment

Appendix 4.8 Water Service Reports
SB 610 Water Supply Assessment
Water Supply Assessment Mission Village Vesting Tentative Tract Map No. 061105, April 2010
2005 Urban Water Management Plan
Los Angeles Superior Court Decision on Riverpark
Santa Barbara Superior Court Decision on West Creek
Newhall Ranch Revised Additional Analysis, Vol VIII


**Volume VIII**


Appendix 4.8 Water Service Reports (continued)
Nickel Water Contract Documentation
Nickel Environmental Documentation
The State Water Project Deliverability Reliability Report, Public Review Draft, November 16, 2005
The State Water Project Deliverability Reliability Report 2005, Final April 2006
Water Supply Contracts Between the State of California Department of Water Resources and CLWA including Amendment No. 18 (41,000 Acre-Feet Water Transfer)
Valencia Water Company Water Management Program Approved November 29, 2001, and Related CPUC Decisions
2002 Point of Delivery Agreement (Semitropic Groundwater Banking Program), February 13, 2004
California's Groundwater Bulletin 118, Update 2003, October 2003
CLWA Data Document Providing Economic Justification for Proposed Facility Capacity Fees, April 19, 2003
2004 Santa Clarita Valley Water Report, Dated May 2005
2005 Santa Clarita Valley Water Report, Dated April 2006
Results of Laboratory Testing of Valencia Water Company Wells
CH2MHill Memorandum, Effect of Urbanization on Aquifer Recharge in the Santa Clarita Valley, February 22, 2004
CH2MHill Final Report, Regional Groundwater Flow Model for the Santa Clarita Valley (Model Development and Calibration), April 2004
CH2MHill, Calibration Update of the Regional Groundwater Flow Model for the Santa Clarita Valley, Santa Clarita, California, August 2005
CH2MHill Final Report, Analysis of Perchlorate Containment in Groundwater Near the Whittaker-Bermite Property, December 2004
CH2MHill Memorandum, Analysis of Near-Term Groundwater Capture Areas for Production Wells Located near the Whittaker-Bermite Property, December 21, 2004

# LIST OF APPENDICES (continued)

**Volume IX**

Appendix 4.8 Water Service Reports (continued)
Analysis of Groundwater Basin Yield, Upper Santa Clara River Groundwater Basin, East Subbasin, Dated August 2005
Analysis of Groundwater Supplies and Groundwater Basin Yield Upper Santa Clara River Groundwater Basin, East Subbasin (2009 Basin Yield Update)
Draft EIR – Supplemental Water Project Transfer of 41,000 Acre-Feet of State Water Project Table A Amount, Dated June 2004
CLWA Draft Report, Recycled Water Master Plan, May 2002 and CLWA Resolution Regarding Availability of Recycled Water, Approved May 28, 2003
Impact and Response to Perchlorate Contamination, Valencia Water Company Well Q2, Dated April 2005
Groundwater Management Plan, Santa Clara River Valley Groundwater Basin, Dated December 2003
Memorandum of Understanding Between the Santa Clara River Valley Upper Basin Water Purveyors and United Water Conservation District, August 2001
Newhall Ranch Litigation, Statement of Decision, August 1, 2000

**Volume X**

Appendix 4.8 Water Service Reports (continued)
Slade, 2001 Update Report Hydrogeologic Conditions in the Alluvial and Saugus Formation Aquifer Systems, Dated July 2002
Interim Remedial Action plan, Dated December 2005
Valencia Water Company Letter to Impact Sciences, March 8, 2006
Luhdorf & Scalmanini Technical Memorandum: Evaluation of Groundwater Recharge Methods for the Saugus Formation in the Newhall Ranch Specific Plan Area, March 8, 2006
Luhdorf & Scalmanini Technical Memorandum: Potential Capture of Perchlorate Contamination, Valencia Water Company Wells E14-E17, April 26, 2006
Final Report, Reclaimed Water System Master Plan, CLWA, September 1993
CPUC Decision Dated November 29, 2001
CPUC Decision Dated October 16, 2003
CPUC Decision Dated August 24, 2006
2003 Point of Delivery Agreement (Semitropic Groundwater Banking Program), February 13, 2004
CLWA Resolution Regarding Availability of Recycled Water, Approved May 28, 2003
CLWA Memorandum to Board of Directors, June 1, 2007
Monterey Settlement Agreement
*Friends of the Santa Clara River v. Castaic Lake Water Agency*, 2003 WL 22839353 (*Friends II*)
DWR "News for Immediate Release," April 18, 2006
DWR Notice to SWP Contractors, May 23, 2007
DWR Bulletin 132-04, *Management of the California State Water Project*, September 2005
DWR Bulletin 132-03, *Management of the California State Water Project*, December 2004
DWR Bulletin 132-02, *Management of the California State Water Project*, January 2004

# LIST OF APPENDICES (continued)

**Volume X (continued)**

Appendix 4.8 Water Service Reports (continued)

DWR Bulletin 132-01, *Management of the California State Water Project,* December 2002

DWR Bulletin 132-06, *Management of the California State Water Project*, December 2007

DWR's "Notices to State Water Project Contractors" 2000 to 2006

Sacramento County Trial Court's Order (re: Monterey Settlement Agreement)

Judgment Granting Peremptory Writ of Mandate, October 25, 2002

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*California Water Impact Network, et al. v. Castaic Lake Water Agency*, Appellate Court 2d Civil No. B177978 (Second District Court of Appeal's unpublished decision)

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Order Granting Plaintiff's Application for Temporary Restraining Order, February 3, 2006

Order Granting Plaintiff's Motion for Preliminary Injunction, February 15, 2006

Governor Schwarzenegger's release issued July 17, 2007

**Volume XI**

Appendix 4.8 Water Service Reports (continued)

2006 Santa Clarita Valley Water Report, May 2007

2008 Santa Clarita Valley Water Report, April 2009

Statement of Decision, *California Water Network v. Castaic Lake Water Agency*, Los Angeles County Superior Court No. BS098724, filed April 2, 2007 ("Chalfant Decision")

*California Water Impact Network, Inc. v. Castaic Lake Water Agency*, Second Appellate District, Division Five, Appellate Case No. B205622

Castaic Lake Water Agency Litigation Settlement Agreement

Order Granting Joint Motion for Court Approval, Good Faith Settlement Determination and Entry of Consent Order, July 13, 2007

Stipulation to Dismiss Plaintiffs' Claims and Defendants' Counterclaim, August 20, 2007

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DWR's Progress on Incorporating Climate Change into Management of California's Water Resources, July 2006

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Pondering a Climate Conundrum in Antarctic, *Nature,* January 13, 2002

# LIST OF APPENDICES (continued)

**Volume XI (continued)**

Appendix 4.8 Water Service Reports (continued)
Buried Soil Cement Evaluation after 2004/05 Winter Storm, PACE, May 8, 2007
In Hot Water: Water Management Strategies to Weather the Effects of Global Warming, NRDC, July 2007
Minute Order and Statement of Decision for the 2005 UWMP
Janavs Decision
Retired Irrigated Farmland, Tentative Tract Map No. TR61105, 2008
Valencia Water Company, Well E-15 Water Quality Compliance Monitoring Results – 2006 to 2009
Progress Letter Report from Hassan Amini, Ph.D., Project Coordinator for AMEC Geomatrix, to DTSC, September 15, 2009
Letter from Hassan Amini, Ph.D., Project Coordinator for AMEC Geomatrix, to DTSC, June 8, 2009
CLWA News Release, September 14, 2009
CLWA Memorandum from Brian J. Folsom to CLWA Board of Directors, October 1, 2009
U.S. EPA, Perchlorate, and Region 9 Perchlorate Update
Biological Opinion for Delta smelt, 2008

**Volume XII**

Appendix 4.8 Water Service Reports (continued)
Biological Opinion for Chinook salmon/sturgeon
*Natural Resources Defense Council v. Kempthorne*, 506 F.Supp.2d 322 (E.D. Cal. 2007) ("2007 Wanger decision")
*Pacific Coast Federation of Fishermen's Associations, et al. v. Gutierrez, et al.*, No. 06-CV-00245-OWW-GSA (E.D. Cal. 2008) ("2008 Wanger decision")
NOAA/NMFS release summarizing the 2009 Biological Opinion, June 4, 2009
DWR release responding to the 2009 Biological Opinion, June 4, 2009
SWP Contractors release concerning litigation filed challenging the 2009 Biological Opinion, August 6, 2009
Coalition for a Sustainable Delta/Kern County Water Agency release concerning the litigation filed challenging the 2009 BO, August 28, 2009

Appendix 4.9 Wastewater Disposal
Wastewater Data

Appendix 4.10 Solid Waste Services
Calculations Details

Appendix 4.11 Sherriff Services
Written correspondence from Captain Patti A. Minutello, Los Angeles County Sheriff's Department, Santa Clarita Valley Station, November 3, 2004
Written communication from E. Conley, Captain, Commander, Newhall Area Station, California Highway Patrol, November 14, 2004

# LIST OF APPENDICES (continued)

**Volume XII (continued)**

Appendix 4.12 Fire Protection Services
Written correspondence, David R. Leininger, Chief, Forestry Division, Prevention Bureau, County of Los Angeles Fire Department, December 22, 2004

Appendix 4.13 Education
School Facilities Funding Agreement entered into between the Newhall District and Newhall on October 17, 1995
School Facilities Funding Agreement Between the Saugus Union School District and Newhall Land and Farming Company, Effective February 18, 1997
School Facilities Funding Agreement Between the William S. Hart Union High School District and The Newhall Land and Farming Company, Effective October 1998
Facilities Mitigation and Funding Agreement By and Between Newhall Land Development, LLC, and the Newhall School District, December 1, 2009
Agreement for the Advancement of School Facilities Funds to the Saugus Union School District by the Newhall Land and Farming Company, Effective October 17, 2000
School Facilities Funding Agreement entered into between the Newhall District and Newhall Land and Farming Company (Newhall School Funding Agreement), Effective January 22, 2010
Student Generation Calculations

Appendix 4.15 Library Services
Written correspondence from Malou Rubio, Head, Staff Services, County of Los Angeles Public Library, Library Headquarters, August 11, 2004
Written correspondence from Malou Rubio, Head, Staff Services, County of Los Angeles Public Library, Library Headquarters, June 28, 2004
E-mail correspondence from Malaisha Hughes, County of Los Angeles Public Library, Library Headquarters, January 21, 2005
Library Calculations

**Volume XIII**

Appendix 4.19 Environmental Safety
Phase I Environmental Site Assessment of Proposed The Mesas East, Valencia, California
Phase I Environmental Site Assessment of Entrada Development Tract Map No. 53295, Henry Mayo Drive and The Old Road, Valencia, California, March 2007 (part 1)

**Volume XIV**

Appendix 4.19 Environmental Safety (continued)
Phase I Environmental Site Assessment of Entrada Development Tract Map No. 53295, Henry Mayo Drive and The Old Road, Valencia, California, March 2007 (part 2)
Phase I Environmental Site Assessment of Entrada Development Tract Map No. 53295, Henry Mayo Drive and The Old Road, Valencia, California, March 2007 (part 3)

# LIST OF APPENDICES (continued)

**Volume XV**

Appendix 4.19 Environmental Safety (continued)
Phase I Environmental Site Assessment of Entrada Development Tract Map No. 53295, Henry Mayo Drive and The Old Road, Valencia, California, March 2007 (part 4)
Phase I Environmental Site Assessment of Parcel Map No. 060678, Highway 126, Valencia, California, September 2005 (part 1)

**Volume XVI**

Appendix 4.19 Environmental Safety (continued)
Phase I Environmental Site Assessment of Parcel Map No. 060678, Highway 126, Valencia, California, September 2005 (part 2)
Phase I Environmental Site Assessment of Parcel Map No. 060678, Highway 126, Valencia, California, September 2005 (part 3)

**Volume XVII**

Appendix 4.19 Environmental Safety (continued)
Phase I Environmental Site Assessment of Legacy Village Development Tract Map VTTM 061996, Valencia, California, March 2007

**Volume XVIII**

Appendix 4.19 Environmental Safety (continued)
Phase II Subsurface Investigation of Water Quality Basins, Entrada ME073-02 Basins, Valencia, California, September 2006
BA Environmental, *Phase I Environmental Site Assessment of River Village Tentative Tract Map No. 53108, Highway 126, Newhall Ranch, California*, September 27, 2004
BA Environmental, *Phase I Environmental Site Assessment Addendum Letter of Proposed Water Tank Locations and Utility Corridor Easements Associated with the proposed River Village Development, Tentative Tract Map No. 53108, Highway 126, Newhall Ranch, California*, September 28, 2004
BA Environmental, Phase I Environmental Site Assessment of Proposed SCE Substation Site and Soil Disposal Site, Valencia, California, May 2010

Appendix 4.20 Cultural Resources
Phase I Archaeological Survey of the West Ranch Area
Backhoe Testing Near the Asistencia de San Francisco

Appendix 4.21 Floodplain Modifications
PACE, Mission Village Flood Technical Report
ENTRIX, Focused Special-Status Aquatic Species Assessment

# LIST OF APPENDICES (continued)

**Volume XIX**

Appendix 4.21 Floodplain Modifications (continued)
Geosyntec Consultants, "Newhall Ranch Specific Plan Sub-Regional Stormwater Mitigation Plan" (April 2008)
Pacific Advanced Civil Engineering, Inc., "Newhall Ranch River Fluvial Study Phase 1, Final Draft" (March 2006; 2006a)
Pacific Advanced Civil Engineering, Inc., "Newhall Ranch River Fluvial Study Phase 2" (January 2008)
Philip Williams and Associates, Ltd., "Newhall Ranch Tributary Channel Design Guidelines" (November 20, 2008)

**Volume XX**

Appendix 4.22 Water Quality
Mission Village Water Quality Technical Report, March 2010
Geosyntec, Newhall Ranch Specific Plan Sub-Regional Stormwater Mitigation Plan, April 2008

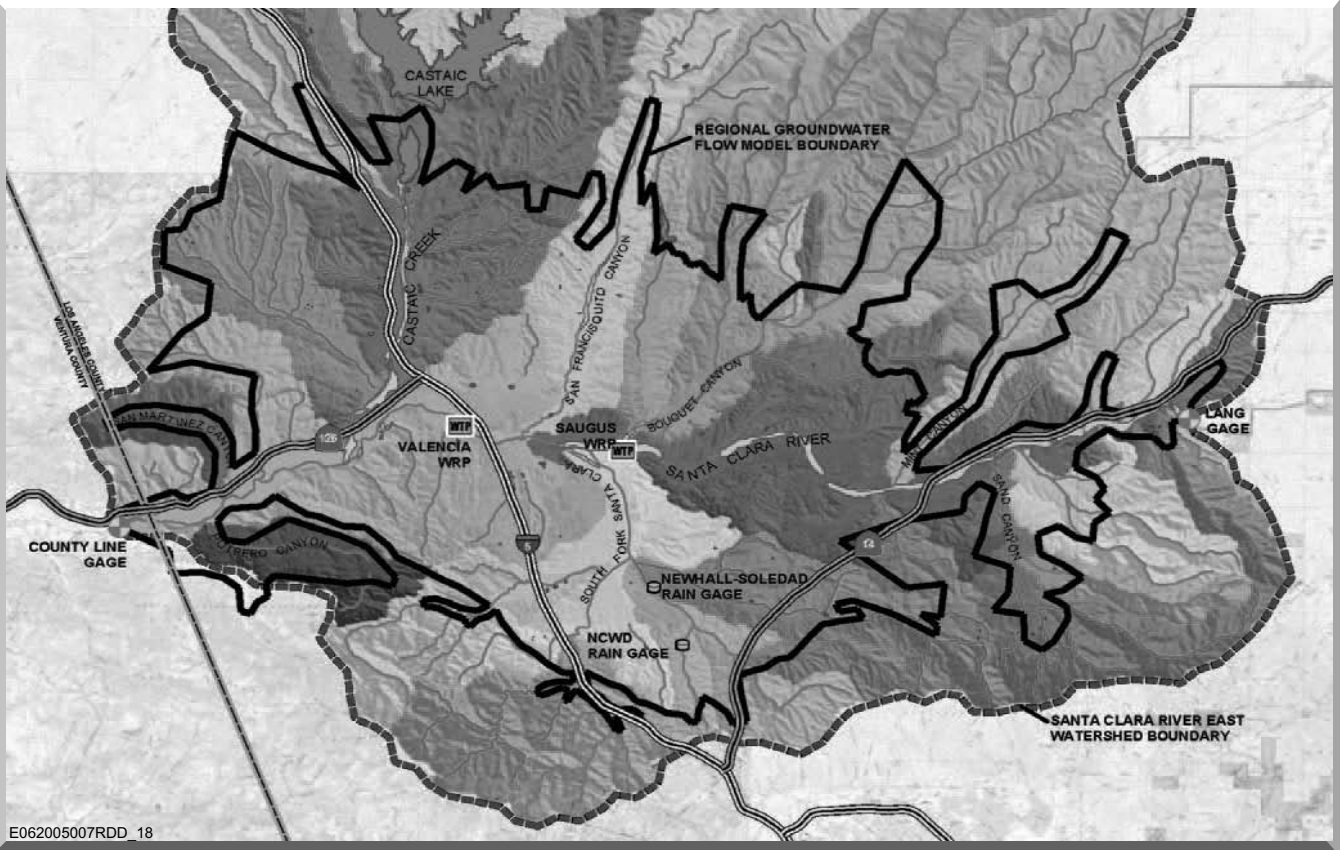
Appendix 4.23 Global Climate Change
ENVIRON, Climate Change Technical Report: Mission Village, August 2010
GSI Water Solutions, Inc., "Technical Memorandum Regarding Potential Effects of Climate Change on Groundwater Supplies for Newhall Ranch Specific Plan, Santa Clarita Valley, California," March 18, 2008
Mission Village Sustainability Overview, 2010
Global Climate Change and Its Effects on Sensitive Biological Resources, July 2010
Global Climate Change and Its Effects on California Water Supplies, July 2010

Appendix 5.0 Project Alternatives
Emissions Calculations

**Analysis of Groundwater Basin Yield, Upper Santa Clara River Groundwater Basin, East Subbasin**
**Dated August 2005**

# Analysis of Groundwater Basin Yield, Upper Santa Clara River Groundwater Basin, East Subbasin, Los Angeles County, California

## Prepared in Support of the August 2001 Memorandum of Understanding between the Upper Basin Water Purveyors and the United Water Conservation District




Prepared by

CH2MHILL

In cooperation with
Luhdorff & Scalmanini Consulting Engineers

August 2005

Prepared for
Upper Basin Water Purveyors:
Castaic Lake Water Agency (CLWA)
Newhall County Water District
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Mr. Steve Cole
Newhall County Water District
P.O. Box 220970
23780 North Pine Street
Santa Clarita, California 91322-0970

Subject: Submittal of Report on Basin Yield Analysis

Dear Mr. DiPrimio, Mr. Masnada, Mr. Manetta, and Mr. Cole:

CH2M HILL is pleased to submit the enclosed report titled *Analysis of Groundwater Basin Yield, Upper Santa Clara River Basin, East Subbasin, Los Angeles County, California*. This report has been developed for the Upper Basin Water Purveyors and is the second of two reports that present and evaluate the groundwater operating plan for water supply wells completed in the Alluvial Aquifer and the Saugus Formation. This work has been performed as part of the August 2001 Memorandum of Understanding between the Santa Clara River Valley Upper Basin Water Purveyors and the United Water Conservation District. The first report, dated April 2004, documented the construction and calibration of a groundwater flow model for the Santa Clarita Valley. The enclosed report presents a modeling analysis of the groundwater operating plan and concludes that the groundwater operating plan is a reliable long-term component of water supply for the valley.

It has been our pleasure to serve the Upper Basin Water Purveyors on this important project. Please call me at 503/235-5022 if you have any questions.

Sincerely,

CH2M HILL

John J. Porcello
Project Manager

Nathan R. Brown, P.G.
Hydrogeologist

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Enclosures

# Analysis of Groundwater Basin Yield, Upper Santa Clara River Groundwater Basin, East Subbasin, Los Angeles County, California

Prepared in Support of the August 2001 Memorandum of Understanding between the Upper Basin Water Purveyors and the United Water Conservation District

Prepared for

## Upper Basin Water Purveyors:

Castaic Lake Water Agency (CLWA)
Newhall County Water District
Santa Clarita Water Division of CLWA
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CERTIFIED HYDROGEOLOGIST
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9/23/05

Prepared by

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In cooperation with

Luhdorff & Scalmanini Consulting Engineers

August 2005

# Contents


Page

Section

**Acronyms and Abbreviations** ..... **xi**

**1 Introduction** ..... **1-1**
1.1 Background ..... 1-1
1.2 Report Organization ..... 1-4

**2 Groundwater Hydrology and Operating Plan** ..... **2-1**
2.1 Basin Hydrogeology ..... 2-1
2.2 Groundwater Operating Plan ..... 2-2
2.2.1 Historical Groundwater Conditions ..... 2-2
2.2.2 Historical Estimates of Basin Yield ..... 2-7
2.2.3 Development of Current Operating Plan ..... 2-9

**3 Modeling Approach for Analyzing Basin Yield** ..... **3-1**
3.1 Model Description ..... 3-1
3.2 Modeling Approach ..... 3-2
3.3 Simulation Period ..... 3-3
3.3.1 Selection of Simulation Period ..... 3-3
3.3.2 Relationship of Simulation Period to Variations in Alluvial Aquifer Pumping ..... 3-4
3.3.3 Relationship of Simulation Period to Variations in Saugus Pumping ..... 3-5
3.4 Assignment of Pumping Rates ..... 3-5
3.4.1 Variations in Alluvial Aquifer Pumping ..... 3-6
3.4.2 Variations in Saugus Formation Pumping ..... 3-7
3.4.3 Monthly Allocation of Pumping ..... 3-7
3.4.4 Influence of Perchlorate Contamination on Groundwater Pumping ..... 3-7
3.5 Simulation Methods for Other Local Hydrologic Processes ..... 3-10
3.5.1 Recharge from Urban Irrigation ..... 3-10
3.5.2 Recharge from Agricultural Irrigation ..... 3-10
3.5.3 Precipitation Recharge ..... 3-11
3.5.4 Stormwater Flows and Recharge from Streams ..... 3-11
3.5.5 WRP Discharges to the Santa Clara River ..... 3-11
3.5.6 Monthly Assignment and Tracking of Surface Water Budget ..... 3-12
3.6 Running the Model and Evaluating Results ..... 3-12

**4 Model Results** ..... **4-1**
4.1 Groundwater Elevations ..... 4-1
4.2 Groundwater Recharge, Discharge, and Storage ..... 4-1

# Contents, Continued


**Page**

4.3 River Flows ..... 4-2
4.4 Relationship of Simulation Results to Future Conditions ..... 4-3

**5 Conclusions ..... 5-1**
5.1 Principal Findings ..... 5-1
5.2 Implications for Long-term Water Management ..... 5-2

**6 References ..... 6-1**

**Appendices**

A Memorandum of Understanding
B Description of the Santa Clarita Valley Regional Groundwater Flow Model

**Tables—Located at the end of each section.**

2-1 Recharge and Discharge Components of the Hydrologic Cycle in the Upper Santa Clara River Basin

2-2 Estimated Annual Groundwater Discharge to the Santa Clara River, 1953 through 1999

2-3 Statistics on Annual Groundwater Discharge to the Santa Clara River, 1953 through 1999

2-4 Statistics on Annual Groundwater Discharge to the Santa Clara River, 1953 through 1965 versus 1975 through 1999

2-5 Statistics on Annual Groundwater Discharge to the Santa Clara River, Including and Excluding 1966 through 1974

2-6 Annual Pumping Rates Specified by the Operating Plan for the Santa Clarita Valley's Groundwater Resources

2-7 CALSIM II Calculated State Water Project Municipal and Industrial Allocations

3-1 Historical Hydrology in Northern California and the Santa Clarita Valley, 1950 through 2003

3-2 Local Hydrology and Corresponding Pumping from the Alluvial Aquifer for the 78-year Simulation

3-3 State Water Project Allocations and Corresponding Saugus Formation Pumping for the 78-year Simulation

3-4 Recent and Simulated Future Annual Groundwater Pumping Volumes from the Alluvial Aquifer

# Contents, Continued

**Tables, continued**

3-5 Simulated Annual Groundwater Pumping from the Saugus Formation for the 78-year Simulation

3-6 Allocation of Pumping by Layer for Wells Completed in the Saugus Formation

3-7 Allocation of Pumping, by Month, for Agricultural and Urban Production Wells

3-8 Simulated Monthly Precipitation at the Newhall County Water District Rain Gage for the 78-year Simulation

3-9 Simulated Monthly Streamflows in the Santa Clara River at the Lang Gage for the 78-year Simulation

3-10 Simulated Monthly Water Releases from Castaic Lagoon to Castaic Creek for the 78-year Simulation

3-11 Water Demands and Indoor Water Use under Full Build-out Conditions (Excluding Newhall Ranch)

3-12 Treated Water Discharges from the Saugus and Valencia WRPs to the Santa Clara River under Full Build-out Conditions

3-13 Simulated Monthly Treated Wastewater Discharge from Santa Clarita Valley WRPs under Full Build-out Conditions

4-1 Simulated Annual Groundwater Budget

# Contents, Continued

**Figures—Located at the end of each section.**


1-1 Map of Study Area

2-1 Groundwater Basins in the Santa Clara River Drainage

2-2 Basin Geologic Map

2-3 Santa Clarita Valley Hydrology

2-4 Regional Well Location Map

2-5 Annual Precipitation and Cumulative Departure from the 1950 through 2000 Average at the Newhall-Soledad Rain Gage

2-6 Annual Precipitation at the Newhall-Soledad and NCWD Rain Gages since 1950

2-7 Isohyetal Map Showing Average Annual Precipitation Pattern from 1900 to 1960

2-8 Alluvial Groundwater Elevations versus Groundwater Recharge and Discharge Mechanisms (1950 to 2000)

2-9 Saugus Groundwater Elevations Closest to Santa Clara River versus Groundwater Recharge and Discharge Mechanisms (1950 to 2000)

2-10 Saugus Groundwater Elevations Closest to Santa Clara River versus Groundwater Recharge and Discharge Mechanisms (1990 to 2000)

2-11 Saugus Groundwater Elevations along the South Fork Santa Clara River versus Groundwater Recharge and Discharge Mechanisms (1950 to 2000)

2-12 Saugus Groundwater Elevations along the South Fork Santa Clara River versus Groundwater Recharge and Discharge Mechanisms (1990 to 2000)

2-13 Groundwater Elevations in Adjacent Alluvial and Saugus Wells versus Groundwater Recharge and Discharge Mechanisms (1950 to 2000)

2-14 Historical Castaic Creek Flood Flows Available to Downstream Users

3-1 Subwatersheds within the Santa Clara Valley East Watershed

3-2 Regional Model Grid

3-3 Schematic Diagram of Model's Representation of Stratigraphy in the Middle of the Basin

3-4 Schematic Cross Sections

# Contents, Continued

**Figures, continued**


3-5 Annual Precipitation and Cumulative Departure from the 1950 through 2000 Average at the Newhall-Soledad Rain Gage for the 78-year Simulation Period

3-6 Well Locations and Perchlorate Concentrations near the Whittaker-Bermite Property

3-7 Simulated Land Use within the Regional Model Boundary under Full Build-out Conditions

4-1 Simulated Average Annual Groundwater Elevations in the Alluvial Aquifer West of Interstate 5

4-2 Simulated Average Annual Groundwater Elevations in the Alluvial Aquifer East of Interstate 5

4-3 Simulated Average Annual Groundwater Elevations in the Alluvial Aquifer in Soledad Canyon

4-4 Simulated Average Annual Groundwater Elevations in the Alluvial Aquifer along Castaic Creek

4-5 Simulated Average Annual Groundwater Elevations in the Alluvial Aquifer along the South Fork Santa Clara River

4-6 Simulated Average Annual Groundwater Elevations in the Saugus Formation West of Interstate 5

4-7 Simulated Average Annual Groundwater Elevations in the Saugus Formation East of Interstate 5

4-8 Simulated Annual Groundwater Inflows

4-9 Simulated Annual Groundwater Outflows

4-10 Simulated Annual and Cumulative Change in Groundwater Storage

4-11 Simulated Santa Clara River Flow at County Line

4-12 Simulated Groundwater Discharge to Santa Clara River

# Acronyms and Abbreviations

| | |
|---|---|
| μg/L | micrograms per liter |
| AF/yr | acre-feet per year |
| AL | State of California's Action Level |
| Amended 2000 UWMP | 2000 Urban Water Management Plan and 2005 amendments |
| CLWA | Castaic Lake Water Agency |
| DWR | California Department of Water Resources |
| ET | evapotranspiration |
| ft/day | feet per day |
| $ft^2$/day | square feet per day |
| in/yr | inches per year |
| Kh | horizontal hydraulic conductivity |
| LACSD | Los Angeles County Sanitation District |
| LADPW | Los Angeles County Department of Public Works |
| LSCE | Luhdorff & Scalmanini Consulting Engineers |
| MOU | Memorandum of Understanding |
| msl | mean sea level |
| NCWD | Newhall County Water District |
| NLF | Newhall Land & Farming Company |
| OCAP | Operating Criteria and Plan |
| Purveyors | Upper Basin Water Purveyors |
| RCS | Richard C. Slade and Associates, LLC |
| Regional Model | Santa Clarita Valley Regional Groundwater Flow Model |
| SCWC | Santa Clarita Water Company |
| SWP | State Water Project |
| SWRM | Surface Water Routing Model |
| T | transmissivity |
| USBR | U.S. Bureau of Reclamation |
| USGS | U.S. Geological Survey |
| UWMP | Urban Water Management Plan |

| | |
|---|---|
| VWC | Valencia Water Company |
| WHR | Wayside Honor Rancho |
| WRP | water reclamation plant |
| UWCD | United Water Conservation District |

SECTION 1

# Introduction

This report presents an evaluation of the long-term sustainability of existing groundwater management practices in the Santa Clarita Valley, located in northwestern Los Angeles County, California. The groundwater system in the Santa Clarita Valley is identified by the California Department of Water Resources (DWR) as the Santa Clara River Valley Groundwater Basin, East Subbasin (Basin No. 4-4.07) and lies within the DWR-designated Upper Santa Clara River Hydrologic Area. Groundwater in the basin is pumped from a shallow Alluvial Aquifer and deeper groundwater resources that are present in an older, underlying unit called the Saugus Formation. Most groundwater pumping is by the local water purveyors (the Upper Basin Water Purveyors [herein referred to as the Purveyors[1]]) for municipal uses (in the range of approximately 23,000 to 28,000 acre-feet per year [AF/yr] in recent years), with some continuing pumping by private landowners, primarily for irrigation uses (approximately 15,000 to 16,000 AF/yr in recent years). The Purveyors also have access to other sources of water, including imported State Water Project (SWP) water, groundwater banking outside the basin, recycled water, short-term water exchanges, and dry-year water purchase programs (Luhdorff & Scalmanini Consulting Engineers [LSCE], 2005a). The water management practices of the Purveyors call for maximizing the use of Alluvial Aquifer and imported water during years of normal or above-normal availability of these supplies, and limiting the use of the Saugus Formation during these periods, then temporarily increasing Saugus Formation pumping during years when supplemental imported water supplies are significantly reduced because of drought conditions.

The evaluation of the Purveyors' current groundwater management practices has been performed using a detailed numerical groundwater flow model of the basin. The model, called the Santa Clarita Valley Groundwater Model (Regional Model), simulates the occurrence and flow of groundwater, including its interaction with streams in the area. The Regional Model has been developed for the Purveyors as a tool for the analysis of groundwater management options in the context of future water demands and water supply conditions in the valley. Among the objectives in developing the model were (1) to be able to evaluate the long-term sustainability (yield) of the Alluvial and Saugus aquifer systems under a range of existing and potential future water resource management conditions, and (2) to facilitate general management of water quantity and water quality issues. Figure 1-1 is a map showing the area simulated by the model (tables and figures are located at the end of each section).

## 1.1 Background

The Regional Model has been developed as part of the work scope contained in an August 2001 Memorandum of Understanding (MOU) that was entered into by the

[1]The Purveyors consist of the Castaic Lake Water Agency (CLWA), the Newhall County Water District, the Santa Clarita Water Division of CLWA, and the Valencia Water Company. The Santa Clarita Water Division of CLWA was acquired by CLWA in 1999. It was formerly called the Santa Clarita Water Company (SCWC).

Purveyors and the United Water Conservation District (UWCD), located downstream in Ventura County. The MOU, which is provided in Appendix A, is a commitment by the Purveyors to expand on previous analyses of groundwater conditions such that the adequacy of the local groundwater supply can be better understood and questions about surface water and groundwater resources can be more readily addressed. The MOU initiated a collaborative and integrated approach to data collection; database management; evaluating groundwater conditions and the sustainability of the Purveyors' operating plan; groundwater flow modeling; annual reporting on basin conditions; and technical reporting focused on geologic and hydrologic aspects of the overall stream-aquifer system.

In 2003, subsequent to the MOU, CLWA prepared and adopted a formal Groundwater Management Plan (CLWA, 2003), which includes 14 elements intended to achieve four management objectives, or goals, for the groundwater basin that were identified in the plan. Those four management objectives were development of local groundwater for water supply; avoidance of overdraft and associated undesirable effects; preservation of groundwater quality; and preservation of interrelated surface water resources. The intent of the Groundwater Management Plan is to ensure that ongoing utilization of local groundwater continues to result in acceptable aquifer conditions, specifically avoidance of overdraft (Element 3 of the plan), no degradation of quality (Element 6 of the plan), no adverse impacts to surface waters (Element 2 of the plan). The plan identified these objectives and elements as being accomplished via continued conjunctive use operations that have been ongoing since the initial importation of supplemental surface water in 1980 (Element 5 of the plan) and via monitoring and interpretation of surface water and groundwater conditions on an ongoing basis (Elements 1 and 2 of the plan).

Both the MOU and the Groundwater Management Plan contain several technical components, including the development and calibration of a regional-scale groundwater flow model and the application of the model to evaluate the sustainability of the Purveyors' current groundwater operating plan. The development and calibration of the model was documented in detail in April 2004 in *Regional Groundwater Flow Model for the Santa Clarita Valley: Model Development and Calibration* (CH2M HILL, 2004a). A summary of the Regional Model's construction and calibration is presented in Appendix B. The analysis of the sustainability of the Purveyor's current groundwater operating plan began in 2004 and is the subject of this report. Consequently, this report and the earlier report on the development and calibration of the model represent the accomplishment of two of the key technical work components that were described in the MOU and in several elements of the Groundwater Management Plan.

The Purveyors prepared the first Urban Water Management Plan (UWMP) for the Santa Clarita Valley in 1985. At about that same time, the Purveyors began studying the local water resources to assess the condition, hydrogeologic character, storage capacity, water budgets, and water quality of the local groundwater aquifers. Some of that work involved evaluating the potential for conjunctive use of groundwater and imported water resources, specifically artificial recharge of the Alluvial Aquifer using spreading basins, and aquifer storage and recovery in the Saugus Formation. An update of the UWMP in December 2000 projected water demands in the valley through 2020 and delineated a number of local and other water supplies, in conjunction with SWP water, to meet those projected water demands. The UWMP also identified a water supply plan that consisted of using alternate

supplies and/or development of future supplies from groundwater storage projects, short-term transfers, local groundwater, and other sources to offset potentially reduced deliveries of SWP water, while meeting demands in a manner that would not cause overdraft conditions in the local aquifer systems. In 2005, CLWA amended the 2000 UWMP to address the adequacy of groundwater supplies in light of perchlorate contamination that had caused the inactivation of five municipal water supply wells. Included in the amendments to the 2000 UWMP (CLWA et al., 2005; hereafter referred to, together with the 2000 UWMP [Black & Veatch, 2000], as the Amended 2000 UWMP) was discussion of the plan currently being implemented to install treatment and restore impacted wells for water supply by 2006. In accordance with the California Urban Water Management Planning Act, the UWMP is currently undergoing a 5-year update that will be completed in late 2005.

The Purveyors and UWCD initially agreed in the MOU, and the Purveyors subsequently committed in the Groundwater Management Plan, to develop and use the Regional Model for the sustainability evaluation of the local groundwater operating plan, in part because (1) the available data showed that no long-term lowering of the water table or degradation of water quality had occurred during the 50 to 60 years of historical groundwater development in the valley, and (2) the various studies and water planning efforts performed up to that time had resulted in a local groundwater operating plan that places future pumping of the Alluvial Aquifer in the same range as historical pumping. However, although the MOU recognized a need to formally analyze the Alluvial Aquifer, it identified that the primary question to evaluate with the Regional Model would be the operational yield of the Saugus Formation, given that the Purveyors' operating plan called for dry-year pumping at rates higher than historically had been pumped. For that reason, the MOU identified that the model would evaluate the effect of the current groundwater operating plan on groundwater conditions in both the Alluvial Aquifer and the Saugus Formation over a multi-year wet/dry cycle. The operational yield was defined in the MOU as an operating plan for the local groundwater basin that would allow continued pumping from the Alluvial Aquifer and Saugus Formation while assuring that groundwater supplies would be adequately replenished from one wet/dry cycle to the next.

Together, the historical development of these plans and the evaluation of their sustainability that is described in this report are grounded in the following objectives, which have been identified by the Purveyors for local groundwater resource management:

1. Prepare a groundwater operating plan for the basin (locations of wells, pumping capacities, and variations in annual pumping volumes) that is integrated with SWP and other imported supplies and recycled water to meet local water demands.

2. Analyze the groundwater operating plan to quantify possible basin responses to the plan, in terms of temporal variations that could occur in groundwater levels, groundwater storage, and Santa Clara River streamflows. This includes evaluating the rate of recovery of Saugus Formation groundwater levels after 1 or more years of increased pumping in the Saugus Formation.

3. Evaluate the range of basin responses to the groundwater operating plan to determine whether the plan will result in sustainable groundwater resources and supplies. This includes evaluating the following:

    a. Whether groundwater level declines during future drought periods will continue to arise primarily from local drought conditions, instead of from the groundwater operating plan for the basin; and, more importantly, whether groundwater levels and storage will recover (recharge) in wet periods following dry or drought conditions

    b. Whether groundwater discharges to the Santa Clara River will continue to be relatively stable over time, compared to the year-to-year variations in groundwater recharge that occur in the rest of the basin

To meet these objectives, the Purveyors developed the Regional Model to be an evolving tool for local groundwater resource management. As discussed in the model development report (CH2M HILL, 2004a), specific objectives identified for the Regional Model were as follows:

1. To evaluate the long-term sustainability (yield) of the two aquifer systems in the valley, the Alluvial Aquifer and the Saugus Formation, under a range of existing and potential future water resource management conditions

2. To evaluate artificial recharge for the purpose of increasing the long-term sustainability of the aquifer system, particularly in conjunction with the availability of imported surface water supplies

3. To evaluate the influences of future water management plans and alternatives on groundwater conditions in the valley and on the flows of water into the downstream basins in Ventura County

4. To facilitate general management of water quantity and water quality issues

This report focuses on the application of the Regional Model to meet the first objective.

## 1.2 Report Organization

The remainder of this report is organized as follows:

- **Section 2** discusses the hydrogeology of the basin and describes the groundwater operating plan.
- **Section 3** describes the process that was used to simulate the groundwater operating plan with the Regional Model and evaluate the modeling results.
- **Section 4** discusses the results of the simulated groundwater operating plan.
- **Section 5** discusses the principal findings from the analyses of historical data and numerical modeling results, and the implications of these findings for long-term water management in the Santa Clarita Valley.
- **Section 6** is the reference list.

# Figure

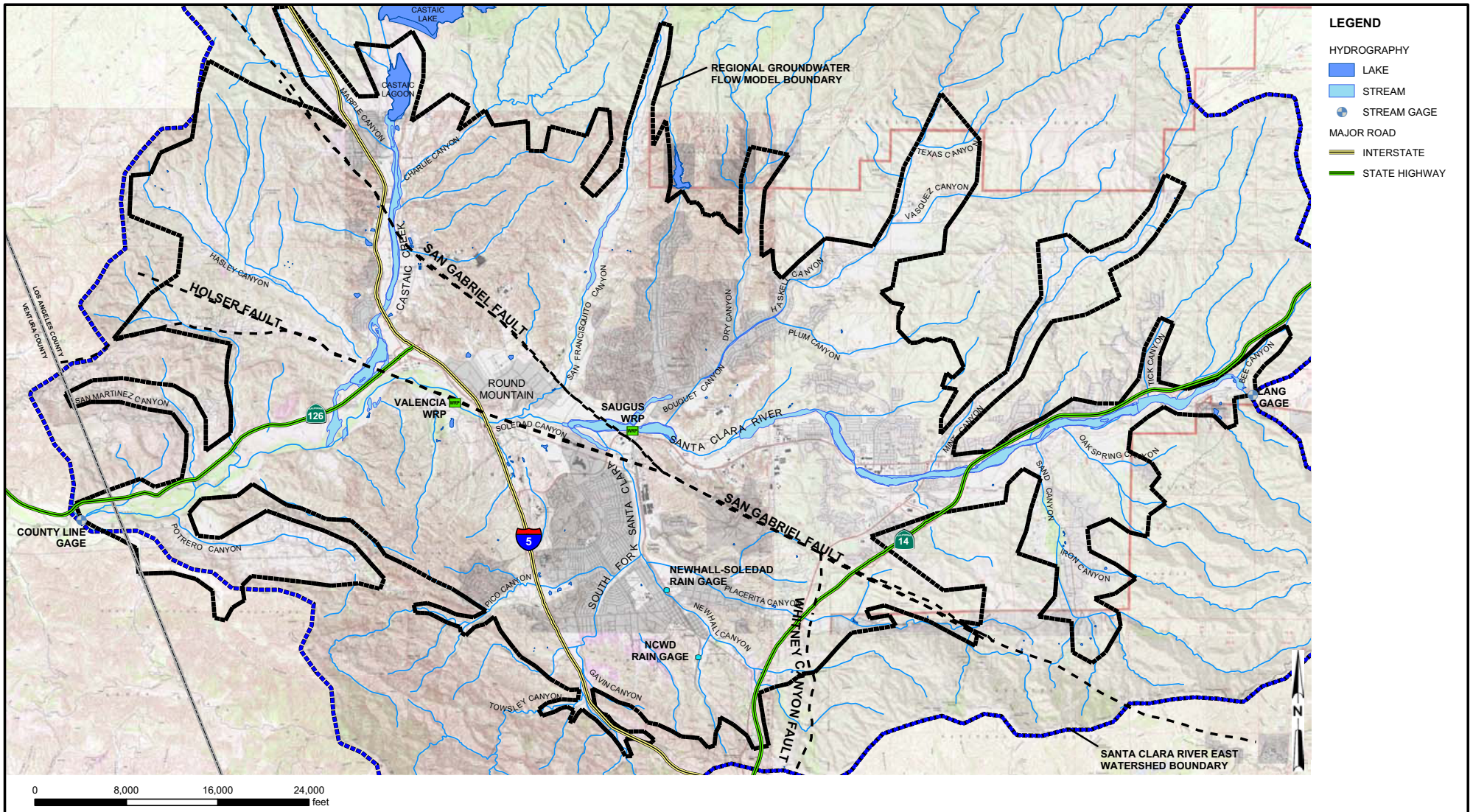


**FIGURE 1-1**
**MAP OF STUDY AREA**
ANALYSIS OF GROUNDWATER BASIN YIELD
UPPER SANTA CLARA RIVER GROUNDWATER BASIN
EAST SUBBASIN, LOS ANGELES COUNTY, CALIFORNIA

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SECTION 2

# Groundwater Hydrology and Operating Plan

## 2.1 Basin Hydrogeology

The groundwater system in the Santa Clarita Valley is identified by DWR as the Santa Clara River Valley Groundwater Basin, East Subbasin (Basin No. 4-4.07), and lies within the DWR-designated Upper Santa Clara River Hydrologic Area. Figure 2-1 shows the location of this groundwater basin. The basin contains two aquifer systems: the Alluvial Aquifer and the Saugus Formation. Figure 2-2 is a geologic map showing the geographical extent of these and other rock units in and around the basin.

In general, natural groundwater recharge occurs in the eastern portion and at the northern and southern limits of the basin, and natural groundwater discharge occurs in the west-central portion of the basin, in the alluvial valley occupied by the Santa Clara River. Groundwater pumping is an additional groundwater discharge mechanism that occurs in discrete portions of the basin. A schematic representation of the regional-scale geology and hydrologic cycle in the Santa Clarita Valley is shown on Figure 2-3, and the components of the hydrologic cycle for the basin's groundwater and surface water resources are listed in Table 2-1. As indicated by the diagram and the table, groundwater is exchanged between the Alluvial Aquifer and the Saugus Formation, with the Alluvial Aquifer recharging the Saugus Formation in certain portions of the regional recharge areas, and the Alluvial Aquifer receiving groundwater from the Saugus Formation in the regional groundwater discharge areas. Additionally, the aquifer systems are affected by direct rainfall; stream-flows in the Santa Clara River and its tributaries; evapotranspiration (ET) by riparian vegetation along portions of the river; and human influences, which consist of pumping, agricultural and urban irrigation, discharge of treated water into the Santa Clara River from two water reclamation plants (WRP), and occasional releases of water into Castaic Creek from Castaic Lake and Castaic Lagoon.

The Santa Clarita Valley obtains its water supply from local groundwater sources and from imported water supplies. Total water use in the valley is largely for municipal and industrial uses and, to a lesser extent, for agricultural uses. In 2004, approximately 61 percent of groundwater pumping was by the Purveyors (for municipal uses) and 39 percent was by private land owners, primarily for irrigation. Figure 2-4 is a map showing the locations of production wells that are currently present in the Alluvial Aquifer and the Saugus Formation. Prior to the 1960s, agriculture was the predominant land use in the valley. Agricultural water was supplied by production wells, most of which were completed in the Alluvial Aquifer. Pumping from the Alluvial Aquifer during much of the 1950s and early 1960s ranged between approximately 35,000 and 44,000 AF/yr. Pumping from the Alluvial Aquifer dropped gradually from approximately 40,000 AF/yr in the mid-1960s to less than 30,000 AF/yr through the 1980s, and did not rise above 30,000 AF/yr until 1993. Since then, it has ranged between 30,000 and nearly 44,000 AF/yr. In the Saugus Formation, very little pumping occurred before 1960. From 1960 through 1990, total pumping from the Saugus Formation ranged from approximately 2,500 AF/yr to approximately 8,500 AF/yr. As a

result of statewide drought conditions, pumping from the Saugus Formation ranged between 10,000 and 15,000 AF/yr from 1991 through 1994. Saugus pumping was reduced beginning in 1995, as the drought ended and additional water supplies became available.

## 2.2 Groundwater Operating Plan

The water management practices of the Purveyors call for maximizing the use of Alluvial Aquifer groundwater and SWP water during years of normal or above-normal availability of SWP water supplies and local Alluvial Aquifer groundwater resources. These practices recognize ongoing Alluvial pumping for agricultural water supply as well as other smaller (private) domestic and related water supply, and are intended to maintain overall pumping within sustainable rates. Groundwater pumping is minimized from the Saugus Formation, except during years when SWP water allocations are below normal. These water management practices are based, in part, on observations about the historical hydrology of the basin (described in Section 2.2.1) and form the groundwater operating plan for the basin (described in Section 2.2.2).

### 2.2.1 Historical Groundwater Conditions

Long-term water level data have been collected over the years at agricultural wells and Purveyor-owned wells in the City of Santa Clarita and along the South Fork Santa Clara River. The data have been collected in pumping wells, and the hydrographs of these wells are steep at certain times, suggesting that the measured water levels are influenced, to a certain degree, by pumping at the well. Nonetheless, the data show general relationships between groundwater elevation trends and changes in groundwater recharge and pumping over time. These relationships have been identified by examining the 50-year period from 1950 through 1999. During this period, the average rainfall was close to the long-term average rainfall observed since 1883. Consequently, long-term changes in the basin's hydrology arising from other factors could be more easily identified because rainfall was near normal for the 50-year period as a whole.

Following are discussions of the observed hydrologic trends in the basin, including rainfall, groundwater elevations in the Alluvial Aquifer and the Saugus Formation, and flows in the Santa Clara River.

#### 2.2.1.1 Historical Trends in Rainfall

Rainfall data have been recorded since 1883 at the Newhall-Soledad gage (Station No. FC32CE), located at the Los Angeles County Department of Public Works (LADPW) Newhall-Soledad Division Headquarters office, on San Fernando Road in the community of Newhall. The average rainfall at this gage was 17.95 inches from 1883 through 2000 and 17.84 inches from 1950 through 2000[2]. Figure 2-5 shows the annual rainfall at the Newhall-Soledad gage for calendar years 1950 through 2000. Figure 2-5 also shows the cumulative departure from the average annual precipitation since 1950. Cumulative departure refers to the cumulative amount of rainfall that is greater than or less than the long-term average rainfall. The slope of the cumulative departure plot shows the temporal trends in rainfall

[2]Annual rainfall values for the Newhall-Soledad gage were derived from monthly values reported by the National Climate Data Center and LADPW.

over successive years. The figure shows the following trends in precipitation within the Santa Clarita Valley:

1. 1950 through 1964: Dry conditions except for single wet years in 1952, 1957, 1958, and 1962 (a nearly continuous decrease in cumulative departure values)
2. 1965 through 1970: Wet conditions (increase in cumulative departure values)
3. 1971 through 1977: Average to dry conditions (flat or declining cumulative departure values)
4. 1978 through 1983: Wet conditions (increase in cumulative departure values)
5. 1984 through 1991: Dry conditions (decrease in cumulative departure values)
6. 1992 through 1999: Highly variable conditions from year to year, but overall increase in cumulative departure values

A second rain gage is located approximately 1.3 miles to the south, at the Newhall County Water District (NCWD) office (see Figure 1-1). Figure 2-6 compares the annual rainfall at the Newhall-Soledad and NCWD gages for calendar years 1950 through 2000. Rainfall at the NCWD gage is usually greater than at the Newhall-Soledad gage, because the NCWD gage is located closer to the hills that form the southern boundary of the watershed and receive a greater amount of orographic precipitation, as shown on Figure 2-7.

#### 2.2.1.2 Historical Trends in Alluvial Aquifer Groundwater Elevations

Figure 2-8 shows trends in groundwater elevations in two Alluvial Aquifer wells located in the basin interior (wells VWC-N and NLF-S, near the mouth of the South Fork Santa Clara River) and two Alluvial Aquifer wells located near the regional groundwater discharge zone at the western end of the basin (wells NLF-C5 and NLF-C7). The figure also shows trends in the following other components of the hydrologic cycle:

1. Precipitation at the Newhall-Soledad rain gage (plotted as the cumulative departure from the average precipitation)
2. Annual pumping volumes from the Alluvial Aquifer and the Saugus Formation
3. Total discharges to the Santa Clara River from two WRPs (which are discussed further in Section 2.2.1.5)
4. Measured flow volume in the Santa Clara River during the lowest flow month of each year

Observations from Figure 2-8 are as follows:

1. Alluvial Aquifer groundwater elevations show greater variability over time within the basin interior (wells VWC-N and NLF-S) than near the basin outlet (wells NLF-C5 and NLF-C7). The range in water levels during the 50-year period of record is approximately 100 feet at the interior wells, but only 20 to 30 feet in the two wells near the basin outlet.
2. The effect of reduced pumping from the Alluvial Aquifer from 1967 through 1989 was to minimize seasonal fluctuations in Alluvial Aquifer water levels near the aquifer's regional discharge zone at the western end of the valley. In this area, fluctuations in

Alluvial Aquifer pumping over time affected Alluvial groundwater elevations only seasonally; year-to-year variations in groundwater elevations were small. This indicates that water levels in this area are controlled less by pumping than by the discharge of Alluvial Aquifer groundwater to the Santa Clara River in the area downstream of Interstate 5.

3. As with the western portion of the Alluvial Aquifer, the central portion of the Alluvial Aquifer has not shown long-term water level declines. During the 1950s and early 1960s, total pumping from the Alluvial Aquifer ranged between approximately 35,000 and 44,000 AF/yr during all but 1 year, and long-term (year-to-year) groundwater elevations were relatively stable (see the hydrographs for wells VWC-N and NLF-S). When pumping from the Alluvial Aquifer decreased beginning in 1967, Alluvial groundwater elevations in this area quickly rose and have been relatively stable since about 1970, despite an increase in Alluvial Aquifer pumping during the 1990s. The hydrographs indicate that after an extended drought and high rates of pumping, Alluvial Aquifer groundwater elevations recover very quickly when normal or above-normal rainfall patterns return.

4. The seasonal low flow in the Santa Clara River at the County Line gage has shown a long-term increase since the mid-1970s and, to some degree, since the late 1960s. Figure 2-5 shows that this increase in flow coincides with increases in the annual discharges of treated water to the Santa Clara River from the two WRPs. Although Alluvial Aquifer pumping increased during the 1980s and 1990s, the seasonal low river flow did not show a long-term decrease during this period. The increases in WRP and Santa Clara River flows and the fluctuations in Alluvial Aquifer pumping have not caused long-term changes in Alluvial Aquifer groundwater elevations at the two wells near the basin outlet.

#### 2.2.1.3 Historical Trends in Saugus Formation Groundwater Elevations

Figures 2-9 and 2-10 compare groundwater elevation trends in the Saugus Formation near the Santa Clara River, below the mouth of the South Fork Santa Clara River, with the same hydrologic components displayed on Figure 2-8. Figure 2-9 shows this information for the period 1950 through 1999, and Figure 2-10 shows this information during the 1990s, when groundwater levels rose in the Saugus Formation. Figures 2-11 and 2-12 show the same information, but for groundwater elevations at Saugus Formation wells located farther away from the Santa Clara River, along the tributary valley containing the South Fork Santa Clara River.

In examining the four Saugus Formation figures, it is difficult to distinguish between the influences of precipitation and pumping trends on changes in Saugus water levels. Although a slight rise in water levels might have occurred at wells VWC-157 and VWC-160 during the late 1960s and early 1970s, it appears to follow the trends in Saugus pumping volumes more closely than the precipitation trends. The data at VWC-157 also suggest that a succession of above-normal precipitation years (e.g., 1978 through 1983) or a year of precipitation that is substantially above normal (e.g., 1983) might have some influence on Saugus water levels. However, the data are limited, and the periods of increased precipitation tend to coincide with periods of decreased pumping, making it difficult to identify the effect of precipitation or pumping on Saugus water levels.

Another observation is that the rise in Saugus Formation water levels in the late 1960s and early 1970s occurred despite an increase in annual pumping volumes from the Alluvial Aquifer. During the late 1980s and 1990s, Saugus pumping increased from slightly less than 6,000 AF/yr (in 1986 and 1987) to approximately 15,000 AF/yr in 1991. When SWP deliveries were substantially reduced in 1991, pumping from the Saugus Formation made up for almost half of the reduction that year. This increased Saugus pumping resulted in short-term declines in groundwater elevations at the pumping wells, particularly from 1991 through 1994, reflecting the use of naturally-stored Saugus groundwater. However, as shown on Figures 2-9 and 2-10, the water levels subsequently rose when pumping declined. This indicates that Saugus water levels are controlled by precipitation and/or Saugus pumping trends, and not by pumping trends in the Alluvial Aquifer.

#### 2.2.1.4 Comparison of Historical Trends in Alluvial and Saugus Groundwater Elevations

Figure 2-13 compares groundwater elevations at Alluvial Aquifer and Saugus Formation wells located near each other along the Santa Clara River, just below the mouth of the South Fork Santa Clara River. At this location, the trends in Alluvial groundwater elevations show no clear relationship with the trends in Saugus groundwater elevations. A moderate overall increase in groundwater elevations was observed in both the Alluvial Aquifer and the Saugus Formation during the late 1960s. However, this similarity in the water level trends might be a coincidence arising from reduced pumping in both aquifers. During the early 1970s, water levels in Saugus well VWC-157 decreased while water levels in the nearby Alluvial Aquifer well (VWC-N) generally increased. During the 1990s, the Alluvial Aquifer groundwater elevations at well VWC-N were generally stable despite (1) increased pumping from the Alluvial Aquifer and (2) a sharp decrease, then increase, in Saugus groundwater elevations, which correlated with the trends in Saugus pumping. In summary, although there might be a relationship between Alluvial and Saugus groundwater elevations near the margins of the groundwater basin, where folding of Saugus beds has brought permeable zones in contact with the alluvium, Figure 2-13 indicates that there is general independence between the Alluvial and Saugus water level trends at this location, which is near the center of the bowl-shaped Saugus Formation structure shown on Figure 2-3.

#### 2.2.1.5 Historical Trends in Santa Clara River Baseflow

Long-term records of flows in the Santa Clara River are available for the eastern and western ends of the basin. The locations of the two gages are shown on Figure 1-1 and Figure 2-3. At the western end of the basin, the County Line gage has recorded Santa Clara River flows leaving the basin for most of the period since 1952, except for a 1-year period during water year 1969 (October 1968 through September 1969). At the eastern end of the basin, the Lang gage has recorded Santa Clara River flows entering the basin from October 1949 through September 1989 and from April 2003 to the present.

Baseflow in the Santa Clara River is perennial in the western portion of the Santa Clarita Valley. The following sources of water contribute to the river's baseflow:

1. **Groundwater discharge from the Alluvial Aquifer to the riverbed.** Groundwater in the Alluvial Aquifer seeps into the riverbed near, and downstream of, Round Mountain (which is located just below the mouth of San Francisquito Canyon).

2. **Discharges from two WRPs.** Treated water is discharged to the Santa Clara River from two Los Angeles County Sanitation District (LACSD) WRPs in the valley. The Saugus WRP (Plant No. 26) is located along the south side of the river near Bouquet Canyon, just above the mouth of the South Fork Santa Clara River. The Valencia WRP (Plant No. 32) is located along the north side of the river, just west of Interstate 5.

3. **Flood Flows in Castaic Creek.** DWR stores SWP water in Castaic Lake. In some years, DWR releases flood flows from Castaic Dam/Lagoon into Castaic Creek during the winter or spring months. Depending on the magnitude of the releases, some of these flows enter the Santa Clara River downstream of the Valencia WRP. As shown on Figure 2-14, these releases have occurred during many, though not all, years since the release program began in the late 1970s.

Hydrograph separation techniques were applied to the daily streamflow data for the County Line gage to estimate historical groundwater discharges (baseflow) to the Santa Clara River within the Santa Clarita Valley. The hydrograph separation was performed for calendar years 1953 through 1999 using the following five steps:

1. For each day, the average daily flow at the County Line gage, in cubic feet per second (cfs), was converted to acre-feet of volumetric flow for the day.

2. The daily flows from Castaic Dam and at the Castaic Creek South gage (located near the mouth of Castaic Creek) were subtracted from the flow at the County Line gage. These data reflect surface water flow from tributaries. Data from the Castaic Creek South gage were used through June 1977. Beginning in July 1977, operational data for Castaic Lagoon, presented in annual reports by DWR, were used to estimate surface flow contributions from Castaic Creek.

3. The discharges of treated water from the two WRPs were subtracted. This step was performed for calendar years 1975 and later, because 1975 was the first year that such records were available.

4. The resulting day-to-day trends in streamflows were scrutinized for days when notably elevated flows occurred suddenly. These days were assumed to be dominated by storm flow. In some cases, the elevated flows lasted for only 2 to 5 days. In other cases, flows remained elevated for several days, but showed steady declines, indicating that only the beginning of the elevated-flow period was dominated by surface runoff.

5. On all other days, storm flow was considered to be minimal or zero, and the flow values calculated for days not dominated by storm flow were assumed to represent river base-flow (that is, groundwater discharge to the river). For each month, an average flow was calculated for these non-storm days. The average flow was then converted to a total flow for the month, and the monthly flow volumes were summed to come up with the total flow for each year.

Table 2-2 presents the annual calculations from the hydrograph separation analysis. Table 2-3 presents summary statistics for the entire 47-year period that was analyzed, as well as for shorter time frames. Tables 2-4 and 2-5 show dry-year, normal-year, and

wet-year statistics for the entire period of record and the shorter time frames. The shorter time frames are as follows:

1. Calendar years 1953 through 1965, which were years of primarily agricultural water use prior to urbanization and construction of WRPs. This 13-year period was also characterized by 5 years of below-normal rainfall.
2. Calendar years 1975 through 1999, which represent 25 years of significant urbanization, including SWP water importation and WRP operations. This 25-year period was characterized by 6 years of below-normal rainfall, although rainfall volumes in general were somewhat higher (19.4 inches per year [in/yr] average, versus 15.5 in/yr average for 1953 through 1965).
3. Calendar years 1953 through 1999, but excluding 8 years (1966 through 1974) when WRP discharges occurred but were not recorded.

The daily streamflow data and the hydrograph separation technique indicate the following:

1. Summary statistics in Table 2-3 for all types of rainfall years (dry, normal, and wet) show that average groundwater discharges to the river from 1953 through 1965 were approximately 2,500 AF/yr (3.5 cfs). Groundwater discharges to the river were typically 14,000 to 22,000 AF/yr (19 to 31 cfs) from 1975 through 1999 because of more rainfall, increasing urbanization, and increasing importation of water from outside the valley.
2. For normal rainfall years only, median and average groundwater discharges to the river were approximately 4,000 and 3,600 AF/yr (5.5 and 5.0 cfs), respectively, from 1953 through 1965 (see Table 2-4); and approximately 12,500 and 14,300 AF/yr (17 and 20 cfs), respectively, during 1975 through 1999 (see Table 2-4).
3. For drought years only, Table 2-4 shows that groundwater discharges to the river ranged from 400 to 4,900 AF/yr (0.5 to 7 cfs) between 1953 and 1965, and from 5,200 to 14,500 AF/yr (7 to 20 cfs) between 1975 and 1999. Table 2-4 also shows that median and average groundwater discharges to the river during drought years were 600 and 1,700 AF/yr (1 and 2 cfs), respectively, from 1953 through 1965, and typically 9,600 and 10,200 AF/yr (13 and 14 cfs), respectively, from 1975 through 1999.

In summary, significant increases in the baseflow of the Santa Clara River have occurred since urbanization of the Santa Clarita Valley began during the late 1960s and early 1970s. Water imports began in 1980, and have increased in volume as urbanization has continued. The imported water has reached the river through releases from Castaic Dam/Lagoon and, more significantly, discharges of treated water into the river. As a result, water is now present in the Santa Clara River on a continuous basis in the western portion of the basin, even during dry years. This is a sharp contrast to conditions prior to the 1970s, when the river would become dry during drought periods.

### 2.2.2 Historical Estimates of Basin Yield

During the late 1980s, Richard C. Slade, Consulting Groundwater Geologist, now known as Richard C. Slade and Associates, LLC (both hereafter referred to as RCS), conducted hydrogeologic assessments of the two aquifer systems in the basin. RCS performed separate

evaluations for the Alluvial Aquifer in 1986 and the Saugus Formation in 1988, then updated this work in 2002.

The first study of the Alluvial Aquifer (RCS, 1986) identified a "practical or perennial yield" of 31,600 to 32,600 AF/yr. RCS derived these values using the so-called "Pumpage and Change-In-Storage" method, a commonly used method at the time that compares groundwater pumping volumes with changes in the volume of groundwater in storage during a multi-year period when cumulative rainfall is close to average. As RCS discussed in a more recent report (2002), this method works best in aquifers that are fully developed or in overdraft, and where recharge does not play an important role in determining the amount of groundwater in storage. Consequently, as discussed by RCS (2002), this method is not well suited to estimating sustainable pumping rates in this setting because natural recharge and water importation are major influences on the groundwater basin in the Santa Clarita Valley, and the local groundwater resources are not fully developed or in overdraft.

The first study of the Saugus Formation (RCS, 1988) did not identify a practical or perennial yield or a range of pumping rates that were estimated to be sustainable on a long-term basis. Instead, this study first estimated the "usable groundwater in storage," which was defined as the volume of Saugus Formation groundwater that is economically obtainable and of satisfactory quality for beneficial use. RCS estimated the usable groundwater in storage to be 1.41 million acre-feet. Then, using precipitation records and calculations of the exposed area of the Saugus Formation and overlying terrace deposits, and also considering the hydraulic potential for inter-aquifer flow from the overlying Alluvial Aquifer, RCS estimated that the Saugus Formation potentially receives between approximately 11,000 and 22,000 AF/yr of recharge from a combination of direct rainfall and inter-aquifer flow in any given year, depending on local hydrologic conditions. However, RCS did not discuss the relationship of these estimates to long-term pumping from the Saugus Formation. In fact, RCS noted that these assessments "…should not be construed as a rigorous determination of the perennial yield of the Saugus…."

In the *2001 Update Report: Hydrogeologic Conditions in the Alluvial and Saugus Formation Aquifer Systems* (RCS, 2002), RCS concluded that groundwater levels in the Alluvial Aquifer and Saugus Formation have fluctuated over time, but have shown no long-term progressive declines in the amount of groundwater storage that could be considered indicative of overdraft conditions. From the long-term pumping and water level data, the report concluded that the Alluvial Aquifer can be pumped at rates between 30,000 and 40,000 AF/yr over the long term, and suggested that pumping be between 30,000 and 35,000 AF/yr during local droughts. For the Saugus Formation, the report concluded that pumping can occur at rates between 7,500 and 15,000 AF/yr on a long-term basis, with short-term increases to as much as 35,000 AF/yr toward the end of a multi-year period of reduced availability of imported water supplies.

RCS (2002) referred to these pumping rates for the Alluvial and Saugus aquifer systems as the "operational yield" of both aquifers, a term that was previously described in the August 2001 MOU. The term perennial yield is often interpreted as a "not-to-exceed" volume, with a related potential for pumping above the perennial yield value in any given year to be incorrectly interpreted as "overdraft." Consequently, the MOU advanced the concept of operational yield to deal with the misinterpretations commonly associated with the concept of perennial yield. In the Santa Clarita Valley, operational yield is used today to describe the

flexible use of groundwater that allows increased pumping during dry periods and subsequent recharge (direct or in-lieu) in wet/normal rainfall periods, performed in a manner that protects the aquifer by assuring that groundwater supplies are adequately replenished on a long-term basis from one wet/dry cycle to the next. This concept is the basis for the development of the current groundwater operating plan for the local groundwater basin, which is discussed in the following section.

### 2.2.3 Development of Current Operating Plan

The groundwater operating plan for the Santa Clarita Valley's groundwater resources has been defined in the Amended 2000 UWMP for the Santa Clarita Valley (Black & Veatch, 2000; CLWA et al., 2005) and in annual water reports that discuss the water demands, water supplies, and surface water and groundwater resources of the valley (including the *Santa Clarita Valley Water Report 2004* [LSCE, 2005a]). These reports provide ranges of values for groundwater extractions from the Alluvial Aquifer and the Saugus Formation during wet/normal years and dry years. The Purveyors have developed the operating plan by considering the water supply needs of the valley, the availability of imported water supplies, and knowledge of the historical recovery of both aquifers (following the peak pumping years that occurred prior to the mid-1960s in the Alluvial Aquifer and during the early 1990s in the Saugus Formation). The plan is summarized in Table 2-6 and is as follows:

1. Pumping from the Alluvial Aquifer in a given year is governed by local hydrologic conditions in the eastern part of the basin. Under the operating plan, pumping ranges between 30,000 and 40,000 AF/yr during normal and above-normal rainfall years, but, because of operational constraints in the eastern part of the basin, is reduced to between 30,000 and 35,000 AF/yr during locally dry years.

2. Pumping from the Saugus Formation in a given year is tied directly to the availability of other water supplies, particularly imported water from the SWP system. For the Saugus Formation, the operating plan consists of pumping between 7,500 and 15,000 AF/yr during average-year conditions within the SWP system. Planned dry-year pumping from the Saugus Formation ranges between 15,000 and 25,000 AF/yr during a drought year, and increases to between 21,000 and 25,000 AF/yr if SWP deliveries are reduced for 2 consecutive years, and between 21,000 and 35,000 AF/yr if SWP deliveries are reduced for 3 consecutive years. Such high pumping would be followed by periods of reduced (average-year) pumping, at rates between 7,500 and 15,000 AF/yr, to further enhance the effectiveness of natural recharge processes that would rapidly recover water levels and groundwater storage volumes in the Saugus Formation, as has been historically experienced.

The Purveyors have developed this plan as part of an overall water supply strategy designed to meet increasing water demands in the Santa Clarita Valley while assuring a reasonable degree of water supply reliability[3] and not exceeding the operational yield of the local aquifer systems on a long-term basis. In particular, this plan employs an integrated use

[3]As discussed in Section ES.5 of the *2004 Santa Clarita Valley Water Report* (LSCE, 2005a), the Purveyors are in the process of establishing a water reliability policy, for planning purposes, sufficient for meeting projected demands 95 percent of the time over each 20-year period. In the remaining 5 percent of the time, it is planned that the maximum supply shortage will be 10 percent of demand, a level that is based on past experience that a 10 percent water demand reduction is feasible during a drought. (During the last drought, in the early 1990s, voluntary conservation efforts by area residents resulted in a reduction in water demands of approximately 20 percent below demands in preceding years.)

of the Alluvial Aquifer and the Saugus Formation that recognizes the fundamental differences in the hydrogeologic characteristics of these two units[4]. Maintaining the substantial volume of water in the Saugus Formation is an important part of this strategy, to help maintain local groundwater supplies on a long-term basis. In implementing this operating plan, the Purveyors blend groundwater and imported water for area residents to ensure consistent quality and reliability of service. The actual blend of imported water and groundwater in any given year and any given location in the valley is an operational decision, which varies over time according to source availability and the operational capacities of Purveyor-owned facilities. In years when SWP supplies are reduced because of regulatory factors and/or dry weather conditions in the watersheds that provide SWP water supplies, the water demands in the Santa Clarita Valley can be met through a combination of the following alternate supplies:

1. Local groundwater pumping (increased short-term Saugus pumping)
2. Deliveries from CLWA's groundwater banking programs, such as the Semitropic Groundwater Storage Program in Kern County, where CLWA has banked excess SWP water in recent years
3. Deliveries from CLWA's flexible storage account in Castaic Lake Reservoir
4. Participation in DWR dry-year water purchase programs
5. Short-term water exchanges

The Purveyors have emphasized developing water supplies that add diversity in water supply options, especially in years of dry conditions in the Santa Clarita Valley (which can reduce Alluvial Aquifer supplies) and/or reduced availability of SWP imports. Drought periods, local or in the SWP system, can affect water supplies in single and multiple years. Details concerning the nature of local hydrologic variations, which govern Alluvial Aquifer pumping, are presented in Section 2.2.3.1. Section 2.2.3.2 discusses variations in imported water availability, which governs pumping from the Saugus Formation.

#### 2.2.3.1 Variations in Local Hydrology and Alluvial Aquifer Pumping

The rate of pumping from the Alluvial Aquifer in a given year is partly affected by groundwater elevations in the eastern portion of the basin, which is the primary groundwater recharge area for the local groundwater systems. Historically, during dry years, decreases in Alluvial Aquifer pumping occur in the eastern-most Alluvial Aquifer production wells, which are located adjacent to the Santa Clara River in Soledad Canyon, upstream of the mouth of Bouquet Canyon. Reduced groundwater pumping occurs in these areas because of declines in groundwater elevations resulting from reduced groundwater recharge by the Santa Clara River during dry years. Groundwater levels in this area have historically decreased between approximately 50 and 100 feet during multi-year periods of below-normal rainfall and Santa Clara River streamflows. Consequently, the approximate

[4]As discussed in this report and other documents (RCS, 2002; CH2M HILL, 2004a; LSCE, 2005a), the Alluvial Aquifer is more permeable and much thinner than the Saugus Formation. The eastern portion of the Alluvial Aquifer also shows considerably greater short-term (month-to-month) and long-term (year-to-year) fluctuations in groundwater levels than the rest of the Alluvial Aquifer and the Saugus Formation.

5,000 AF/yr reduction in Alluvial Aquifer pumping in dry years that is called for under the operating plan occurs primarily as reduced pumping from wells in eastern Soledad Canyon.

Elsewhere in the Alluvial Aquifer, where groundwater elevations have fluctuated much less during single-year or multi-year dry periods, reductions in pumping rates have been unnecessary. Throughout the Alluvial Aquifer, groundwater elevations have historically recovered fully in response to the normal and above-normal rainfall and stream flows that mark the end of each dry period.

The historical record of rainfall and pumping indicates that the 5,000 AF/yr of dry-year reduction in Alluvial Aquifer pumping typically occurs when rainfall is below 12 in/yr, as measured at the Newhall-Soledad rain gage. Annual rainfall at this gage was below 12 in/yr during 14 years of this 50-year period, as shown on Figure 2-5.

#### 2.2.3.2 Variations in State Water Project Hydrology and Saugus Formation Pumping

The rate of pumping from the Saugus Formation in a given year is governed by the availability of imported water supplies, particularly imported water from the SWP system. CLWA has performed a statistical evaluation of SWP deliveries (Kennedy/Jenks Consultants, 2003) using the 2021B scenario from the CALSIM II model, which was developed by DWR for its SWP Delivery Reliability Report (DWR, 2003). The CALSIM II model and the SWP Delivery Reliability Report were developed to support (1) the preparation of urban water management plans by the water agencies that are SWP contractors, (2) analyses required to comply with Senate Bills 221 and 610, and (3) other water supply planning activities that include the SWP as a supply component. The 2021B scenario simulates the anticipated deliveries of water to the 29 SWP contractors using an historical hydrologic record and anticipated operating and regulatory conditions for the SWP system in 2021. The U.S. Bureau of Reclamation (USBR) has also used CALSIM II to perform biological assessment studies for the Operating Criteria and Plan (OCAP) for the SWP (USBR, 2004). Both the CLWA and the USBR studies, which were made public for review in February 2004, include evaluations of the role and function of an Environmental Water Account (EWA), which consists of water purchased to mitigate the water supply impacts of protection measures for endangered species. These CALSIM II simulations have been performed for the SWP system at a present-day level of development and for the anticipated level of development in 2020. Table 2-7 compares the municipal and industrial water use allocations calculated by CALSIM II for the SWP Reliability Report (DWR, 2003) and for the OCAP (USBR, 2004) for the hydrology that occurred from 1950 through 1993.

CLWA's evaluation reached the following conclusions regarding the deliveries it will receive under this scenario (Kennedy/Jenks Consultants, 2003):

1. A regression analysis indicates that there is a weak relationship between the SWP delivery in a given year and the previous year's delivery.
2. SWP deliveries will equal or exceed 70 percent of CLWA's 95,200 AF/yr Table A water amount during approximately 75 percent of the simulated years. During the remaining years, the deliveries will vary between 20 and 70 percent.
3. A Monte Carlo analysis of projected deliveries during 73 consecutive years indicated that at a 95 percent confidence level, 4 years of a 7-year drought period in the SWP

system (such as was observed from 1988 through 1994) will have sufficiently low deliveries to require short-term pumping of increased groundwater volumes to meet local water demands. This includes a period of 3 consecutive years of increased pumping.

Section 3.3.3 of this report discusses the relationship between SWP hydrology, SWP allocations to the 29 SWP contractors, and corresponding pumping from the Saugus Formation, and how this relationship was built into the modeling analysis of the groundwater operating plan.

# Tables

**TABLE 2-1**
Recharge and Discharge Components of the Hydrologic Cycle in the Upper Santa Clara River Basin
*Analysis of Groundwater Basin Yield, Upper Santa Clara River Groundwater Basin, East Subbasin, Los Angeles County, California*

| Recharge | Discharge |
|---|---|
| **Surface Water** | |
| Direct runoff of precipitation | Evapotranspiration of precipitation |
| Precipitation runoff from upstream watershed areas | Santa Clara River flow to Ventura County |
| Castaic Lake/Lagoon releases into Castaic Creek | Streamflow seepage to the Alluvial Aquifer |
| WRP discharges to the Santa Clara River | Evapotranspiration of applied irrigation water |
| Groundwater seepage into the Santa Clara River | |
| Irrigation return flows (agricultural and urban) | |
| **Groundwater** | |
| Infiltration of precipitation | Pumping |
| Infiltration of outdoor applied water (agricultural and urban) | Evapotranspiration of Alluvial Aquifer groundwater by riparian vegetation |
| Alluvial Aquifer subsurface inflow (Castaic Dam, Lang gage) | Alluvial Aquifer subsurface outflow (western study area boundary) |
| Streamflow seepage to Alluvial Aquifer | Groundwater seepage into the Santa Clara River |

Notes:

The two sources of water for agricultural and municipal water uses in the basin are groundwater pumping and imported water from the SWP.

Because SWP water is stored in Castaic Lake, which is outside the limits of the Alluvial and Saugus aquifers, it is not considered a part of the valley's hydrologic cycle while it is still in storage. However, SWP water that is land-applied or that is discharged from a WRP qualifies as a component of the hydrologic cycle. In addition, subsurface groundwater flow into the Santa Clarita Valley occurs beneath Castaic Creek through water seepage beneath Castaic Dam.

**TABLE 2-2**
Estimated Annual Groundwater Discharge to the Santa Clara River, 1953 through 1999
*Analysis of Groundwater Basin Yield, Upper Santa Clara River Groundwater Basin, East Subbasin, Los Angeles County, California*

| Calendar Year | Total Flow at Mouth of Castaic Creek (acre-feet)[a] | Total Gaged Flow at County Line (acre-feet)[b] | Estimated Non-storm Flow at County Line (acre-feet) | WRP Flows (acre-feet) | Estimated Groundwater Discharge to River (acre-feet) | Rainfall at Newhall-Soledad Gage (inches)[c] | Local Rainfall Condition[d] |
|---|---|---|---|---|---|---|---|
| 1953 | 0 | 4,986 | 4,943 | 0 | 4,943 | 4.88 | Dry |
| 1954 | 977 | 7,316 | 5,554 | 0 | 5,554 | 15.82 | Normal |
| 1955 | 134 | 4,795 | 4,122 | 0 | 4,122 | 13.91 | Normal |
| 1956 | 311 | 5,429 | 3,803 | 0 | 3,803 | 14.21 | Normal |
| 1957 | 559 | 4,782 | 2,410 | 0 | 2,410 | 22.85 | Wet |
| 1958 | 21,204 | 38,756 | 5,344 | 0 | 5,344 | 23.14 | Wet |
| 1959 | 473 | 3,277 | 2,206 | 0 | 2,206 | 9.81 | Dry |
| 1960 | 1 | 777 | 586 | 0 | 586 | 11.64 | Dry |
| 1961 | 79 | 804 | 410 | 0 | 410 | 8.82 | Dry |
| 1962 | 5,101 | 28,460 | 2,433 | 0 | 2,433 | 21.22 | Wet |
| 1963 | 32 | 1,884 | 1,058 | 0 | 1,058 | 12.79 | Normal |
| 1964 | 1 | 1,030 | 646 | 0 | 646 | 10.09 | Dry |
| 1965 | 3,702 | 35,614 | 996 | 0 | 996 | 32.28 | Wet |
| 1966 | 5,780 | 10,101 | 2,332 | No data | --- | 14.57 | Normal |
| 1967 | 27,819 | 40,480 | 8,640 | No data | --- | 23.23 | Wet |
| 1968 | 4,381 | 7,216 | 3,895 | No data | --- | 6.90 | Dry |
| 1969 | 46,461 | 258,660 | 29,395 | No data | --- | 32.42 | Wet |
| 1970 | 6,597 | 31,066 | 14,924 | No data | --- | 23.19 | Wet |
| 1971 | 2,310 | 15,883 | 10,843 | No data | --- | 13.75 | Normal |
| 1972 | 2,205 | 16,027 | 12,975 | No data | --- | 4.15 | Dry |
| 1973 | 12,671 | 52,631 | 26,115 | No data | --- | 19.79 | Wet |
| 1974 | 7,288 | 25,265 | 11,918 | No data | --- | 18.04 | Wet |
| 1975 | 2,027 | 14,770 | 10,806 | 5,534 | 5,272 | 10.92 | Dry |
| 1976 | 156 | 10,162 | 9,754 | 6,095 | 3,659 | 14.02 | Normal |
| 1977 | 1,380 | 13,454 | 9,359 | 6,004 | 3,355 | 20.87 | Wet |
| 1978 | 35,378 | 129,187 | 60,955 | 6,982 | 53,973 | 42.17 | Wet |
| 1979 | 13,626 | 57,594 | 42,448 | 7,397 | 35,051 | 21.47 | Wet |
| 1980 | 16,785 | 95,211 | 57,593 | 7,372 | 50,221 | 27.00 | Wet |
| 1981 | 6,519 | 24,232 | 21,172 | 7,949 | 13,223 | 13.42 | Normal |
| 1982 | 9,102 | 36,488 | 32,531 | 8,436 | 24,095 | 20.20 | Wet |
| 1983 | 67,058 | 131,236 | 55,878 | 9,420 | 46,458 | 39.07 | Wet |

**TABLE 2-2**
Estimated Annual Groundwater Discharge to the Santa Clara River, 1953 through 1999
*Analysis of Groundwater Basin Yield, Upper Santa Clara River Groundwater Basin, East Subbasin, Los Angeles County, California*

| Calendar Year | Total Flow at Mouth of Castaic Creek (acre-feet)[a] | Total Gaged Flow at County Line (acre-feet)[b] | Estimated Non-storm Flow at County Line (acre-feet) | WRP Flows (acre-feet) | Estimated Groundwater Discharge to River (acre-feet) | Rainfall at Newhall-Soledad Gage (inches)[c] | Local Rainfall Condition[d] |
|---|---|---|---|---|---|---|---|
| 1984 | 13,787 | 39,279 | 35,215 | 9,512 | 25,703 | 12.86 | Normal |
| 1985 | 2,619 | 24,466 | 24,089 | 9,614 | 14,475 | 8.37 | Dry |
| 1986 | 4,945 | 48,024 | 31,327 | 10,822 | 20,505 | 18.02 | Wet |
| 1987 | 911 | 26,198 | 23,663 | 11,844 | 11,819 | 14.45 | Normal |
| 1988 | 2,415 | 36,611 | 24,934 | 12,363 | 12,571 | 16.92 | Wet |
| 1989 | Unavailable | 24,799 | 23,453 | 13,560 | 9,893 | 7.56 | Dry |
| 1990 | 0 | 23,472 | 21,772 | 14,006 | 7,766 | 6.98 | Dry |
| 1991 | 65 | 34,901 | 18,702 | 14,108 | 4,594 | 17.21 | Wet |
| 1992 | 4,450 | 68,577 | 23,601 | 15,703 | 7,898 | 32.03 | Wet |
| 1993 | 7,725 | 152,783 | 65,054 | 17,179 | 47,875 | 32.72 | Wet |
| 1994 | Unavailable | 32,039 | 31,239 | 16,946 | 14,293 | 10.27 | Dry |
| 1995 | 5,611 | 82,409 | 51,001 | 17,824 | 33,177 | 29.15 | Wet |
| 1996 | 5,632 | 47,930 | 36,366 | 16,831 | 19,535 | 15.88 | Normal |
| 1997 | 9,885 | 36,780 | 27,521 | 15,778 | 11,743 | 13.35 | Normal |
| 1998 | 47,803 | 205,139 | 81,744 | 17,695 | 64,049 | 30.73 | Wet |
| 1999 | 5,830 | 32,382 | 27,176 | 17,847 | 9,329 | 8.96 | Dry |

[a]Values through June 1977 are from the former Castaic Creek South gage (U.S. Geologic Survey [USGS] Gage Station 11108145). Values after June 1977 are derived from records of releases from Castaic Dam/Lagoon into Castaic Creek, as provided by DWR.

[b]Values through September 30, 1996, are from USGS Gage Station 11108500. This gage was located immediately downstream of the Los Angeles-Ventura County Line and was taken permanently out of service after October 21, 1996. Data beginning on October 1, 1996, are from new USGS gage station 11109000, located approximately 2.5 miles farther downstream, near Piru Junction, at the Las Brisas Bridge.

[c]Annual rainfall values are based on monthly records for this gage, as reported by the National Climate Data Center and LADPW.

[d]Defined from median rainfall (14.57 in/yr) from 1950 through 2000. Dry year < 12.38 in/yr (85 percent of median rainfall). Wet year > 16.75 in/yr (115 percent of median rainfall).

**TABLE 2-3**
Statistics on Annual Groundwater Discharge to the Santa Clara River, 1953 through 1999
*Analysis of Groundwater Basin Yield, Upper Santa Clara River Groundwater Basin, East Subbasin, Los Angeles County, California*

| | Castaic Creek Flows (acre-feet) | Total Gaged Flow at County Line (acre-feet) | Estimated Non-storm Flow at County Line (acre-feet) | WRP Flows (acre-feet) | Estimated Groundwater Discharge to River (acre-feet) | Rainfall at Newhall-Soledad Gage (inches) |
|---|---|---|---|---|---|---|
| **Statistics for 1953 through 1965** | | | | | | |
| Minimum | 0 | 777 | 410 | 0 | 410 | 4.88 |
| Median | 311 | 4,795 | 2,410 | 0 | 2,410 | 13.91 |
| Average | 2,506 | 10,608 | 2,655 | 0 | 2,655 | 15.50 |
| Maximum | 21,204 | 38,756 | 5,554 | 0 | 5,554 | 32.28 |
| **Statistics for 1975 through 1999** | | | | | | |
| Minimum | 0 | 10,162 | 9,359 | 5,534 | 3,355 | 6.98 |
| Median | 5,632 | 36,611 | 27,521 | 11,844 | 14,293 | 16.92 |
| Average | 11,466 | 57,125 | 33,894 | 11,873 | 22,021 | 19.38 |
| Maximum | 67,058 | 205,139 | 81,744 | 17,847 | 64,049 | 42.17 |
| **Statistics for 1953 through 1965 and 1975 through 1999** | | | | | | |
| Minimum | 0 | 777 | 410 | 5,534 | 410 | 4.88 |
| Median | 3,161 | 30,250 | 22,613 | 11,844 | 8,613 | 15.14 |
| Average | 8,230 | 41,211 | 23,207 | 11,873 | 15,396 | 18.05 |
| Maximum | 67,058 | 205,139 | 81,744 | 17,847 | 64,049 | 42.17 |
| **Statistics for 1953 through 1999** | | | | | | |
| Minimum | 0 | 777 | 410 | 5,534 | 410 | 4.15 |
| Median | 4,450 | 28,460 | 18,702 | 11,844 | 8,613 | 15.82 |
| Average | 9,151 | 43,050 | 21,338 | 11,873 | 15,396 | 17.92 |
| Maximum | 67,058 | 258,660 | 81,744 | 17,847 | 64,049 | 42.17 |

**TABLE 2-4**
Statistics on Annual Groundwater Discharge to the Santa Clara River, 1953 through 1965 versus 1975 through 1999
*Analysis of Groundwater Basin Yield, Upper Santa Clara River Groundwater Basin, East Subbasin, Los Angeles County, California*

| | Castaic Creek Flows (acre-feet) | Total Gaged Flow at County Line (acre-feet) | Estimated Non-storm Flow at County Line (acre-feet) | WRP Flows (acre-feet) | Estimated Groundwater Discharge to River (acre-feet) | Rainfall at Newhall-Soledad Gage (inches) |
|---|---|---|---|---|---|---|
| **Statistics for 5 Dry Years during 1953 through 1965** | | | | | | |
| Minimum | 0 | 777 | 410 | 0 | 410 | 4.88 |
| Median | 1 | 1,030 | 646 | 0 | 646 | 9.81 |
| Average | 111 | 2,175 | 1,758 | 0 | 1,758 | 9.05 |
| Maximum | 473 | 4,986 | 4,943 | 0 | 4,943 | 11.64 |
| **Statistics for 4 Normal Years during 1953 through 1965** | | | | | | |
| Minimum | 32 | 1,884 | 1,058 | 0 | 1,058 | 12.79 |
| Median | 222 | 5,112 | 3,963 | 0 | 3,963 | 14.06 |
| Average | 363 | 4,856 | 3,634 | 0 | 3,634 | 14.18 |
| Maximum | 977 | 7,316 | 5,554 | 0 | 5,554 | 15.82 |
| **Statistics for 4 Wet Years during 1953 through 1965** | | | | | | |
| Minimum | 559 | 4,782 | 996 | 0 | 996 | 21.22 |
| Median | 4,402 | 32,037 | 2,421 | 0 | 2,421 | 23.00 |
| Average | 7,641 | 26,903 | 2,796 | 0 | 2,796 | 24.87 |
| Maximum | 21,204 | 38,756 | 5,344 | 0 | 5,344 | 32.28 |
| **Statistics for 6 Dry Years during 1975 through 1999** | | | | | | |
| Minimum | 0 | 14,770 | 10,806 | 5,534 | 5,272 | 6.98 |
| Median | 2,323 | 24,633 | 23,771 | 13,783 | 9,611 | 8.67 |
| Average | 2,619 | 25,322 | 23,089 | 12,918 | 10,171 | 8.84 |
| Maximum | 5,830 | 32,382 | 31,239 | 17,847 | 14,475 | 10.92 |
| **Statistics for 6 Normal Years during 1975 through 1999** | | | | | | |
| Minimum | 156 | 10,162 | 9,754 | 6,095 | 3,659 | 12.86 |
| Median | 6,076 | 31,489 | 25,592 | 10,678 | 12,521 | 13.72 |
| Average | 6,148 | 30,763 | 25,615 | 11,335 | 14,280 | 14.00 |
| Maximum | 13,787 | 47,930 | 36,366 | 16,831 | 25,703 | 15.88 |
| **Statistics for 13 Wet Years during 1975 through 1999** | | | | | | |
| Minimum | 65 | 13,454 | 9,359 | 6,004 | 3,355 | 16.92 |
| Median | 7,725 | 68,577 | 42,448 | 10,822 | 33,177 | 27.00 |
| Average | 16,642 | 83,970 | 42,702 | 11,639 | 31,063 | 26.74 |
| Maximum | 67,058 | 205,139 | 81,744 | 17,824 | 64,049 | 42.17 |

**TABLE 2-5**
Statistics on Annual Groundwater Discharge to the Santa Clara River, Including and Excluding 1966 through 1974
*Analysis of Groundwater Basin Yield, Upper Santa Clara River Groundwater Basin, East Subbasin, Los Angeles County, California*

| | Castaic Creek Flows (acre-feet) | Total Gaged Flow at County Line (acre-feet) | Estimated Non-storm Flow at County Line (acre-feet) | WRP Flows (acre-feet) | Estimated Groundwater Discharge to River (acre-feet) | Rainfall at Newhall-Soledad Gage (inches) |
|---|---|---|---|---|---|---|
| **Statistics for 13 Dry Years during 1953 through 1999** | | | | | | |
| Minimum | 0 | 777 | 410 | 5,534 | 410 | 4.15 |
| Median | 473 | 14,770 | 10,806 | 13,783 | 5,272 | 8.82 |
| Average | 1,601 | 14,311 | 12,630 | 12,918 | 6,347 | 8.41 |
| Maximum | 5,830 | 32,382 | 31,239 | 17,847 | 14,475 | 11.64 |
| **Statistics for 12 Normal Years during 1953 through 1999** | | | | | | |
| Minimum | 0 | 7,316 | 2,433 | 6,004 | 2,433 | 13.35 |
| Median | 5,101 | 26,198 | 21,172 | 11,844 | 11,743 | 16.92 |
| Average | 5,238 | 27,883 | 16,963 | 10,788 | 8,671 | 17.10 |
| Maximum | 12,671 | 52,631 | 27,521 | 15,778 | 13,223 | 21.22 |
| **Statistics for 22 Wet Years during 1953 through 1999** | | | | | | |
| Minimum | 65 | 4,782 | 996 | 6,004 | 996 | 16.92 |
| Median | 7,507 | 44,252 | 25,525 | 10,822 | 20,505 | 23.17 |
| Average | 15,807 | 73,060 | 29,877 | 11,639 | 24,412 | 25.62 |
| Maximum | 67,058 | 258,660 | 81,744 | 17,824 | 64,049 | 42.17 |
| **Statistics for 11 Dry Years during 1953 through 1965 and 1975 through 1999** | | | | | | |
| Minimum | 0 | 777 | 410 | 5,534 | 410 | 4.88 |
| Median | 79 | 14,770 | 10,806 | 13,783 | 5,272 | 8.96 |
| Average | 1,226 | 14,800 | 13,393 | 12,918 | 6,347 | 8.94 |
| Maximum | 5,830 | 32,382 | 31,239 | 17,847 | 14,475 | 11.64 |
| **Statistics for 10 Normal Years during 1953 through 1965 and 1975 through 1999** | | | | | | |
| Minimum | 32 | 1,884 | 1,058 | 6,095 | 1,058 | 12.79 |
| Median | 944 | 17,197 | 15,463 | 10,678 | 8,649 | 13.97 |
| Average | 3,834 | 20,400 | 16,823 | 11,335 | 10,022 | 14.07 |
| Maximum | 13,787 | 47,930 | 36,366 | 16,831 | 25,703 | 15.88 |
| **Statistics for 17 Wet Years during 1953 through 1965 and 1975 through 1999** | | | | | | |
| Minimum | 65 | 4,782 | 996 | 6,004 | 996 | 16.92 |
| Median | 5,611 | 48,024 | 31,327 | 10,822 | 20,505 | 23.14 |
| Average | 14,524 | 70,543 | 33,312 | 11,639 | 24,412 | 26.30 |
| Maximum | 67,058 | 205,139 | 81,744 | 17,824 | 64,049 | 42.17 |

**TABLE 2-6**
Annual Pumping Rates Specified by the Operating Plan for Santa Clarita Valley Groundwater Resources
*Analysis of Groundwater Basin Yield, Upper Santa Clara River Groundwater Basin, East Subbasin, Los Angeles County, California*

| Aquifer | Normal Years | Dry Year 1 | Dry Year 2 | Dry Year 3 |
|---|---|---|---|---|
| **Operating Plan Pumping** | | | | |
| Alluvium | 30,000 to 40,000 | 30,000 to 35,000 | 30,000 to 35,000 | 30,000 to 35,000 |
| Saugus | 7,500 to 15,000 | 15,000 to 25,000 | 21,000 to 25,000 | 21,000 to 35,000 |
| **Total** | **37,500 to 55,000** | **45,000 to 60,000** | **51,000 to 60,000** | **51,000 to 70,000** |
| **Modeled Pumping** | | | | |
| Alluvium | 38,429 | 33,767 | 33,767 | 33,767 |
| Saugus | 10,679 | 15,760 | 24,346 | 34,096 |
| **Total** | **49,108** | **49,527** | **58,113** | **67,863** |

Notes:

All pumping volumes are listed in acre-feet.

The operating plan is defined in the Amended 2000 UWMP (Black & Veatch, 2000; CLWA et al., 2005).

In the model simulations, total pumping is different than listed in this table when dry-year pumping conditions in one aquifer coincide with normal-year pumping conditions in the other aquifer (because of differences in the timing of dry conditions locally versus reduced deliveries of SWP water imports).

**TABLE 2-7**
CALSIM II Calculated State Water Project Municipal and Industrial Allocations
*Analysis of Groundwater Basin Yield, Upper Santa Clara River Groundwater Basin, East Subbasin, Los Angeles County, California*

| Year | OCAP Current EWA[a] | OCAP Future EWA[a] | 2020 SWP Reliability[b] |
|---|---|---|---|
| 1950 | 0.88 | 0.91 | 0.79 |
| 1951 | 1.00 | 1.00 | 0.96 |
| 1952 | 1.00 | 1.00 | 1.00 |
| 1953 | 1.00 | 1.00 | 0.95 |
| 1954 | 1.00 | 1.00 | 0.96 |
| 1955 | 0.44 | 0.45 | 0.43 |
| 1956 | 1.00 | 1.00 | 1.00 |
| 1957 | 0.94 | 0.91 | 0.75 |
| 1958 | 1.00 | 1.00 | 1.00 |
| 1959 | 0.84 | 0.88 | 0.83 |
| 1960 | 0.51 | 0.55 | 0.56 |
| 1961 | 0.68 | 0.72 | 0.76 |
| 1962 | 0.93 | 0.98 | 0.87 |
| 1963 | 1.00 | 1.00 | 1.00 |
| 1964 | 0.84 | 0.74 | 0.73 |
| 1965 | 0.87 | 0.81 | 0.77 |
| 1966 | 1.00 | 1.00 | 0.92 |
| 1967 | 1.00 | 1.00 | 1.00 |
| 1968 | 0.89 | 0.90 | 0.85 |
| 1969 | 1.00 | 1.00 | 1.00 |
| 1970 | 1.00 | 1.00 | 0.95 |
| 1971 | 1.00 | 1.00 | 1.00 |
| 1972 | 0.76 | 0.75 | 0.65 |
| 1973 | 1.00 | 1.00 | 0.91 |
| 1974 | 1.00 | 1.00 | 1.00 |
| 1975 | 1.00 | 1.00 | 1.00 |
| 1976 | 0.78 | 0.75 | 0.65 |
| 1977 | 0.03 | 0.04 | 0.20 |
| 1978 | 1.00 | 1.00 | 1.00 |
| 1979 | 1.00 | 0.94 | 0.89 |
| 1980 | 1.00 | 0.91 | 0.85 |
| 1981 | 0.90 | 0.92 | 0.84 |
| 1982 | 1.00 | 1.00 | 1.00 |
| 1983 | 1.00 | 1.00 | 1.00 |
| 1984 | 0.66 | 1.00 | 0.99 |
| 1985 | 0.97 | 0.91 | 0.83 |
| 1986 | 0.74 | 0.70 | 0.78 |
| 1987 | 0.70 | 0.77 | 0.71 |
| 1988 | 0.12 | 0.17 | 0.23 |
| 1989 | 0.96 | 0.95 | 0.83 |
| 1990 | 0.24 | 0.27 | 0.28 |
| 1991 | 0.24 | 0.29 | 0.25 |
| 1992 | 0.39 | 0.43 | 0.29 |
| 1993 | 1.00 | 1.00 | 1.00 |

[a]Source: USBR, 2004

[b]Source: DWR, 2003

# Figures

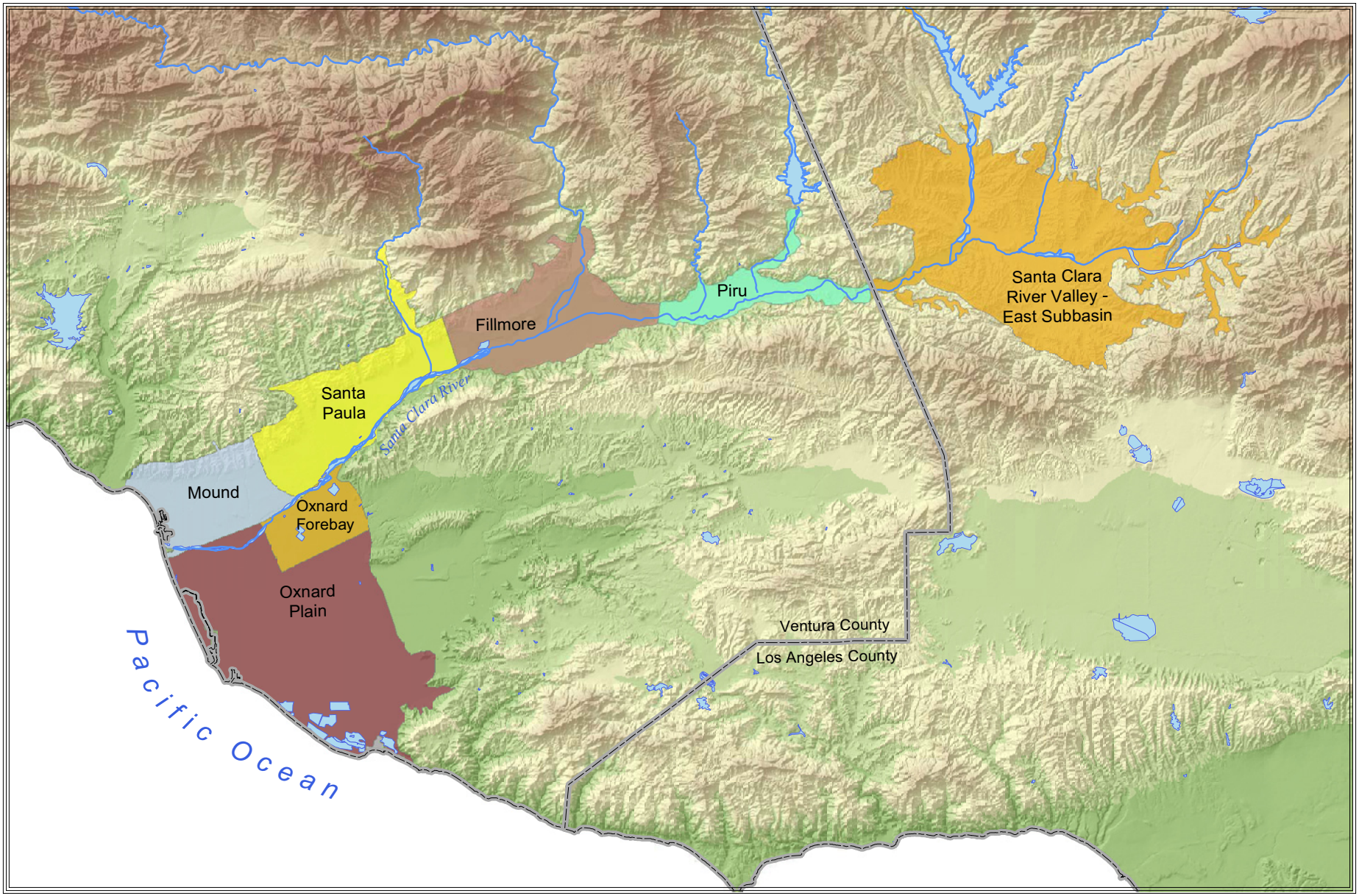


**FIGURE 2-1**
**GROUNDWATER BASINS IN THE SANTA CLARA RIVER DRAINAGE**
ANALYSIS OF GROUNDWATER BASIN YIELD
UPPER SANTA CLARA RIVER GROUNDWATER BASIN
EAST SUBBASIN, LOS ANGELES COUNTY, CALIFORNIA

E062005007RDD_08 (7/8/05)

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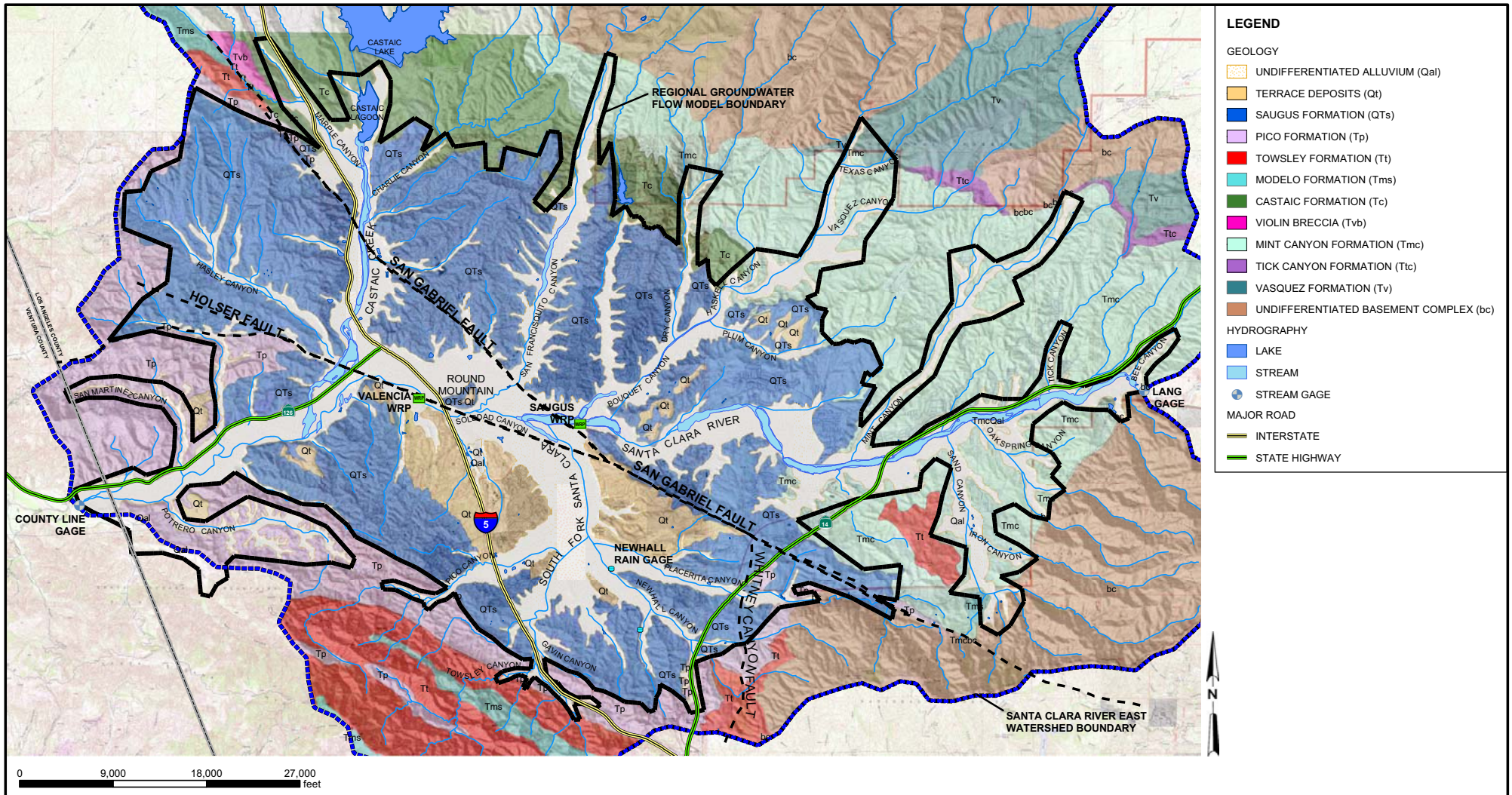


**FIGURE 2-2**
**BASIN GEOLOGIC MAP**
ANALYSIS OF GROUNDWATER BASIN YIELD
UPPER SANTA CLARA RIVER GROUNDWATER BASIN
EAST SUBBASIN, LOS ANGELES COUNTY, CALIFORNIA

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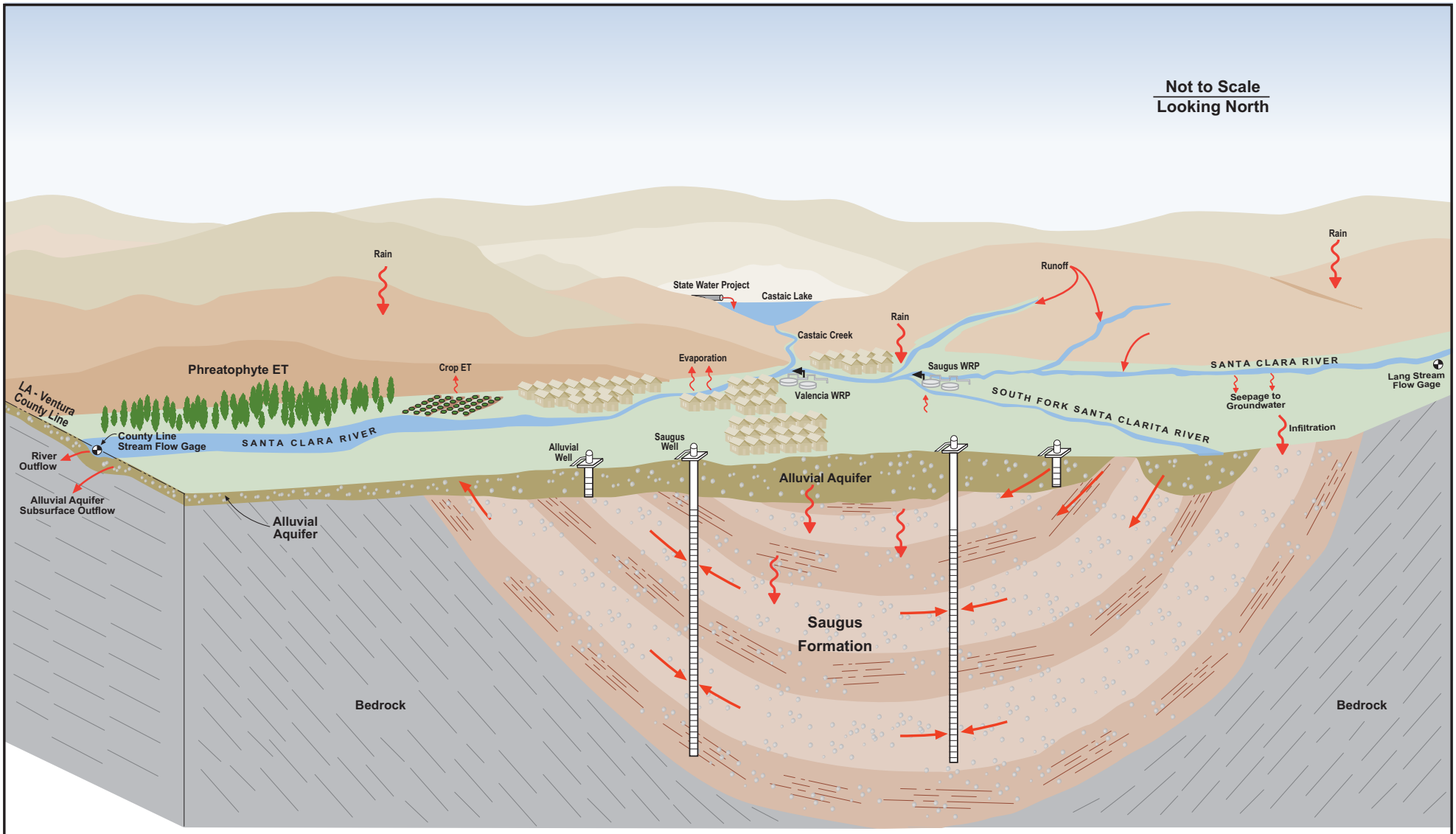


**FIGURE 2-3**
**SANTA CLARITA VALLEY HYDROLOGY**
ANALYSIS OF GROUNDWATER BASIN YIELD
UPPER SANTA CLARA RIVER GROUNDWATER BASIN
EAST SUBBASIN, LOS ANGELES COUNTY, CALIFORNIA

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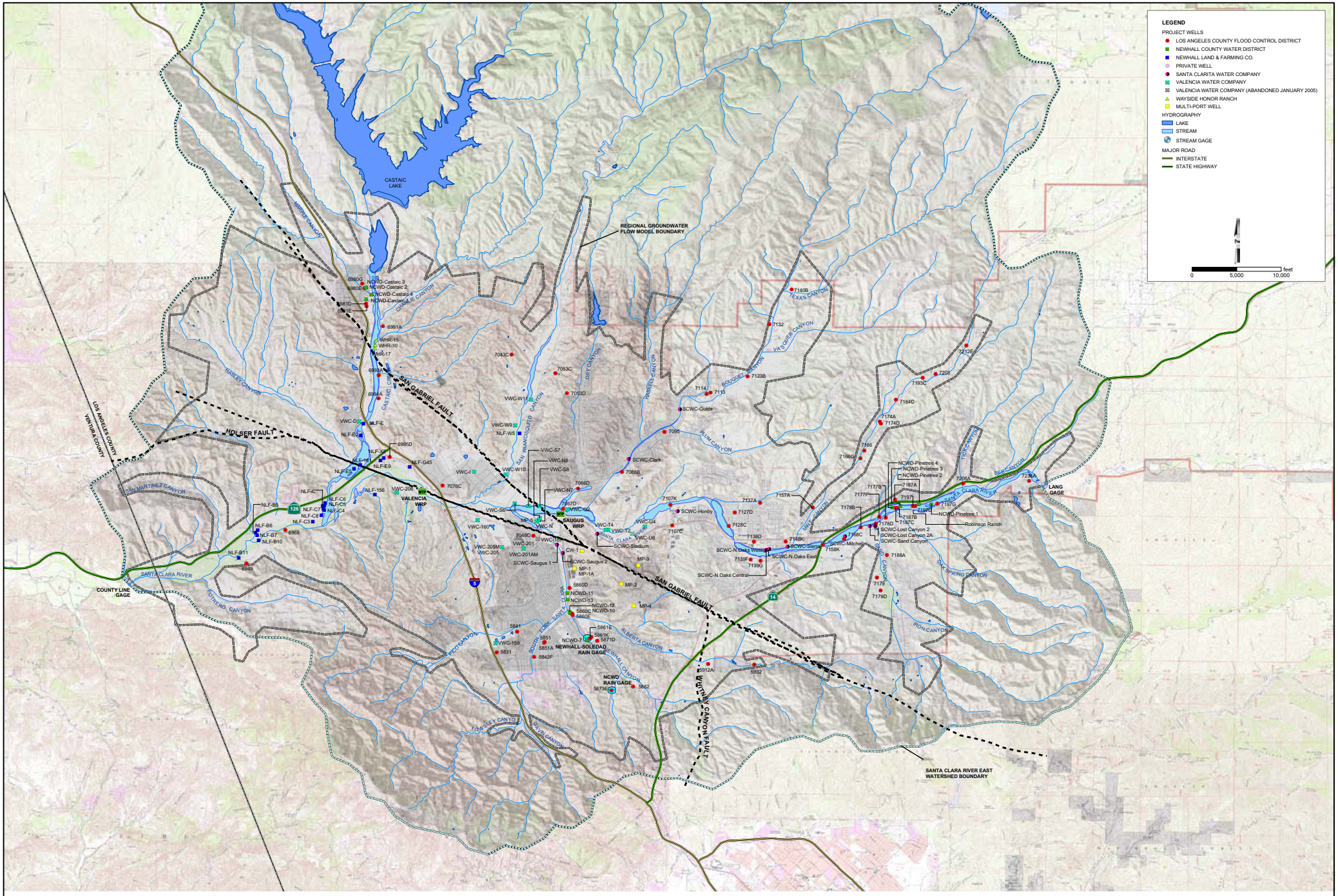


**FIGURE 2-4**
**REGIONAL WELL LOCATION MAP**
ANALYSIS OF GROUNDWATER BASIN YIELD
UPPER SANTA CLARA RIVER GROUNDWATER BASIN
EAST SUBBASIN, LOS ANGELES COUNTY, CALIFORNIA

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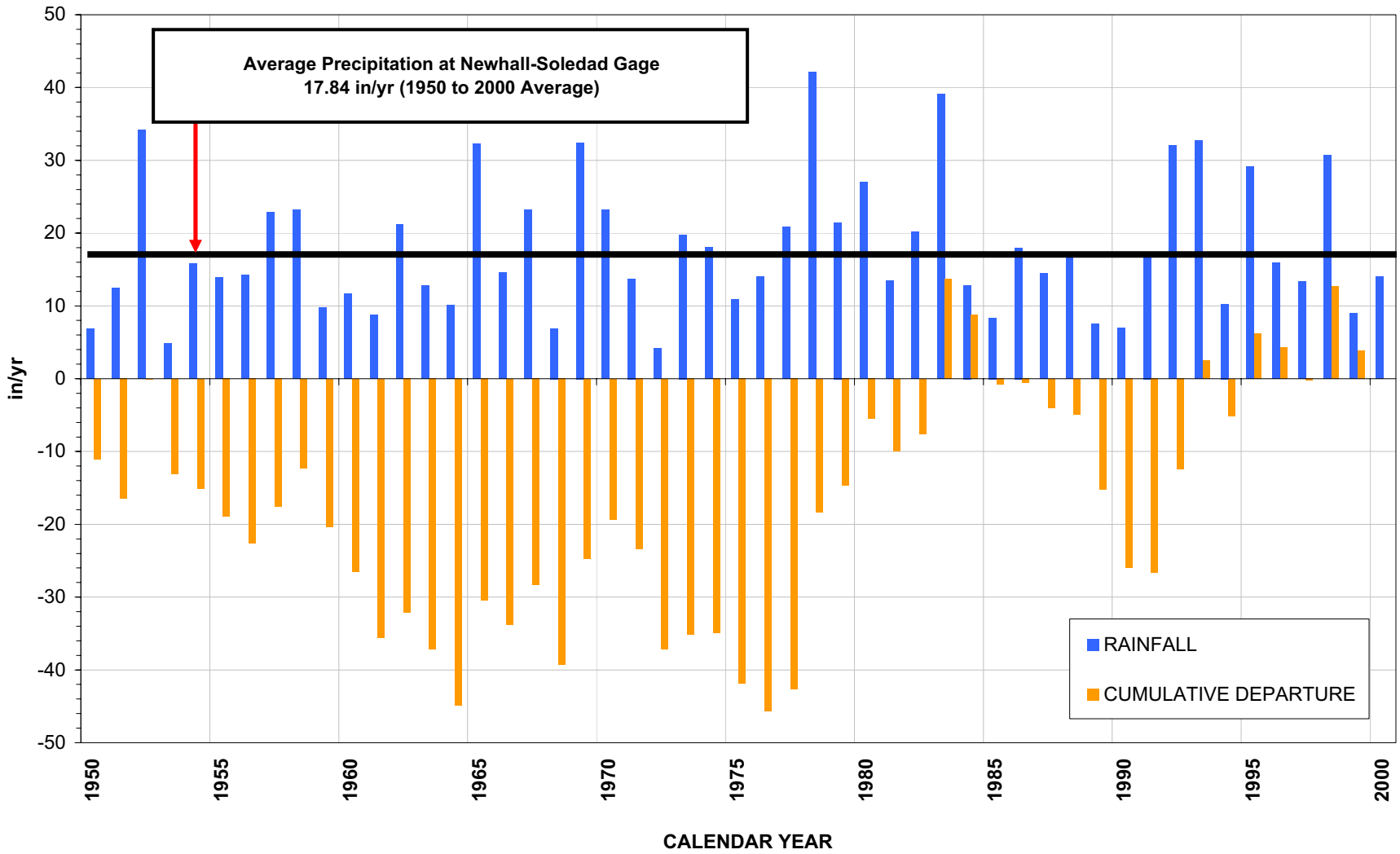


**FIGURE 2-5**
**ANNUAL PRECIPITATION AND CUMULATIVE DEPARTURE FROM THE 1950 THROUGH 2000 AVERAGE AT THE NEWHALL-SOLEDAD RAIN GAGE**

ANALYSIS OF GROUNDWATER BASIN YIELD
UPPER SANTA CLARA RIVER GROUNDWATER BASIN
EAST SUBBASIN, LOS ANGELES COUNTY, CALIFORNIA

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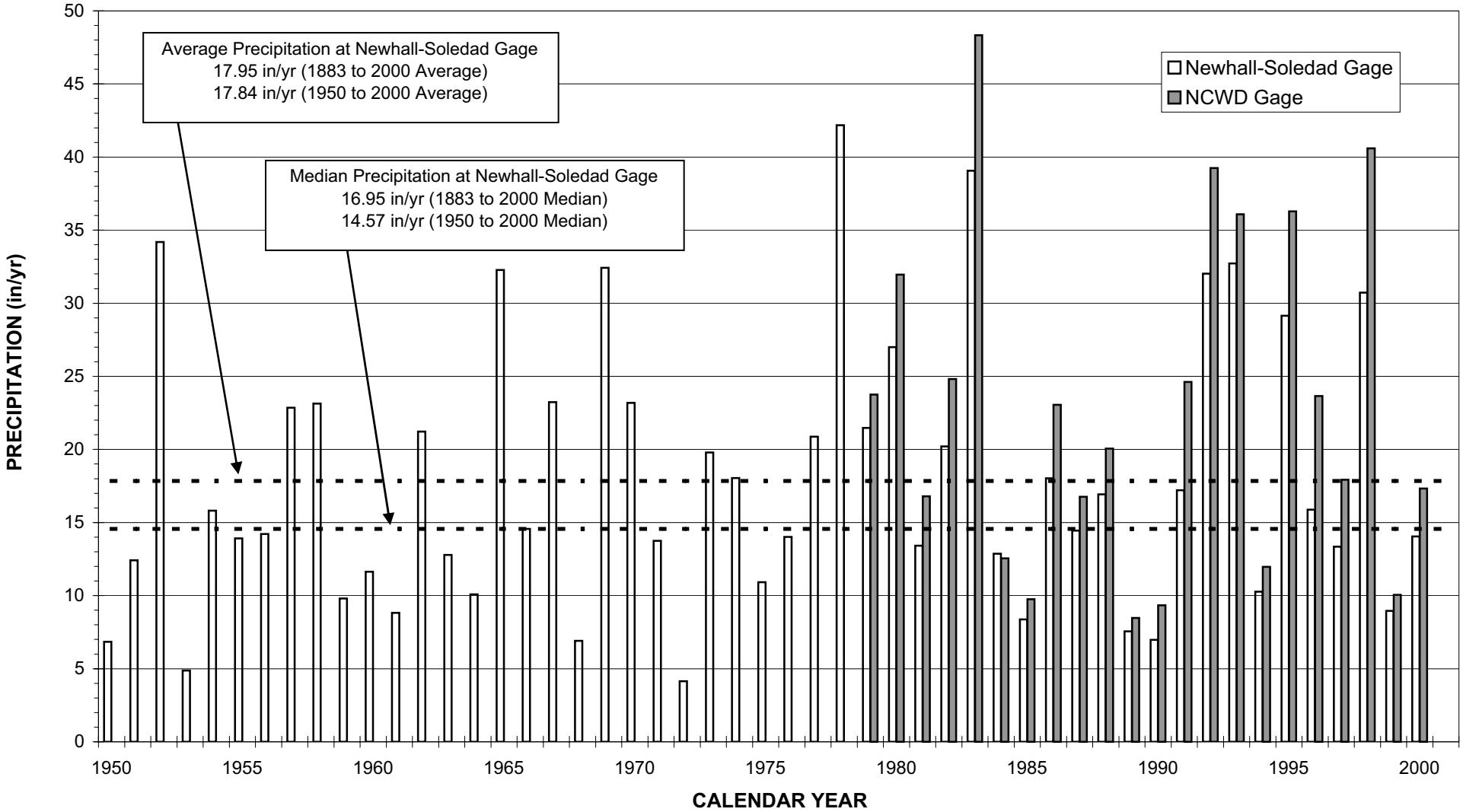


**FIGURE 2-6**
**ANNUAL PRECIPITATION AT THE NEWHALL-SOLEDAD AND NCWD RAIN GAGES SINCE 1950**
ANALYSIS OF GROUNDWATER BASIN YIELD
UPPER SANTA CLARA RIVER GROUNDWATER BASIN
EAST SUBBASIN, LOS ANGELES COUNTY, CALIFORNIA

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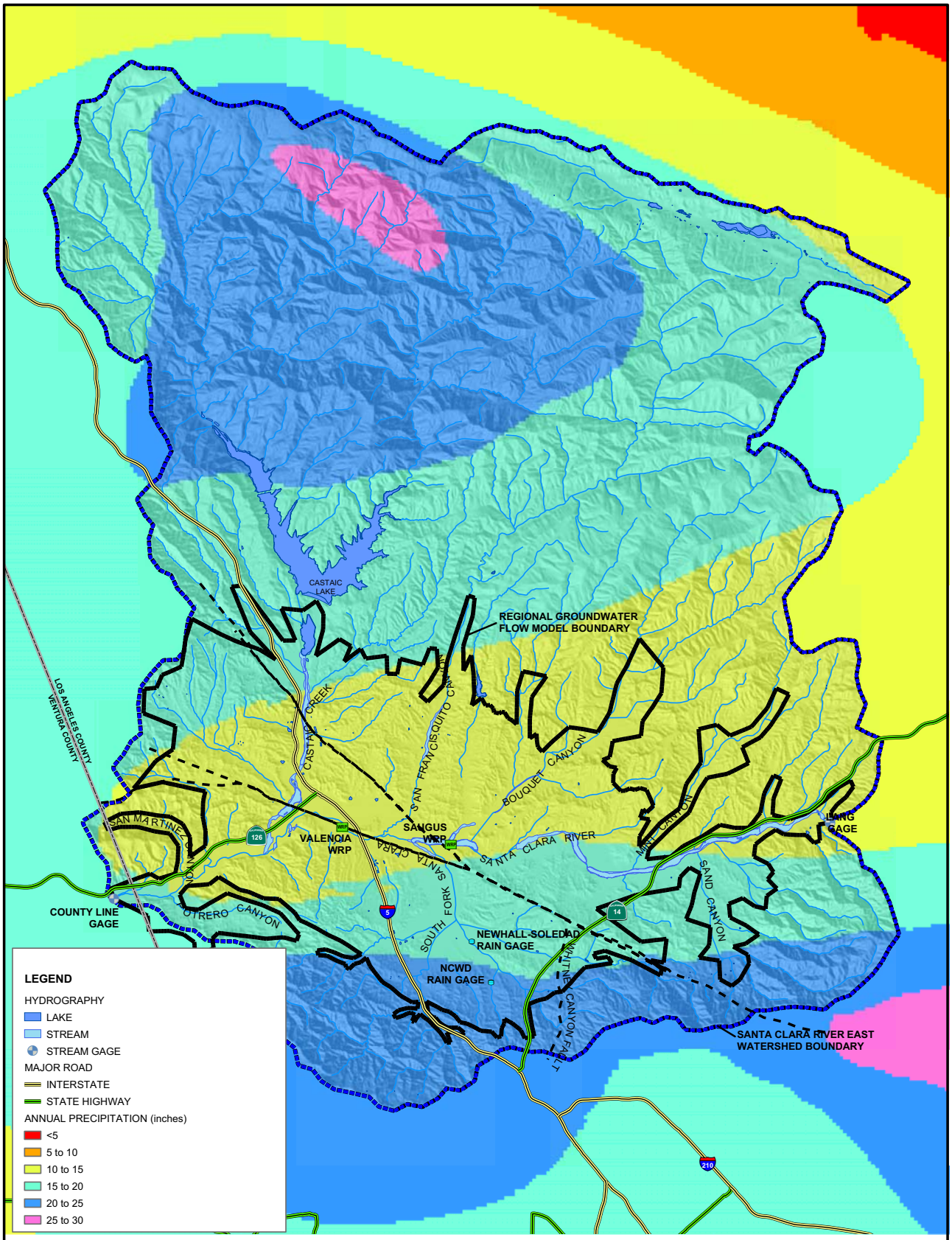


SOURCE: SEE THE INTERNET SITE HTTP://GIS.CA.GOV/META.EPL?OID=286 FOR MORE INFORMATION.

N

0 2.5 5 miles

**FIGURE 2-7**
**ISOHYETAL MAP SHOWING AVERAGE ANNUAL PRECIPITATION PATTERN FROM 1900 TO 1960**

ANALYSIS OF GROUNDWATER BASIN YIELD
UPPER SANTA CLARA RIVER GROUNDWATER BASIN
EAST SUBBASIN, LOS ANGELES COUNTY, CALIFORNIA

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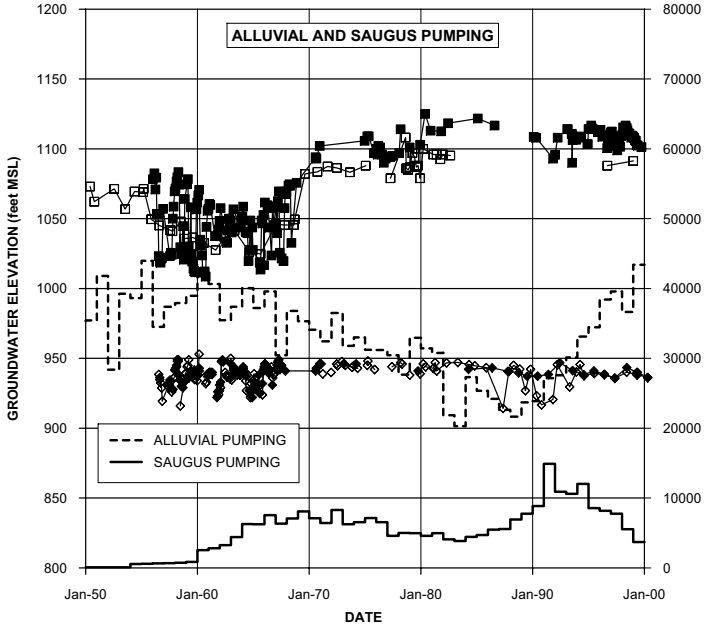


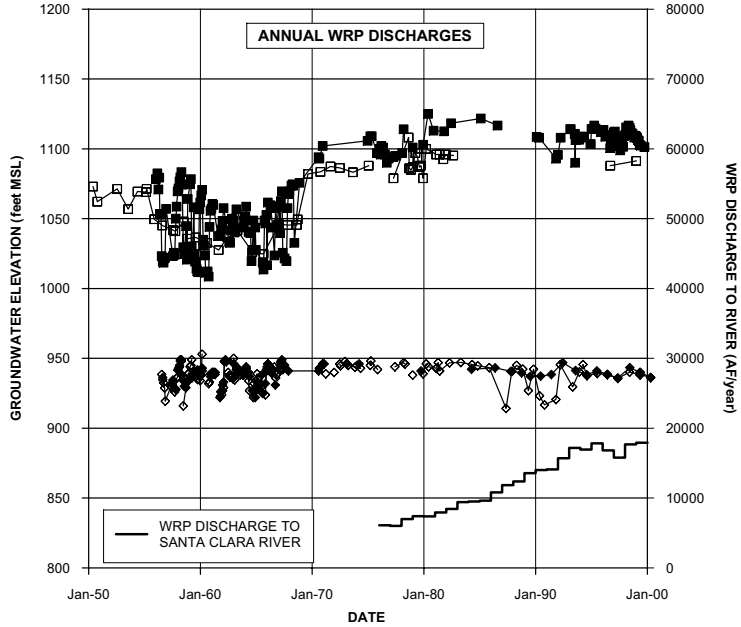


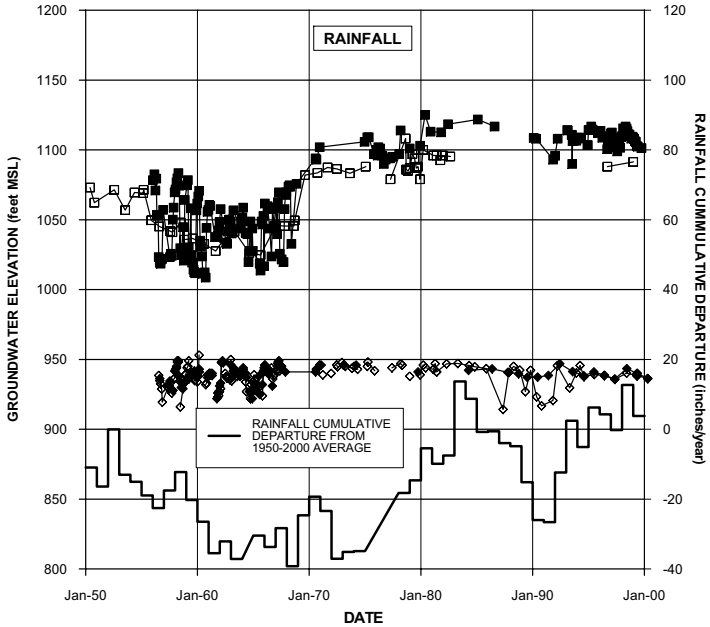


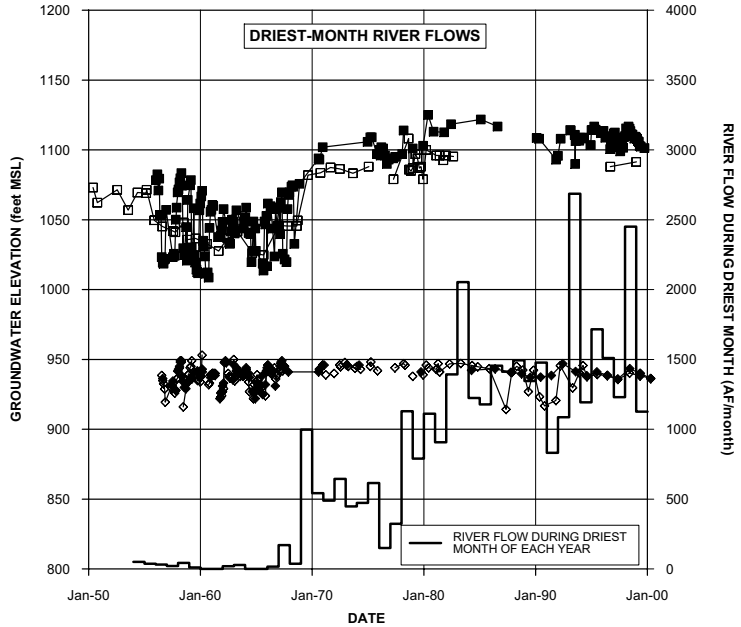


**LEGEND**

- ELEVATION OF GROUNDWATER IN VWC-N
- ELEVATION OF GROUNDWATER IN NLF-S
- ELEVATION OF GROUNDWATER IN NLF-C5
- ELEVATION OF GROUNDWATER IN NLF-C7

NOTES:

1. SEE FIGURE 2-4 FOR LOCATIONS OF WELLS. FORMER WELL NLF-S WAS LOCATED 940 feet SOUTHWEST OF WELL VWC-S6.
2. WRP = WATER RECLAMATION PLANT.

**FIGURE 2-8**
**ALLUVIAL GROUNDWATER ELEVATIONS VERSUS GROUNDWATER RECHARGE AND DISCHARGE MECHANISMS (1950 to 2000)**
ANALYSIS OF GROUNDWATER BASIN YIELD
UPPER SANTA CLARA RIVER GROUNDWATER BASIN
EAST SUBBASIN, LOS ANGELES COUNTY, CALIFORNIA

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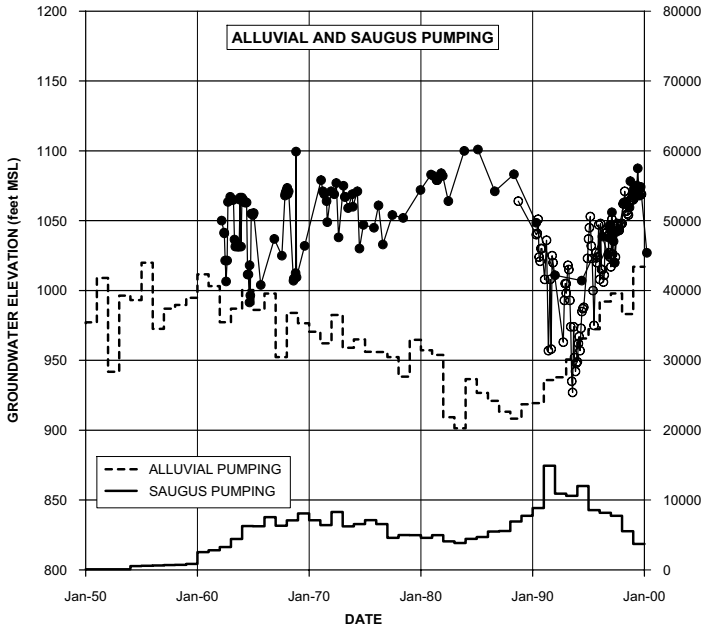
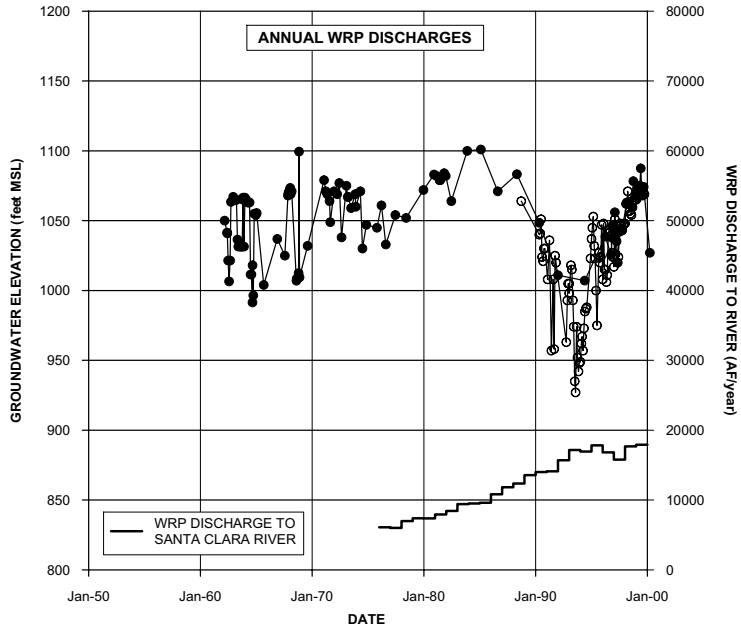


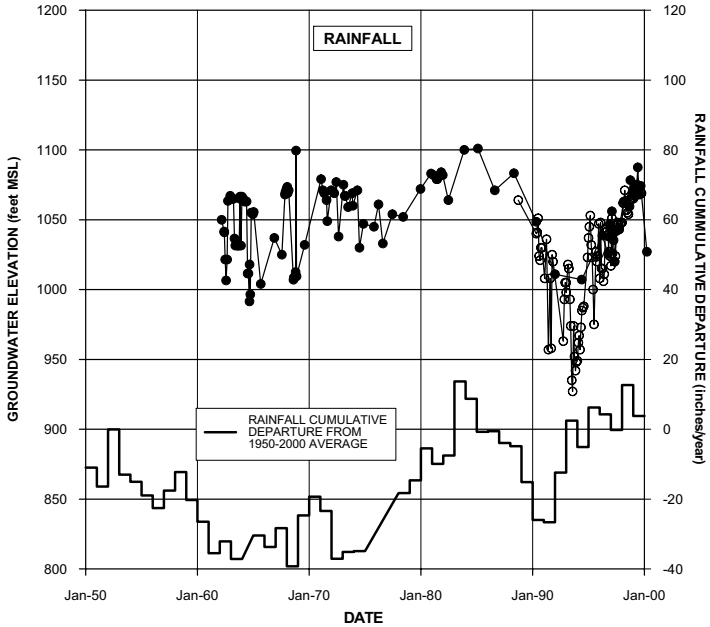




**LEGEND**

- ELEVATION OF GROUNDWATER IN VWC-157 (DESTROYED JANUARY 2005)
- ELEVATION OF GROUNDWATER IN SCWC-SAUGUS 2

NOTES:

1. SEE FIGURE 2-4 FOR LOCATIONS OF WELLS.
2. WRP = WATER RECLAMATION PLANT.



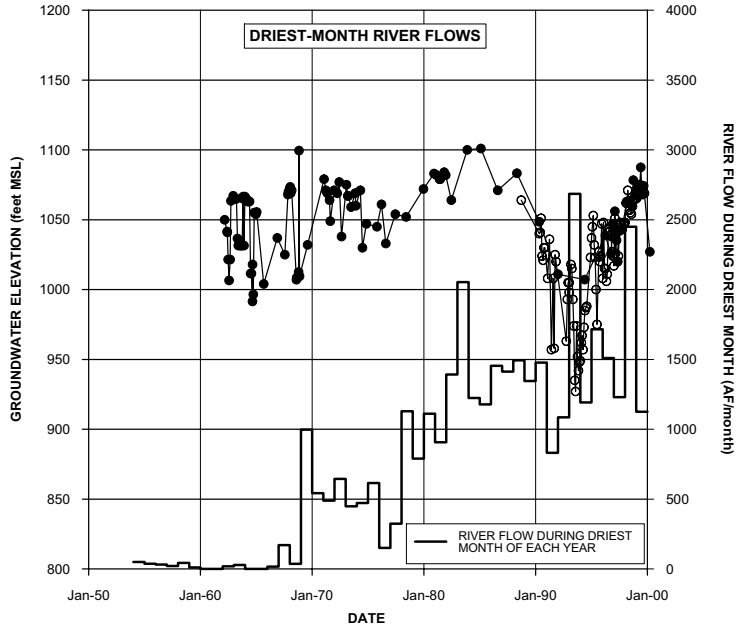




**FIGURE 2-9**
**SAUGUS GROUNDWATER ELEVATIONS CLOSEST TO SANTA CLARA RIVER VERSUS GROUNDWATER RECHARGE AND DISCHARGE MECHANISMS (1950 to 2000)**
ANALYSIS OF GROUNDWATER BASIN YIELD
UPPER SANTA CLARA RIVER GROUNDWATER BASIN
EAST SUBBASIN, LOS ANGELES COUNTY, CALIFORNIA

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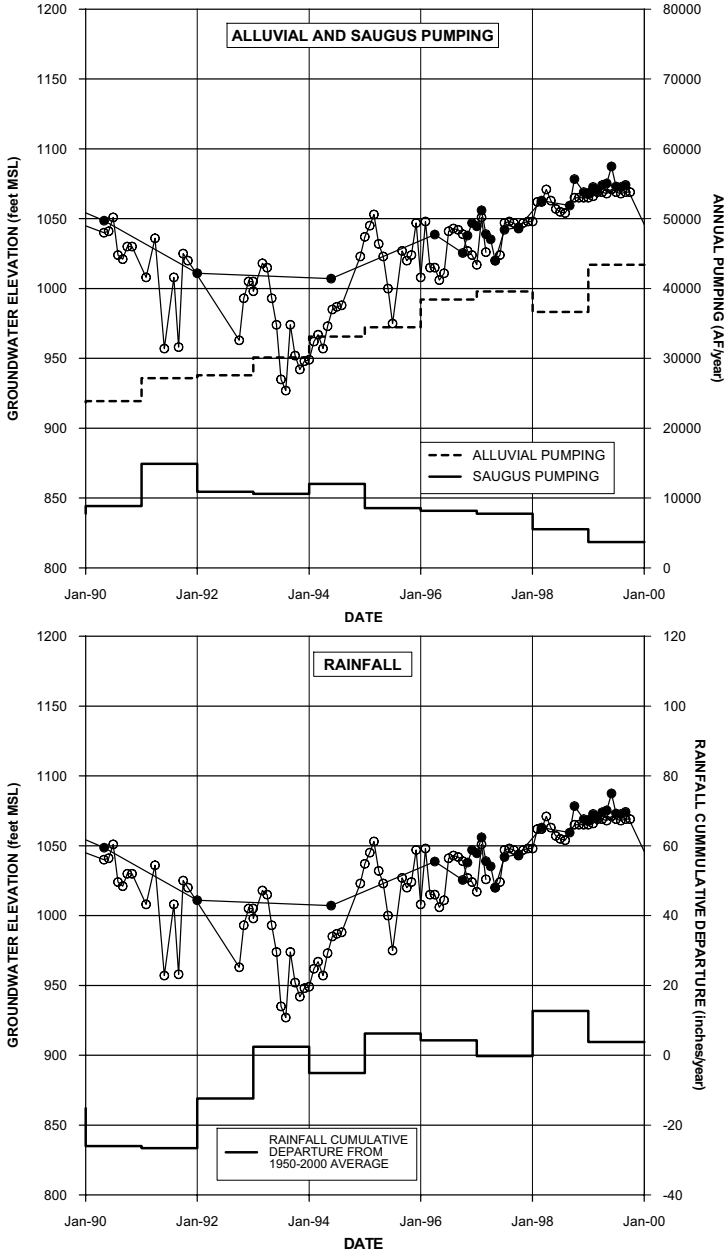


**LEGEND**

- ELEVATION OF GROUNDWATER IN VWC-157 (ABANDONED JANUARY 2005)
- ELEVATION OF GROUNDWATER IN SCWC-SAUGUS 2

NOTES:

1. SEE FIGURE 2-4 FOR LOCATIONS OF WELLS.
2. WRP = WATER RECLAMATION PLANT.

**FIGURE 2-10**
**SAUGUS GROUNDWATER ELEVATIONS CLOSEST TO SANTA CLARA RIVER VERSUS GROUNDWATER RECHARGE AND DISCHARGE MECHANISMS (1990 to 2000)**
ANALYSIS OF GROUNDWATER BASIN YIELD
UPPER SANTA CLARA RIVER GROUNDWATER BASIN
EAST SUBBASIN, LOS ANGELES COUNTY, CALIFORNIA

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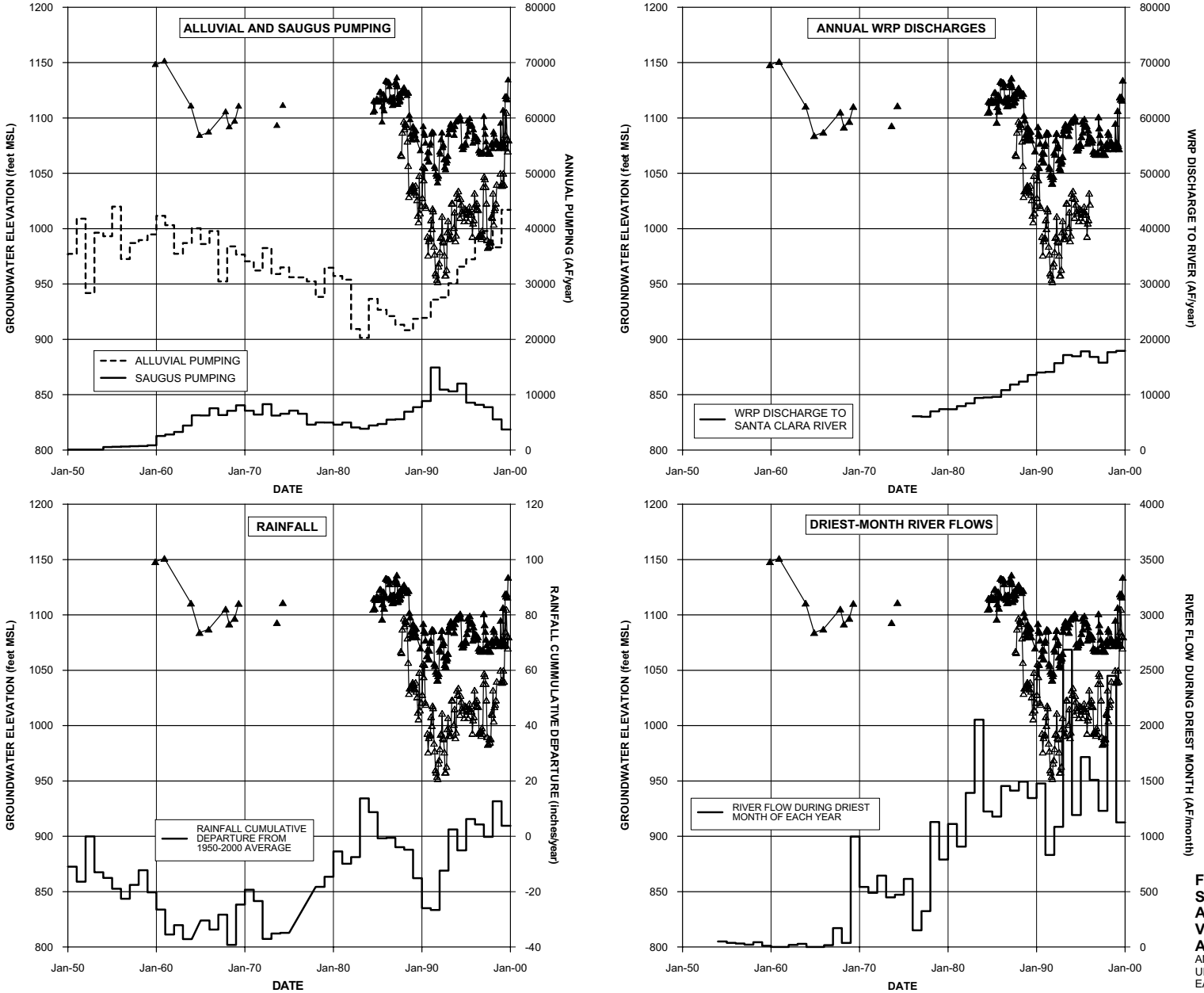


**LEGEND**

- ELEVATION OF GROUNDWATER IN NCWD-7
- ELEVATION OF GROUNDWATER IN NCWD-12

NOTES:

1. SEE FIGURE 2-4 FOR LOCATIONS OF WELLS.
2. WRP = WATER RECLAMATION PLANT.

**FIGURE 2-11**
**SAUGUS GROUNDWATER ELEVATIONS ALONG THE SOUTH FORK SANTA CLARA RIVER VERSUS GROUNDWATER RECHARGE AND DISCHARGE MECHANISMS (1950 to 2000)**
ANALYSIS OF GROUNDWATER BASIN YIELD
UPPER SANTA CLARA RIVER GROUNDWATER BASIN
EAST SUBBASIN, LOS ANGELES COUNTY, CALIFORNIA

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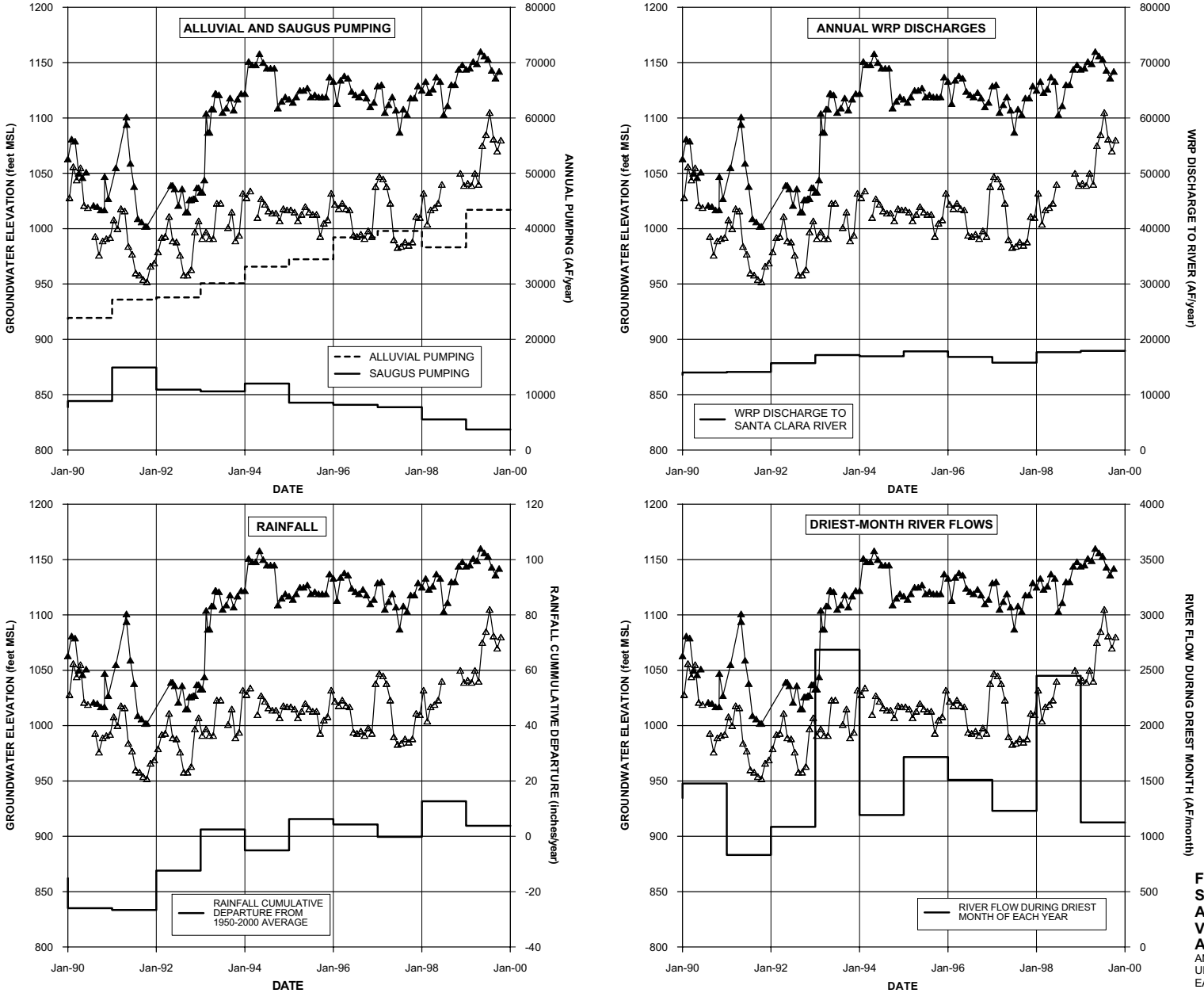


**LEGEND**

ELEVATION OF GROUNDWATER IN NCWD-10

ELEVATION OF GROUNDWATER IN NCWD-12

NOTES:

1. SEE FIGURE 2-4 FOR LOCATIONS OF WELLS.
2. WRP = WATER RECLAMATION PLANT.

**FIGURE 2-12**
**SAUGUS GROUNDWATER ELEVATIONS ALONG THE SOUTH FORK SANTA CLARA RIVER VERSUS GROUNDWATER RECHARGE AND DISCHARGE MECHANISMS (1990 to 2000)**

ANALYSIS OF GROUNDWATER BASIN YIELD
UPPER SANTA CLARA RIVER GROUNDWATER BASIN
EAST SUBBASIN, LOS ANGELES COUNTY, CALIFORNIA

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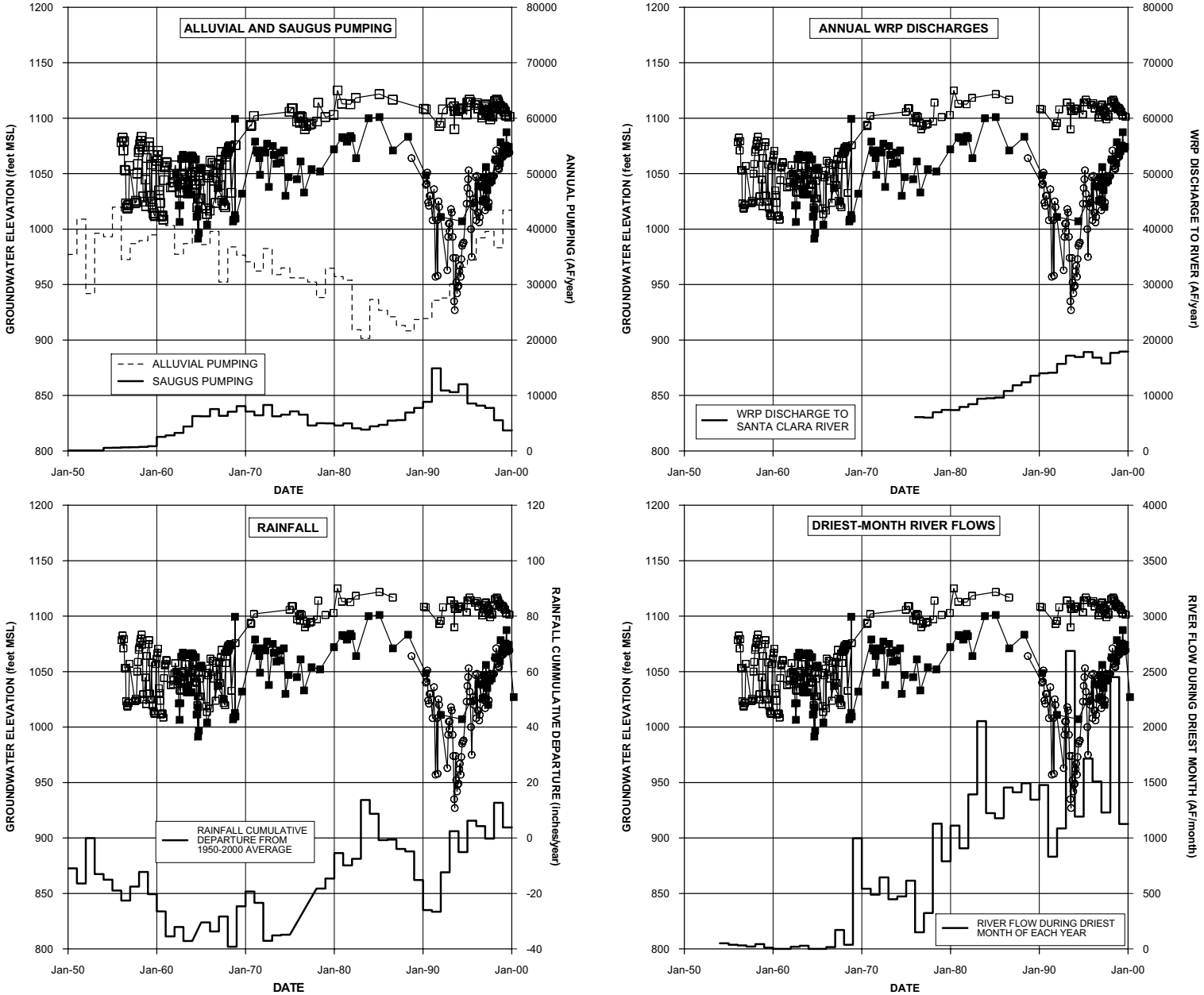


**LEGEND**

- ELEVATION OF GROUNDWATER IN VWC-N (ALLUVIUM)
- ELEVATION OF GROUNDWATER IN VWC-157 (SAUGUS)
- ELEVATION OF GROUNDWATER IN SCWC-SAUGUS 2 (SAUGUS)

NOTES:

1. SEE FIGURE 2-4 FOR LOCATIONS OF WELLS.
2. WRP = WATER RECLAMATION PLANT.

**FIGURE 2-13**
**GROUNDWATER ELEVATIONS IN ADJACENT ALLUVIAL AND SAUGUS WELLS VERSUS GROUNDWATER RECHARGE AND DISCHARGE MECHANISMS (1950 to 2000)**
ANALYSIS OF GROUNDWATER BASIN YIELD
UPPER SANTA CLARA RIVER GROUNDWATER BASIN
EAST SUBBASIN, LOS ANGELES COUNTY, CALIFORNIA

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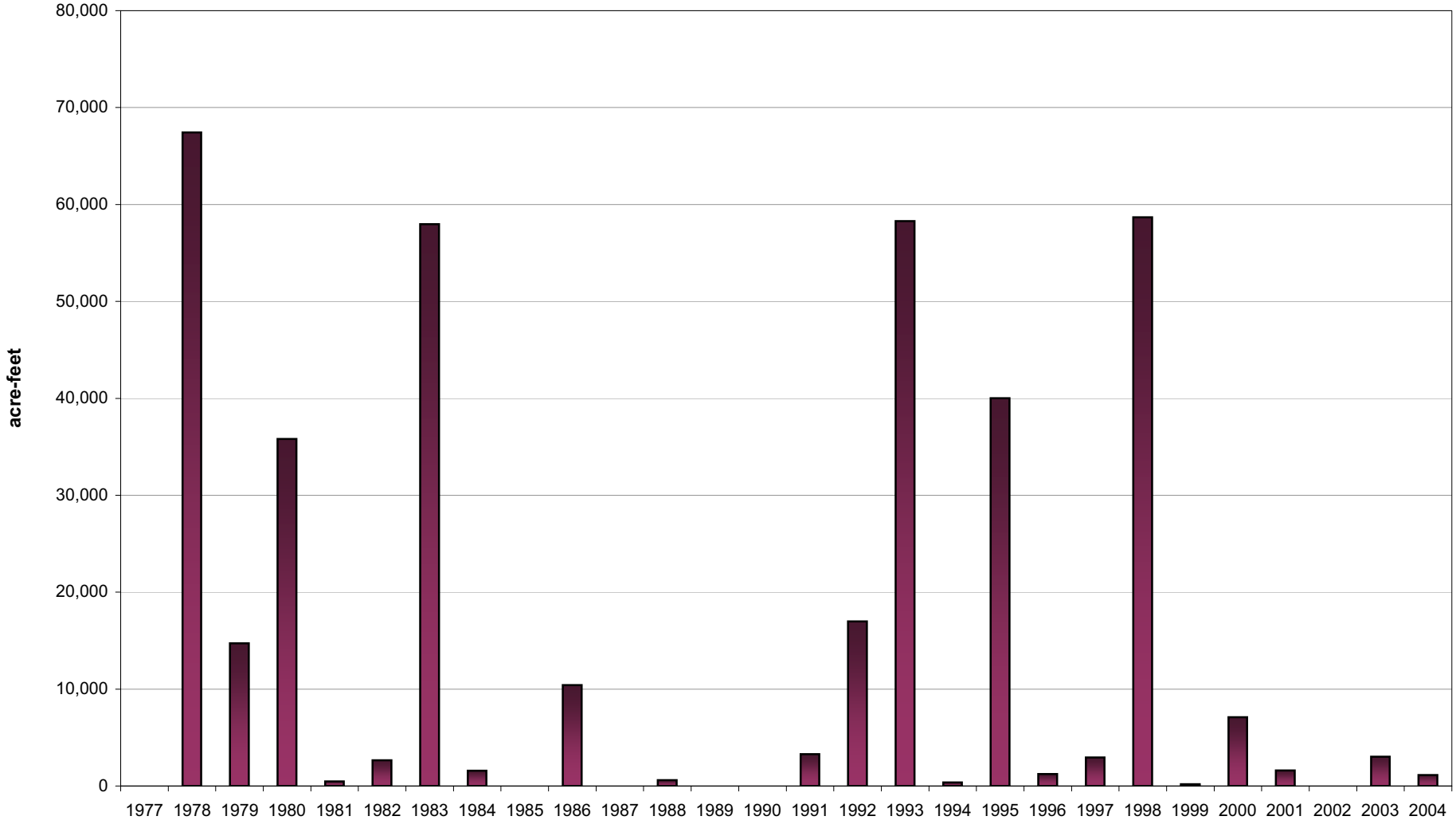


Note:
This chart shows the potential Flood Flows available during water years 1977 through 2004. Water Year 1977 is defined as October 1, 1976, through September 30, 1977, but the water is generally available only from October 1 through April 30.

**FIGURE 2-14**
**HISTORICAL CASTAIC CREEK FLOOD FLOWS AVAILABLE TO DOWNSTREAM USERS**
ANALYSIS OF GROUNDWATER BASIN YIELD
UPPER SANTA CLARA RIVER GROUNDWATER BASIN
EAST SUBBASIN, LOS ANGELES COUNTY, CALIFORNIA

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SECTION 3

# Modeling Approach for Analyzing Basin Yield

The approach to using the Regional Model for the basin yield analysis began with identifying a simulation period spanning several decades to capture short-term (year-to-year) and longer-term (multi-year) variations in pumping from both aquifer systems. Pumping was then assigned in the Regional Model in accordance with historical and current uses of each production well, and in consideration of how the pumping rate assignments are currently impacted by the presence of perchlorate in groundwater in specific areas. Regional Model simulation results were then studied to evaluate short-term and long-term trends in groundwater elevations, groundwater budgets, and river flows. This section presents the design details of this modeling evaluation.

## 3.1 Model Description

The Regional Model is a three-dimensional, numerical model that uses MicroFEM® finite-element software (Hemker and de Boer, 2003). The Regional Model covers the entire area underlain by the Saugus Formation, plus the portions of the Alluvial Aquifer that lie beyond the limits of the Saugus Formation. Figure 3-1 shows the model domain, along with its location relative to the upstream watersheds that contribute runoff into the model study area. The Regional Model's construction and calibration is summarized in Appendix B and discussed in detail in *Regional Groundwater Flow Model for the Santa Clarita Valley: Model Development and Calibration* (CH2M HILL, 2004a).

The Regional Model area largely coincides with the Santa Clara River Valley Groundwater Basin, East Subbasin, delineated by DWR, extending from the Lang stream gage at the eastern end of the valley to the County Line stream gage area in the west. The Regional Model is based on a finite-element mesh consisting of 7 layers, with 17,103 nodes and 32,496 elements in each layer. Figure 3-2 shows the spacing of the individual nodes that make up the grid. The upper model layer simulates the Alluvial Aquifer and also the upper portion of the Saugus Formation where the Alluvial Aquifer is not present. The underlying layers simulate the underlying freshwater Saugus Formation and its Sunshine Ranch Member. The layer representation is summarized schematically on Figure 3-3. Figure 3-4 shows the model layering in three cross-sectional views.

The boundary conditions in the model consist of the following:

1. Specified flux boundaries for the following:

    a. Precipitation
    b. Irrigation
    c. Recharge from ephemeral streams
    d. Pumping
    e. Underflow from beneath Castaic Dam

2. Head-dependent flux boundaries for the following:
   a. Groundwater discharges to the perennial reach of the Santa Clara River
   b. Residual drainage of groundwater to the Santa Clara River in the ephemeral reach under high water table conditions
   c. Evapotranspiration (ET) by phreatophyte plants, which extract groundwater from the shallow water table that lies along riparian river corridors
3. Constant-head boundaries for the following:
   a. Subsurface inflow in the Alluvial Aquifer at the eastern end of the valley, at the Lang gage[5]
   b. Subsurface outflow in the Alluvial Aquifer at the western end of the valley, at the County Line gage

Groundwater recharge rates are estimated using precipitation records; streamflow records; watershed maps; topographic maps; and aerial photography. These recharge rates are calculated using a detailed Surface Water Routing Model (SWRM), which was written specifically to provide time-dependent, spatially varying recharge rates as input to the Regional Model. The SWRM relies on streamflow records at the Lang and County Line gages; historical records of rainfall data from the NCWD rain gage (see Figure 1-1 for the location of this gage); spatial variations in rainfall across the basin (see Figure 2-7); and, for the basin yield analysis, the rates and locations of future WRP discharges to the Santa Clara River and irrigation from agricultural and urban water uses.

The depths from which production wells obtain water are defined in the Regional Model from well construction records. The rates and locations of pumping are based on the Purveyors' operating plan for the basin and on the surveyed location of each production well.

## 3.2 Modeling Approach

The process of designing the modeling analysis of the operating plan for the basin consisted of the following five activities:

1. Selecting a period over which to simulate groundwater conditions resulting from various pumping configurations
2. Defining pumping rates and schedules for each production well in the Santa Clarita Valley, considering the variability in pumping demands that occur due to cycles of drought and nondrought conditions and year-to-year variations in the availability of other water supplies
3. Defining the variation in local hydrology (rainfall, streamflows, and groundwater recharge) on a month-to-month basis throughout the simulation period

[5]A constant-head boundary was established in the Regional Model at this location using recent field conditions that were observed after the model calibration report (CH2M HILL, 2004a) was published. This change improved the Regional Model's calibration in the Alluvial Aquifer in the upper reaches of Soledad Canyon and did not appreciably change the calibration quality elsewhere. See CH2M HILL (2005) for further details.

4. Running the model to calculate time-varying (monthly) groundwater elevations and groundwater discharge terms throughout the multi-year simulation period
5. Evaluating the modeling results by examining forecasted time-series plots (hydrographs) of water budget terms and groundwater elevations to evaluate the effects of the operating plan in the Alluvial Aquifer, the Saugus Formation, and the Santa Clara River

These activities are described in further detail below.

## 3.3 Simulation Period

The locations and temporal variation in pumping from the Alluvial Aquifer were defined in the model from the operating plan and from historical records of the year-to-year variability in local hydrology. Simulated pumping from the Saugus Formation was defined from the operating plan, historical pumping records, and operational constraints and historical patterns of SWP water supply availability.

### 3.3.1 Selection of Simulation Period

Because the operating plan for the Saugus Formation is linked to the hydrology and operational constraints for the SWP system, the year-to-year variability in Saugus Formation pumping is, to a great extent, dependent on the hydrology outside the valley (i.e., in northern California). As shown in Table 3-1, local hydrology is often not a good indicator of local pumping conditions in the Saugus Formation, because local droughts and SWP droughts frequently do not coincide with each other. The following are examples:

1. In 1955, dry conditions in the SWP system coincided with approximately 14 inches of rainfall at the Newhall-Soledad rain gage, which is similar to the long-term median rainfall recorded at this gage.
2. In 1976 and 1977, the SWP system hydrology was critical, while the local hydrology during those years was near normal (1976) and wetter than normal (1977).
3. In 1987 and 1988, the SWP system hydrology was dry (1987) and critical (1988), while the local hydrology during those years was near normal (1987) and wetter than normal (1988).
4. In 1991 and 1992, the SWP system hydrology was in its fifth and sixth consecutive years of dry or critical hydrology, while the local hydrology was wetter than normal both years.
5. In 2001, dry conditions in the SWP system coincided with wetter-than-normal local conditions.

Consequently, it was decided that the model would need to be run over several decades to capture the year-to-year variability in the hydrology of each system, as well as the less frequent times when both systems experience similar hydrologic conditions (as occurred

periodically during the 1960s and in 1994). Historical records were then analyzed to identify a synthetic simulation period that would meet the following criteria:

1. The simulation time should be long enough to include an historical period that accounts for the year-to-year variations in local hydrology that have been observed in the past.
2. The period should be long enough to include longer-term (i.e., on the order of decades) periods of relatively dry conditions and relatively wet conditions.
3. The average rainfall during the simulation period should be similar to the average rainfall of 17.84 in/yr that was observed from 1950 through 2000 at the Newhall-Soledad gage.
4. The period should be sufficiently long to allow simulation of two occurrences of reduced SWP water supplies during the period 1990 through 1992, which corresponds to periods of increased pumping from the Saugus Formation under the operating plan.
5. The frequency of dry-year occurrences in the SWP system, corresponding to increased pumping from the Saugus Formation, should be similar to the historical frequency.
6. If necessary to meet other criteria, the simulation should repeat parts of this sequence before and/or after the historical sequence.

Examination of historical local hydrology and independent simulations of SWP deliveries resulted in the selection of a 78-year period over which the model was run, with monthly time steps. The 78-year period replicates the historical hydrology of the following years:

1. Years 1 through 24 = 1980 through 2003
2. Years 25 through 78 = 1950 through 2003

### 3.3.2 Relationship of Simulation Period to Variations in Alluvial Aquifer Pumping

Figure 3-5 shows the year-to-year rainfall in the valley and the cumulative departure from average rainfall for each year during the 78-year simulation period. The figure also shows each simulation year's corresponding historical year. The cumulative departure from average rainfall is plotted to show the occurrence of relatively wet versus relatively dry periods. A year-to-year decline in the slope of the cumulative departure curve indicates that conditions are dry, whereas a year-to-year increase indicates that rainfall is above normal. Also plotted are the occurrences of SWP droughts. The figure shows the following:

1. The first 19 years of the simulation period are generally wet, as a whole, though a multi-year drought occurs in years 5 through 12 (1984 through 1991).
2. A prolonged dry period begins in year 20, as indicated by the downward slope in the cumulative departure curve. This period lasts through year 39, as the curve starts to slope upward to the right beginning in year 40[6]. This 20-year period of generally dry conditions corresponds to the historical period 1999 through 2003, followed by 1950 through 1964.

[6]Year 40 is equivalent to historical year 1965, when rainfall was over 32 inches, or 2.2 times the long-term median rainfall and 1.8 times the long-term average rainfall.

3. Rainfall was generally at or above normal from years 40 through 45 (historical years 1965 through 1970), before a drought ensued from years 46 through 51 (historical years 1971 through 1976).

4. Rainfall was then generally above normal during years 52 through 58 (1977 through 1983), followed by the drought years 59 through 66 (1984 through 1991), the wetter-than-normal years 67 through 76 (1992 through 2001), and dry years 77 and 78 (2002 and 2003).

Table 3-2 shows the sequence of local hydrologic conditions and resulting valleywide pumping volumes for the Alluvial Aquifer that have been defined from the groundwater operating plan for the valley. The 78-year simulation period contains the following:

1. Twenty-four years of sporadic dry-year pumping, which is approximately 30 percent of the simulated 78-year period.

2. One drought consisting of 4 consecutive years of below-normal pumping (in years 34 through 37, based on historical hydrology from 1959 through 1962).

3. Two droughts consisting of 3 consecutive years of below-normal pumping (in years 10 through 12 and 64 through 66, both of which are based on historical hydrology from 1989 through 1991).

4. Three years (years 12, 37, and 66) when rainfall is near or above normal, but pumping is assigned at a dry-year rate because the year was preceded by a multi-year local drought.

### 3.3.3 Relationship of Simulation Period to Variations in Saugus Pumping

Table 3-3 shows the sequence of SWP droughts, SWP allocations, and resulting pumping volumes for the Saugus Formation that have been defined based on the CLWA and USBR analyses. With respect to Saugus Formation pumping, the 78-year period contains the following:

1. Two droughts lasting 2 years
2. Two droughts lasting 3 years
3. A dry year that occurs 2 years before the beginning of each 3-year drought
4. A dry year that begins 1 year after each 3-year drought has ended
5. A total of 18 dry years, or an average of 1 dry year approximately every 4 years
6. Sixty years of normal-year pumping from the Saugus Formation

## 3.4 Assignment of Pumping Rates

Pumping rates for Purveyor-owned wells and known private pumping wells (owned by the Newhall Land & Farming Company (NLF), the Wayside Honor Rancho, and Robinson Ranch) were assigned in accordance with the groundwater operating plan for the Santa Clarita Valley, which defines ranges of valleywide annual pumping, given the water supply needs of the Purveyors. Pumping rates at individual wells were also assigned using the recent and planned production schedules for each well, information on the depths and lengths of the intake sections (open intervals) of each well, and by incorporating current

plans addressing the presence of perchlorate in specific portions of the Saugus Formation and the Alluvial Aquifer.

As noted in the discussion of the groundwater operating plan in Section 2.2, the water management practices of the Purveyors recognize ongoing Alluvial Aquifer pumping for agricultural water supply, as well as other smaller private domestic and related pumping. For the last 7 years of formal annual water report preparation in the Santa Clarita Valley, those reports have included estimates of the latter private pumping. In recent years, that estimate has been 500 AF/yr. Initially in 2003, during the preparation of the Groundwater Management Plan (CLWA, 2003), and recently, during ongoing preparation of the 2005 UWMP, the Santa Clarita Valley Well Owners' Association submitted limited information about the nature and magnitude of private well pumping. The most notable input from the Well Owners' Association was its detailed estimate of private well pumping in the San Francisquito Canyon portion of the basin: a total of 85 AF/yr by 73 individual private pumpers, or an average of approximately 1.2 AF/yr per private well (equivalent to approximately 0.7 gallon per minute). As a result of that information, there is increased confidence that total private pumping in the basin by smaller users is within the 500 AF/yr estimate presented in recent annual water reports and is, therefore, approximately 1 percent of typical Alluvial Aquifer pumping by the Purveyors and other known private well owners (including agricultural pumpers) combined. However, the small private wells are not explicitly modeled in the basin yield analysis described herein because their locations and operations are not known, and their operation creates a pumping stress that is essentially negligible at the scale of the regional model. Ultimately, as discussed throughout this report, the intent to maintain overall pumping within the operating plan, including private pumping, will result in sustainable groundwater conditions to support the combination of municipal (Purveyor), agricultural, and private groundwater use on an ongoing basis. Thus, private well owners in the basin, like the large municipal and agricultural pumpers, can expect groundwater supplies to continue to be available as they have been in the past, with some fluctuations in water levels through wet and dry periods, but no long-term depletion of supply.

Details of pumping rate assignments for Purveyor-owned wells and known private pumping wells are discussed for the Alluvial Aquifer in Section 3.4.1 and for the Saugus Formation in Section 3.4.2. Section 3.4.3 discusses the monthly distribution of pumping for each well. Section 3.4.4 discusses how the pumping rate assignments relate to the presence of perchlorate in groundwater.

### 3.4.1 Variations in Alluvial Aquifer Pumping

Pumping rates at specific wells were assigned for normal and dry years using the operating plan and information on the capacity, recent and planned use, and location of each well. Figure 2-4 shows the locations of these wells and other wells in the valley. Table 3-4 compares recent annual pumping volumes at each Alluvial Aquifer well with the assumed future production rates at each well under normal and dry-year conditions. Most Alluvial Aquifer wells were specified to operate at similar rates regardless of year type. However, there were two exceptions, as follows:

1. Wells in the eastern portion of the basin (the NCWD-Pinetree wells, nine wells owned by SCWC, and the privately owned Robinson Ranch well) were assumed to have lower

pumping capacities during dry years than nondrought years because of lower groundwater elevations during dry periods. This assumption was based on historical observations indicating that the eastern portion of the Alluvial Aquifer, in contrast to other parts of the valley, experiences declines in water levels during dry periods.

2. Pumping was also reduced at NCWD's three operating wells in Castaic Valley, in accordance with recent pumping records from those wells.

### 3.4.2 Variations in Saugus Formation Pumping

Pumping rates at specific Saugus Formation production wells were assigned for each type of year (normal, dry year 1, dry year 2, and dry year 3) using the operating plan for the valley and information on the capacity, recent and planned use, and location of each well. Table 3-5 summarizes the annual pumping volumes at each Saugus Formation well[7]. Significant aspects of the pumping rate selection at each well are as follows:

1. Pumping from most existing Saugus Formation production wells was based on recent and planned use of these wells, as defined by the Purveyors. The simulation included increased dry-year pumping from the Saugus Formation in the western portion of the basin, where it is anticipated that future wells will be installed.

2. Each Saugus Formation production well has an intake section (open interval) that is significantly longer in vertical extent than the thicknesses of the individual layers that represent the Saugus Formation in the Regional Model. Consequently, the Saugus pumping rates were assigned to multiple layers in the model by considering the depths of the intake section of each well and the transmissivity of each model layer. Table 3-6 shows the allocation of pumping in each model layer for each Saugus Formation production well, along with the intake sections of each well and the model-simulated transmissivity in each layer at each well location.

### 3.4.3 Monthly Allocation of Pumping

Table 3-7 shows the allocation of pumping, by month, for agricultural and urban production wells in both the Saugus Formation and the Alluvial Aquifer. Separate distributions were used because agricultural demands are for exclusively outdoor uses, whereas urban demands are for both indoor and outdoor uses. As discussed in the model development report (CH2M HILL, 2004a), the monthly distribution of agricultural pumping was derived from crop consumptive use requirements published by the California Irrigation Management Information Service. The monthly distribution of urban demand was determined by examining historical monthly flow records for the two LACSD WRPs and monthly demand distributions recorded by the Purveyors during the past several years.

### 3.4.4 Influence of Perchlorate Contamination on Groundwater Pumping

In 1997, two Saugus Formation production wells owned by CLWA's Santa Clarita Water Division (formerly SCWC) (wells SCWC-Saugus1 and SCWC-Saugus2), one Saugus Formation production well owned by the Newhall County Water District (NCWD)

[7]Table 3-5 only lists wells that are anticipated to be operating in the future. Existing wells that are not listed in this table (such as NCWD-7 and NCWD-10) are currently not in service or pump very limited quantities of groundwater, and, therefore, are not expected to provide significant quantities of water in the future.

(well NCWD-11), and one Saugus Formation production well owned by VWC (well VWC-157) were shut down because perchlorate was detected in groundwater at these wells[8]. In 2002, an Alluvial Aquifer production well owned by SCWC (well SCWC-Stadium) was shut down because of perchlorate detection. In March 2005, an Alluvial Aquifer production well owned by VWC (well VWC-Q2) was shut down because of perchlorate detection. The locations of the six impacted production wells and nearby nonimpacted production wells are shown on Figure 3-6, along with the locations of monitoring wells and exploratory borings that have been installed to investigate the extent of perchlorate contamination. Figure 3-6 also shows perchlorate concentrations at locations where perchlorate has been detected in groundwater. At each of the six production wells, the detected perchlorate concentrations exceeded the State of California's Action Level (AL) for perchlorate at the time of the detection[9].

In 2003, the Purveyors entered into a voluntary cleanup agreement with the California Department of Toxic Substances Control whereby the Department of Toxic Substances Control provides review and oversight of the activities of the Purveyors in response to the perchlorate detections. The Purveyors have also initiated a process for approval by the California Department of Health Services, in accordance with its Policy 97-005, for restoration of water supply from "severely impaired" water sources, such as the perchlorate-impacted wells. Also in 2003, the Purveyors and the responsible party (the Whittaker Corporation) entered into an Interim Settlement Agreement. Activities since execution of the Interim Settlement Agreement have consisted of developing the elements of a remedial strategy that will entail pumping of two impacted wells for containment of perchlorate migration; treatment and subsequent use of the pumped water for water supply; and installation of replacement wells in non-impacted portions of the basin to restore the remainder of groundwater supply impacted by perchlorate. A noteworthy detail of these activities is that the Regional Model was used to identify the design of a pumping scheme that would meet the Purveyors' objectives for perchlorate containment in the Saugus Formation (CH2M HILL, 2004b).

With respect to perchlorate presence in the Alluvial Aquifer, the selection of pumping rates for the basin yield analysis was as follows:

1. Well SCWC-Stadium was simulated as pumping during each year of the 78-year simulation period. The Whittaker Corporation is developing plans to mitigate the source of perchlorate to the portion of the Alluvial Aquifer immediately north and downgradient of the Whittaker-Bermite property. The modeled pumping scenario simulates the possibility that the well will be returned to service in the future and pump at a rate similar to historical volumes after source mitigation activities have reduced perchlorate concentrations to undetectable levels in the Alluvial Aquifer at and near this well.

[8]As part of the ongoing implementation of perchlorate containment and restoration of impacted capacity, well VWC-157 was abandoned in January 2005 and replaced by new well VWC-206. Thus, this analysis includes planned pumping from replacement well VWC-206.

[9]The AL has varied over time. The California Department of Health Services initially established an AL of 18 micrograms per liter (μg/L) in 1997, at the same time the four impacted Saugus Formation production wells were taken offline. In 2002, the Department of Health Services revised the AL to 4 μg/L based on studies by the U.S. Environmental Protection Agency. In March 2004, the AL was revised to 6 μg/L based on a public health goal published by the Office of Environmental Health Hazard Assessment. See http://www.dhs.ca.gov/ps/ddwem/chemicals/perchl/actionlevel.htm for further details.

2. Well VWC-Q2 was simulated as pumping during each year of the 78-year simulation period. VWC and the Whittaker Corporation are currently implementing plans to install perchlorate treatment (ion exchange) facilities at the wellhead to remove perchlorate so that the well can be returned to service (LSCE, 2005b). VWC is working with USFilter to install and maintain this treatment and is preparing an application to amend its water supply permit to allow treatment at this well, which is expected to be returned to service by fall 2005. The perchlorate detected in well VWC-Q2 does not significantly impact the water supplies used to meet demand in the Santa Clarita Valley during the time required to respond to the contamination at this well (LSCE, 2005b).

With respect to perchlorate presence in the Saugus Formation, the Purveyors have developed a hydraulic containment plan for the Saugus Formation that consists of pumping from the SCWC-Saugus1 and SCWC-Saugus2 production wells. The three Saugus wells impacted by perchlorate had produced a combined average of 4,186 AF/yr of water during the 5 years preceding the detection of perchlorate. Restoration of that volume of water is currently planned to be achieved by reactivating wells SCWC-Saugus1 and SCWC-Saugus2, with treatment for removal of perchlorate, and by constructing replacement wells in other parts of the Saugus Formation not impacted by perchlorate. Full restoration of impacted water supply, including implementation of the containment plan, is currently scheduled for 2006. The containment plan will consist of (1) pumping groundwater on a nearly continual basis from production wells SCWC-Saugus1 and SCWC-Saugus2 production wells; (2) treating the pumped water using ion exchange resins followed by chlorine and ammonia disinfection; and (3) pumping the treated water to CLWA's Rio Vista Intake Pump Station for subsequent distribution for municipal water supply. This containment plan was developed to meet the following objectives, which were identified by the Purveyors:

1. Hydraulically contain perchlorate that is migrating westward in the Saugus Formation from the Whittaker-Bermite property toward the impacted production wells
2. Hydraulically contain perchlorate that is present at monitoring well MP-5 and production well VWC-157, which are located downgradient of the impacted wells
3. Protect downgradient production wells that are currently not impacted
4. Restore the annual volumes of water that were pumped from the impacted wells before they were shut down
5. Operate the impacted wells in a manner that is consistent with the groundwater operating plan
6. If possible, pump one or more of the impacted Saugus Formation production wells in a manner that also contains perchlorate migrating in the Alluvial Aquifer from the northern portion of the Whittaker-Bermite property

A detailed analysis of this perchlorate containment plan in the Saugus Formation is presented in *Final Report: Analysis of Perchlorate Containment in Groundwater Near the Whittaker-Bermite Property* (CH2M HILL, 2004b). The pumping plan described in that report for the SCWC-Saugus1 and SCWC-Saugus2 production wells was also used in the basin yield modeling evaluation. These wells were assumed to operate on a continuous basis to contain perchlorate in this portion of the Saugus Formation. The analysis assumed each well

would be offline 1 month each year for routine maintenance, but would otherwise operate on a continuous basis.

Additionally, for the previous evaluations of the containment plan and for the basin yield analysis, the third impacted production well (NCWD-11) was assumed to operate at a yield of 1,200 gallons per minute for a period of 5 months during the peak-demand season, providing a volume of 811 acre-feet that would be treated prior to entering the distribution system. Consequently, total pumping from the three perchlorate-impacted Saugus Formation production wells that will be returned to service (SCWC-Saugus1, SCWC-Saugus2, and NCWD-11) was simulated as 4,355 AF/yr. Total pumping from NCWD wells completed in the Saugus Formation was simulated as 3,441 AF/yr in normal years and 4,899 AF/yr in dry years, with pumping occurring from NCWD-11 and nearby production wells NCWD-12 and NCWD-13. Because they are closely spaced geographically, the three wells together form a pumping center in the Saugus Formation. Thus, although NCWD may choose to no longer use well NCWD-11, this analysis includes a pumping distribution that examines the sustainability of the Saugus Formation with a conservatively high pumping capacity at this pumping center.

## 3.5 Simulation Methods for Other Local Hydrologic Processes

In addition to groundwater pumping, infiltration from irrigation (from urban and agricultural lands), precipitation, and streamflows (stormwater and WRP discharges) were also modeled. These other local hydrologic processes were defined using the Surface Water Routing Model (SWRM), which is described in Appendix C to the Regional Model development and calibration report (CH2M HILL, 2004a). Key aspects of the derivation of these terms are described in the following sections.

### 3.5.1 Recharge from Urban Irrigation

Under existing land use and water use conditions, the estimated long-term infiltration rates of applied irrigation water beneath urban areas, under full build-out conditions in the valley, were estimated to be 1.0 in/yr for industrial and retail lands, 2.2 in/yr for residential developments and parks, and 4.6 in/yr for golf courses. These rates were applied during each year (and each month) of the 78-year simulation period. The areas over which these rates were applied were larger than under current conditions. The areas were defined from existing land use data and from LACSD mapping of projected future land uses in the rest of the Santa Clarita Valley under full build-out conditions[10]. Figure 3-7 shows the land use that was simulated in the model for full build-out conditions.

### 3.5.2 Recharge from Agricultural Irrigation

As discussed in the *Newhall Ranch Updated Water Resources Impact Evaluation* (CH2M HILL, 2002), irrigation of lands owned by NLF results in existing agricultural return flows. The source of most irrigation water is groundwater pumping from the Alluvial Aquifer, with some limited pumping occurring from one Saugus Formation well (NLF-156).

[10]LACSD land use mapping indicates that, including Newhall Ranch, approximately 14,000 acres of currently undeveloped land will be urbanized in the future within the Regional Model simulation area. Additional urbanization will also occur in areas that are within the watershed, but outside the Regional Model's boundaries.

Under full valley build-out conditions, the currently irrigated lands will no longer be irrigated because their water source will be used as part of the water supply for Newhall Ranch. Therefore, under full build-out conditions, no agricultural irrigation will occur within the area simulated by the Regional Model.

### 3.5.3 Precipitation Recharge

Infiltration from direct precipitation within the Regional Model domain was defined using data from the Newhall-Soledad and NCWD rain gages, an isohyet map of rainfall throughout the watershed, and a power-function equation developed by Turner (1986) that describes the relationship between annual rainfall and ET rates within the valley. Details concerning the derivation of precipitation infiltration rates from these data are contained in Appendix C to the Regional Model development and calibration report (CH2M HILL, 2004a). Table 3-8 lists the simulated monthly precipitation at the NCWD rain gage for the 78-year model period[11].

### 3.5.4 Stormwater Flows and Recharge from Streams

For each month of the simulation, the SWRM calculated the amounts of stormwater flow and groundwater recharge in all streams, plus the amount of flow and groundwater recharge arising from projected future WRP discharges to the Santa Clara River. For the Santa Clara River, the volume of streamflow was defined from measured and estimated streamflow data at the Lang gage (Table 3-9). For Castaic Creek, the volume of streamflow was defined from historical DWR operations and consideration of the hydrologic year type (Table 3-10). For the remaining Santa Clara River tributaries, streamflow volumes were defined by the SWRM using monthly rainfall data and the Turner (1986) relationship between rainfall, ET, and the subsequent yield from each watershed.

### 3.5.5 WRP Discharges to the Santa Clara River

Treated water is discharged to the Santa Clara River from two LACSD WRPs. As shown on Figure 1-1, the Saugus WRP discharges to the river immediately above the mouth of the South Fork Santa Clara River, and the Valencia WRP discharges to the river just west of Interstate 5.

Under full valley build-out conditions, future flows into and from WRPs will be higher than historical flows because of increased development and the associated increase in indoor water use volumes. Additionally, a portion of the future treated water will be reclaimed, as described in CLWA's recycled water master plan (Kennedy/Jenks Consultants, 2002). Future inflows to the Saugus and Valencia WRPs were estimated from projected future water demands and from comparisons of historical water use and measured inflows to both WRPs. Table 3-11 shows the derivation of urban water demands outside the Newhall Ranch development (which will be served by a new, separate WRP). Table 3-12 shows the total amount of treated water generated by the Saugus and Valencia WRPs, and the amount of this water that is reclaimed and discharged to the river, by month. The analysis assumes that the reclaimed water volume will be no more than 16,000 AF/yr, to maintain existing flow volumes in the Santa Clara River. For the Newhall Ranch WRP, discharges to the river

[11]The simulated monthly precipitation was defined from measurements at the NCWD gage from 1979 through 2003, as well as by combining the isohyet map with measurements at the Newhall-Soledad gage from 1950 through 1978.

will be 286 AF/yr, occurring primarily in December and January, when demands for reclaimed water are at their seasonal low. The total combined volumes of treated water discharged to the Santa Clara River under full valley build-out conditions (including Newhall Ranch) are summarized, by month, in Table 3-13. These rates were used in each year of the 78-year simulation.

### 3.5.6 Monthly Assignment and Tracking of Surface Water Budget

The month-by-month assignment of the rates and locations of surface water infiltration to the underlying Alluvial Aquifer system was performed by the SWRM using the procedures described in Section C.8.5 of Appendix C to the Regional Model development and calibration report (CH2M HILL, 2004a). Streambed infiltration capacities were the same as those used in the calibrated model. For each of the 78 years in the model simulation, the streambed infiltration capacity values were selected by matching the year to 1 of the 20 years (1980 through 1999) from the model calibration runs, using rainfall and streamflow data to select the corresponding streambed infiltration rates.

The SWRM also tracked the volume of surface water in each simulated stream that does not infiltrate during each month because of gaining stream conditions (i.e., rejected stream leakage). This rejected stream leakage was calculated to remain as surface water in the Santa Clara River and to eventually exit the Regional Model at the west end of the valley, at the County Line gage.

## 3.6 Running the Model and Evaluating Results

As discussed in the previous sections, the modeling evaluations were performed by simulating conditions on a monthly basis for the 78-year simulation period. The first step in this process consisted of running the SWRM to calculate the monthly distribution of recharge to the Alluvial Aquifer system (from rainfall, streamflow, irrigation, and WRP discharges) and recharge to the Saugus Formation (from rainfall and irrigation) in areas where the Alluvial Aquifer is not present. The output from the SWRM consisted of monthly files that assigned recharge to each node in the model grid.

The Regional Model was then run using monthly time steps, in which pumping and recharge terms were varied each month. The model was run by solving the groundwater flow equations for three time intervals during each month to improve the accuracy of the calculations. For each sub-interval of time, the model was run with a convergence criterion of 0.0001 foot for groundwater elevations and a water budget convergence criterion of 1 cubic foot per day. The model results were then evaluated by generating time-series plots (hydrographs) of water budget terms and groundwater elevations to evaluate the potential effects of the groundwater operating plan across the basin. The hydrographs were used to evaluate whether the operating plan is consistent with the objective of operating the basin in a manner that maintains long-term stability in groundwater levels and river flows. This analysis and its findings are presented in Section 4.

# Tables

**TABLE 3-1**
Historical Hydrology in Northern California and the Santa Clarita Valley, 1950 through 2003
*Analysis of Groundwater Basin Yield, Upper Santa Clara River Groundwater Basin, East Subbasin, Los Angeles County, California*

| Year | Northern California Hydrology[a] | Local Rainfall[b] |
|---|---|---|
| 1950 | Below Normal | 6.84 |
| 1951 | Above Normal | 12.42 |
| 1952 | Wet | 34.19 |
| 1953 | Wet | 4.88 |
| 1954 | Above Normal | 15.82 |
| 1955 | Dry | 13.91 |
| 1956 | Wet | 14.21 |
| 1957 | Above Normal | 22.85 |
| 1958 | Wet | 23.14 |
| 1959 | Below Normal | 9.81 |
| 1960 | Dry | 11.64 |
| 1961 | Dry | 8.82 |
| 1962 | Below Normal | 21.22 |
| 1963 | Wet | 12.79 |
| 1964 | Dry | 10.09 |
| 1965 | Wet | 32.28 |
| 1966 | Below Normal | 14.57 |
| 1967 | Wet | 23.23 |
| 1968 | Below Normal | 6.90 |
| 1969 | Wet | 32.42 |
| 1970 | Wet | 23.19 |
| 1971 | Wet | 13.75 |
| 1972 | Below Normal | 4.15 |
| 1973 | Above Normal | 19.79 |
| 1974 | Wet | 18.04 |
| 1975 | Wet | 10.92 |
| 1976 | Critical | 14.02 |
| 1977 | Critical | 20.87 |
| 1978 | Above Normal | 42.17 |
| 1979 | Below Normal | 21.47 |
| 1980 | Above Normal | 27.00 |
| 1981 | Dry | 13.42 |
| 1982 | Wet | 20.20 |
| 1983 | Wet | 39.07 |
| 1984 | Wet | 12.86 |

**TABLE 3-1**
Historical Hydrology in Northern California and the Santa Clarita Valley, 1950 through 2003
*Analysis of Groundwater Basin Yield, Upper Santa Clara River Groundwater Basin, East Subbasin, Los Angeles County, California*

| Year | Northern California Hydrology[a] | Local Rainfall[b] |
|---|---|---|
| 1985 | Dry | 8.37 |
| 1986 | Wet | 18.02 |
| 1987 | Dry | 14.45 |
| 1988 | Critical | 16.92 |
| 1989 | Dry | 7.56 |
| 1990 | Critical | 6.98 |
| 1991 | Critical | 17.21 |
| 1992 | Critical | 32.03 |
| 1993 | Above Normal | 32.72 |
| 1994 | Critical | 10.27 |
| 1995 | Wet | 29.15 |
| 1996 | Wet | 15.88 |
| 1997 | Wet | 13.35 |
| 1998 | Wet | 30.73 |
| 1999 | Wet | 8.96 |
| 2000 | Above Normal | 14.04 |
| 2001 | Dry | 22.24 |
| 2002 | Dry | 7.90 |
| 2003 | Above Normal | 15.70 |

[a]Defined by water year, using DWR's Sacramento Valley Unimpaired Runoff Index: wet = wettest; critical = driest.

[b]Records are for the Newhall-Soledad rain gage (Station No. FC32CE), in inches. As shown on Figure 2-6, the median and average rainfall at this gage from 1950 through 2002 were 14.57 in/yr and 17.84 in/yr, respectively.

**TABLE 3-2**
Local Hydrology and Corresponding Pumping from the Alluvial Aquifer for the 78-year Simulation
*Analysis of Groundwater Basin Yield, Upper Santa Clara River Groundwater Basin, East Subbasin, Los Angeles County, California*

| Model Year | Based on Historical Year | Local Rainfall (inches)[a] | Alluvial Aquifer Pumping under the Groundwater Operating Plan[b,c] (AF/yr) |
|---|---|---|---|
| 1 | 1980 | 27.00 | 35,000-40,000 |
| 2 | 1981 | 13.42 | 35,000-40,000 |
| 3 | 1982 | 20.20 | 35,000-40,000 |
| 4 | 1983 | 39.07 | 35,000-40,000 |
| 5 | 1984 | 12.86 | 35,000-40,000 |
| 6 | 1985 | 8.37 | 30,000-35,000 |
| 7 | 1986 | 18.02 | 35,000-40,000 |
| 8 | 1987 | 14.45 | 35,000-40,000 |
| 9 | 1988 | 16.92 | 35,000-40,000 |
| 10 | 1989 | 7.56 | 30,000-35,000 |
| 11 | 1990 | 6.98 | 30,000-35,000 |
| 12 | 1991 | 17.21 | 30,000-35,000 |
| 13 | 1992 | 32.03 | 35,000-40,000 |
| 14 | 1993 | 32.72 | 35,000-40,000 |
| 15 | 1994 | 10.27 | 30,000-35,000 |
| 16 | 1995 | 29.15 | 35,000-40,000 |
| 17 | 1996 | 15.88 | 35,000-40,000 |
| 18 | 1997 | 13.35 | 35,000-40,000 |
| 19 | 1998 | 30.73 | 35,000-40,000 |
| 20 | 1999 | 8.96 | 30,000-35,000 |
| 21 | 2000 | 14.04 | 35,000-40,000 |
| 22 | 2001 | 22.24 | 35,000-40,000 |
| 23 | 2002 | 7.90 | 30,000-35,000 |
| 24 | 2003 | 15.70 | 35,000-40,000 |
| 25 | 1950 | 6.84 | 30,000-35,000 |
| 26 | 1951 | 12.42 | 35,000-40,000 |
| 27 | 1952 | 34.19 | 35,000-40,000 |
| 28 | 1953 | 4.88 | 30,000-35,000 |
| 29 | 1954 | 15.82 | 35,000-40,000 |
| 30 | 1955 | 13.91 | 35,000-40,000 |
| 31 | 1956 | 14.21 | 35,000-40,000 |
| 32 | 1957 | 22.85 | 35,000-40,000 |
| 33 | 1958 | 23.14 | 35,000-40,000 |
| 34 | 1959 | 9.81 | 30,000-35,000 |
| 35 | 1960 | 11.64 | 30,000-35,000 |
| 36 | 1961 | 8.82 | 30,000-35,000 |
| 37 | 1962 | 21.22 | 30,000-35,000 |
| 38 | 1963 | 12.79 | 35,000-40,000 |
| 39 | 1964 | 10.09 | 30,000-35,000 |
| 40 | 1965 | 32.28 | 35,000-40,000 |
| 41 | 1966 | 14.57 | 35,000-40,000 |

**TABLE 3-2**
Local Hydrology and Corresponding Pumping from the Alluvial Aquifer for the 78-year Simulation
*Analysis of Groundwater Basin Yield, Upper Santa Clara River Groundwater Basin, East Subbasin, Los Angeles County, California*

| Model Year | Based on Historical Year | Local Rainfall (inches)[a] | Alluvial Aquifer Pumping under the Groundwater Operating Plan[b,c] (AF/yr) |
|---|---|---|---|
| 42 | 1967 | 23.23 | 35,000-40,000 |
| 43 | 1968 | 6.90 | 30,000-35,000 |
| 44 | 1969 | 32.42 | 35,000-40,000 |
| 45 | 1970 | 23.19 | 35,000-40,000 |
| 46 | 1971 | 13.75 | 35,000-40,000 |
| 47 | 1972 | 4.15 | 30,000-35,000 |
| 48 | 1973 | 19.79 | 35,000-40,000 |
| 49 | 1974 | 18.04 | 35,000-40,000 |
| 50 | 1975 | 10.92 | 30,000-35,000 |
| 51 | 1976 | 14.02 | 35,000-40,000 |
| 52 | 1977 | 20.87 | 35,000-40,000 |
| 53 | 1978 | 42.17 | 35,000-40,000 |
| 54 | 1979 | 21.47 | 35,000-40,000 |
| 55 | 1980 | 27.00 | 35,000-40,000 |
| 56 | 1981 | 13.42 | 35,000-40,000 |
| 57 | 1982 | 20.20 | 35,000-40,000 |
| 58 | 1983 | 39.07 | 35,000-40,000 |
| 59 | 1984 | 12.86 | 35,000-40,000 |
| 60 | 1985 | 8.37 | 30,000-35,000 |
| 61 | 1986 | 18.02 | 35,000-40,000 |
| 62 | 1987 | 14.45 | 35,000-40,000 |
| 63 | 1988 | 16.92 | 35,000-40,000 |
| 64 | 1989 | 7.56 | 30,000-35,000 |
| 65 | 1990 | 6.98 | 30,000-35,000 |
| 66 | 1991 | 17.21 | 30,000-35,000 |
| 67 | 1992 | 32.03 | 35,000-40,000 |
| 68 | 1993 | 32.72 | 35,000-40,000 |
| 69 | 1994 | 10.27 | 30,000-35,000 |
| 70 | 1995 | 29.15 | 35,000-40,000 |
| 71 | 1996 | 15.88 | 35,000-40,000 |
| 72 | 1997 | 13.35 | 35,000-40,000 |
| 73 | 1998 | 30.73 | 35,000-40,000 |
| 74 | 1999 | 8.96 | 30,000-35,000 |
| 75 | 2000 | 14.04 | 35,000-40,000 |
| 76 | 2001 | 22.24 | 35,000-40,000 |
| 77 | 2002 | 7.90 | 30,000-35,000 |
| 78 | 2003 | 15.70 | 35,000-40,000 |

[a]From records at Newhall-Soledad rain gage (Station No. FC32CE).

[b]Alluvial Aquifer pumping rates listed in this column will occur under the operating plan for the valley if the 1950 through 2003 local hydrology repeats itself in the future.

[c]Alluvial Aquifer pumping is set at the dry-year rate in years 12, 37, and 66 because each of these years is the first nondrought year that occurs after a multi-year drought ends.

**TABLE 3-3**
State Water Project Allocations and Corresponding Saugus Formation Pumping for the 78-year Simulation
*Analysis of Groundwater Basin Yield, Upper Santa Clara River Groundwater Basin, East Subbasin, Los Angeles County, California*

| Year | SWP Hydrology[a] | SWP Allocations[b] (%) | Simulated Saugus Pumping Conditions (AF/yr) |
|---|---|---|---|
| 1 | Above Normal | 90 | Normal (7,500-15,000) |
| 2 | Dry | 90 | Normal (7,500-15,000) |
| 3 | Wet | 100 | Normal (7,500-15,000) |
| 4 | Wet | 100 | Normal (7,500-15,000) |
| 5 | Wet | 100 | Normal (7,500-15,000) |
| 6 | Dry | 95 | Normal (7,500-15,000) |
| 7 | Wet | 70 | Normal (7,500-15,000) |
| 8 | Dry | 75 | Normal (7,500-15,000) |
| 9 | Critical | 15 | Dry Year 1 (15,000) |
| 10 | Dry | 95 | Normal (7,500-15,000) |
| 11 | Critical | 25 | Dry Year 1 (15,000) |
| 12 | Critical | 30 | Dry Year 2 (25,000) |
| 13 | Critical | 45 | Dry Year 3 (35,000) |
| 14 | Above Normal | 100 | Normal (7,500-15,000) |
| 15 | Critical | 50 | Dry Year 1 (15,000) |
| 16 | Wet | 80 | Normal (7,500-15,000) |
| 17 | Wet | 100 | Normal (7,500-15,000) |
| 18 | Wet | 100 | Normal (7,500-15,000) |
| 19 | Wet | 100 | Normal (7,500-15,000) |
| 20 | Wet | 100 | Normal (7,500-15,000) |
| 21 | Above Normal | 90 | Normal (7,500-15,000) |
| 22 | Dry | 39 | Dry Year 1 (15,000) |
| 23 | Dry | 70 | Normal (7,500-15,000) |
| 24 | Above Normal | 90 | Normal (7,500-15,000) |
| 25 | Below Normal | 90 | Normal (7,500-15,000) |
| 26 | Above Normal | 100 | Normal (7,500-15,000) |
| 27 | Wet | 100 | Normal (7,500-15,000) |
| 28 | Wet | 100 | Normal (7,500-15,000) |
| 29 | Above Normal | 100 | Normal (7,500-15,000) |
| 30 | Dry | 45 | Dry Year 1 (15,000) |
| 31 | Wet | 100 | Normal (7,500-15,000) |
| 32 | Above Normal | 90 | Normal (7,500-15,000) |
| 33 | Wet | 100 | Normal (7,500-15,000) |
| 34 | Below Normal | 85 | Normal (7,500-15,000) |
| 35 | Dry | 55 | Dry Year 1 (15,000) |
| 36 | Dry | 70 | Dry Year 2 (25,000) |
| 37 | Below Normal | 95 | Normal (7,500-15,000) |
| 38 | Wet | 100 | Normal (7,500-15,000) |
| 39 | Dry | 75 | Dry Year 1 (15,000) |
| 40 | Wet | 80 | Normal (7,500-15,000) |
| 41 | Below Normal | 100 | Normal (7,500-15,000) |
| 42 | Wet | 100 | Normal (7,500-15,000) |

**TABLE 3-3**
State Water Project Allocations and Corresponding Saugus Formation Pumping for the 78-year Simulation
*Analysis of Groundwater Basin Yield, Upper Santa Clara River Groundwater Basin, East Subbasin, Los Angeles County, California*

| Year | SWP Hydrology[a] | SWP Allocations[b] (%) | Simulated Saugus Pumping Conditions (AF/yr) |
|---|---|---|---|
| 43 | Below Normal | 90 | Normal (7,500-15,000) |
| 44 | Wet | 100 | Normal (7,500-15,000) |
| 45 | Wet | 100 | Normal (7,500-15,000) |
| 46 | Wet | 100 | Normal (7,500-15,000) |
| 47 | Below Normal | 75 | Normal (7,500-15,000) |
| 48 | Above Normal | 100 | Normal (7,500-15,000) |
| 49 | Wet | 100 | Normal (7,500-15,000) |
| 50 | Wet | 100 | Normal (7,500-15,000) |
| 51 | Critical | 75 | Dry Year 1 (15,000) |
| 52 | Critical | 4 | Dry Year 2 (25,000) |
| 53 | Above Normal | 100 | Normal (7,500-15,000) |
| 54 | Below Normal | 95 | Normal (7,500-15,000) |
| 55 | Above Normal | 90 | Normal (7,500-15,000) |
| 56 | Dry | 90 | Normal (7,500-15,000) |
| 57 | Wet | 100 | Normal (7,500-15,000) |
| 58 | Wet | 100 | Normal (7,500-15,000) |
| 59 | Wet | 100 | Normal (7,500-15,000) |
| 60 | Dry | 95 | Normal (7,500-15,000) |
| 61 | Wet | 70 | Normal (7,500-15,000) |
| 62 | Dry | 75 | Normal (7,500-15,000) |
| 63 | Critical | 15 | Dry Year 1 (15,000) |
| 64 | Dry | 95 | Normal (7,500-15,000) |
| 65 | Critical | 25 | Dry Year 1 (15,000) |
| 66 | Critical | 30 | Dry Year 2 (25,000) |
| 67 | Critical | 45 | Dry Year 3 (35,000) |
| 68 | Above Normal | 100 | Normal (7,500-15,000) |
| 69 | Critical | 50 | Dry Year 1 (15,000) |
| 70 | Wet | 80 | Normal (7,500-15,000) |
| 71 | Wet | 100 | Normal (7,500-15,000) |
| 72 | Wet | 100 | Normal (7,500-15,000) |
| 73 | Wet | 100 | Normal (7,500-15,000) |
| 74 | Wet | 100 | Normal (7,500-15,000) |
| 75 | Above Normal | 90 | Normal (7,500-15,000) |
| 76 | Dry | 39 | Dry Year 1 (15,000) |
| 77 | Dry | 70 | Normal (7,500-15,000) |
| 78 | Above Normal | 90 | Normal (7,500-15,000) |

[a]Defined by water year, using DWR's Sacramento Valley Unimpaired Runoff Index: wet = wettest; critical = driest.

[b]Defined from simulations performed by CLWA (Kennedy/Jenks Consultants, 2003) and USBR (2004) using the CALSIM II model. This condition is for the year 2020 level of development. In any given year, the allocation may be made up, in part, of carryover water from the prior year.

**TABLE 3-4**

Recent and Simulated Future Annual Groundwater Pumping Volumes from the Alluvial Aquifer

*Analysis of Groundwater Basin Yield, Upper Santa Clara River Groundwater Basin, East Subbasin, Los Angeles County, California*

| | | Historical Pumping | | | UWMP Pumping | |
|---|---|---|---|---|---|---|
| **Well Name** | **Location[a]** | **2001** | **2002** | **2003** | **Normal Years** | **Dry Years** |
| NCWD-Castaic 1 | Castaic Valley | 345 | 385 | 561 | 385 | 345 |
| NCWD-Castaic 2 | Castaic Valley | 166 | 0 | 123 | 166 | 125 |
| NCWD-Castaic 3 | Castaic Valley | 0 | 0 | 0 | 0 | 0 |
| NCWD-Castaic 4 | Castaic Valley | 100 | 47 | 56 | 100 | 45 |
| NCWD-Pinetree 1 | Mint Canyon | 164 | 0 | 0 | 164 | 0 |
| NCWD-Pinetree 2 | Mint Canyon | 0 | 0 | 0 | 0 | 0 |
| NCWD-Pinetree 3 | Mint Canyon | 566 | 544 | 525 | 545 | 525 |
| NCWD-Pinetree 4 | Mint Canyon | 300 | 5 | 0 | 300 | 0 |
| **NCWD Total** | | **1,641** | **981** | **1,265** | **1,660** | **1,040** |
| NLF-161 | Downstream of Valencia WRP | 496 | 485 | 2,021 | 485 | 485 |
| NLF-B10 | Downstream of Valencia WRP | 1,240 | 534 | 344 | 344 | 344 |
| NLF-B11 | Downstream of Valencia WRP | 205 | 232 | 271 | 232 | 232 |
| NLF-B5 | Downstream of Valencia WRP | 1,680 | 2,280 | 1,582 | 1,582 | 1,582 |
| NLF-B6 | Downstream of Valencia WRP | 1,312 | 2,175 | 1,766 | 1,766 | 1,766 |
| NLF-B7 | Downstream of Valencia WRP | 474 | 584 | 402 | 584 | 584 |
| NLF-C | Downstream of Valencia WRP | 1,319 | 1,720 | 1,373 | 1,373 | 1,373 |
| NLF-C3 | Downstream of Valencia WRP | 93 | 192 | 186 | 192 | 192 |
| NLF-C4 | Downstream of Valencia WRP | 1,028 | 809 | 764 | 809 | 809 |
| NLF-C5 | Downstream of Valencia WRP | 680 | 850 | 622 | 850 | 850 |
| NLF-C6 | Downstream of Valencia WRP | 231 | 241 | 108 | 241 | 241 |
| NLF-C7 | Downstream of Valencia WRP | 741 | 866 | 443 | 866 | 866 |
| NLF-C8 | Downstream of Valencia WRP | 293 | 594 | 408 | 594 | 594 |
| NLF-E | Castaic Valley | 1,691 | 16 | 28 | 16 | 16 |
| NLF-E2 | Castaic Valley | 141 | 55 | 14 | 55 | 55 |
| NLF-E4 | Downstream of Valencia WRP | 0 | 0 | 0 | 0 | 0 |
| NLF-E5 | Downstream of Valencia WRP | 172 | 679 | 537 | 679 | 679 |
| NLF-E9 | Downstream of Valencia WRP | 238 | 814 | 47 | 814 | 814 |
| NLF-G45 | Downstream of Valencia WRP | 291 | 283 | 60 | 283 | 283 |
| NLF-W4 | San Francisquito Canyon[b] | 46 | 1 | 0 | 0 | 0 |
| NLF-W5 | San Francisquito Canyon | 276 | 104 | 23 | 107 | 107 |
| NLF-X3 | Downstream of Valencia WRP | 12 | 0 | 0 | 0 | 0 |
| **NLF Total** | | **12,659** | **13,514** | **10,999** | **11,872** | **11,872** |
| SCWD-Clark | Bouquet Canyon | 696 | 782 | 712 | 782 | 700 |
| SCWD-Guida | Bouquet Canyon | 1,047 | 1,320 | 1,230 | 1,320 | 1,230 |
| SCWD-Honby | Above Saugus WRP | 721 | 696 | 874 | 696 | 870 |
| SCWD-Lost Canyon 2 | Mint Canyon | 741 | 730 | 644 | 741 | 640 |
| SCWD-Lost Canyon 2A | Mint Canyon | 1,034 | 905 | 593 | 1,034 | 590 |
| SCWD-Mitchell #5A | Mint Canyon | 407 | 143 | 19 | 0 | 0 |
| SCWD-Mitchell #5B | Mint Canyon | 0 | 150 | 0 | 557 | 0 |
| SCWD-N. Oaks Central | Mint Canyon | 822 | 1,646 | 1,641 | 822 | 1,640 |
| SCWD-N. Oaks East | Mint Canyon | 1,234 | 448 | 485 | 1,234 | 485 |
| SCWD-N. Oaks West | Mint Canyon | 898 | 1,123 | 31 | 898 | 0 |
| SCWD-Sand Canyon | Mint Canyon | 930 | 705 | 195 | 930 | 195 |
| SCWD-Sierra | Mint Canyon | 846 | 87 | 0 | 846 | 0 |
| SCWD-Stadium | Above Saugus WRP | 565 | 778 | 0 | 800 | 800 |
| **SCWD Total** | | **9,941** | **9,513** | **6,424** | **10,660** | **7,150** |

**TABLE 3-5**
Simulated Annual Groundwater Pumping from the Saugus Formation for the 78-year Simulation
*Analysis of Groundwater Basin Yield, Upper Santa Clara River Groundwater Basin, East Subbasin, Los Angeles County, California*

| Owner | Well Name | Normal Years | Dry Year 1 | Dry Year 2 | Dry Year 3 |
|---|---|---|---|---|---|
| NCWD | 11 | 811 | 811 | 811 | 811 |
| | 12 | 1,315 | 2,044 | 2,044 | 2,044 |
| | 13 | 1,315 | 2,044 | 2,044 | 2,044 |
| **Total Pumping (NCWD)** | | **3,441** | **4,899** | **4,899** | **4,899** |
| NLF | 156 | 369 | 369 | 369 | 369 |
| **Total Pumping (NLF)** | | **369** | **369** | **369** | **369** |
| SCWC | Saugus1 | 1,772 | 1,772 | 1,772 | 1,772 |
| | Saugus2 | 1,772 | 1,772 | 1,772 | 1,772 |
| **Total Pumping (SCWC)** | | **3,544** | **3,544** | **3,544** | **3,544** |
| VWC | 159 | 50 | 50 | 50 | 50 |
| | 160 (Municipal) | 500 | 830 | 830 | 830 |
| | 160 (Valencia Country Club) | 500 | 500 | 500 | 500 |
| | 201 | 100 | 100 | 3,577 | 3,577 |
| | 205 | 1,000 | 2,734 | 3,827 | 3,827 |
| | 206 | 1,175 | 2,734 | 3,500 | 3,500 |
| **Total Pumping (VWC)** | | **3,325** | **6,948** | **12,284** | **12,284** |
| To Be Determined | Future #1 | 0 | 0 | 3,250 | 3,250 |
| | Future #2 | 0 | 0 | 0 | 3,250 |
| | Future #3 | 0 | 0 | 0 | 3,250 |
| | Future #4 | 0 | 0 | 0 | 3,250 |
| **Total Pumping (Future)** | | **0** | **0** | **3,250** | **13,000** |
| **Total Saugus Formation Pumping** | | **10,679** | **15,760** | **24,346** | **34,096** |

Notes:

All pumping volumes are listed in acre-feet.

Wells VWC-157 and NCWD-7, 8, 9, and 10 are assumed to no longer operate in the future.

**TABLE 3-6**

Allocation of Pumping by Layer for Wells Completed in the Saugus Formation

*Analysis of Groundwater Basin Yield, Upper Santa Clara River Groundwater Basin, East Subbasin, Los Angeles County, California*

| Well Owner - Well Name | Model Layer | Depth to Open Interval (feet) Top | Bottom | Length of Open Interval in Model Layer (feet) | Kh (ft/day) | T in Open Interval ($ft^2$/day) | Percentage of Yield from Model Layer |
|---|---|---|---|---|---|---|---|
| NCWD-11 | 2 | 200 | 1,075 | 300 | 10 | 3,000 | 72.3 |
| | 3 | | | 500 | 2 | 1,000 | 24.1 |
| | 4 | | | 75 | 2 | 150 | 3.6 |
| NCWD-12 | 2 | 485 | 1,280 | 15 | 10 | 150 | 8.8 |
| | 3 | | | 500 | 2 | 1,000 | 58.5 |
| | 4 | | | 280 | 2 | 560 | 32.7 |
| NCWD-13 | 2 | 420 | 750 | 80 | 10 | 800 | 61.5 |
| | 3 | | | 250 | 2 | 500 | 38.5 |
| NLF-156 | 2 | 320 | 1,800 | 180 | 10 | 1,800 | 21.8 |
| | 3 | | | 500 | 6.5 | 3,250 | 39.4 |
| | 4 | | | 500 | 4 | 2,000 | 24.2 |
| | 5 | | | 300 | 4 | 1,200 | 14.5 |
| SCWC-Saugus1 | 2 | 490 | 1,620 | 10 | 10 | 100 | 1.8 |
| | 3 | | | 500 | 6.5 | 3,250 | 59.9 |
| | 4 | | | 500 | 4 | 2,000 | 36.8 |
| | 5 | | | 20 | 4 | 80 | 1.5 |
| SCWC-Saugus2 | 2 | 490 | 1,591 | 10 | 10 | 100 | 1.7 |
| | 3 | | | 500 | 6.5 | 3,250 | 56.9 |
| | 4 | | | 500 | 4 | 2,000 | 35.0 |
| | 5 | | | 91 | 4 | 364 | 6.4 |
| VWC-159 | 3 | 662 | 1,900 | 338 | 0.025 | 8.45 | 27.3 |
| | 4 | | | 500 | 0.025 | 12.5 | 40.4 |
| | 5 | | | 400 | 0.025 | 10 | 32.3 |
| VWC-160 | 3 | 950 | 2,000 | 50 | 6.5 | 325 | 7.6 |
| | 4 | | | 500 | 4 | 2,000 | 46.2 |
| | 5 | | | 500 | 4 | 2,000 | 46.2 |
| VWC-201 | 3 | 540 | 1,670 | 460 | 6.5 | 2,990 | 52.7 |
| | 4 | | | 500 | 4 | 2,000 | 35.3 |
| | 5 | | | 170 | 4 | 680 | 12.0 |
| VWC-205 | 3 | 820 | 1,930 | 180 | 6.5 | 1,170 | 23.9 |
| | 4 | | | 500 | 4 | 2,000 | 40.9 |
| | 5 | | | 430 | 4 | 1,720 | 35.2 |
| VWC-206 | 3 | 500 | 2,000 | 500 | 6.5 | 3,250 | 44.8 |
| | 4 | | | 500 | 4 | 2,000 | 27.6 |
| | 5 | | | 500 | 4 | 2,000 | 27.6 |

**TABLE 3-6**

Allocation of Pumping by Layer for Wells Completed in the Saugus Formation

*Analysis of Groundwater Basin Yield, Upper Santa Clara River Groundwater Basin, East Subbasin, Los Angeles County, California*

| Well Owner - Well Name | Model Layer | Depth to Open Interval (feet) Top | Bottom | Length of Open Interval in Model Layer (feet) | Kh (ft/day) | T in Open Interval ($ft^2$/day) | Percentage of Yield from Model Layer |
|---|---|---|---|---|---|---|---|
| Future Wells | 3 | 820 | 1,930 | 180 | 6.5 | 1,170 | 23.9 |
| Near VWC-206 | 4 | | | 500 | 4 | 2,000 | 40.9 |
| (Assumed) | 5 | | | 430 | 4 | 1,720 | 35.2 |

Notes:

Existing wells NCWD-7 and NCWD-10 are assumed to no longer operate in the future.

Kh = horizontal hydraulic conductivity
T = transmissivity
ft/day = feet per day
$ft^2$/day = square feet per day

**TABLE 3-7**
Allocation of Pumping, by Month, for Agricultural and Urban Production Wells
*Analysis of Groundwater Basin Yield, Upper Santa Clara River Groundwater Basin, East Subbasin, Los Angeles County, California*

| Month | Percent of Annual Water Use, Agricultural | Percent of Annual Water Use, Urban | Percent of May through October Water Use, Urban |
|---|---|---|---|
| January | 3.75 | 5.2 | |
| February | 5.10 | 3.7 | |
| March | 6.60 | 5.2 | |
| April | 9.10 | 6.6 | |
| May | 10.55 | 8.7 | 13.2 |
| June | 11.40 | 10.4 | 15.8 |
| July | 14.10 | 13.0 | 19.7 |
| August | 12.95 | 13.6 | 20.6 |
| September | 10.20 | 10.9 | 16.6 |
| October | 7.50 | 9.3 | 14.1 |
| November | 5.00 | 7.1 | |
| December | 3.75 | 6.3 | |
| **Total** | **100.0** | **100.0** | **100.0** |

**TABLE 3-8**

Simulated Monthly Precipitation at the Newhall County Water District Rain Gage for the 78-year Simulation

*Analysis of Groundwater Basin Yield, Upper Santa Clara River Groundwater Basin, East Subbasin, Los Angeles County, California*

| Year | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Annual |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 10.36 | 14.63 | 4.84 | 0.36 | 0.40 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.36 | 31.95 |
| 2 | 4.76 | 1.66 | 5.50 | 0.46 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.58 | 3.62 | 0.22 | 16.80 |
| 3 | 3.33 | 1.21 | 9.50 | 1.09 | 0.13 | 0.00 | 0.00 | 0.00 | 1.02 | 0.25 | 5.34 | 2.95 | 24.82 |
| 4 | 8.67 | 6.85 | 13.07 | 4.61 | 0.20 | 0.00 | 0.00 | 1.17 | 1.85 | 1.74 | 5.04 | 5.13 | 48.33 |
| 5 | 0.00 | 0.00 | 0.27 | 0.07 | 0.00 | 0.00 | 0.00 | 0.00 | 0.05 | 0.16 | 3.87 | 8.13 | 12.55 |
| 6 | 0.78 | 1.20 | 1.04 | 0.14 | 0.07 | 0.00 | 0.06 | 0.00 | 0.12 | 0.54 | 5.11 | 0.70 | 9.76 |
| 7 | 5.84 | 6.65 | 5.39 | 0.88 | 0.00 | 0.00 | 0.05 | 0.00 | 1.78 | 0.68 | 1.55 | 0.24 | 23.06 |
| 8 | 2.10 | 0.61 | 1.69 | 0.14 | 0.00 | 0.00 | 0.09 | 0.02 | 0.00 | 3.47 | 3.84 | 4.80 | 16.76 |
| 9 | 3.27 | 3.39 | 1.16 | 3.98 | 0.09 | 0.00 | 0.00 | 0.00 | 0.10 | 0.00 | 0.92 | 7.14 | 20.05 |
| 10 | 0.89 | 4.13 | 1.30 | 0.30 | 0.00 | 0.00 | 0.00 | 0.00 | 0.62 | 0.86 | 0.37 | 0.00 | 8.47 |
| 11 | 2.89 | 4.23 | 0.22 | 0.48 | 0.88 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.63 | 0.01 | 9.34 |
| 12 | 1.11 | 5.72 | 11.33 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.50 | 0.00 | 5.95 | 24.61 |
| 13 | 3.28 | 16.64 | 9.73 | 0.15 | 0.34 | 0.00 | 0.30 | 0.00 | 0.00 | 1.55 | 0.00 | 7.25 | 39.24 |
| 14 | 17.11 | 11.73 | 4.27 | 0.00 | 0.00 | 0.65 | 0.00 | 0.00 | 0.00 | 0.57 | 0.75 | 1.00 | 36.08 |
| 15 | 0.48 | 5.31 | 2.33 | 0.42 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.78 | 0.71 | 1.94 | 11.97 |
| 16 | 21.98 | 1.93 | 8.30 | 0.72 | 0.26 | 0.76 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 2.33 | 36.28 |
| 17 | 2.97 | 6.73 | 2.08 | 0.13 | 0.68 | 0.00 | 0.00 | 0.00 | 0.00 | 1.30 | 1.06 | 8.70 | 23.65 |
| 18 | 6.67 | 0.23 | 0.00 | 0.00 | 0.00 | 0.00 | 0.05 | 0.00 | 0.53 | 0.00 | 3.73 | 6.72 | 17.93 |
| 19 | 3.49 | 22.00 | 3.98 | 2.28 | 5.50 | 0.06 | 0.00 | 0.00 | 0.21 | 0.33 | 1.36 | 1.39 | 40.60 |
| 20 | 2.08 | 0.65 | 3.00 | 3.78 | 0.00 | 0.48 | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | 0.05 | 10.05 |
| 21 | 1.21 | 9.43 | 3.15 | 2.10 | 0.00 | 0.00 | 0.00 | 0.31 | 0.00 | 1.13 | 0.00 | 0.00 | 17.33 |
| 22 | 5.96 | 9.79 | 3.70 | 1.88 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.36 | 3.33 | 1.08 | 26.10 |
| 23 | 1.08 | 1.10 | 0.26 | 0.05 | 0.05 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 | 2.48 | 4.25 | 9.27 |
| 24 | 0.00 | 9.88 | 2.73 | 2.42 | 0.05 | 0.00 | 0.00 | 0.00 | 0.09 | 0.10 | 0.63 | 2.57 | 18.47 |
| 25 | 2.58 | 1.69 | 1.27 | 0.86 | 0.01 | 0.00 | 0.00 | 0.00 | 0.32 | 0.36 | 0.73 | 0.21 | 8.03 |
| 26 | 2.96 | 0.93 | 1.16 | 1.69 | 0.09 | 0.00 | 0.00 | 0.05 | 0.00 | 0.49 | 1.33 | 5.88 | 14.57 |
| 27 | 17.68 | 0.61 | 10.30 | 1.80 | 0.00 | 0.00 | 0.00 | 0.00 | 0.12 | 0.00 | 4.52 | 5.09 | 40.12 |
| 28 | 0.80 | 0.02 | 0.21 | 1.64 | 0.69 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 2.32 | 0.04 | 5.73 |
| 29 | 6.38 | 3.36 | 4.86 | 0.12 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 2.38 | 1.47 | 18.56 |
| 30 | 5.69 | 1.69 | 0.21 | 3.38 | 1.91 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.43 | 2.01 | 16.32 |
| 31 | 7.55 | 1.00 | 0.00 | 5.90 | 1.82 | 0.00 | 0.11 | 0.00 | 0.00 | 0.15 | 0.00 | 0.15 | 16.68 |
| 32 | 7.22 | 2.71 | 3.05 | 1.16 | 1.06 | 0.25 | 0.00 | 0.00 | 0.00 | 2.68 | 0.40 | 8.30 | 26.81 |
| 33 | 2.11 | 10.42 | 5.82 | 7.18 | 0.00 | 0.00 | 0.00 | 0.00 | 0.04 | 1.35 | 0.23 | 0.00 | 27.15 |
| 34 | 3.70 | 5.47 | 0.00 | 0.59 | 0.00 | 0.00 | 0.00 | 0.00 | 0.08 | 0.00 | 0.00 | 1.68 | 11.51 |
| 35 | 4.17 | 2.21 | 0.20 | 2.05 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 4.96 | 0.07 | 13.66 |
| 36 | 1.88 | 0.00 | 0.76 | 0.33 | 0.09 | 0.00 | 0.07 | 0.00 | 0.11 | 0.00 | 4.12 | 2.99 | 10.35 |
| 37 | 3.86 | 19.44 | 1.53 | 0.00 | 0.02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.05 | 0.00 | 0.00 | 24.90 |
| 38 | 0.99 | 3.63 | 4.10 | 2.23 | 0.06 | 0.43 | 0.00 | 0.00 | 0.77 | 0.50 | 2.29 | 0.01 | 15.01 |
| 39 | 2.95 | 0.00 | 1.88 | 2.41 | 0.04 | 0.12 | 0.00 | 0.00 | 0.00 | 0.52 | 1.47 | 2.48 | 11.84 |
| 40 | 0.25 | 0.07 | 1.65 | 9.14 | 0.00 | 0.02 | 0.26 | 0.16 | 0.95 | 0.00 | 17.49 | 7.89 | 37.88 |
| 41 | 1.42 | 1.55 | 0.33 | 0.00 | 0.09 | 0.00 | 0.00 | 0.00 | 0.09 | 0.11 | 7.56 | 5.95 | 17.10 |

**TABLE 3-8**

Simulated Monthly Precipitation at the Newhall County Water District Rain Gage for the 78-year Simulation

*Analysis of Groundwater Basin Yield, Upper Santa Clara River Groundwater Basin, East Subbasin, Los Angeles County, California*

| Year | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Annual |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 42 | 6.76 | 0.22 | 3.23 | 5.41 | 0.19 | 0.00 | 0.00 | 0.00 | 0.50 | 0.00 | 9.36 | 1.58 | 27.26 |
| 43 | 0.86 | 0.93 | 2.91 | 0.97 | 0.07 | 0.00 | 0.00 | 0.38 | 0.00 | 0.39 | 0.35 | 1.24 | 8.10 |
| 44 | 19.53 | 13.89 | 0.82 | 1.16 | 0.05 | 0.05 | 0.18 | 0.00 | 0.00 | 0.00 | 2.32 | 0.05 | 38.04 |
| 45 | 0.94 | 6.63 | 4.33 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.13 | 8.86 | 6.33 | 27.21 |
| 46 | 1.23 | 1.41 | 0.48 | 0.94 | 0.15 | 0.00 | 0.00 | 0.00 | 0.47 | 0.50 | 0.38 | 10.57 | 16.14 |
| 47 | 0.00 | 0.12 | 0.00 | 0.02 | 0.05 | 0.05 | 0.00 | 0.06 | 0.00 | 0.05 | 3.45 | 1.08 | 4.87 |
| 48 | 5.19 | 11.74 | 3.29 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.15 | 1.83 | 1.03 | 23.22 |
| 49 | 10.58 | 0.02 | 4.30 | 0.06 | 0.00 | 0.00 | 0.02 | 0.00 | 0.00 | 1.17 | 0.12 | 4.89 | 21.17 |
| 50 | 0.28 | 3.02 | 6.04 | 2.96 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.39 | 0.04 | 0.09 | 12.81 |
| 51 | 0.00 | 7.39 | 1.47 | 0.46 | 0.15 | 0.35 | 0.01 | 0.00 | 3.40 | 0.22 | 2.09 | 0.90 | 16.45 |
| 52 | 5.75 | 0.12 | 2.15 | 0.00 | 5.27 | 0.00 | 0.00 | 2.68 | 0.02 | 0.05 | 0.06 | 8.40 | 24.49 |
| 53 | 10.74 | 13.23 | 17.10 | 2.72 | 0.00 | 0.00 | 0.00 | 0.00 | 1.23 | 0.01 | 2.70 | 1.76 | 49.49 |
| 54 | 12.44 | 3.20 | 6.01 | 0.00 | 0.02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.89 | 1.19 | 23.75 |
| 55 | 10.36 | 14.63 | 4.84 | 0.36 | 0.40 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.36 | 31.95 |
| 56 | 4.76 | 1.66 | 5.50 | 0.46 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.58 | 3.62 | 0.22 | 16.80 |
| 57 | 3.33 | 1.21 | 9.50 | 1.09 | 0.13 | 0.00 | 0.00 | 0.00 | 1.02 | 0.25 | 5.34 | 2.95 | 24.82 |
| 58 | 8.67 | 6.85 | 13.07 | 4.61 | 0.20 | 0.00 | 0.00 | 1.17 | 1.85 | 1.74 | 5.04 | 5.13 | 48.33 |
| 59 | 0.00 | 0.00 | 0.27 | 0.07 | 0.00 | 0.00 | 0.00 | 0.00 | 0.05 | 0.16 | 3.87 | 8.13 | 12.55 |
| 60 | 0.78 | 1.20 | 1.04 | 0.14 | 0.07 | 0.00 | 0.06 | 0.00 | 0.12 | 0.54 | 5.11 | 0.70 | 9.76 |
| 61 | 5.84 | 6.65 | 5.39 | 0.88 | 0.00 | 0.00 | 0.05 | 0.00 | 1.78 | 0.68 | 1.55 | 0.24 | 23.06 |
| 62 | 2.10 | 0.61 | 1.69 | 0.14 | 0.00 | 0.00 | 0.09 | 0.02 | 0.00 | 3.47 | 3.84 | 4.80 | 16.76 |
| 63 | 3.27 | 3.39 | 1.16 | 3.98 | 0.09 | 0.00 | 0.00 | 0.00 | 0.10 | 0.00 | 0.92 | 7.14 | 20.05 |
| 64 | 0.89 | 4.13 | 1.30 | 0.30 | 0.00 | 0.00 | 0.00 | 0.00 | 0.62 | 0.86 | 0.37 | 0.00 | 8.47 |
| 65 | 2.89 | 4.23 | 0.22 | 0.48 | 0.88 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.63 | 0.01 | 9.34 |
| 66 | 1.11 | 5.72 | 11.33 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.50 | 0.00 | 5.95 | 24.61 |
| 67 | 3.28 | 16.64 | 9.73 | 0.15 | 0.34 | 0.00 | 0.30 | 0.00 | 0.00 | 1.55 | 0.00 | 7.25 | 39.24 |
| 68 | 17.11 | 11.73 | 4.27 | 0.00 | 0.00 | 0.65 | 0.00 | 0.00 | 0.00 | 0.57 | 0.75 | 1.00 | 36.08 |
| 69 | 0.48 | 5.31 | 2.33 | 0.42 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.78 | 0.71 | 1.94 | 11.97 |
| 70 | 21.98 | 1.93 | 8.30 | 0.72 | 0.26 | 0.76 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 2.33 | 36.28 |
| 71 | 2.97 | 6.73 | 2.08 | 0.13 | 0.68 | 0.00 | 0.00 | 0.00 | 0.00 | 1.30 | 1.06 | 8.70 | 23.65 |
| 72 | 6.67 | 0.23 | 0.00 | 0.00 | 0.00 | 0.00 | 0.05 | 0.00 | 0.53 | 0.00 | 3.73 | 6.72 | 17.93 |
| 73 | 3.49 | 22.00 | 3.98 | 2.28 | 5.50 | 0.06 | 0.00 | 0.00 | 0.21 | 0.33 | 1.36 | 1.39 | 40.60 |
| 74 | 2.08 | 0.65 | 3.00 | 3.78 | 0.00 | 0.48 | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | 0.05 | 10.05 |
| 75 | 1.21 | 9.43 | 3.15 | 2.10 | 0.00 | 0.00 | 0.00 | 0.31 | 0.00 | 1.13 | 0.00 | 0.00 | 17.33 |
| 76 | 5.96 | 9.79 | 3.70 | 1.88 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.36 | 3.33 | 1.08 | 26.10 |
| 77 | 1.08 | 1.10 | 0.26 | 0.05 | 0.05 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 | 2.48 | 4.25 | 9.27 |
| 78 | 0.00 | 9.88 | 2.73 | 2.42 | 0.05 | 0.00 | 0.00 | 0.00 | 0.09 | 0.10 | 0.63 | 2.57 | 18.47 |

**TABLE 3-9**

Simulated Monthly Streamflows in the Santa Clara River at the Lang Gage for the 78-year Simulation

*Analysis of Groundwater Basin Yield, Upper Santa Clara River Groundwater Basin, East Subbasin, Los Angeles County, California*

| Year | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Annual |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1,310 | 7,449 | 1,213 | 568 | 218 | 78 | 6 | 0 | 37 | 274 | 467 | 553 | 12,175 |
| 2 | 594 | 98 | 339 | 240 | 107 | 18 | 18 | 12 | 338 | 321 | 258 | 394 | 2,739 |
| 3 | 333 | 1,420 | 785 | 283 | 238 | 0 | 0 | 0 | 0 | 95 | 178 | 855 | 4,188 |
| 4 | 1,922 | 16,971 | 2,755 | 2,576 | 958 | 523 | 639 | 512 | 0 | 0 | 0 | 0 | 26,855 |
| 5 | 0 | 596 | 405 | 240 | 143 | 166 | 228 | 411 | 154 | 220 | 904 | 578 | 4,044 |
| 6 | 483 | 461 | 274 | 215 | 77 | 0 | 0 | 0 | 12 | 179 | 221 | 301 | 2,224 |
| 7 | 483 | 1,138 | 488 | 283 | 107 | 6 | 0 | 12 | 6 | 12 | 80 | 129 | 2,744 |
| 8 | 117 | 117 | 65 | 31 | 12 | 0 | 0 | 0 | 0 | 0 | 258 | 516 | 1,116 |
| 9 | 222 | 209 | 506 | 117 | 77 | 68 | 0 | 0 | 0 | 0 | 12 | 25 | 1,236 |
| 10 | 50 | 111 | 60 | 25 | 6 | 0 | 0 | 0 | 102 | 94 | 34 | 18 | 499 |
| 11 | 212 | 276 | 230 | 46 | 46 | 5 | 0 | 0 | 0 | 27 | 36 | 147 | 1,025 |
| 12 | 162 | 775 | 879 | 736 | 145 | 142 | 14 | 0 | 45 | 69 | 62 | 263 | 3,291 |
| 13 | 336 | 534 | 429 | 398 | 117 | 84 | 16 | 5 | 108 | 144 | 498 | 1,446 | 4,115 |
| 14 | 14,709 | 5,336 | 1,194 | 530 | 239 | 110 | 54 | 10 | 64 | 145 | 264 | 281 | 22,937 |
| 15 | 388 | 493 | 497 | 319 | 163 | 80 | 20 | 7 | 37 | 102 | 193 | 941 | 3,239 |
| 16 | 1,211 | 1,421 | 954 | 802 | 268 | 156 | 62 | 8 | 6 | 1 | 27 | 189 | 5,104 |
| 17 | 666 | 896 | 730 | 315 | 151 | 46 | 7 | 0 | 54 | 154 | 307 | 510 | 3,836 |
| 18 | 517 | 346 | 140 | 85 | 33 | 5 | 4 | 50 | 66 | 240 | 566 | 809 | 2,859 |
| 19 | 18,997 | 8,508 | 3,837 | 961 | 667 | 347 | 81 | 91 | 70 | 139 | 190 | 186 | 34,074 |
| 20 | 92 | 85 | 204 | 224 | 197 | 107 | 80 | 46 | 52 | 54 | 31 | 80 | 1,252 |
| 21 | 117 | 117 | 65 | 31 | 12 | 0 | 0 | 0 | 0 | 0 | 258 | 516 | 1,116 |
| 22 | 333 | 1,420 | 785 | 283 | 238 | 0 | 0 | 0 | 0 | 95 | 178 | 855 | 4,188 |
| 23 | 50 | 111 | 60 | 25 | 6 | 0 | 0 | 0 | 102 | 94 | 34 | 18 | 499 |
| 24 | 666 | 896 | 730 | 315 | 151 | 46 | 7 | 0 | 54 | 154 | 307 | 510 | 3,836 |
| 25 | 83 | 198 | 184 | 126 | 105 | 83 | 51 | 54 | 56 | 53 | 43 | 42 | 1,078 |
| 26 | 49 | 40 | 66 | 91 | 98 | 84 | 79 | 72 | 57 | 71 | 47 | 53 | 807 |
| 27 | 9,629 | 636 | 7,091 | 2,114 | 895 | 326 | 153 | 138 | 86 | 97 | 178 | 313 | 21,656 |
| 28 | 300 | 282 | 271 | 237 | 165 | 134 | 102 | 86 | 85 | 83 | 74 | 68 | 1,888 |
| 29 | 145 | 278 | 404 | 356 | 181 | 108 | 110 | 99 | 91 | 90 | 80 | 75 | 2,017 |
| 30 | 103 | 156 | 157 | 128 | 153 | 99 | 78 | 76 | 74 | 68 | 66 | 62 | 1,220 |
| 31 | 69 | 85 | 130 | 137 | 139 | 98 | 86 | 80 | 77 | 76 | 67 | 69 | 1,113 |
| 32 | 67 | 55 | 78 | 90 | 93 | 80 | 78 | 78 | 76 | 79 | 66 | 71 | 910 |
| 33 | 66 | 329 | 743 | 4,550 | 825 | 283 | 130 | 108 | 95 | 145 | 146 | 116 | 7,536 |
| 34 | 246 | 351 | 189 | 127 | 111 | 92 | 84 | 86 | 83 | 69 | 68 | 68 | 1,575 |
| 35 | 68 | 67 | 70 | 69 | 70 | 68 | 65 | 65 | 60 | 58 | 316 | 164 | 1,140 |
| 36 | 124 | 91 | 38 | 38 | 36 | 32 | 28 | 33 | 22 | 19 | 19 | 119 | 597 |
| 37 | 139 | 1,904 | 791 | 449 | 329 | 169 | 97 | 82 | 80 | 84 | 82 | 82 | 4,287 |
| 38 | 85 | 142 | 145 | 131 | 104 | 86 | 79 | 74 | 66 | 65 | 62 | 58 | 1,096 |
| 39 | 69 | 50 | 51 | 62 | 66 | 54 | 53 | 53 | 54 | 45 | 43 | 41 | 640 |
| 40 | 30 | 23 | 25 | 46 | 43 | 36 | 31 | 34 | 37 | 35 | 1,305 | 3,300 | 4,944 |
| 41 | 1,765 | 1,014 | 778 | 450 | 308 | 115 | 68 | 54 | 45 | 63 | 91 | 523 | 5,274 |

**TABLE 3-9**

Simulated Monthly Streamflows in the Santa Clara River at the Lang Gage for the 78-year Simulation

*Analysis of Groundwater Basin Yield, Upper Santa Clara River Groundwater Basin, East Subbasin, Los Angeles County, California*

| Year | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Annual |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 42 | 757 | 489 | 1,028 | 2,295 | 1,880 | 729 | 212 | 104 | 89 | 73 | 255 | 487 | 8,397 |
| 43 | 300 | 247 | 276 | 180 | 72 | 32 | 32 | 30 | 25 | 133 | 208 | 851 | 2,384 |
| 44 | 13,797 | 2,856 | 1,005 | 489 | 320 | 147 | 98 | 98 | 46 | 318 | 392 | 399 | 19,966 |
| 45 | 461 | 550 | 1,168 | 465 | 290 | 169 | 74 | 60 | 58 | 27 | 501 | 1,338 | 5,161 |
| 46 | 614 | 524 | 556 | 397 | 262 | 167 | 70 | 25 | 5 | 30 | 200 | 420 | 3,270 |
| 47 | 332 | 250 | 131 | 90 | 50 | 22 | 32 | 6 | 0 | 0 | 11 | 58 | 983 |
| 48 | 153 | 1,717 | 950 | 471 | 226 | 71 | 18 | 12 | 8 | 3 | 8 | 44 | 3,679 |
| 49 | 608 | 229 | 392 | 190 | 129 | 49 | 17 | 6 | 0 | 3 | 19 | 87 | 1,728 |
| 50 | 53 | 90 | 228 | 181 | 104 | 31 | 15 | 3 | 0 | 0 | 0 | 0 | 704 |
| 51 | 0 | 110 | 63 | 39 | 33 | 12 | 0 | 0 | 1 | 0 | 0 | 0 | 258 |
| 52 | 28 | 7 | 28 | 19 | 60 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 147 |
| 53 | 744 | 9,486 | 11,412 | 1,696 | 2,736 | 1,154 | 418 | 209 | 101 | 264 | 422 | 86 | 28,730 |
| 54 | 1,254 | 433 | 1,113 | 506 | 246 | 190 | 178 | 111 | 125 | 90 | 120 | 558 | 4,925 |
| 55 | 1,310 | 7,449 | 1,213 | 568 | 218 | 78 | 6 | 0 | 37 | 274 | 467 | 553 | 12,175 |
| 56 | 594 | 98 | 339 | 240 | 107 | 18 | 18 | 12 | 338 | 321 | 258 | 394 | 2,739 |
| 57 | 333 | 1,420 | 785 | 283 | 238 | 0 | 0 | 0 | 0 | 95 | 178 | 855 | 4,188 |
| 58 | 1,922 | 16,971 | 2,755 | 2,576 | 958 | 523 | 639 | 512 | 0 | 0 | 0 | 0 | 26,855 |
| 59 | 0 | 596 | 405 | 240 | 143 | 166 | 228 | 411 | 154 | 220 | 904 | 578 | 4,044 |
| 60 | 483 | 461 | 274 | 215 | 77 | 0 | 0 | 0 | 12 | 179 | 221 | 301 | 2,224 |
| 61 | 483 | 1,138 | 488 | 283 | 107 | 6 | 0 | 12 | 6 | 12 | 80 | 129 | 2,744 |
| 62 | 117 | 117 | 65 | 31 | 12 | 0 | 0 | 0 | 0 | 0 | 258 | 516 | 1,116 |
| 63 | 222 | 209 | 506 | 117 | 77 | 68 | 0 | 0 | 0 | 0 | 12 | 25 | 1,236 |
| 64 | 50 | 111 | 60 | 25 | 6 | 0 | 0 | 0 | 102 | 94 | 34 | 18 | 499 |
| 65 | 212 | 276 | 230 | 46 | 46 | 5 | 0 | 0 | 0 | 27 | 36 | 147 | 1,025 |
| 66 | 162 | 775 | 879 | 736 | 145 | 142 | 14 | 0 | 45 | 69 | 62 | 263 | 3,291 |
| 67 | 336 | 534 | 429 | 398 | 117 | 84 | 16 | 5 | 108 | 144 | 498 | 1,446 | 4,115 |
| 68 | 14,709 | 5,336 | 1,194 | 530 | 239 | 110 | 54 | 10 | 64 | 145 | 264 | 281 | 22,937 |
| 69 | 388 | 493 | 497 | 319 | 163 | 80 | 20 | 7 | 37 | 102 | 193 | 941 | 3,239 |
| 70 | 1,211 | 1,421 | 954 | 802 | 268 | 156 | 62 | 8 | 6 | 1 | 27 | 189 | 5,104 |
| 71 | 666 | 896 | 730 | 315 | 151 | 46 | 7 | 0 | 54 | 154 | 307 | 510 | 3,836 |
| 72 | 517 | 346 | 140 | 85 | 33 | 5 | 4 | 50 | 66 | 240 | 566 | 809 | 2,859 |
| 73 | 18,997 | 8,508 | 3,837 | 961 | 667 | 347 | 81 | 91 | 70 | 139 | 190 | 186 | 34,074 |
| 74 | 92 | 85 | 204 | 224 | 197 | 107 | 80 | 46 | 52 | 54 | 31 | 80 | 1,252 |
| 75 | 117 | 117 | 65 | 31 | 12 | 0 | 0 | 0 | 0 | 0 | 258 | 516 | 1,116 |
| 76 | 333 | 1,420 | 785 | 283 | 238 | 0 | 0 | 0 | 0 | 95 | 178 | 855 | 4,188 |
| 77 | 50 | 111 | 60 | 25 | 6 | 0 | 0 | 0 | 102 | 94 | 34 | 18 | 499 |
| 78 | 666 | 896 | 730 | 315 | 151 | 46 | 7 | 0 | 54 | 154 | 307 | 510 | 3,836 |

**TABLE 3-10**

Simulated Monthly Water Releases from Castaic Lagoon to Castaic Creek for the 78-year Simulation

*Analysis of Groundwater Basin Yield, Upper Santa Clara River Groundwater Basin, East Subbasin, Los Angeles County, California*

| Year | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Annual |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0 | 0 | 0 | 0 | 0 | 834 | 1,052 | 919 | 0 | 0 | 0 | 0 | 2,805 |
| 2 | 105 | 0 | 0 | 1,490 | 46 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1,641 |
| 3 | 0 | 0 | 0 | 0 | 0 | 667 | 842 | 735 | 0 | 0 | 0 | 0 | 2,244 |
| 4 | 0 | 0 | 0 | 0 | 0 | 1,168 | 1,473 | 1,287 | 0 | 0 | 0 | 0 | 3,928 |
| 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 7 | 105 | 0 | 0 | 1,490 | 46 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1,641 |
| 8 | 105 | 0 | 0 | 1,490 | 46 | 0 | 0 | 0 | 0 | 0 | 212 | 0 | 1,853 |
| 9 | 0 | 0 | 809 | 341 | 900 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2,050 |
| 10 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 11 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 12 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 66 | 66 |
| 13 | 0 | 0 | 580 | 3,052 | 667 | 127 | 24 | 0 | 0 | 0 | 0 | 0 | 4,450 |
| 14 | 0 | 140 | 186 | 3,031 | 1,901 | 635 | 341 | 337 | 813 | 0 | 0 | 341 | 7,725 |
| 15 | 210 | 0 | 0 | 2,979 | 93 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3,282 |
| 16 | 0 | 0 | 0 | 0 | 0 | 1,668 | 2,104 | 1,839 | 0 | 0 | 0 | 0 | 5,611 |
| 17 | 0 | 0 | 0 | 4,961 | 671 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5,632 |
| 18 | 0 | 0 | 8,701 | 873 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 310 | 9,884 |
| 19 | 1,186 | 19,545 | 10,747 | 4,566 | 7,561 | 47 | 1,370 | 436 | 464 | 302 | 652 | 926 | 47,802 |
| 20 | 612 | 691 | 0 | 3,187 | 1,191 | 149 | 0 | 0 | 0 | 0 | 0 | 0 | 5,830 |
| 21 | 0 | 660 | 855 | 0 | 2,087 | 3,484 | 0 | 0 | 0 | 0 | 0 | 0 | 7,086 |
| 22 | 0 | 0 | 0 | 0 | 0 | 667 | 842 | 735 | 0 | 0 | 0 | 0 | 2,244 |
| 23 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 24 | 0 | 0 | 0 | 4,961 | 671 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5,632 |
| 25 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 26 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 27 | 0 | 140 | 186 | 3,031 | 1,901 | 635 | 341 | 337 | 813 | 0 | 0 | 341 | 7,725 |
| 28 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 29 | 0 | 0 | 0 | 4,961 | 671 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5,632 |
| 30 | 105 | 0 | 0 | 1,490 | 46 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1,641 |
| 31 | 105 | 0 | 0 | 1,490 | 46 | 0 | 0 | 0 | 0 | 0 | 212 | 0 | 1,853 |
| 32 | 0 | 0 | 0 | 0 | 0 | 667 | 842 | 735 | 0 | 0 | 0 | 0 | 2,244 |
| 33 | 0 | 0 | 0 | 0 | 0 | 667 | 842 | 735 | 0 | 0 | 0 | 0 | 2,244 |
| 34 | 210 | 0 | 0 | 2,979 | 93 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3,282 |
| 35 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 36 | 612 | 691 | 0 | 3,187 | 1,191 | 149 | 0 | 0 | 0 | 0 | 0 | 0 | 5,830 |
| 37 | 0 | 0 | 0 | 0 | 0 | 667 | 842 | 735 | 0 | 0 | 0 | 0 | 2,244 |
| 38 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 39 | 210 | 0 | 0 | 2,979 | 93 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3,282 |
| 40 | 0 | 0 | 580 | 3,052 | 667 | 127 | 24 | 0 | 0 | 0 | 0 | 0 | 4,450 |
| 41 | 105 | 0 | 0 | 1,490 | 46 | 0 | 0 | 0 | 0 | 0 | 212 | 0 | 1,853 |

**TABLE 3-10**

Simulated Monthly Water Releases from Castaic Lagoon to Castaic Creek for the 78-year Simulation

*Analysis of Groundwater Basin Yield, Upper Santa Clara River Groundwater Basin, East Subbasin, Los Angeles County, California*

| Year | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Annual |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 42 | 0 | 0 | 0 | 0 | 0 | 667 | 842 | 735 | 0 | 0 | 0 | 0 | 2,244 |
| 43 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 44 | 0 | 140 | 186 | 3,031 | 1,901 | 635 | 341 | 337 | 813 | 0 | 0 | 341 | 7,725 |
| 45 | 0 | 0 | 0 | 0 | 0 | 667 | 842 | 735 | 0 | 0 | 0 | 0 | 2,244 |
| 46 | 105 | 0 | 0 | 1,490 | 46 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1,641 |
| 47 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 48 | 0 | 0 | 0 | 0 | 0 | 667 | 842 | 735 | 0 | 0 | 0 | 0 | 2,244 |
| 49 | 105 | 0 | 0 | 1,490 | 46 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1,641 |
| 50 | 210 | 0 | 0 | 2,979 | 93 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3,282 |
| 51 | 105 | 0 | 0 | 1,490 | 46 | 0 | 0 | 0 | 0 | 0 | 212 | 0 | 1,853 |
| 52 | 0 | 0 | 0 | 0 | 0 | 667 | 842 | 735 | 0 | 0 | 0 | 0 | 2,244 |
| 53 | 0 | 0 | 0 | 0 | 0 | 1,168 | 1,473 | 1,287 | 0 | 0 | 0 | 0 | 3,928 |
| 54 | 0 | 0 | 0 | 0 | 0 | 667 | 842 | 735 | 0 | 0 | 0 | 0 | 2,244 |
| 55 | 0 | 0 | 0 | 0 | 0 | 834 | 1,052 | 919 | 0 | 0 | 0 | 0 | 2,805 |
| 56 | 105 | 0 | 0 | 1,490 | 46 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1,641 |
| 57 | 0 | 0 | 0 | 0 | 0 | 667 | 842 | 735 | 0 | 0 | 0 | 0 | 2,244 |
| 58 | 0 | 0 | 0 | 0 | 0 | 1,168 | 1,473 | 1,287 | 0 | 0 | 0 | 0 | 3,928 |
| 59 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 60 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 61 | 105 | 0 | 0 | 1,490 | 46 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1,641 |
| 62 | 105 | 0 | 0 | 1,490 | 46 | 0 | 0 | 0 | 0 | 0 | 212 | 0 | 1,853 |
| 63 | 0 | 0 | 809 | 341 | 900 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2,050 |
| 64 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 65 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 66 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 66 | 66 |
| 67 | 0 | 0 | 580 | 3,052 | 667 | 127 | 24 | 0 | 0 | 0 | 0 | 0 | 4,450 |
| 68 | 0 | 140 | 186 | 3,031 | 1,901 | 635 | 341 | 337 | 813 | 0 | 0 | 341 | 7,725 |
| 69 | 210 | 0 | 0 | 2,979 | 93 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3,282 |
| 70 | 0 | 0 | 0 | 0 | 0 | 1,668 | 2,104 | 1,839 | 0 | 0 | 0 | 0 | 5,611 |
| 71 | 0 | 0 | 0 | 4,961 | 671 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5,632 |
| 72 | 0 | 0 | 8,701 | 873 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 310 | 9,884 |
| 73 | 1,186 | 19,545 | 10,747 | 4,566 | 7,561 | 47 | 1,370 | 436 | 464 | 302 | 652 | 926 | 47,802 |
| 74 | 612 | 691 | 0 | 3,187 | 1,191 | 149 | 0 | 0 | 0 | 0 | 0 | 0 | 5,830 |
| 75 | 0 | 660 | 855 | 0 | 2,087 | 3,484 | 0 | 0 | 0 | 0 | 0 | 0 | 7,086 |
| 76 | 0 | 0 | 0 | 0 | 0 | 667 | 842 | 735 | 0 | 0 | 0 | 0 | 2,244 |
| 77 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 78 | 0 | 0 | 0 | 4,961 | 671 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5,632 |

**TABLE 3-11**
Water Demands and Indoor Water Use under Full Build-out Conditions (Excluding Newhall Ranch)
*Analysis of Groundwater Basin Yield, Upper Santa Clara River Groundwater Basin, East Subbasin, Los Angeles County, California*

| Year 2000 Actual (AF/yr) | Full Build-out Conditions (AF/yr) | Comments |
|---|---|---|
| **Annual Urban Water Use Outside Newhall Ranch** | | |
| 60,988 | 123,038 | Year 2000 value is retail purveyor demand plus other demands in Table II-6 of the *2004 Santa Clarita Valley Water Report* (LSCE, 2005a).<br><br>Year 2045 value is from Table 2.5-4 of the *Newhall Ranch Draft Additional Analysis* (Impact Sciences, Inc., 2001). Consists of 89,805 AF/yr Development Monitoring System[a] demand, plus 55,995 AF/yr additional urban demand, minus 14,480 AF/yr conservation, minus 5,193 AF/yr agricultural uses and 3,089 AF/yr "other" uses. Does not include 4,500 AF/yr for aquifer storage and recovery or 17,680 AF/yr of demand for the Newhall Ranch Specific Plan. |
| **Annual Indoor Water Use Outside Newhall Ranch (Equal to LACSD WRP Influent Volumes)** | | |
| 18,723 | 40,313 (average year) | The year 2000 volume is from the Saugus and Valencia WRPs for the period January 2000 through December 2000. The long-term current generated effluent volume is based on the influent volume estimated from water balance calculations performed for the chloride mass balance analysis. The effluent volume is 32.8 percent of the total urban water production of 123,038 AF/yr, which includes other uses. |

[a]Development Monitoring System water demands are demands associated with future build-out of developments identified in Los Angeles County's Development Monitoring System for the Santa Clarita Valley.

**TABLE 3-12**
Treated Water Discharges from the Saugus and Valencia WRPs to the Santa Clara River under Full Build-out Conditions
*Analysis of Groundwater Basin Yield, Upper Santa Clara River Groundwater Basin, East Subbasin, Los Angeles County, California*

| Month | Treated Water Volume (2000)[a] | Treated Water Volume (Full Build-out Conditions)[b] | Percent of Annual Outdoor Demand | Reclaimed Volume under Full Build-out Conditions (Before Maintaining Existing Streamflows) | Reclaimed Volume under Full Build-out Conditions (After Maintaining Existing Streamflows) | WRP Discharges to River under Full Build-out Conditions[c] | Month |
|---|---|---|---|---|---|---|---|
| January | 1,503 | 3,237 | 3.75 | 637 | 637 | 2,600 | January |
| February | 1,443 | 3,106 | 5.10 | 867 | 867 | 2,239 | February |
| March | 1,528 | 3,290 | 6.60 | 1,122 | 1,122 | 2,168 | March |
| April | 1,505 | 3,240 | 9.10 | 1,547 | 1,547 | 1,693 | April |
| May | 1,569 | 3,379 | 10.55 | 1,794 | 1,794 | 1,585 | May |
| June | 1,543 | 3,322 | 11.40 | 1,938 | 1,781 | 1,541 | June |
| July | 1,606 | 3,459 | 14.10 | 2,397 | 1,854 | 1,605 | July |
| August | 1,649 | 3,550 | 12.95 | 2,202 | 1,902 | 1,648 | August |
| September | 1,593 | 3,430 | 10.20 | 1,734 | 1,734 | 1,696 | September |
| October | 1,631 | 3,512 | 7.50 | 1,275 | 1,275 | 2,237 | October |
| November | 1,546 | 3,329 | 5.00 | 850 | 850 | 2,479 | November |
| December | 1,607 | 3,459 | 3.75 | 637 | 637 | 2,822 | December |
| **Total Annual** | **18,723** | **40,313** | **100.0** | **17,000** | **16,000** | **24,313** | **Total Annual** |

[a]Values shown are the actual volumes of treated water discharged to the Santa Clara River from the Saugus and Valencia WRPs during calendar year 2000. (See also Table 3-11.)

[b]Values shown are the combined treated water volumes estimated to be produced by the Saugus and Valencia WRPs for full build-out conditions in the Santa Clarita Valley. These values do not include the future Newhall Ranch WRP, which will be operated by LACSD.

[c]Values shown do not include discharges of treated water to the river from the future Newhall Ranch WRP. These volumes are 10 acre-feet in November, 138 acre-feet in December, and 138 acre-feet in January. During the other nine months of the year, this WRP will not discharge treated water to the river (see the *Newhall Ranch Draft Additional Analysis* [Impact Sciences, Inc., 2001] for further details). The combined total discharge from the Saugus, Valencia, and Newhall Ranch WRPs is summarized in Table 3-13.

Note:
All units are in acre-feet.

**TABLE 3-13**

Simulated Monthly Treated Wastewater Discharges from Santa Clarita Valley WRPs under Full Build-out Conditions

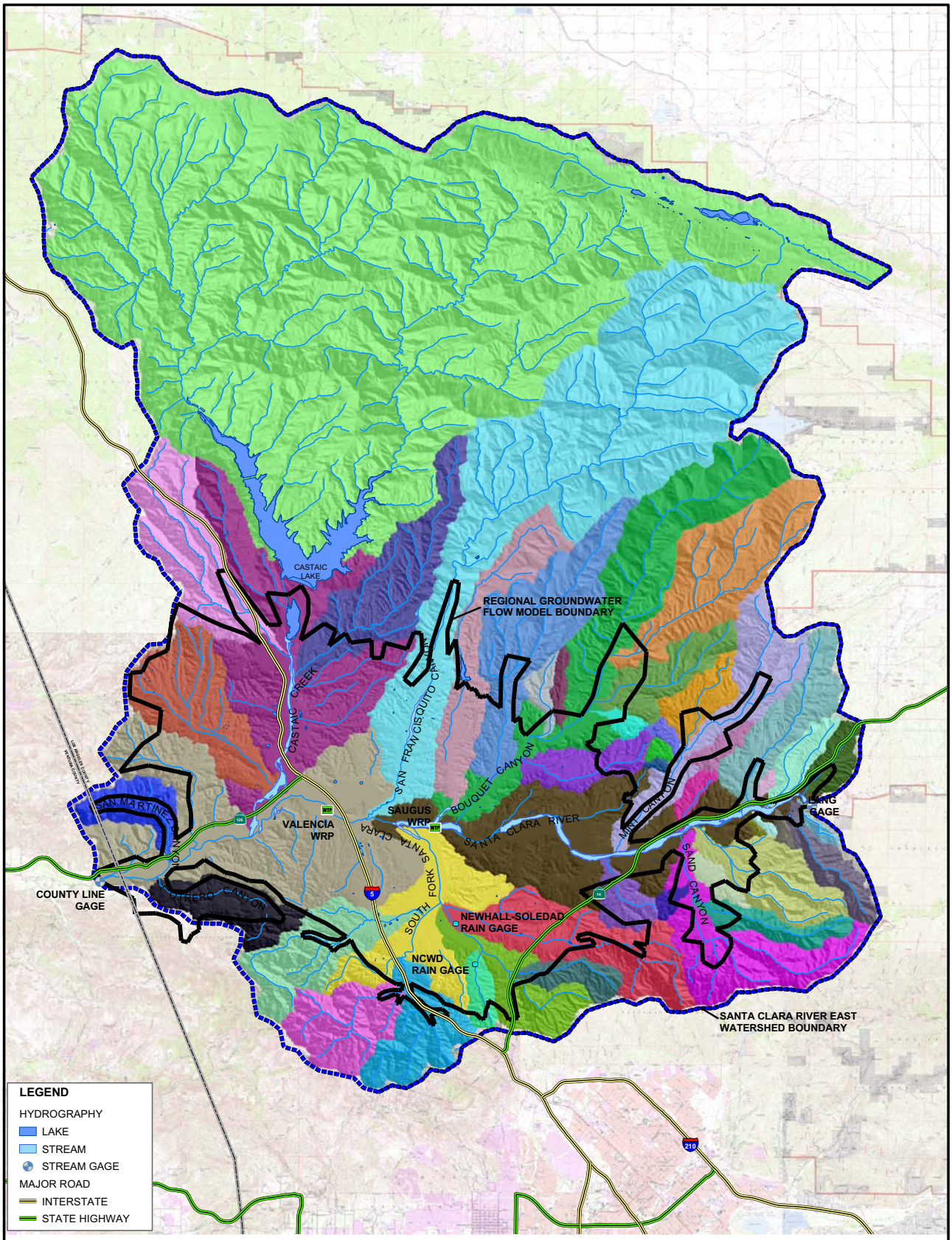
*Analysis of Groundwater Basin Yield, Upper Santa Clara River Groundwater Basin, East Subbasin, Los Angeles County, California*

| WRP | January | February | March | April | May | June | July | August | September | October | November | December | Annual |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Saugus | 493 | 487 | 500 | 490 | 503 | 466 | 457 | 508 | 586 | 555 | 514 | 596 | 6,155 |
| Valencia | 2,107 | 1,752 | 1,668 | 1,203 | 1,082 | 1,075 | 1,148 | 1,140 | 1,110 | 1,682 | 1,965 | 2,226 | 18,158 |
| Newhall | 138 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | 138 | 286 |
| **Total** | **2,738** | **2,239** | **2,168** | **1,693** | **1,585** | **1,541** | **1,605** | **1,648** | **1,696** | **2,237** | **2,489** | **2,960** | **24,599** |

Note:

Wastewater discharge volumes are listed in acre-feet.

# Figures




N

0 2.5 5 miles

**FIGURE 3-1**
**SUBWATERSHEDS WITHIN THE SANTA CLARA VALLEY EAST WATERSHED**
ANALYSIS OF GROUNDWATER BASIN YIELD
UPPER SANTA CLARA RIVER GROUNDWATER BASIN
EAST SUBBASIN, LOS ANGELES COUNTY, CALIFORNIA

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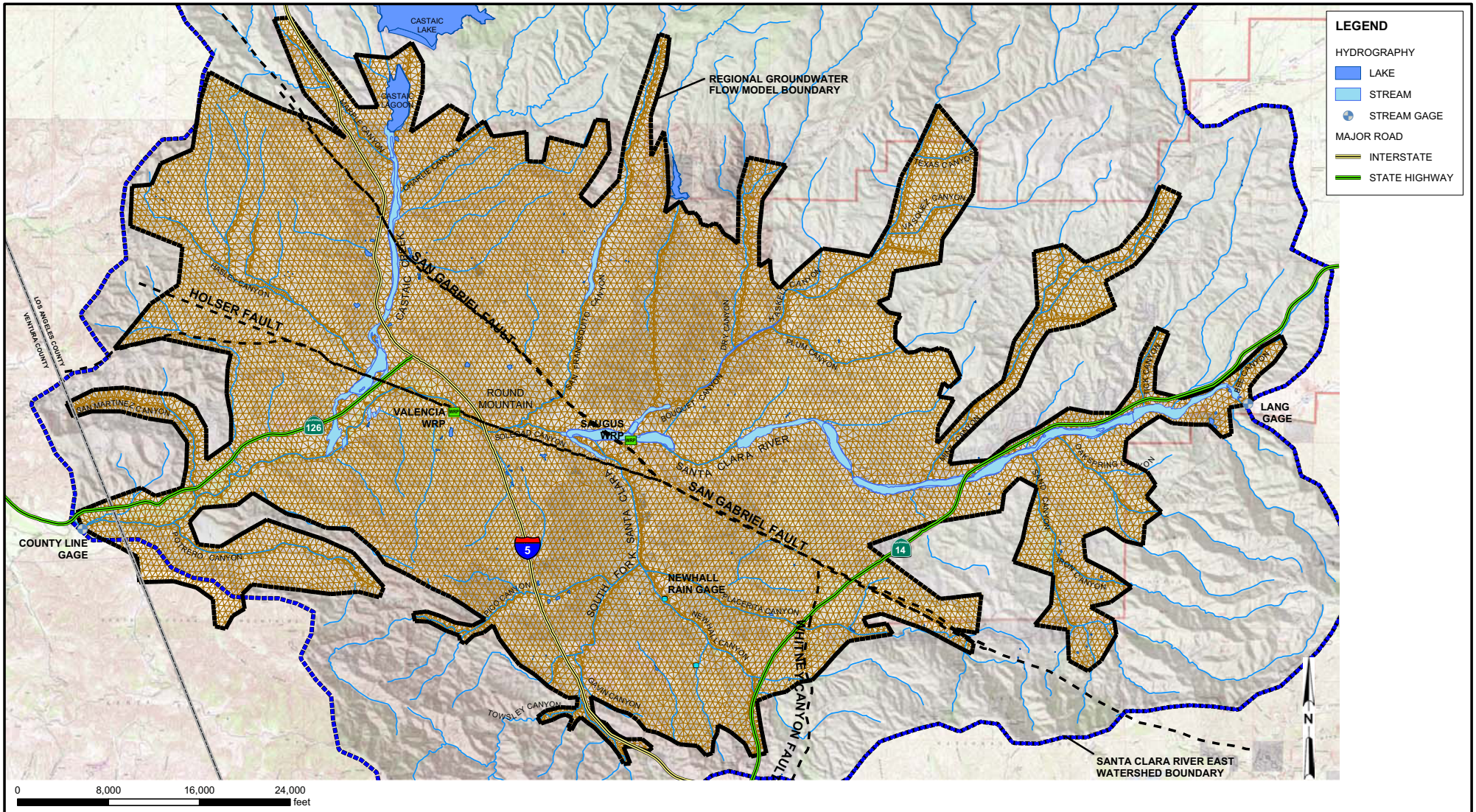


**FIGURE 3-2**
**REGIONAL MODEL GRID**
ANALYSIS OF GROUNDWATER BASIN YIELD
UPPER SANTA CLARA RIVER GROUNDWATER BASIN
EAST SUBBASIN, LOS ANGELES COUNTY, CALIFORNIA

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| | Stratigraphy | | Model Layer | Thickness (feet) |
|---|---|---|---|---|
| Saugus | Alluvium | Saugus | 1 | 500 |
| Saugus | Saugus | Saugus | 2 | |
| Saugus | Saugus | Saugus | 3 | 500 |
| Saugus | Saugus | Saugus | 4 | 500 |
| Saugus | Saugus | Saugus | 5 | 500 |
| Saugus | Saugus | Saugus | 6 | 500 |
| Sunshine | Sunshine | Sunshine | 7 | Variable |

**FIGURE 3-3**
**SCHEMATIC DIAGRAM OF THE MODEL'S REPRESENTATION OF STRATIGRAPHY IN THE MIDDLE OF THE BASIN**
ANALYSIS OF GROUNDWATER BASIN YIELD
UPPER SANTA CLARA RIVER GROUNDWATER BASIN
EAST SUBBASIN, LOS ANGELES COUNTY, CALIFORNIA

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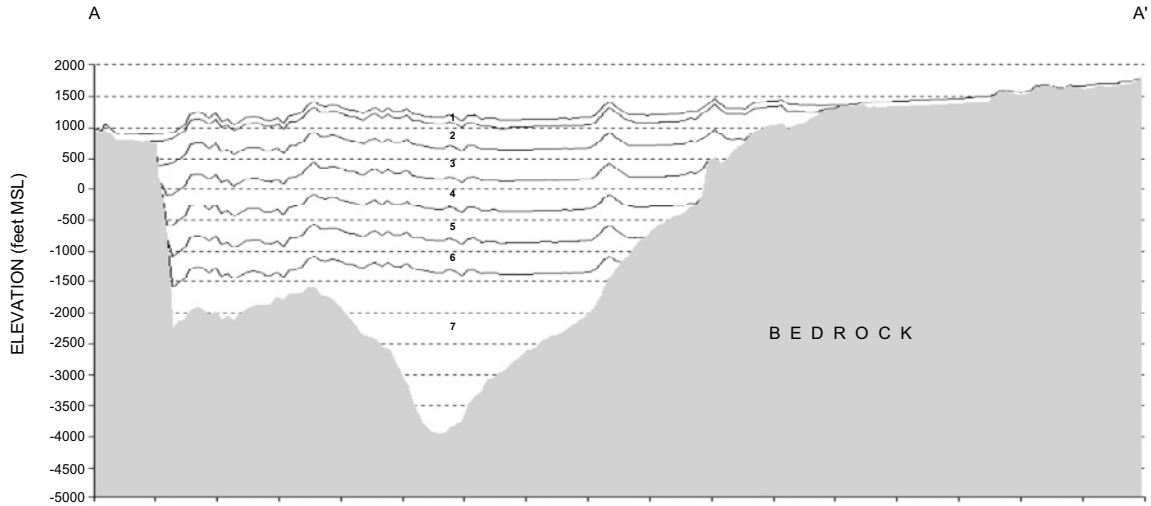


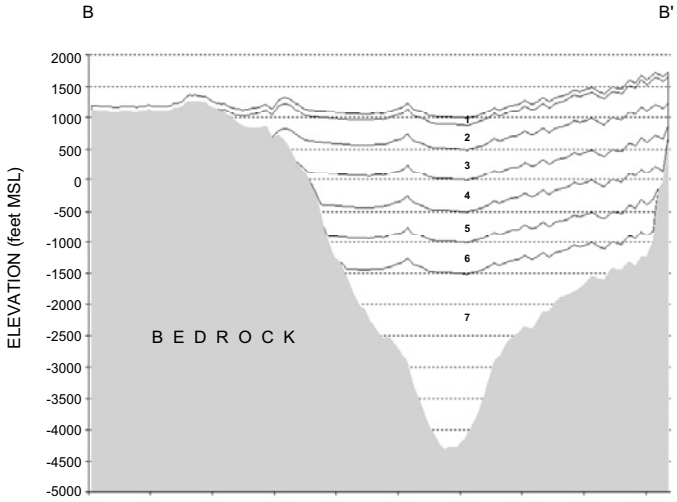


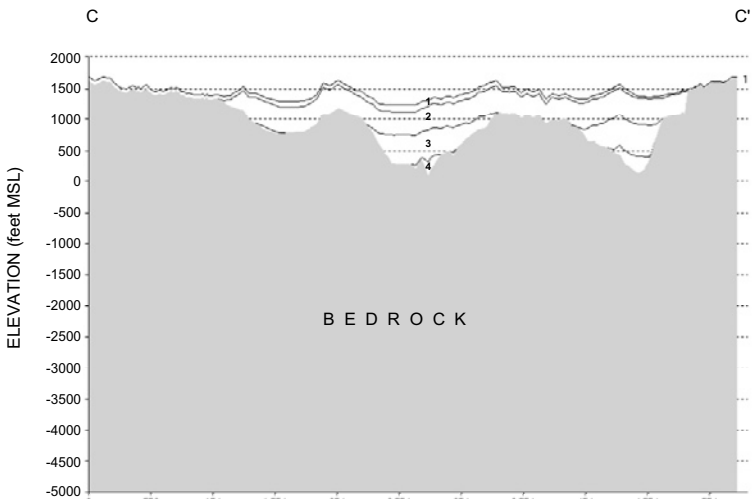


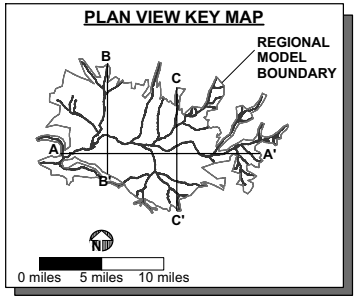


**LEGEND**

1 = MODEL LAYER 1

2 = MODEL LAYER 2

3 = MODEL LAYER 3

4 = MODEL LAYER 4

5 = MODEL LAYER 5

6 = MODEL LAYER 6

7 = MODEL LAYER 7

HORIZONTAL CROSS SECTION SCALE

0 feet 10,000 feet 20,000 feet

5x VERTICAL EXAGGERATION

**FIGURE 3-4**
**SCHEMATIC CROSS SECTIONS**
ANALYSIS OF GROUNDWATER BASIN YIELD
UPPER SANTA CLARA RIVER GROUNDWATER BASIN
EAST SUBBASIN, LOS ANGELES COUNTY, CALIFORNIA

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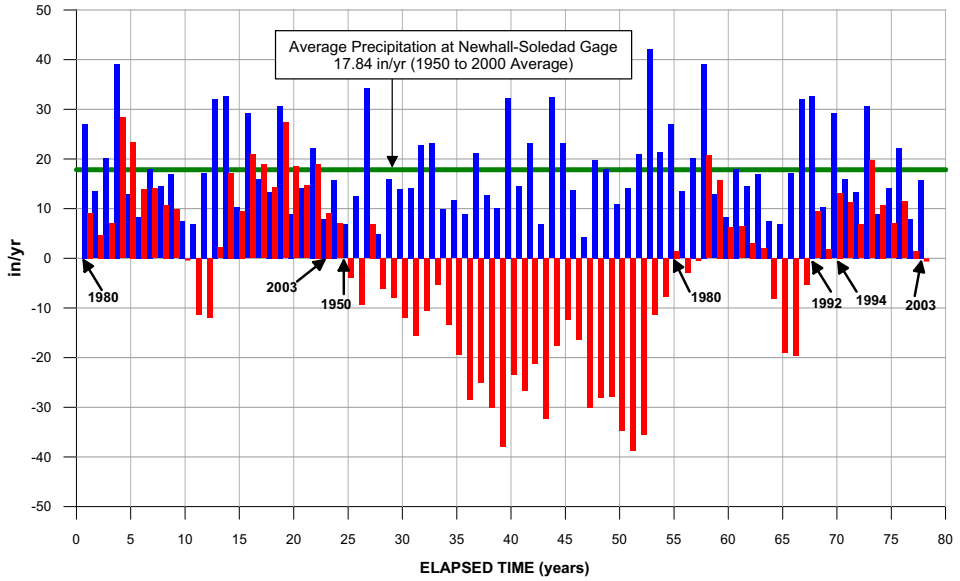


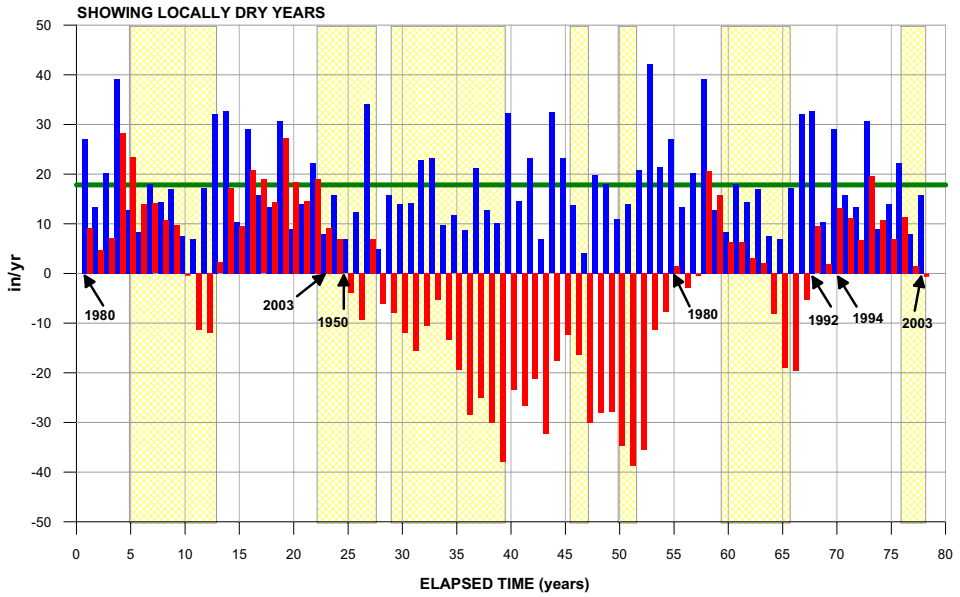


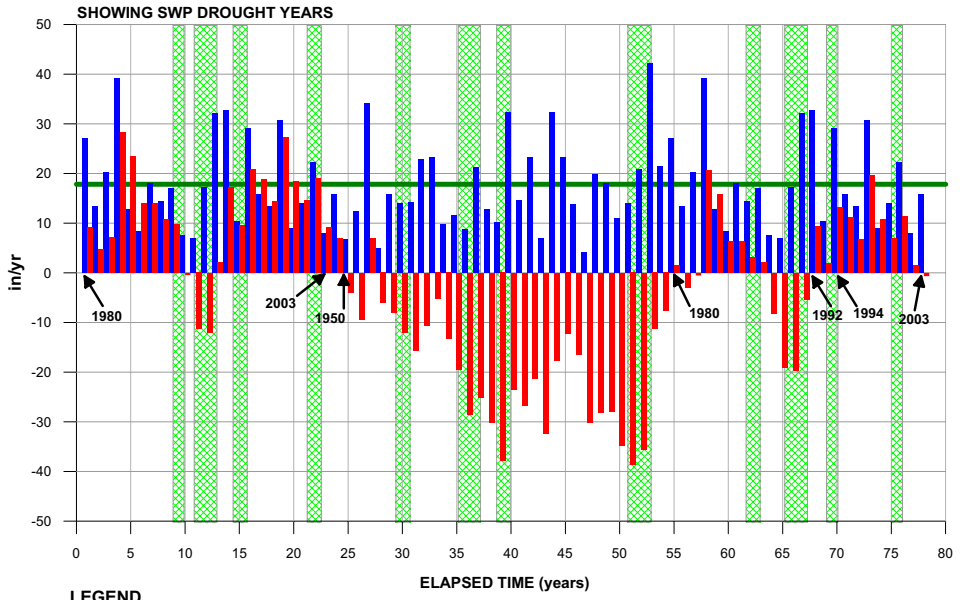


**LEGEND**

- RAINFALL
- CUMULATIVE DEPARTURE
- LOCAL DRY YEARS
- SWP DROUGHT YEARS

**FIGURE 3-5**
**ANNUAL PRECIPITATION AND CUMULATIVE DEPARTURE FROM THE 1950 THROUGH 2000 AVERAGE AT THE NEWHALL-SOLEDAD RAIN GAGE FOR THE 78-YEAR SIMULATION PERIOD**
ANALYSIS OF GROUNDWATER BASIN YIELD
UPPER SANTA CLARA RIVER GROUNDWATER BASIN
EAST SUBBASIN, LOS ANGELES COUNTY, CALIFORNIA

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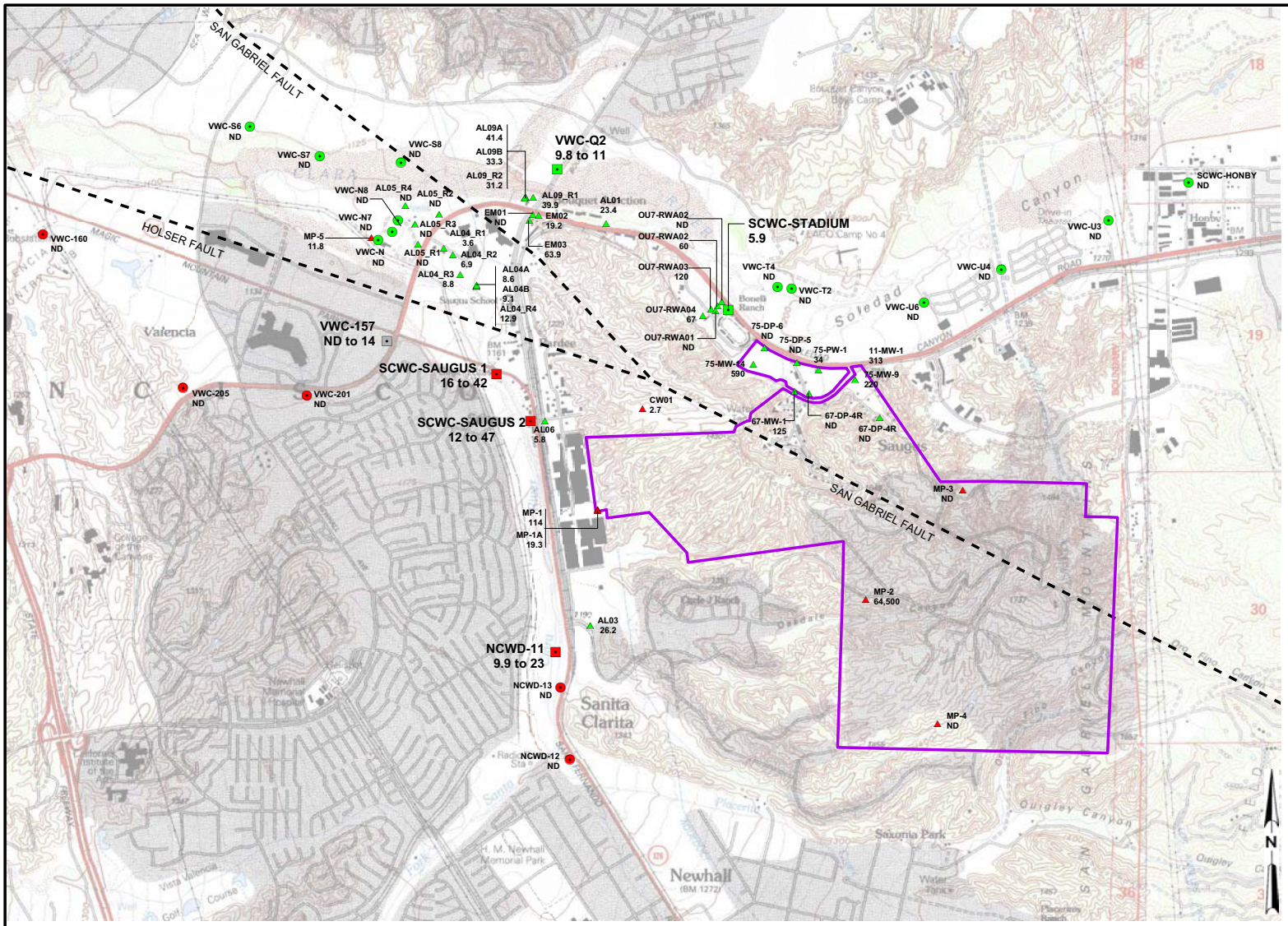


## LEGEND

**CONTAMINATED PRODUCTION WELL**

- ALLUVIUM
- SAUGUS
- SAUGUS (DESTROYED JANUARY 2005)

**UNCONTAMINATED PRODUCTION WELL**

- ALLUVIUM
- SAUGUS

**MONITORING WELL**

- ALLUVIUM
- SAUGUS
- WHITTAKER-BERMITE PROPERTY BOUNDARY

**NOTES:**

1. VALUES PRESENTED UNDER WELL SYMBOLS REPRESENT PERCHLORATE CONCENTRATION IN GROUNDWATER (µg/L).
2. ND = PERCHLORATE NOT DETECTED IN GROUNDWATER SAMPLE.
3. µg/L = MICROGRAMS PER LITER.

**FIGURE 3-6**
**WELL LOCATIONS AND PERCHLORATE CONCENTRATIONS NEAR THE WHITTAKER-BERMITE PROPERTY**
ANALYSIS OF GROUNDWATER BASIN YIELD
UPPER SANTA CLARA RIVER GROUNDWATER BASIN
EAST SUBBASIN, LOS ANGELES COUNTY, CALIFORNIA

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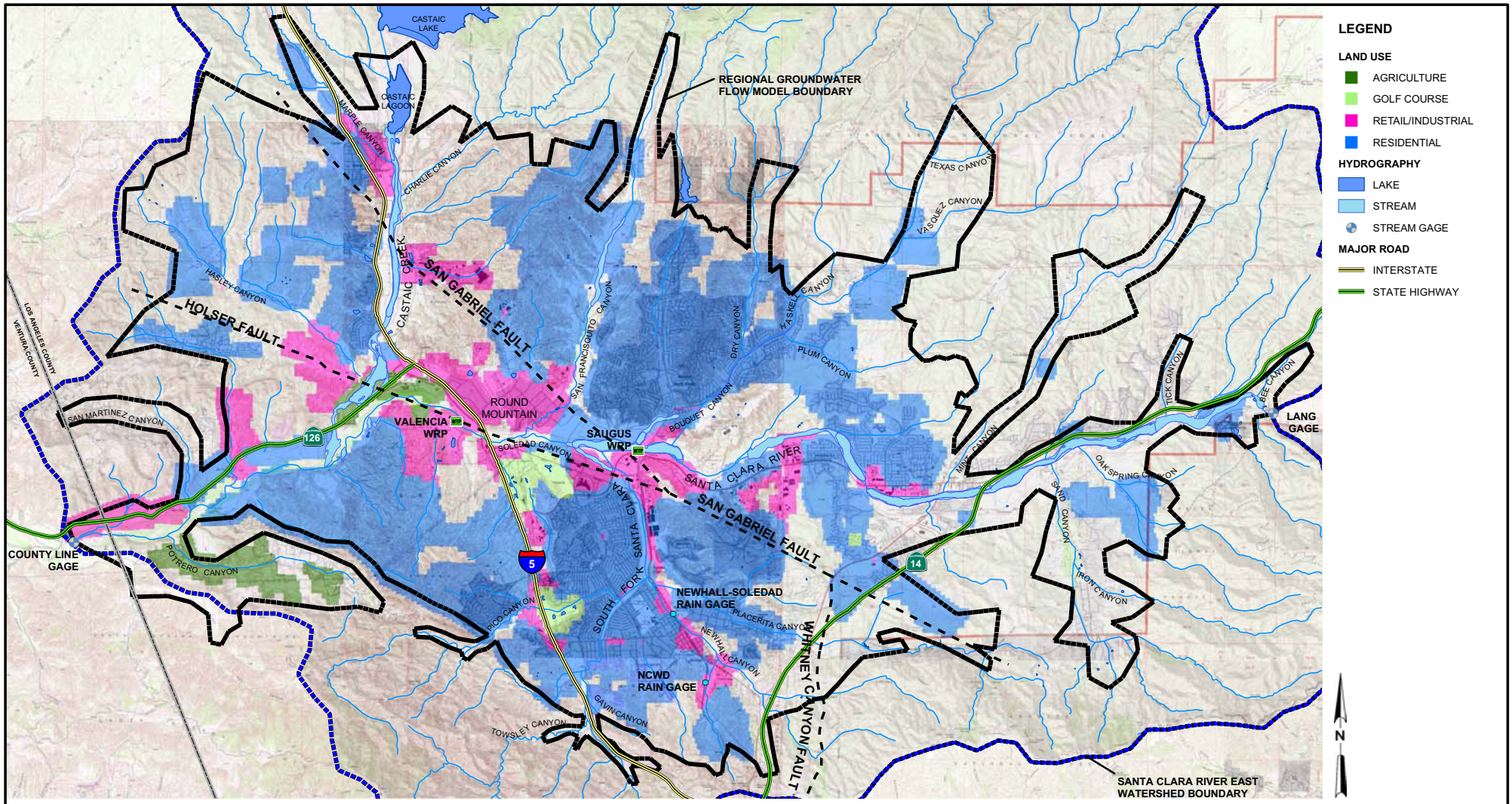


NOTE:
LAND USES UNDER FULL BUILD-OUT CONDITIONS ARE SHOWN ONLY INSIDE THE MODEL BOUNDARY, AND ARE NOT SHOWN OUTSIDE THE MODEL BOUNDARY.

**FIGURE 3-7**
**SIMULATED LAND USE WITHIN THE REGIONAL MODEL BOUNDARY UNDER FULL BUILD-OUT CONDITIONS**
ANALYSIS OF GROUNDWATER BASIN YIELD
UPPER SANTA CLARA RIVER GROUNDWATER BASIN
EAST SUBBASIN, LOS ANGELES COUNTY, CALIFORNIA

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RDD \\ODIN\PROJ2\55\SANTACLARITA_MOU\FIGURES\MXD\0605_TM\FIG03-07.MXD FIG03-07.PDF 6/21/2005 17:29:31

SECTION 4

# Model Results

This section of the report presents and discusses hydrographs of simulated groundwater elevations, groundwater budget terms, and Santa Clara River flows for the 78-year modeling period.

## 4.1 Groundwater Elevations

Groundwater elevation hydrographs for different portions of the Alluvial Aquifer are presented on Figures 4-1 through 4-5. Hydrographs for different portions of the Saugus Formation are presented on Figures 4-6 and 4-7. Each figure shows the monthly groundwater elevations simulated for the 78-year modeling period.

These figures show that the spatial distribution and temporal variation of pumping are not expected to cause a long-term decline in groundwater levels in the Alluvial Aquifer or the Saugus Formation. The Regional Model simulates distinct multi-year periods of overall declining or overall increasing groundwater elevations resulting from cycles of below-normal and above-normal rainfall periods. This variation is consistent with historical observations of the relationship between rainfall and groundwater level fluctuations (CH2M HILL, 2004a). The Regional Model also simulates short-term declines in Saugus Formation groundwater elevations that arise from the increased Saugus pumping that occurs during the second and third years of reduced water imports. The model simulates water level recovery within a few years after Saugus pumping returns to normal-year pumping rates, a finding that is consistent with historical observations following a peak pumping period in the early 1990s (see Figures 2-9 and 2-10).

## 4.2 Groundwater Recharge, Discharge, and Storage

Figures 4-8 and 4-9 show the annual valleywide variations in groundwater recharge and discharge, respectively, throughout the 78-year simulation period. These groundwater recharge and discharge rates are also listed in Table 4-1. Figure 4-10 shows the annual and cumulative changes in groundwater storage volumes. Figures 4-8 through 4-10 and Table 4-1 together show the following:

1. Groundwater recharge rates (see Figure 4-8) vary greatly from year to year, because of variations in (a) precipitation within the groundwater basin and (b) precipitation and stormwater generation in the watersheds lying upstream of the groundwater basin. In contrast, total groundwater discharge (see Figure 4-9) is much less variable from year to year, with the more limited variations arising from increased pumping during drought years and increased ET and groundwater discharge to the Santa Clara River during wet years.

2. Year-to-year and cumulative changes in groundwater storage during the 78-year simulation period (see Figure 4-10) provide insights as to the manner in which the basin is

functioning hydrologically under the groundwater operating plan for the valley. The cumulative change in groundwater storage is a measure of the longer-term trends in the amount of groundwater in storage, and is plotted on a monthly basis. Table 4-1 tabulates the annual water budget for each year of the 78-year simulation, and shows the cumulative change on an annual basis (in contrast to the monthly basis shown on Figure 4-10). Figure 4-10 and Table 4-1 together show the following:

a. The cumulative change in total groundwater storage volume, which measures the continuous change in storage in the combined Alluvial-Saugus aquifer system since the beginning of the simulation, ranges between approximately a 150,000-acre-foot decline and a 260,000-acre-foot increase. The change in groundwater storage during a single year ranges from approximately an 80,000-AF/yr decline to a 170,000-AF/yr increase.

b. A nearly 20-year period of overall decline in the cumulative groundwater storage volume occurs between years 19 and 39, as shown on Figure 4-10. Beginning in year 40, the cumulative change in storage shows a generally upward trend, with occasional downward trends during specific drought periods.

3. Implementation of the groundwater operating plan will not cause permanent declines in groundwater storage volumes. This is shown by the forecasted recovery of groundwater storage volumes after periods of continued decline, such as after the 20-year period of groundwater declines that occurs during years 19 through 39.

4. Based on the previous observations, changes in groundwater storage volumes, particularly over a period of many years, are governed significantly by variations in local hydrologic conditions. Local precipitation and streamflows are the primary recharge mechanisms in the valley and therefore have a direct influence on year-to-year and longer-term changes in groundwater storage volumes.

## 4.3 River Flows

Figure 4-11 shows the total flows estimated by the model for the Santa Clara River at the County Line gage, which is located at the western end of the valley. The figure contains both a linear plot and a semi-logarithmic plot, to better illustrate the flows during low-flow periods. As shown by both plots, the total streamflows vary considerably over time at this location, due primarily to variations in rainfall.

The influences of the local hydrology and the groundwater operating plan on the Santa Clara River are also shown by Figure 4-12, which displays the model-calculated volumes of monthly groundwater discharge to the river. Groundwater discharges to the river occur along the river reach lying downstream of the mouth of San Francisquito Canyon. The figure shows that the groundwater discharge rates to the river also vary over time, both seasonally and over multi-year periods. Additionally, the figure shows that the Regional Model simulates a period of relatively low groundwater discharge to the river from years 23 through 39 (historical years 2002 through 2003, followed by 1950 through 1964), which corresponds to the prevailing below-normal rainfall conditions in those years. The figure also shows higher volumes of groundwater discharge to the river in years of above-normal

rainfall, particularly the very wet periods years 1 through 4, 13 through 19, 52 through 58, and 67 through 72.

The similarity between rainfall and groundwater discharges to the river indicates that local hydrology is the primary influence on these discharges. Additionally, the groundwater discharge hydrographs do not show any marked short-term declines in flows when Saugus Formation groundwater levels decrease during years of increased Saugus Formation pumping. The Regional Model, therefore, indicates that the operating plan for the groundwater system is not expected to adversely affect river flows.

## 4.4 Relationship of Simulation Results to Future Conditions

The curves presented on Figures 4-1 through 4-12 provide a general indication of the types of fluctuations in groundwater conditions that could be expected to occur in the future in the Santa Clarita Valley over a period of many years. However, these curves have been derived using an assumed sequence of local hydrologic conditions that is based on the sequence of rainfall and streamflow volumes that were measured during the past several decades. In the future, the year-to-year volumes and trends in rainfall and streamflow could vary from those observed in the past. Consequently, actual future trends in rainfall and streamflow might differ from those presented in this simulation on a short-term basis. However, over a period of several years or decades, the model-simulated recharge values and basin responses are more likely to reflect actual long-term average basin conditions under this operating plan.

The modeling simulation described in this report meets the intended objectives of quantifying possible basin responses to the operating plan, in terms of temporal variations that could occur in groundwater levels, groundwater storage, and Santa Clara River streamflows; and using the quantified responses to evaluate the sustainability of the operating plan with respect to potential trends in groundwater levels and Santa Clara River flows. The principal conclusions about the groundwater operating plan that have been drawn from the historical analyses and modeling simulations presented in this report are discussed in Section 5.

# Table

**TABLE 4-1**

Simulated Annual Groundwater Budget

*Analysis of Groundwater Basin Yield, Upper Santa Clara River Groundwater Basin, East Subbasin, Los Angeles County, California*

| Year | | | Precipitation Infiltration | Infiltration of Applied Water | Streambed Infiltration | Subsurface Inflow | Total Recharge | Pumping | Groundwater Discharge to Streams | ET | Subsurface Outflow at County Line | Total Discharge | Change in Groundwater Storage | Cumulative Change in Groundwater Storage |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | to | 1 | 41,053 | 13,970 | 39,953 | 17,871 | 112,847 | 49,119 | 21,649 | 17,524 | 18,464 | 106,756 | 6,091 | 6,091 |
| 1 | to | 2 | 11,601 | 13,970 | 3,373 | 18,632 | 47,576 | 49,035 | 10,147 | 10,469 | 18,136 | 87,788 | -40,212 | -34,120 |
| 2 | to | 3 | 51,672 | 13,970 | 28,415 | 18,444 | 112,501 | 49,035 | 10,925 | 12,319 | 18,585 | 90,863 | 21,638 | -12,483 |
| 3 | to | 4 | 181,820 | 13,970 | 89,448 | 16,985 | 302,223 | 49,035 | 36,265 | 29,506 | 19,056 | 133,861 | 168,361 | 155,879 |
| 4 | to | 5 | 687 | 13,970 | 527 | 18,253 | 33,437 | 49,119 | 16,665 | 23,150 | 18,225 | 107,158 | -73,721 | 82,158 |
| 5 | to | 6 | 2 | 13,970 | 535 | 18,927 | 33,434 | 44,372 | 9,497 | 13,286 | 18,171 | 85,326 | -51,891 | 30,266 |
| 6 | to | 7 | 42,574 | 13,970 | 19,998 | 18,619 | 95,161 | 49,035 | 11,479 | 14,376 | 18,568 | 93,458 | 1,703 | 31,969 |
| 7 | to | 8 | 11,415 | 13,970 | 2,484 | 19,419 | 47,288 | 49,035 | 7,923 | 10,419 | 18,277 | 85,654 | -38,366 | -6,397 |
| 8 | to | 9 | 27,363 | 13,970 | 10,507 | 19,743 | 71,583 | 54,214 | 6,664 | 10,234 | 18,507 | 89,618 | -18,036 | -24,433 |
| 9 | to | 10 | 0 | 13,970 | 523 | 20,113 | 34,606 | 44,372 | 4,739 | 8,041 | 18,359 | 75,510 | -40,904 | -65,336 |
| 10 | to | 11 | 0 | 13,970 | 1,472 | 20,347 | 35,789 | 49,446 | 2,584 | 5,612 | 18,354 | 75,996 | -40,208 | -105,544 |
| 11 | to | 12 | 50,580 | 13,970 | 28,173 | 19,613 | 112,336 | 58,025 | 3,061 | 8,476 | 18,563 | 88,125 | 24,211 | -81,334 |
| 12 | to | 13 | 130,074 | 13,970 | 80,760 | 17,850 | 242,654 | 72,600 | 14,234 | 18,462 | 18,728 | 124,024 | 118,630 | 37,296 |
| 13 | to | 14 | 112,433 | 13,970 | 51,561 | 17,509 | 195,472 | 49,035 | 24,221 | 29,084 | 18,797 | 121,137 | 74,335 | 111,632 |
| 14 | to | 15 | 414 | 13,970 | 1,979 | 18,575 | 34,939 | 49,446 | 7,788 | 16,616 | 18,157 | 92,007 | -57,068 | 54,563 |
| 15 | to | 16 | 113,543 | 13,970 | 60,100 | 17,636 | 205,250 | 49,035 | 29,255 | 26,983 | 18,745 | 124,018 | 81,232 | 135,795 |
| 16 | to | 17 | 45,609 | 13,970 | 21,594 | 18,204 | 99,376 | 49,119 | 15,122 | 21,342 | 18,635 | 104,218 | -4,842 | 130,954 |
| 17 | to | 18 | 16,967 | 13,970 | 5,320 | 18,758 | 55,015 | 49,035 | 11,851 | 16,757 | 18,242 | 95,885 | -40,870 | 90,084 |
| 18 | to | 19 | 137,727 | 13,970 | 59,717 | 17,397 | 228,810 | 49,035 | 27,143 | 31,249 | 18,923 | 126,350 | 102,460 | 192,544 |
| 19 | to | 20 | 13 | 13,970 | 4,717 | 18,586 | 37,286 | 49,035 | 14,305 | 20,865 | 18,200 | 102,405 | -65,119 | 127,425 |
| 20 | to | 21 | 14,095 | 13,970 | 4,962 | 19,294 | 52,321 | 49,119 | 11,194 | 14,485 | 18,342 | 93,139 | -40,818 | 86,607 |
| 21 | to | 22 | 58,364 | 13,970 | 35,154 | 18,639 | 126,127 | 54,116 | 12,710 | 19,337 | 18,655 | 104,818 | 21,309 | 107,917 |
| 22 | to | 23 | 0 | 13,970 | 523 | 19,557 | 34,050 | 44,372 | 8,105 | 13,129 | 18,311 | 83,916 | -49,866 | 58,051 |
| 23 | to | 24 | 19,602 | 13,970 | 5,065 | 19,867 | 58,504 | 49,035 | 8,138 | 10,710 | 18,375 | 86,258 | -27,754 | 30,297 |
| 24 | to | 25 | 0 | 13,970 | 524 | 20,258 | 34,752 | 44,441 | 5,486 | 7,896 | 18,418 | 76,240 | -41,489 | -11,192 |
| 25 | to | 26 | 3,053 | 13,970 | 518 | 20,406 | 37,947 | 49,035 | 4,033 | 6,132 | 18,386 | 77,587 | -39,639 | -50,832 |
| 26 | to | 27 | 135,033 | 13,970 | 73,747 | 18,014 | 240,763 | 49,035 | 16,024 | 17,254 | 18,639 | 100,951 | 139,812 | 88,980 |
| 27 | to | 28 | 0 | 13,970 | 536 | 18,764 | 33,270 | 44,372 | 9,238 | 15,229 | 18,125 | 86,963 | -53,693 | 35,287 |
| 28 | to | 29 | 20,048 | 13,970 | 4,960 | 19,518 | 58,496 | 49,119 | 7,646 | 10,808 | 18,326 | 85,898 | -27,402 | 7,885 |
| 29 | to | 30 | 9,397 | 13,970 | 2,999 | 19,929 | 46,296 | 54,116 | 4,726 | 8,252 | 18,339 | 85,433 | -39,138 | -31,253 |
| 30 | to | 31 | 11,022 | 13,970 | 2,348 | 20,308 | 47,647 | 49,035 | 4,024 | 7,140 | 18,409 | 78,609 | -30,962 | -62,215 |
| 31 | to | 32 | 62,138 | 13,970 | 37,429 | 19,568 | 133,105 | 49,035 | 6,854 | 11,497 | 18,820 | 86,205 | 46,900 | -15,315 |
| 32 | to | 33 | 63,939 | 13,970 | 36,375 | 18,890 | 133,174 | 49,119 | 11,471 | 19,025 | 18,678 | 98,293 | 34,881 | 19,566 |
| 33 | to | 34 | 244 | 13,970 | 2,395 | 20,199 | 36,808 | 44,372 | 6,943 | 11,585 | 18,375 | 81,275 | -44,466 | -24,900 |
| 34 | to | 35 | 1,555 | 13,970 | 524 | 20,530 | 36,579 | 49,446 | 3,767 | 7,507 | 18,404 | 79,124 | -42,545 | -67,445 |
| 35 | to | 36 | 32 | 13,970 | 4,852 | 20,690 | 39,543 | 58,025 | 303 | 5,882 | 18,401 | 82,610 | -43,067 | -110,512 |
| 36 | to | 37 | 52,098 | 13,970 | 24,510 | 19,931 | 110,509 | 44,441 | 4,564 | 10,236 | 18,620 | 77,860 | 32,648 | -77,864 |
| 37 | to | 38 | 4,170 | 13,970 | 616 | 20,483 | 39,239 | 49,035 | 2,503 | 6,237 | 18,378 | 76,152 | -36,913 | -114,777 |
| 38 | to | 39 | 362 | 13,970 | 2,463 | 20,816 | 37,610 | 49,446 | 719 | 4,966 | 18,418 | 73,549 | -35,938 | -150,716 |
| 39 | to | 40 | 122,459 | 13,970 | 74,037 | 19,276 | 229,741 | 49,035 | 8,546 | 10,468 | 18,766 | 86,814 | 142,927 | -7,789 |
| 40 | to | 41 | 12,997 | 13,970 | 4,096 | 19,066 | 50,129 | 49,119 | 8,998 | 13,953 | 18,220 | 90,290 | -40,161 | -47,950 |
| 41 | to | 42 | 64,499 | 13,970 | 40,945 | 18,797 | 138,210 | 49,035 | 10,243 | 16,890 | 18,577 | 94,745 | 43,465 | -4,484 |
| 42 | to | 43 | 0 | 13,970 | 536 | 19,752 | 34,258 | 44,372 | 6,577 | 12,461 | 18,301 | 81,711 | -47,454 | -51,938 |
| 43 | to | 44 | 123,377 | 13,970 | 53,751 | 18,022 | 209,121 | 49,035 | 17,543 | 21,442 | 18,640 | 106,660 | 102,461 | 50,523 |
| 44 | to | 45 | 64,250 | 13,970 | 39,379 | 18,423 | 136,022 | 49,119 | 13,271 | 20,449 | 18,544 | 101,383 | 34,639 | 85,163 |
| 45 | to | 46 | 8,541 | 13,970 | 2,217 | 19,103 | 43,830 | 49,035 | 10,232 | 18,196 | 18,249 | 95,712 | -51,882 | 33,281 |
| 46 | to | 47 | 0 | 13,970 | 533 | 19,897 | 34,399 | 44,372 | 6,746 | 10,372 | 18,334 | 79,823 | -45,424 | -12,143 |

**TABLE 4-1**

Simulated Annual Groundwater Budget

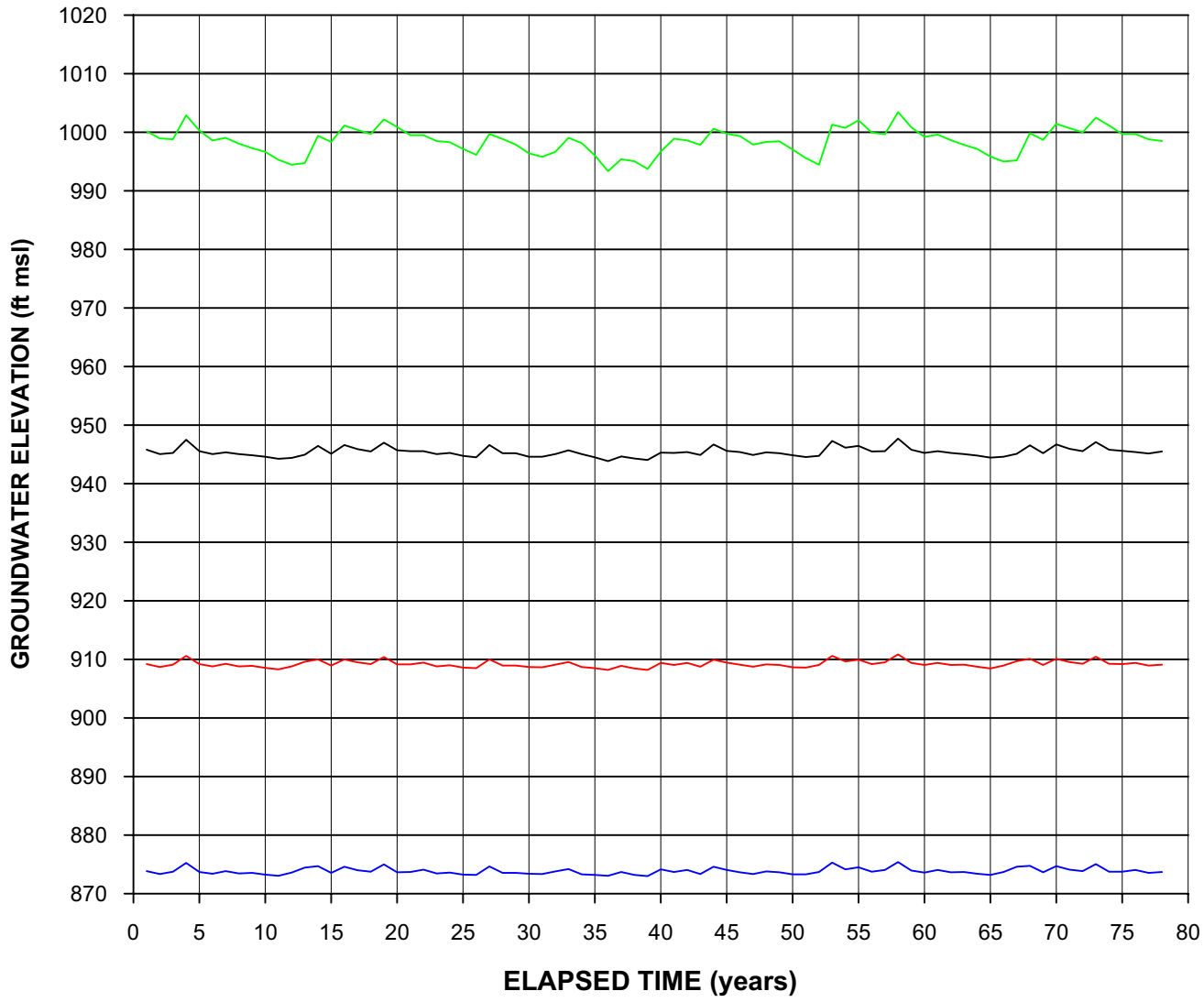
*Analysis of Groundwater Basin Yield, Upper Santa Clara River Groundwater Basin, East Subbasin, Los Angeles County, California*

| Year | Precipitation Infiltration | Infiltration of Applied Water | Streambed Infiltration | Subsurface Inflow | Total Recharge | Pumping | Groundwater Discharge to Streams | ET | Subsurface Outflow at County Line | Total Discharge | Change in Groundwater Storage | Cumulative Change in Groundwater Storage |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 47 to 48 | 43,414 | 13,970 | 18,560 | 19,505 | 95,448 | 49,035 | 8,927 | 12,755 | 18,638 | 89,355 | 6,094 | -6,050 |
| 48 to 49 | 32,966 | 13,970 | 13,527 | 19,953 | 80,416 | 49,119 | 8,497 | 12,634 | 18,666 | 88,916 | -8,499 | -14,549 |
| 49 to 50 | 839 | 13,970 | 1,856 | 20,451 | 37,117 | 44,372 | 5,528 | 8,992 | 18,434 | 77,326 | -40,209 | -54,758 |
| 50 to 51 | 9,990 | 13,970 | 2,645 | 20,684 | 47,289 | 54,116 | 3,517 | 6,845 | 18,455 | 82,933 | -35,643 | -90,401 |
| 51 to 52 | 49,961 | 13,970 | 25,027 | 20,153 | 109,112 | 62,702 | 3,319 | 9,913 | 18,755 | 94,689 | 14,423 | -75,978 |
| 52 to 53 | 188,493 | 13,970 | 69,633 | 17,584 | 289,679 | 49,119 | 22,292 | 27,398 | 18,933 | 117,742 | 171,937 | 95,959 |
| 53 to 54 | 46,125 | 13,970 | 20,155 | 18,290 | 98,539 | 49,035 | 15,148 | 24,661 | 18,522 | 107,366 | -8,827 | 87,132 |
| 54 to 55 | 89,718 | 13,970 | 39,953 | 17,979 | 161,620 | 49,035 | 20,589 | 29,655 | 18,624 | 117,903 | 43,716 | 130,848 |
| 55 to 56 | 11,601 | 13,970 | 3,373 | 19,267 | 48,211 | 49,035 | 11,347 | 18,242 | 18,316 | 96,940 | -48,729 | 82,119 |
| 56 to 57 | 51,672 | 13,970 | 28,415 | 19,203 | 113,260 | 49,119 | 11,982 | 18,862 | 18,806 | 98,769 | 14,491 | 96,610 |
| 57 to 58 | 181,820 | 13,970 | 89,448 | 17,106 | 302,343 | 49,035 | 32,399 | 38,747 | 19,048 | 139,229 | 163,114 | 259,725 |
| 58 to 59 | 687 | 13,970 | 527 | 18,350 | 33,534 | 49,035 | 16,623 | 29,046 | 18,213 | 112,917 | -79,383 | 180,342 |
| 59 to 60 | 2 | 13,970 | 535 | 19,266 | 33,773 | 44,372 | 10,576 | 17,223 | 18,266 | 90,437 | -56,664 | 123,678 |
| 60 to 61 | 42,574 | 13,970 | 19,998 | 18,987 | 95,529 | 49,119 | 12,553 | 18,152 | 18,704 | 98,527 | -2,998 | 120,680 |
| 61 to 62 | 11,415 | 13,970 | 2,484 | 19,754 | 47,622 | 49,035 | 9,005 | 13,268 | 18,366 | 89,674 | -42,052 | 78,628 |
| 62 to 63 | 27,363 | 13,970 | 10,507 | 20,014 | 71,853 | 54,116 | 7,752 | 12,812 | 18,539 | 93,219 | -21,366 | 57,262 |
| 63 to 64 | 0 | 13,970 | 523 | 20,416 | 34,909 | 44,372 | 5,755 | 10,119 | 18,437 | 78,683 | -43,774 | 13,488 |
| 64 to 65 | 0 | 13,970 | 1,472 | 20,680 | 36,121 | 49,522 | 3,569 | 7,254 | 18,475 | 78,820 | -42,698 | -29,210 |
| 65 to 66 | 50,580 | 13,970 | 28,173 | 19,854 | 112,576 | 58,025 | 4,004 | 10,335 | 18,623 | 90,989 | 21,588 | -7,622 |
| 66 to 67 | 130,074 | 13,970 | 80,760 | 17,898 | 242,702 | 72,452 | 13,502 | 21,223 | 18,686 | 125,863 | 116,839 | 109,216 |
| 67 to 68 | 112,433 | 13,970 | 51,561 | 17,536 | 195,499 | 49,035 | 23,462 | 32,532 | 18,803 | 123,833 | 71,667 | 180,883 |
| 68 to 69 | 414 | 13,970 | 1,979 | 18,661 | 35,024 | 49,522 | 8,596 | 18,842 | 18,226 | 95,186 | -60,162 | 120,721 |
| 69 to 70 | 113,543 | 13,970 | 60,100 | 17,647 | 205,261 | 49,035 | 29,552 | 30,176 | 18,761 | 127,523 | 77,737 | 198,459 |
| 70 to 71 | 45,609 | 13,970 | 21,594 | 18,166 | 99,339 | 49,035 | 15,740 | 23,534 | 18,602 | 106,911 | -7,572 | 190,886 |
| 71 to 72 | 16,967 | 13,970 | 5,320 | 18,777 | 55,034 | 49,035 | 12,551 | 18,552 | 18,264 | 98,402 | -43,368 | 147,518 |
| 72 to 73 | 137,727 | 13,970 | 59,717 | 17,442 | 228,856 | 49,119 | 28,296 | 34,847 | 19,001 | 131,263 | 97,592 | 245,111 |
| 73 to 74 | 13 | 13,970 | 4,717 | 18,592 | 37,292 | 49,035 | 14,986 | 23,059 | 18,220 | 105,299 | -68,007 | 177,103 |
| 74 to 75 | 14,095 | 13,970 | 4,962 | 19,254 | 52,281 | 49,035 | 11,783 | 15,930 | 18,311 | 95,059 | -42,779 | 134,324 |
| 75 to 76 | 58,364 | 13,970 | 35,154 | 18,654 | 126,142 | 54,116 | 13,385 | 20,958 | 18,673 | 107,132 | 19,010 | 153,334 |
| 76 to 77 | 0 | 13,970 | 523 | 19,646 | 34,139 | 44,441 | 8,624 | 14,082 | 18,380 | 85,527 | -51,388 | 101,946 |
| 77 to 78 | 19,602 | 13,970 | 5,065 | 19,899 | 58,536 | 49,035 | 8,607 | 11,515 | 18,393 | 87,550 | -29,014 | 72,932 |
| Minimum | 0 | 13,970 | 518 | 16,985 | 33,270 | 44,372 | 303 | 4,966 | 18,125 | 73,549 | -79,383 | -150,716 |
| Maximum | 188,493 | 13,970 | 89,448 | 20,816 | 302,343 | 72,600 | 36,265 | 38,747 | 19,056 | 139,229 | 171,937 | 259,725 |
| Average | 42,498 | 13,970 | 21,480 | 19,092 | 97,040 | 49,823 | 11,520 | 16,262 | 18,498 | 96,105 | 935 | 44,866 |
| Median | 19,602 | 13,970 | 5,193 | 19,153 | 58,500 | 49,035 | 9,822 | 14,430 | 18,446 | 92,573 | -28,384 | 36,292 |

Note:

All flow volumes are listed in AF/yr.

# Figures




**LEGEND**

- LACFCD-6968
- NLF-TOPCO1
- NLF-C6
- LACFCD-6995D

NOTE:

1. SEE FIGURE 2-4 FOR LOCATIONS OF WELLS. WELL NLF-TOPCO1 IS LOCATED 210 feet SOUTHWEST OF WELL NLF-B11.

**FIGURE 4-1**
**SIMULATED AVERAGE ANNUAL GROUNDWATER ELEVATIONS IN THE ALLUVIAL AQUIFER WEST OF INTERSTATE 5**
ANALYSIS OF GROUNDWATER BASIN YIELD
UPPER SANTA CLARA RIVER GROUNDWATER BASIN
EAST SUBBASIN, LOS ANGELES COUNTY, CALIFORNIA

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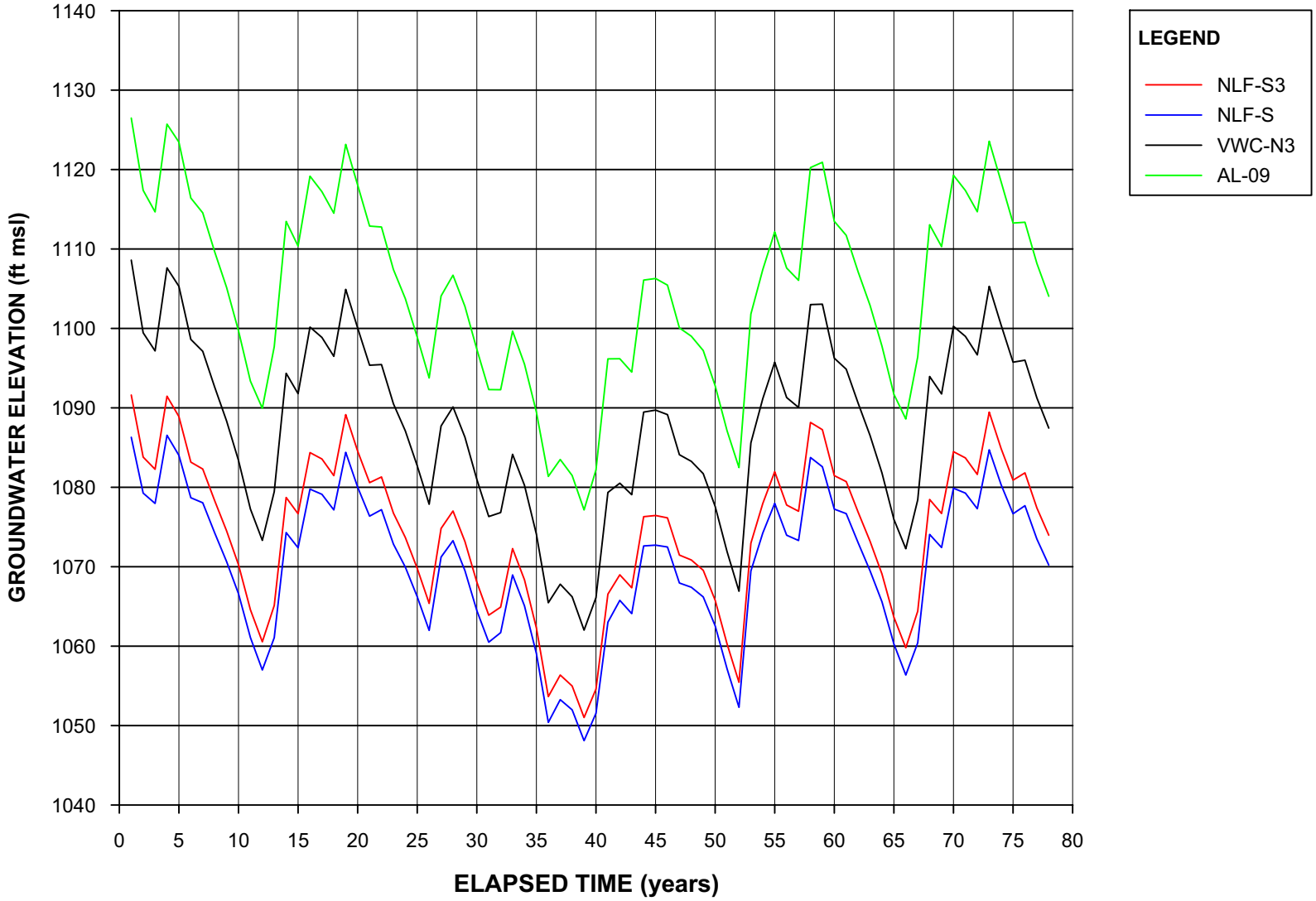
CH2MHILL




NOTES:

1. AL09 IS A CLUSTER OF OBSERVATION WELLS LOCATED 845 feet SOUTHWEST OF PRODUCTION WELL VWC-Q2.

2. THE REMAINING HYDROGRAPHS REPRESENT FORMER ALLUVIAL AQUIFER WELLS THAT HAVE BEEN ABANDONED AND THEREFORE ARE NOT PUMPED IN THE MODEL SIMULATIONS. RELATIVE TO EXISTING WELLS SHOWN ON FIGURE 2-4, THESE FORMER WELLS WERE LOCATED AS FOLLOWS:

   – WELL NLF-S3 WAS LOCATED 305 feet EAST OF WELL VWC-S6
   – WELL NLF-S WAS LOCATED 940 feet SOUTHWEST OF WELL VWC-S6
   – WELL VWC-N3 WAS LOCATED 435 feet NORTHEAST OF WELL VWC-N8

**FIGURE 4-2**
**SIMULATED AVERAGE ANNUAL GROUNDWATER ELEVATIONS IN THE ALLUVIAL AQUIFER EAST OF INTERSTATE 5**
ANALYSIS OF GROUNDWATER BASIN YIELD
UPPER SANTA CLARA RIVER GROUNDWATER BASIN
EAST SUBBASIN, LOS ANGELES COUNTY, CALIFORNIA

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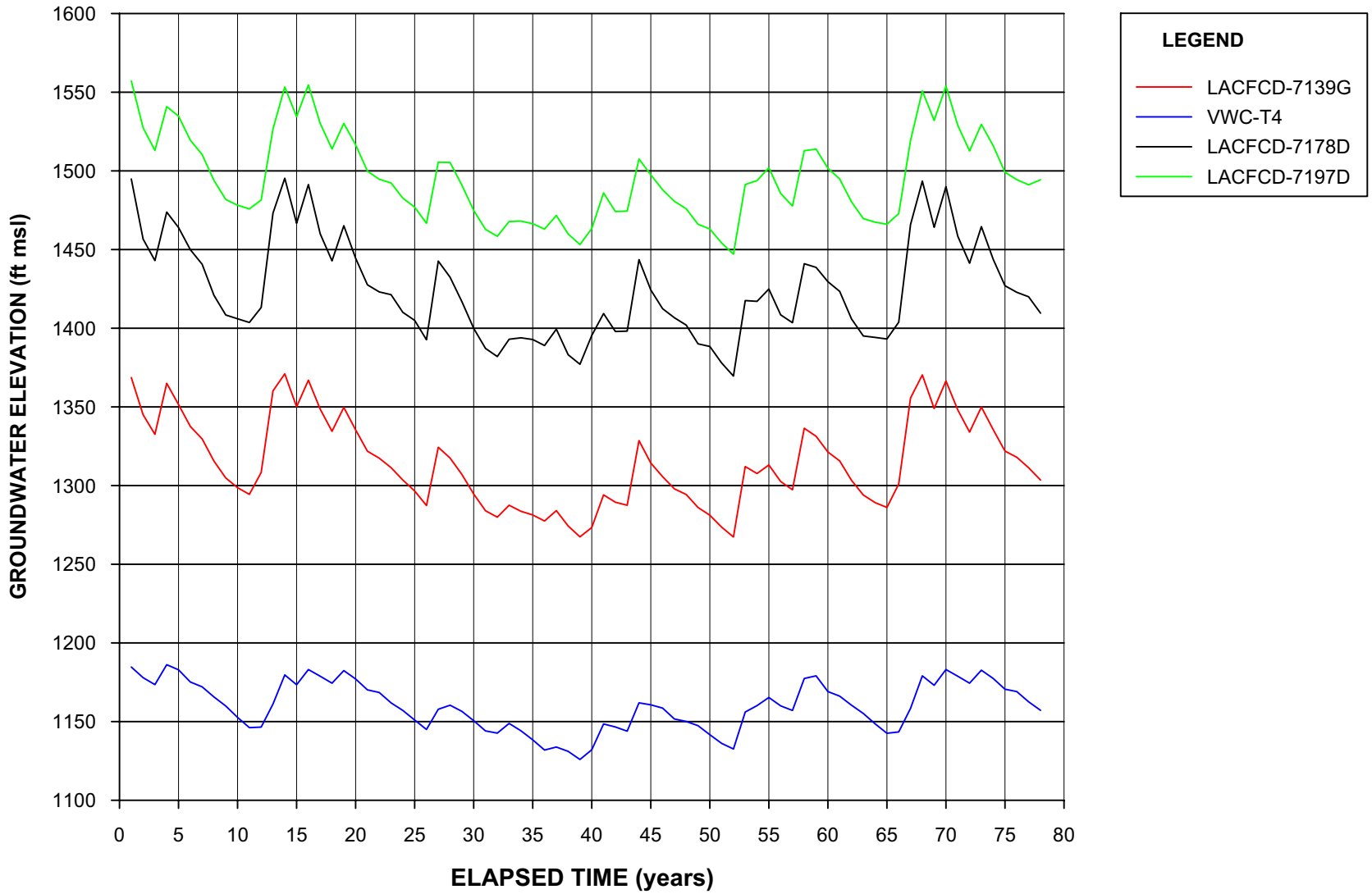
CH2MHILL




NOTES:

1. SEE FIGURE 2-4 FOR LOCATIONS OF WELLS.
2. LOWEST HISTORICAL GROUNDWATER ELEVATION FOR VWC- T4 = 1101 ft msl; ALLUVIUM BOTTOM ELEVATION ~1050 TO 1065 ft msl.
3. LOWEST HISTORICAL GROUNDWATER ELEVATION FOR LACFCD-7139G = 1289 ft msl; ALLUVIUM BOTTOM ELEVATION ~1256 ft msl OR LOWER.
4. LOWEST HISTORICAL GROUNDWATER ELEVATION FOR LACFCD-7178D = 1463 ft msl; ALLUVIUM BOTTOM ELEVATION ~1398 TO 1425 ft msl.
5. LOWEST HISTORICAL GROUNDWATER ELEVATION FOR LACFCD-7197D = 1474 ft msl; ALLUVIUM BOTTOM ELEVATION ~1423 TO 1447 ft msl.

**FIGURE 4-3**
**SIMULATED AVERAGE ANNUAL GROUNDWATER ELEVATIONS IN THE ALLUVIAL AQUIFER IN SOLEDAD CANYON**
ANALYSIS OF GROUNDWATER BASIN YIELD
UPPER SANTA CLARA RIVER GROUNDWATER BASIN
EAST SUBBASIN, LOS ANGELES COUNTY, CALIFORNIA

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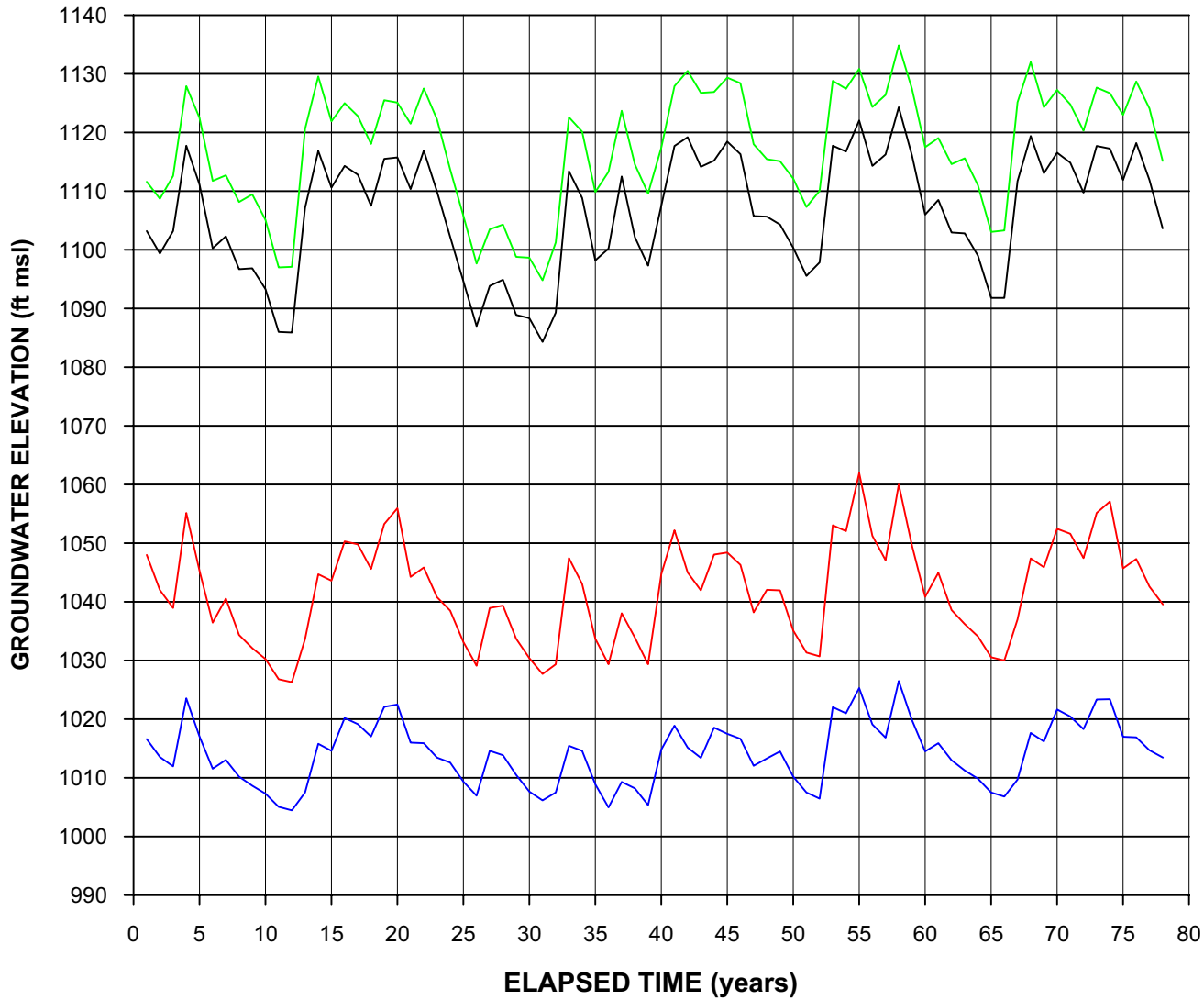


**LEGEND**

- LACFCD-6993A
- VWC-D
- LACFCD-6981D
- LACFCD-6980E

NOTE:

1. SEE FIGURE 2-4 FOR LOCATIONS OF WELLS.

**FIGURE 4-4**
**SIMULATED AVERAGE ANNUAL GROUNDWATER ELEVATIONS IN THE ALLUVIAL AQUIFER ALONG CASTAIC CREEK**
ANALYSIS OF GROUNDWATER BASIN YIELD
UPPER SANTA CLARA RIVER GROUNDWATER BASIN
EAST SUBBASIN, LOS ANGELES COUNTY, CALIFORNIA

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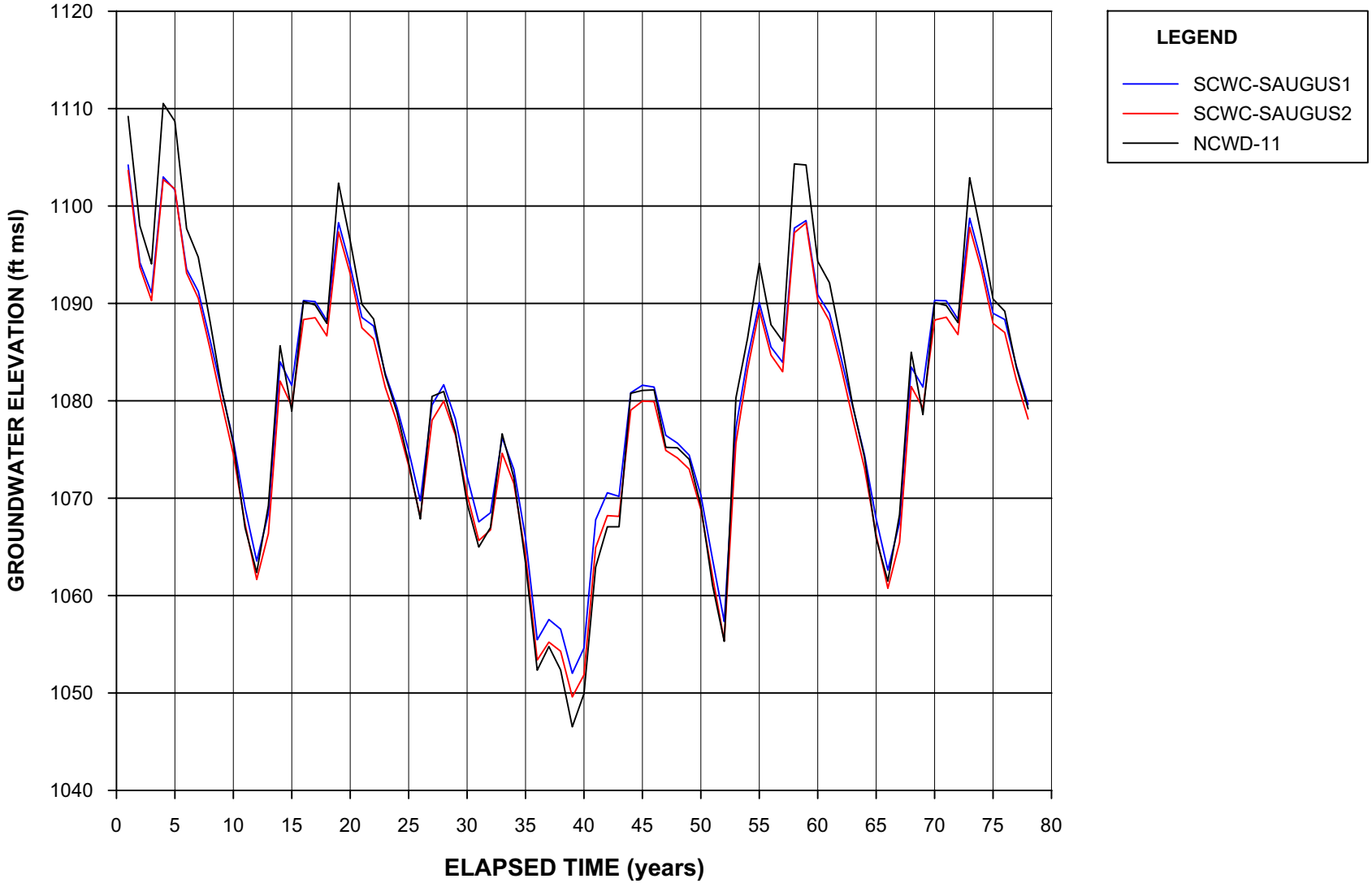


NOTES:

1. SEE FIGURE 2-4 FOR LOCATIONS OF WELLS.

2. THESE WELLS ARE CONSTRUCTED IN THE SAUGUS FORMATION AND ARE NOT OPEN TO THE ALLUVIAL AQUIFER. THE SIMULATED HYDROGRAPHS AT THESE WELL LOCATIONS ARE FOR GROUNDWATER LEVELS IN THE ALLUVIAL AQUIFER, ABOVE THE OPEN INTERVALS OF THESE WELLS.

**FIGURE 4-5**
**SIMULATED AVERAGE ANNUAL GROUNDWATER ELEVATIONS IN THE ALLUVIAL AQUIFER ALONG THE SOUTH FORK SANTA CLARA RIVER**
ANALYSIS OF GROUNDWATER BASIN YIELD
UPPER SANTA CLARA RIVER GROUNDWATER BASIN
EAST SUBBASIN, LOS ANGELES COUNTY, CALIFORNIA

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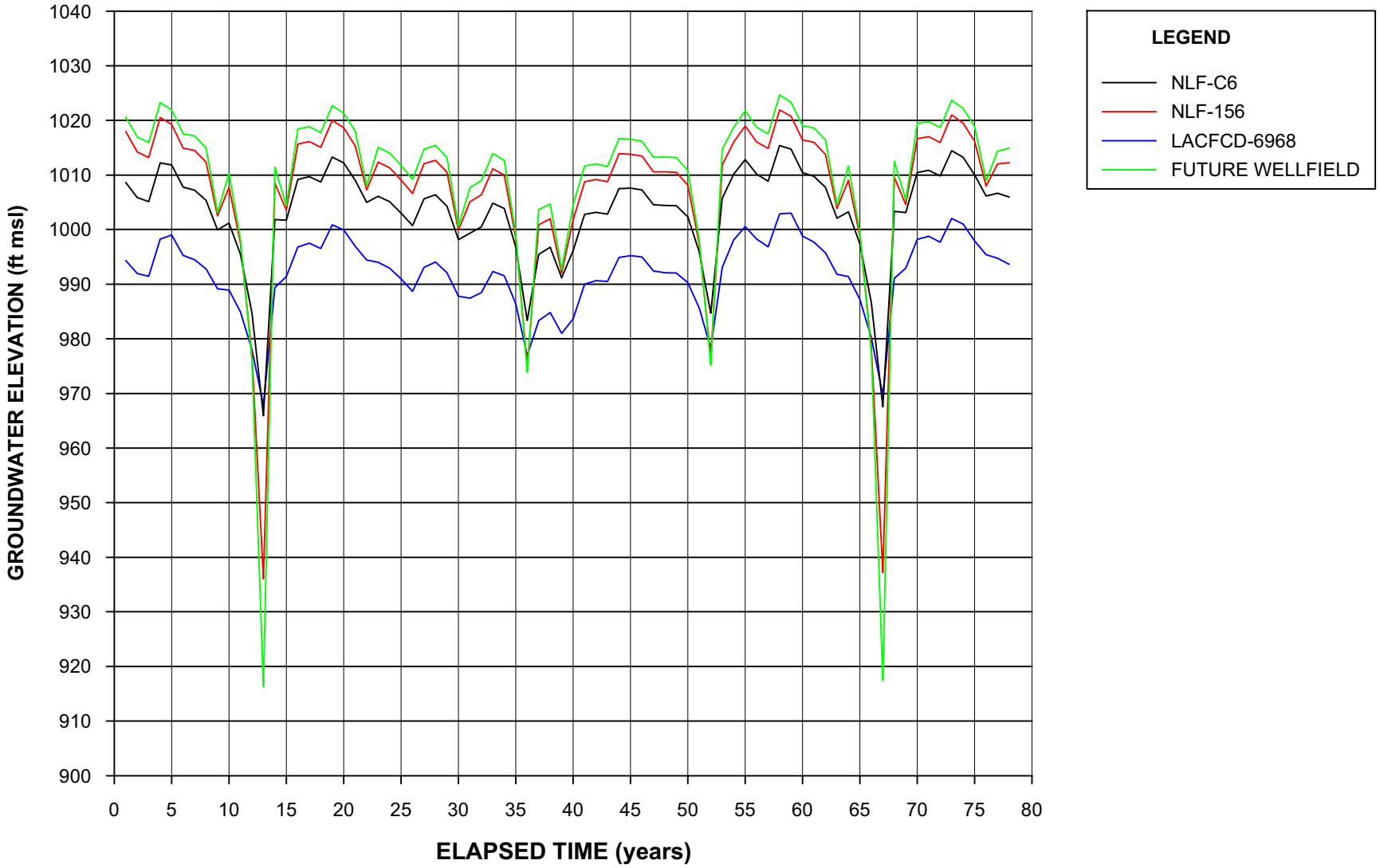


NOTES:

1. SEE FIGURE 2-4 FOR LOCATIONS OF WELLS.

2. WELLS NLF-C6 AND LACFCD-6968 ARE CONSTRUCTED IN THE ALLUVIAL AQUIFER AND ARE NOT OPEN TO THE SAUGUS FORMATION. THE SIMULATED HYDROGRAPHS SHOWN AT THESE WELL LOCATIONS ARE FOR GROUNDWATER LEVELS IN THE SAUGUS FORMATION, BELOW THE OPEN INTERVALS OF THESE WELLS.

3. THE SIMULATED HYDROGRAPH FOR THE FUTURE WELLFIELD IS FOR A MODEL NODE WITH NO ASSIGNED PUMPING, LOCATED INSIDE THE WELLFIELD NEAR VWC-206.

**FIGURE 4-6**
**SIMULATED AVERAGE ANNUAL GROUNDWATER ELEVATIONS IN THE SAUGUS FORMATION WEST OF INTERSTATE 5**
ANALYSIS OF GROUNDWATER BASIN YIELD
UPPER SANTA CLARA RIVER GROUNDWATER BASIN
EAST SUBBASIN, LOS ANGELES COUNTY, CALIFORNIA

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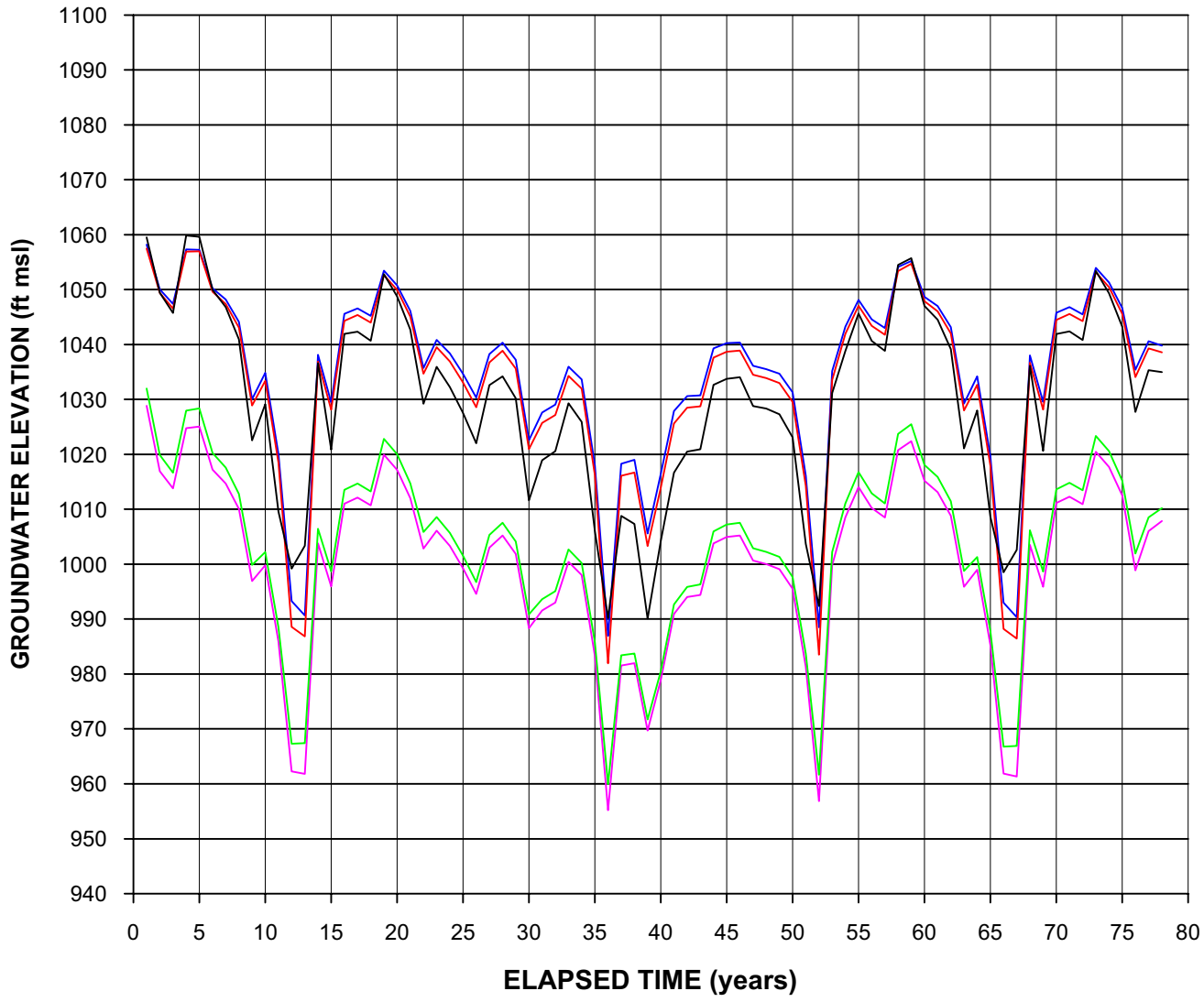


**LEGEND**

- VCW-157
- MP-5
- NCWD-11
- SCWC-SAUGUS1
- SCWC-SAUGUS2

NOTE:

1. SEE FIGURE 2-4 FOR LOCATIONS OF WELLS.

**FIGURE 4-7**
**SIMULATED AVERAGE ANNUAL GROUNDWATER ELEVATIONS IN THE SAUGUS FORMATION EAST OF INTERSTATE 5**
ANALYSIS OF GROUNDWATER BASIN YIELD
UPPER SANTA CLARA RIVER GROUNDWATER BASIN
EAST SUBBASIN, LOS ANGELES COUNTY, CALIFORNIA

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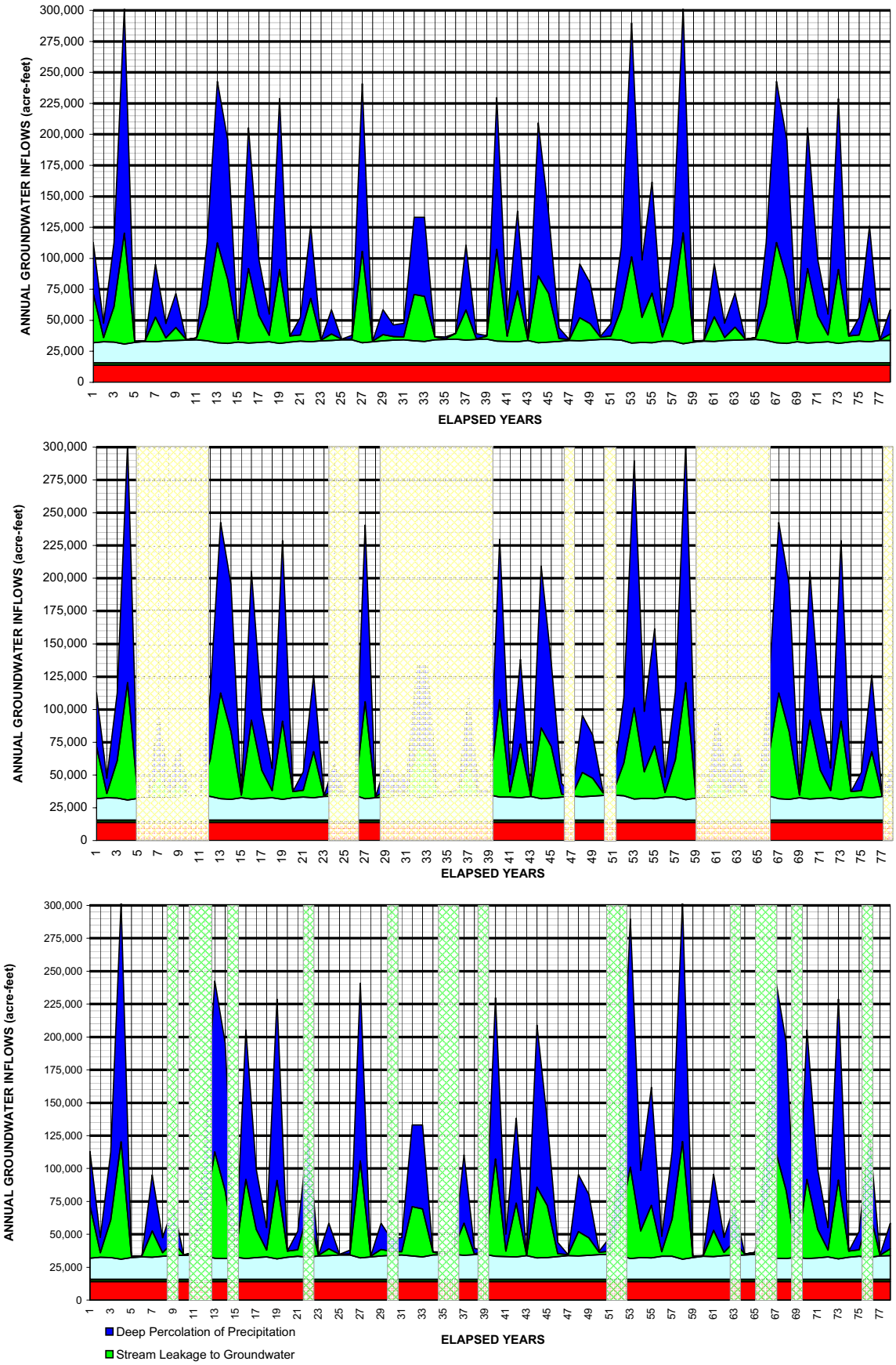


Note:

The deep percolation of applied water is calculatedfor full build-out conditions within the Regional Model boundary, as shown on Figure 3-7 and discussed in Section 3.5.

**FIGURE 4-8**
**SIMULATED ANNUAL GROUNDWATER INFLOWS**
ANALYSIS OF GROUNDWATER BASIN YIELD
UPPER SANTA CLARA RIVER GROUNDWATER BASIN
EAST SUBBASIN, LOS ANGELES COUNTY, CALIFORNIA

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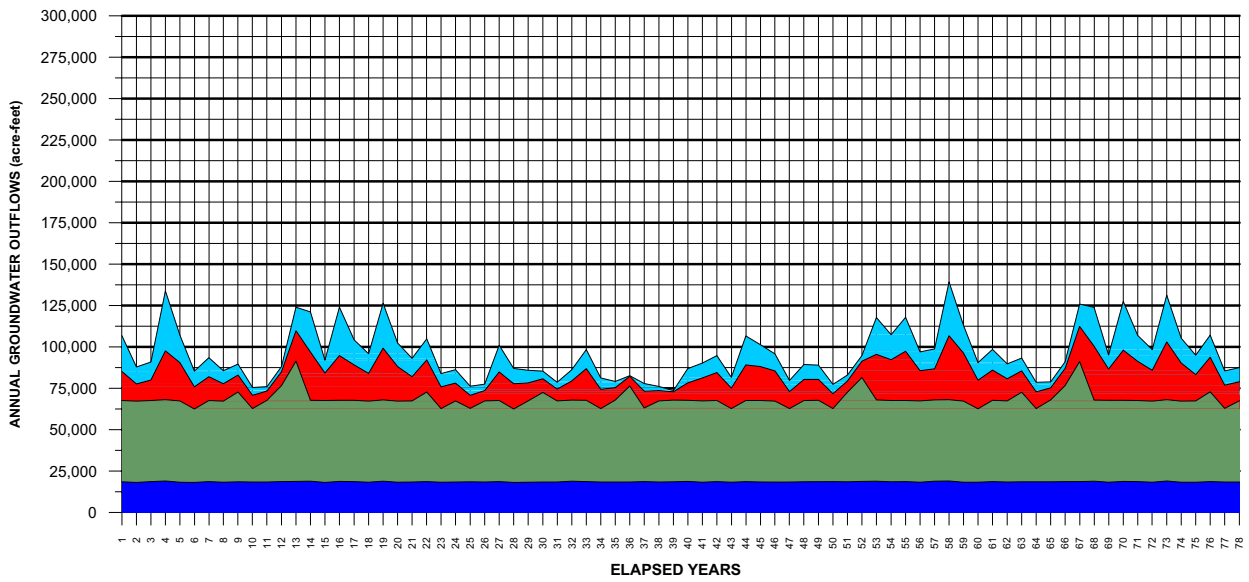


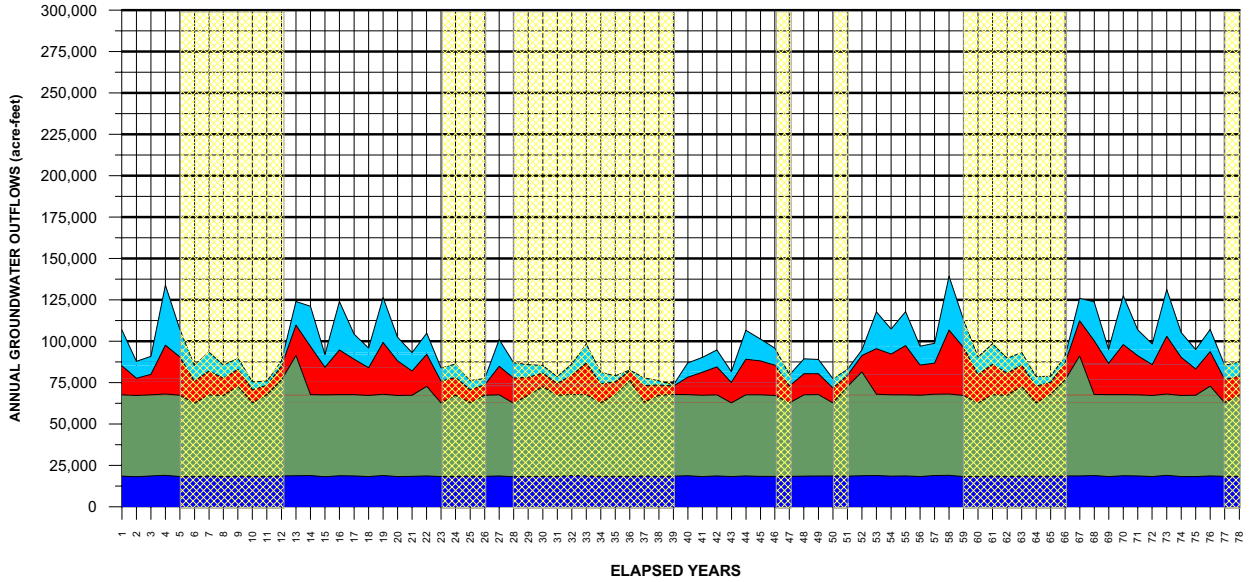


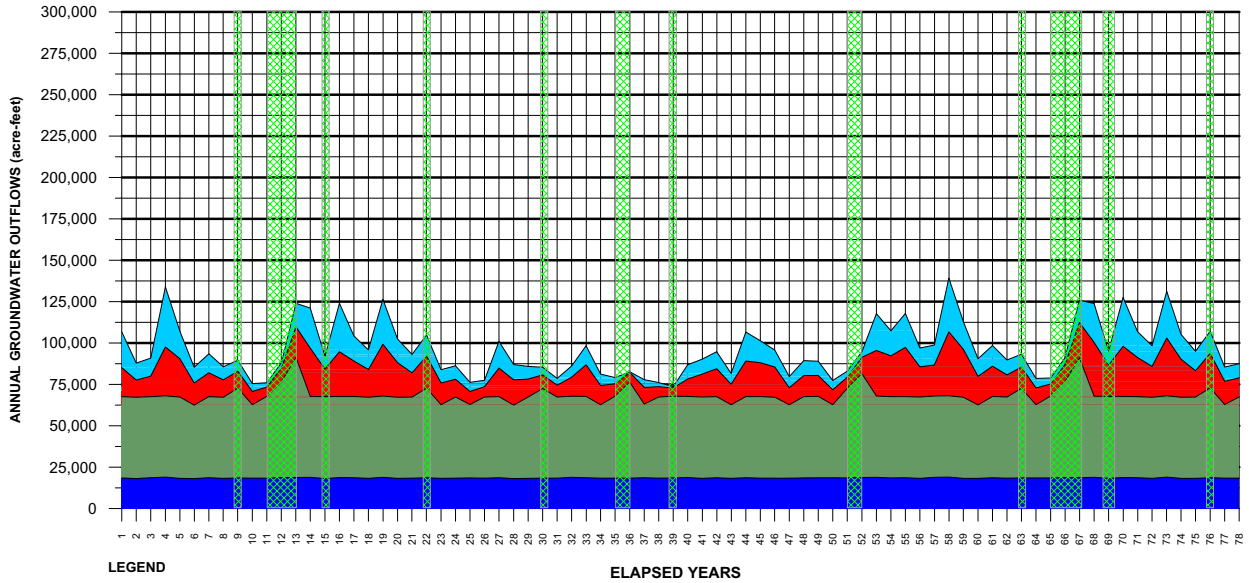


**LEGEND**

- GROUNDWATER DISCHARGE TO STREAMS
- EVAPOTRANSPIRATION
- PUMPING
- SUBSURFACE OUTFLOW AT BLUE CUT
- LOCAL DRY YEARS
- SWP DROUGHT YEARS

**FIGURE 4-9**
**SIMULATED ANNUAL GROUNDWATER OUTFLOWS**
ANALYSIS OF GROUNDWATER BASIN YIELD
UPPER SANTA CLARA RIVER GROUNDWATER BASIN
EAST SUBBASIN, LOS ANGELES COUNTY, CALIFORNIA

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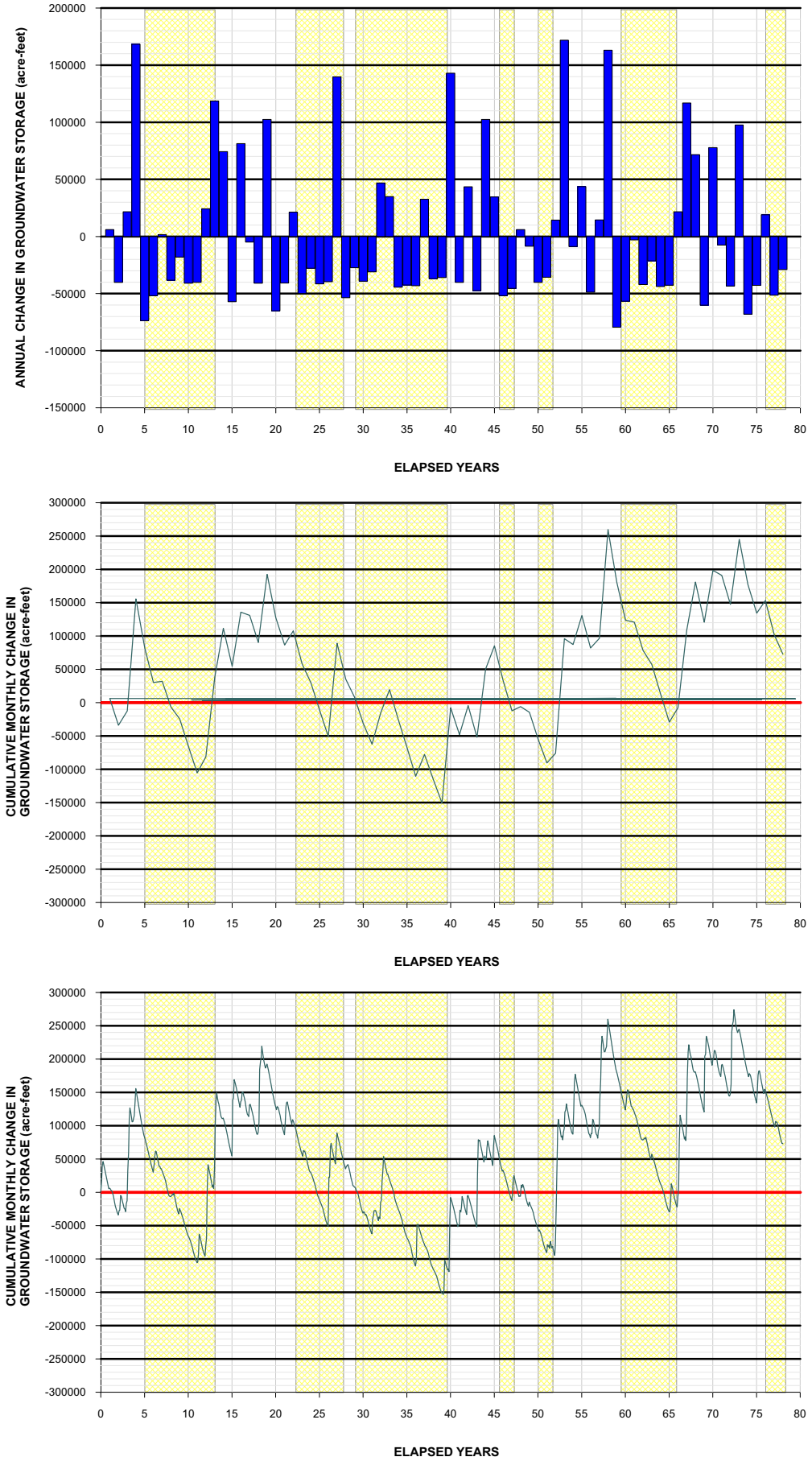


**FIGURE 4-10 (PAGE 1 OF 2)**
**ANNUAL AND CUMULATIVE CHANGE IN SIMULATED GROUNDWATER STORAGE**
ANALYSIS OF GROUNDWATER BASIN YIELD
UPPER SANTA CLARA RIVER GROUNDWATER BASIN
EAST SUBBASIN, LOS ANGELES COUNTY, CALIFORNIA

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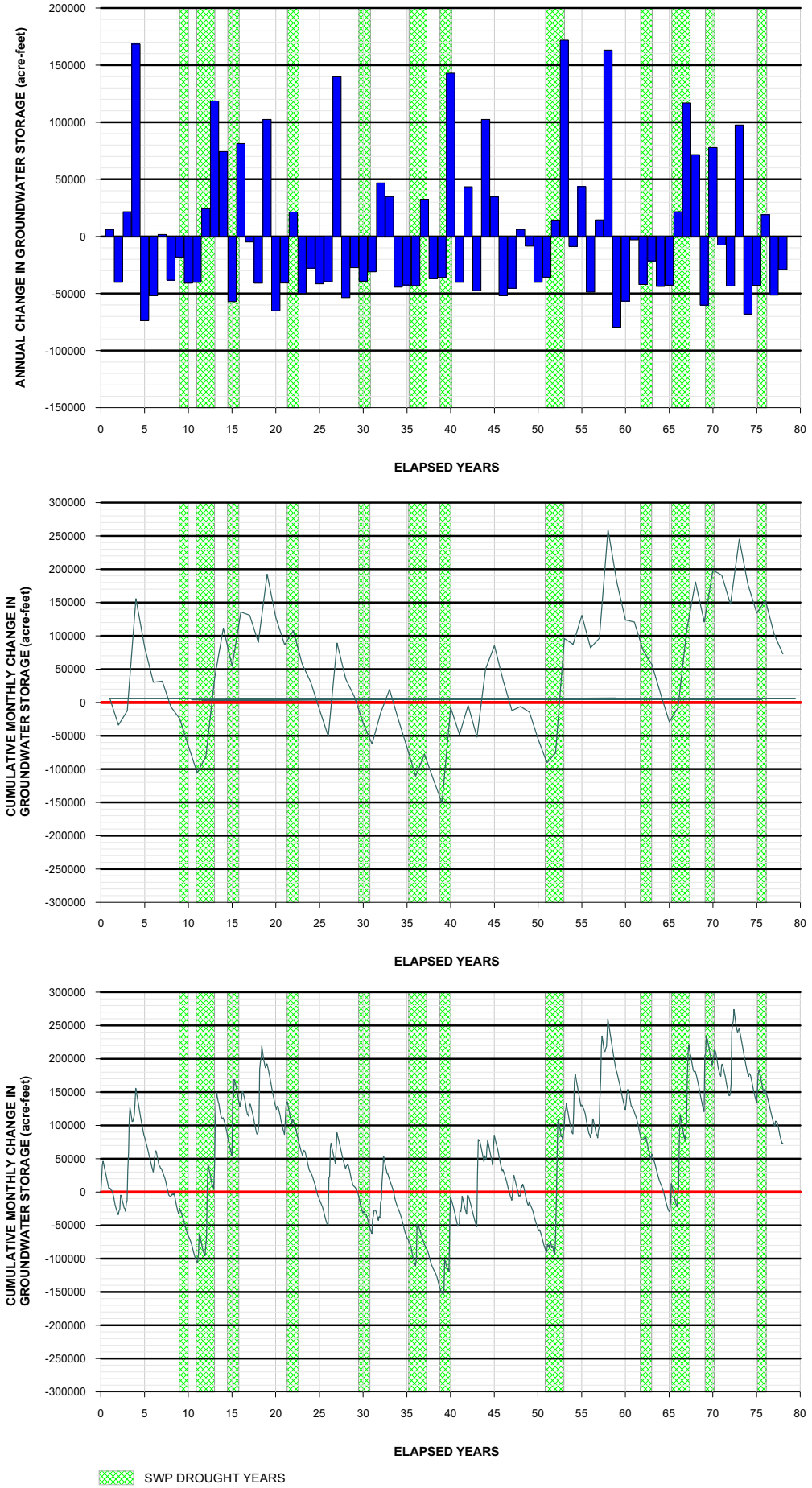


**FIGURE 4-10 (PAGE 2 OF 2)**
**ANNUAL AND CUMULATIVE CHANGE IN SIMULATED GROUNDWATER STORAGE**
ANALYSIS OF GROUNDWATER BASIN YIELD
UPPER SANTA CLARA RIVER GROUNDWATER BASIN
EAST SUBBASIN, LOS ANGELES COUNTY, CALIFORNIA

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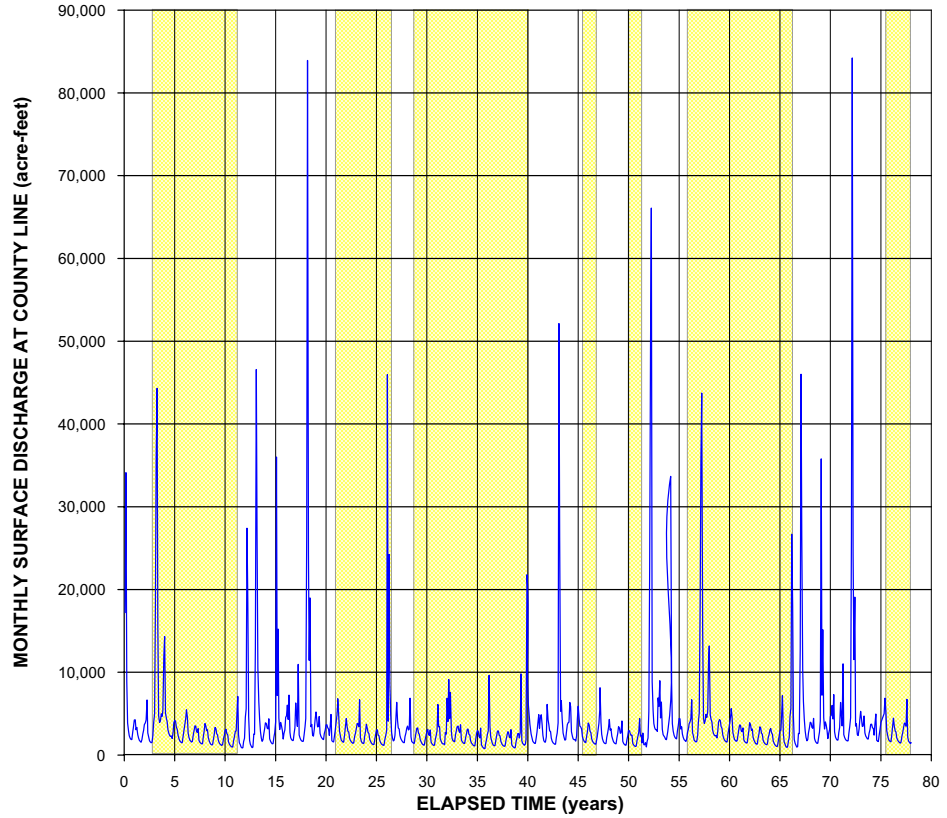


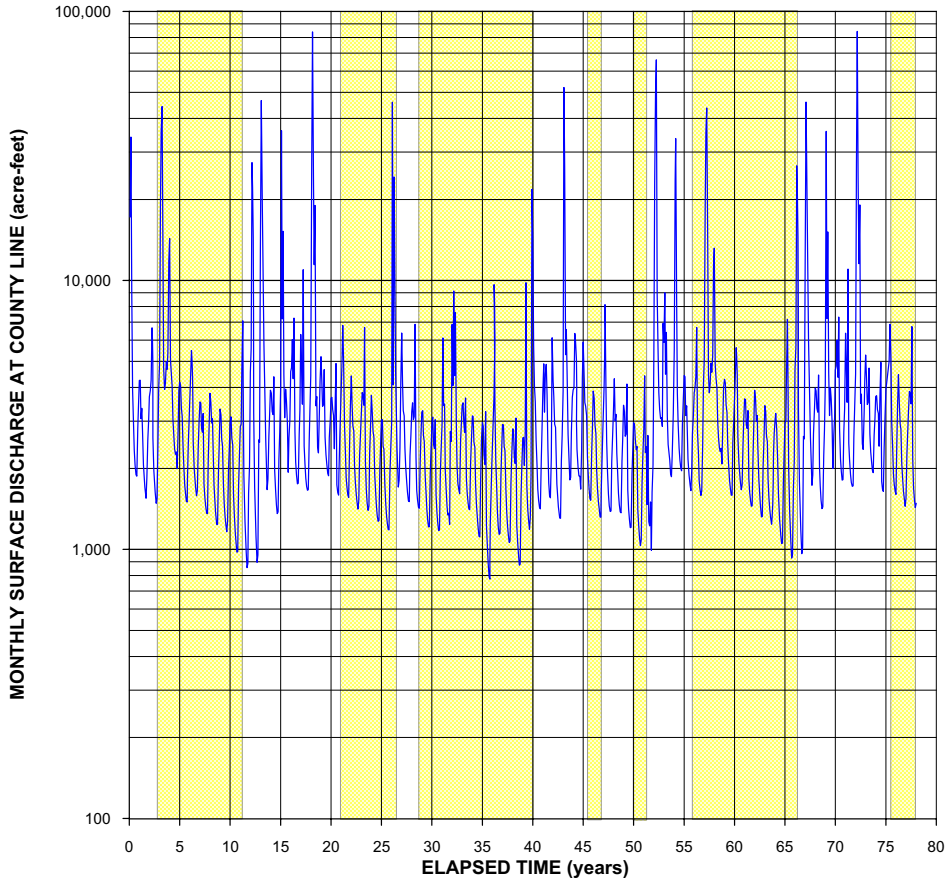


**LEGEND**

LOCAL DRY YEARS

**FIGURE 4-11**
**SIMULATED SANTA CLARA RIVER FLOW AT COUNTY LINE**
ANALYSIS OF GROUNDWATER BASIN YIELD
UPPER SANTA CLARA RIVER GROUNDWATER BASIN
EAST SUBBASIN, LOS ANGELES COUNTY, CALIFORNIA

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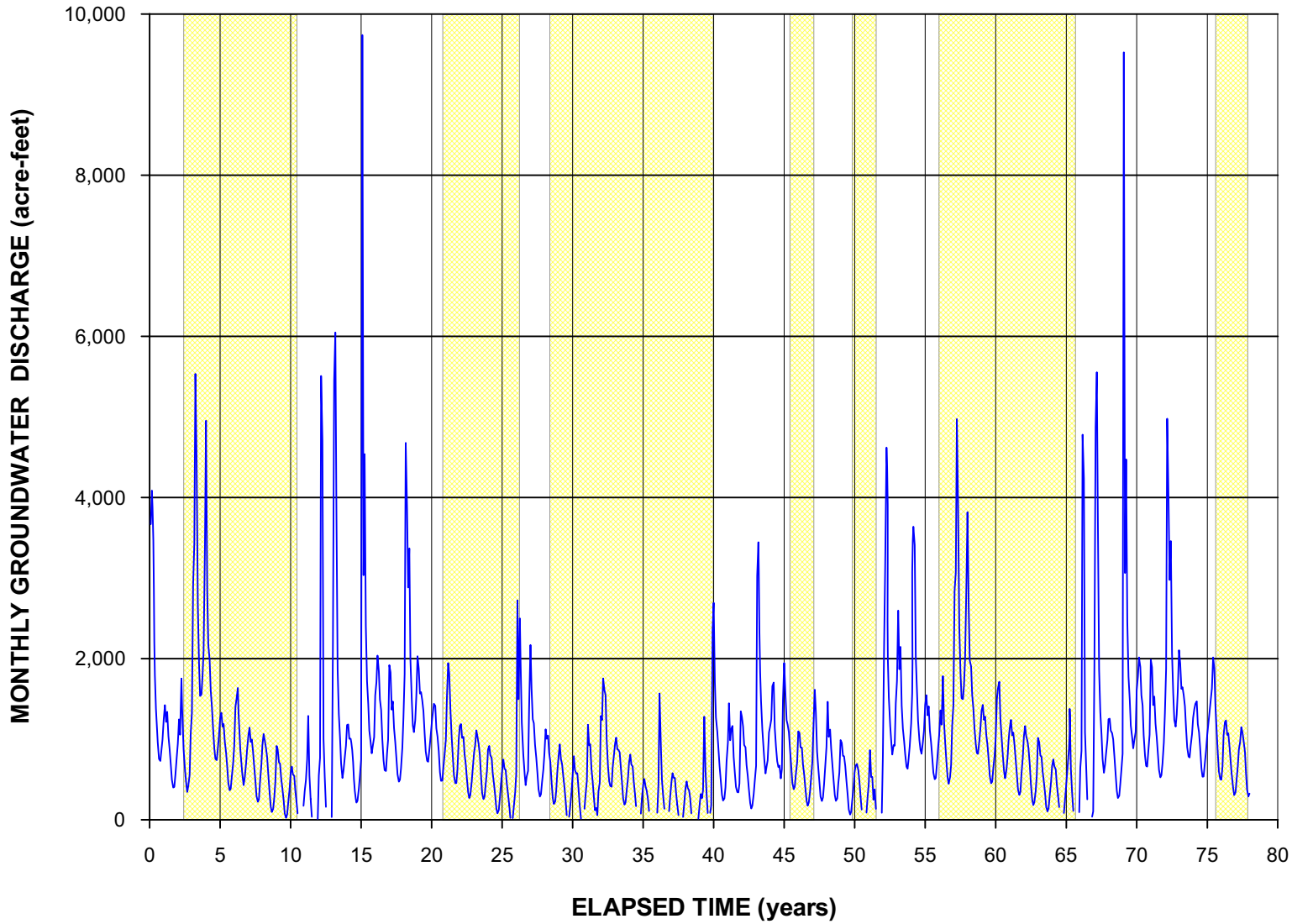


**LEGEND**

LOCAL DRY YEARS

**FIGURE 4-12**
**SIMULATED GROUNDWATER DISCHARGE TO SANTA CLARA RIVER**
ANALYSIS OF GROUNDWATER BASIN YIELD
UPPER SANTA CLARA RIVER GROUNDWATER BASIN
EAST SUBBASIN, LOS ANGELES COUNTY, CALIFORNIA

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SECTION 5

# Conclusions

This section discusses the principal findings from the analyses of historical data and numerical modeling results and the implications of these findings for both groundwater management and water supply in the Santa Clarita Valley.

## 5.1 Principal Findings

The primary objective of the groundwater basin yield evaluation was to use the Regional Model to examine the groundwater operating plan under a range of potential hydrologic conditions to determine whether the groundwater resources in the valley could be expected to respond to such operations in a sustainable fashion. For the purposes of this evaluation, as in other settings, sustainability is defined in terms of renewability (recharge) of groundwater as reflected by the following indicators:

1. Lack of chronic, or sustained, depletion of groundwater storage, as indicated by projected groundwater levels, over a reasonable range of wet, normal, and dry hydrologic conditions
2. Maintenance of surface water flows in the western portion of the basin (which are partially maintained by groundwater discharge) and surface water outflow to downstream basins over the same range of hydrologic conditions

Regarding maintenance of surface water flows, although the development and use of groundwater in a sustainable manner necessitates the inducement of recharge from surface water, sustainability, in this case, does not rely on inducing groundwater recharge by eliminating surface water flows. Rather, it retains and, as supported by increased supplemental water importation, generally increases surface water outflow. Regarding both indicators of sustainability, the range of analyzed hydrologic conditions is a long-term period that includes anticipated occurrences of the types of years and groups of year types that have historically occurred in the basin.

The primary conclusion from the modeling analysis is that the current operating plan for the groundwater basin in the Santa Clarita Valley will not cause detrimental short- or long-term effects to the groundwater and surface water resources in the valley and is, therefore, sustainable. The modeling analysis, along with the historical data described in this report, result in the following specific conclusions regarding the sustainability of the operating plan:

1. The groundwater basin has historically been, and continues to be, in good operating condition and not in overdraft conditions, as indicated by historical data.
2. The operating plan is sustainable over varying hydrologic conditions, because it is feasible to intermittently exceed a long-term average yield for 1 or more years without

creating long-term adverse impacts to the groundwater system and the Santa Clara River.

3. Yields from the Alluvial Aquifer and the Saugus Formation during wet and dry years can be used for long-term water supply planning purposes. In particular, although increased pumping from the Saugus Formation during years of reduced SWP deliveries can be expected to cause short-term declines in groundwater levels during such pumping, it is not projected to cause permanent declines in groundwater discharges or streamflow. Additionally, Saugus groundwater levels will rapidly recover to pre-drought conditions.
4. The strategy around which the plan was designed (maximizing the use of Alluvial Aquifer and imported water during years of normal or above-normal availability of these supplies, while limiting the use of the Saugus Formation during these periods, then temporarily increasing Saugus pumping during years when SWP supplies are significantly reduced because of drought conditions) is viable on a long-term basis.
5. The historical observations of basin conditions and the model simulations together support the historical and ongoing confidence that groundwater can continue to be a sustainable source of water supply under the current groundwater operating plan described in the Amended 2000 UWMP (Black & Veatch, 2000; CLWA et al., 2005), the Groundwater Management Plan (CLWA, 2003), and the annual water reports (LSCE, 2005a).

In summary, the groundwater basin can be expected to respond to the operating plan in a manner similar to what has been experienced over approximately the last 50 years: use of water from groundwater storage during drier periods, mostly reflected by small to large fluctuations in Alluvial Aquifer groundwater levels from the middle to the eastern part of the basin, followed by full to near-full recovery in wet years or periods of years. A notable difference from historically experienced conditions is in the Saugus Formation. Greater Saugus pumping during periods of significantly reduced imported water supplies is projected to cause larger fluctuations in groundwater levels during such pumping, with full to near-full recovery of Saugus water levels in subsequent years, when the availability of imported water supplies returns to normal.

## 5.2 Groundwater Management and Water Supply Implications

The primary focus of the MOU and a key focus of the Groundwater Management Plan is basin yield; specifically, whether a groundwater operating yield could be developed whereby some defined amount of groundwater could be pumped on a sustainable basis. The evaluation described in this report addresses that question. The MOU did not envision impacts from groundwater contamination such as have recently impacted a number of municipal water supply wells. Fortunately, the Regional Model could be used, and has been used, to also examine the effectiveness of the operating plan in containing groundwater contaminants while concurrently pumping (with appropriate treatment at contaminated wells) for municipal water supply (CH2M HILL, 2004b). Thus, in addition to the water supply and groundwater management findings derived from the original intent of the MOU, as discussed below, an additional significant finding derived from the

development and application of the model is that groundwater supply and the control of groundwater contamination migration can be concurrently accomplished without having to modify or, more importantly, compromise the operating yield of the basin.

In addition to the preceding contamination-related findings, there are other findings that directly relate to the original intent of the MOU and can be classified as findings related to the yield of the basin and/or the long-term water supply in the valley. First, the long-term yield of the basin can be considered, for the present, to be equivalent to the operating plan for the basin, based on the simulated projections of groundwater levels, storage, and stream flows. In other words, with the existing and planned distribution of wells and pumping capacities in the operating plan, the basin can be expected to sustainably yield the annual volumes of groundwater in the operating plan for ongoing municipal and agricultural water supply. Additionally, other pumpers in the basin, such as small private well owners, can expect to experience Alluvial Aquifer groundwater conditions generally similar to what they have experienced in the past. This expression of basin yield, based on the existing and planned distribution of wells and pumping capacities, should not be considered or interpreted as a limit to the yield of the basin. It is possible that some alternate configurations of well locations and pumping capacities, potentially complemented by other management actions (e.g., artificial recharge activities), could increase the yield of the basin in the future. The Regional Model, developed for analysis of the current operating plan, can be used to examine potential changes in the operating plan and associated changes in basin yield if that is ever desirable. For the present, however, the main finding of the current groundwater operating plan is that basin conditions can be expected to generally repeat what has been experienced over the last several decades, with some increase in Saugus groundwater level fluctuations if dry-year increases in pumping are actually needed as planned, all resulting in no long-term depletion of groundwater.

From a water supply perspective, the main finding of the operational yield analysis is that it supports the groundwater component of overall water supply for the Santa Clarita Valley as described in the 2000 UWMP, and as expected to be carried forward in the 2005 UWMP.

As discussed in Section 5.1, the Saugus Formation has not been historically pumped at the dry-year rates described in the operating plan. Consistent with the ongoing water resource management, data collection, data management, data evaluation, and reporting activities that have been ongoing in the basin for the past several years, the Purveyors will closely monitor the effects of the greater-than-historical Saugus Formation pumping when it occurs. Depending on the findings from monitoring activities during the first period of increased Saugus pumping, the conjunctive use program that currently relies on SWP deliveries could potentially expand to include artificial recharge activities to enhance Saugus water level recovery after periods of increased Saugus pumping.

In conclusion, through the UWMP, the MOU, the Groundwater Management Plan, and other related water resource management activities, the Purveyors have developed an ongoing process for groundwater resource management in the Santa Clarita Valley that results in a sustainable operating plan for the local groundwater basin. As discussed in the annual water reports (including LSCE, 2005a), the ongoing process of groundwater management relies not only on the historical evaluations and numerical modeling analyses, but also on other program elements identified in the MOU—data gathering, database maintenance, and annual reporting—as well as other activities, such as implementing

conservation measures, increasing the use of recycled water, planning for water reliability, updating the UWMP on a regular schedule, and administering the Groundwater Management Plan. The development and implementation of the UWMP, the MOU, and the Groundwater Management Plan have resulted in a significantly improved understanding of the local water resources, and, in particular, have demonstrated that the current groundwater operating plan results in a reliable, long-term component of water supply for the valley. Ongoing monitoring and interpretation of actual groundwater conditions, as discussed in the MOU and the Groundwater Management Plan, will allow (1) continued assessment of basin responses to future pumping; (2) verification that, as public and private development increase with time, both within and adjacent to the basin, the groundwater basin responds in the same general manner as described herein; and (3) identification of whether adjustments to the operating plan might be warranted to achieve its primary objective of a sustainable groundwater resource.

SECTION 6

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# Appendix A
# Memorandum of Understanding

# Memorandum of Understanding
Between the
Santa Clara River Valley
Upper Basin Water Purveyors and
United Water Conservation District

August 2001

## MEMORANDUM OF UNDERSTANDING

This Memorandum of Understanding ("MOU") is entered into effective August 20, 2001, by and among Castaic Lake Water Agency ("CLWA"), CLWA's Santa Clarita Water Division ("SCWC"), Newhall County Water District ("NCWD"), Valencia Water Company ("VWC") and Los Angeles County Waterworks District No. 36 ("LACWD"), which are collectively referred to as the "Upper Basin Water Purveyors" and United Water Conservation District "UWCD", hereinafter referred together as the "parties."

## RECITALS

**WHEREAS**, UWCD is a public agency that encompasses approximately 214,000 acres of land located in central Ventura County. UWCD's service area covers the downstream portion of the Santa Clara River Valley in Ventura County, as well as the Oxnard Plain (sometimes referred to as the "Lower Santa Clara River Area"). UWCD manages surface and groundwater resources within seven groundwater basins in the Lower Santa Clara River Valley Area. UWCD's Boundary is shown on Figure 1-1; and,

**WHEREAS**, the Upper Basin Water Purveyors meet regularly as a technical group to coordinate conjunctive use of imported, recycled and groundwater resources of the water basins east of the Los Angeles/ Ventura County line (sometimes referred to as the "Upper Santa Clara River Area"), which is located almost entirely within northwestern Los Angeles County. The respective services areas of the Upper Basin Water Purveyors members (CLWA, SCWC, NCWD, VWC and LACWD) are shown on Figure 1-2; and,

**WHEREAS,** UWCD has been involved in the review of water resources in both the Lower Santa Clara River Area and also the Upper Santa Clara River Area as part of UWCD's review of the Newhall Ranch Specific Plan and EIR (NRSP); and,

**WHEREAS,** litigation of the Newhall Ranch Specific Plan and EIR resulted in preparation of an additional analysis to the previously certified EIR for the NRSP, including the section addressing water resource issues; and,

**WHEREAS,** the Additional Analysis includes a water flow model and impact analyses of the future water usage projections for the Upper Santa Clara River Area; and,

**WHEREAS,** UWCD, Newhall Land and Farming Company (NLF) and others have had several technical meetings to further study the Additional Analysis as it relates to the water issues, and, based on this information, and further discussions between UWCD and the Upper Basin Water Purveyors, UWCD believes that it is in the best interests of the parties and the future beneficial water resources management in the upper and lower basins to enter into a cooperative working relationship among the parties; and,

**WHEREAS,** the parties have determined that this MOU is the best format for establishing a program that would be implemented over time for purposes of agreeing upon overall water resources management techniques and an information database that would benefit the upper and lower basins; and,

**WHEREAS,** this MOU is prepared by UWCD and the Upper Basin Water Purveyors because the parties believe that a cooperative water resource monitoring program in the Upper and Lower Santa Clara River Areas is desirable to protect and enhance the conjunctive use of imported water, groundwater and surface water resources within the region; and,

**WHEREAS,** the parties support regional water planning efforts that rely on the provision of accurate and timely information about available water resources; and,

**WHEREAS,** the parties to this MOU desire to create and maintain a cooperative relationship for purposes of gathering information for UWCD and the Upper Basin Water Purveyors to be used in further assessing imported water, surface water and groundwater conditions in both the Upper and Lower Santa Clara River Areas; and,

**WHEREAS**, the parties to this MOU intend to form a reciprocal relationship. In order to do this, UWCD will designate an individual or individuals with technical knowledge and experience appointed by the General Manager of UWCD who will be included in discussions and efforts that take place with the Upper Basin Water Purveyors and others regarding the Upper Santa Clara River Area. Likewise, the Upper Basin Water Purveyors will designate an individual or individuals with technical knowledge and experience appointed by the General Managers of the Upper Basin Purveyors who will be included in discussions and efforts with UWCD and others regarding the Lower Santa Clara River Area, and,

**WHEREAS,** the goal of the MOU is to establish a joint monitoring program, which includes: (a) data collection (monitoring and testing); (b) database management; (c) groundwater flow modeling; (d) assessment of groundwater basin conditions (operational yield); and (e) report preparation and presentation.

**NOW, THEREFORE**, in consideration of the mutual promises and covenants herein contained, the parties to this MOU agree as follows:

1.1 **Program Monitoring.** The parties will participate in a joint monitoring program.

1.2 **Program Content.** The technical aspects of this joint monitoring program are set forth in a technical memorandum entitled, "Water Resource Monitoring Program Upper Santa Clara River Area," (Program) which is attached as Exhibit 1 and incorporated by this reference.

1.3 **Program Meetings.** The General Manager or President of each party to this MOU (or their designee) shall meet as the "Program Committee" within 30 days of the execution of this MOU. The "Program Committee" will establish appropriate subcommittees to initiate the Program and determine the meeting times and locations for the committees. The Program Committee and subcommittees will discuss and coordinate technical aspects of the Program, including the gathering, interpretation and reporting of information as outlined in the technical memorandum (Exhibit 1). Other attendees may be permitted by agreement of the parties to this MOU.

1.4 **Monitoring Costs.** The costs incurred in administrating the Monitoring Program will be determined as implementation of the Program takes place. However, it is understood that, unless the parties to this MOU agree otherwise, the Upper River monitoring costs of the program will be borne by the Upper Basin Water Purveyors because such monitoring will take place within their service areas and the Lower River monitoring costs of the program will be borne by UWCD because such monitoring will take place within its service area.

1.5 **Program Implementation**. The parties to this MOU have prepared a schedule, attached as Exhibit 2, that describes the tasks and estimated time to implement the Program. The Parties acknowledge that Program Implementation will be an on-going and evolving process and may change due to future amendments to the Program, challenging technical issues or other unforeseen circumstances.

1.6 **Water Rights**. Notwithstanding the provisions of this MOU, nothing in either this MOU or the technical memorandum (Exhibit 1) shall be construed as affecting the water rights or operations of any party, person or entity.

1.7 **Term.** This MOU shall remain in effect for an initial period of seven (7) years and shall be automatically renewed for additional one year increments unless otherwise unanimously terminated by the members of the Program Committee as that committee exists at the time action is taken to terminate this MOU.

1.8 **Counterparts.** This MOU may be executed in any number of counterparts, each of which, when so executed, will be deemed to be an original and all of which taken together will constitute one and the same agreement.

IN WITNESS WHEREOF, the parties have executed this MOU as of the date first set forth above.

United Water Conservation District

By _____
General Manager

Castaic Lake Water Agency

By _____
General Manager

Newhall County Water District

By _____
General Manager

Valencia Water Company

By _____
President

Santa Clarita Water Company

By _____
President

Los Angeles County Waterworks District No. 36

By _____
County of Los Angeles

# United Water Conservation District Boundary

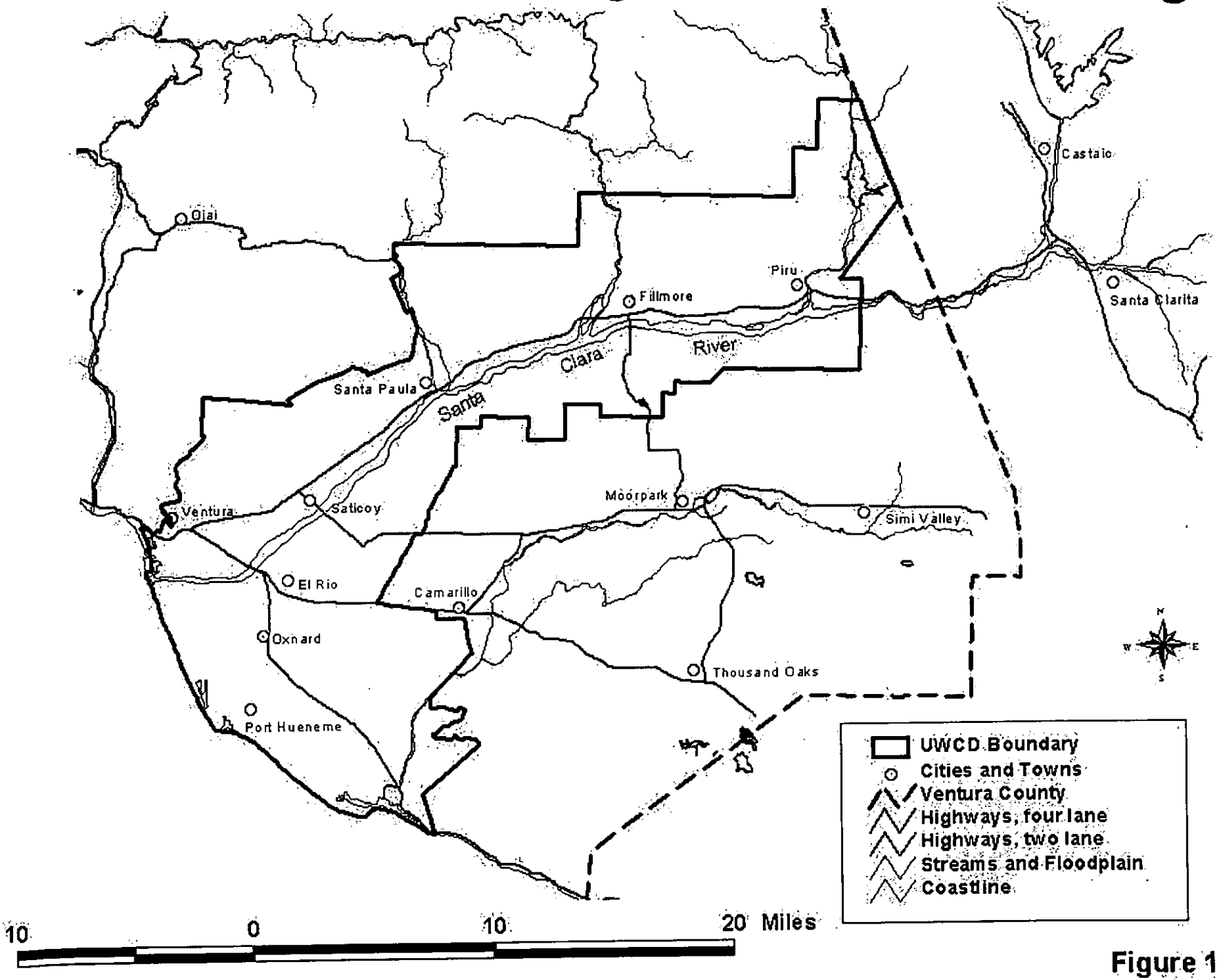



Figure 1-1

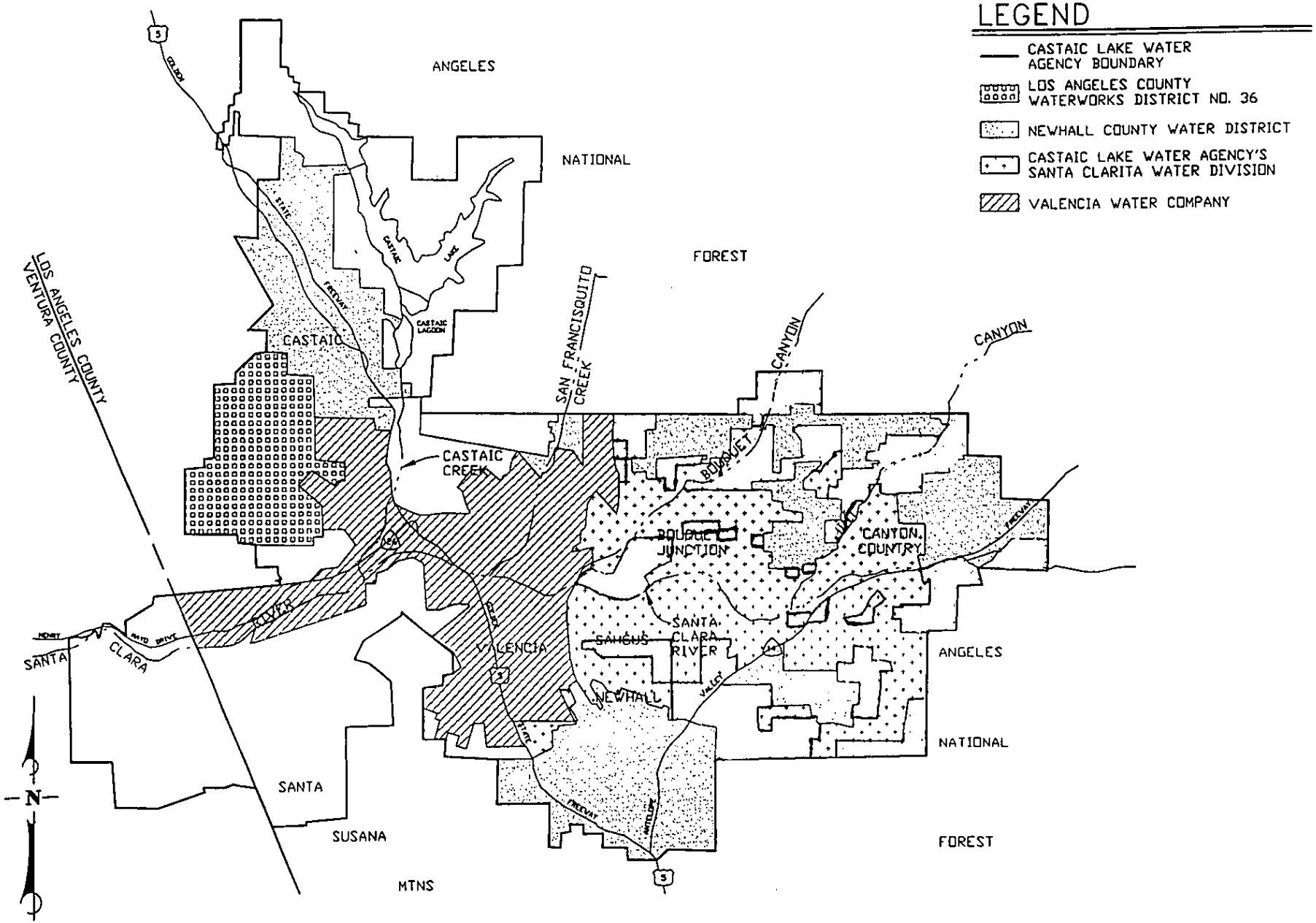



FIGURE 1-2

CLWA AND WATER PURVEYOR SERVICE AREAS

# Exhibit 1
# WATER RESOURCE MONITORING PROGRAM
# UPPER SANTA CLARA RIVER AREA

## INTRODUCTION

As part of its ongoing monitoring, interpretation, and reporting on imported water supplies and groundwater conditions in the aquifer systems underlying the Upper Santa Clara River Area, generally east of the Los Angeles County - Ventura County line and extending east to about the vicinity of Lang Station, the principal water purveyors in the area (primarily the municipal water purveyors - Castaic Lake Water Agency, Los Angeles County Waterworks District No. 36, Newhall County Water District, and Valencia Water Company) have committed to formalizing the data base on which water supply conditions are analyzed, and expanding the analysis of groundwater conditions such that the adequacy of water supply is well understood, and that both local and regional questions or issues about surface and groundwater can be addressed.

This water monitoring program outline has been prepared as a cooperative effort by the Upper Basin Water Purveyors operating in the Santa Clarita Valley and by the United Water Conservation District in Ventura County, the latter as the primary groundwater resource management entity in the Lower Santa Clara River Area (west of the Los Angeles - Ventura County line). The intent of the program outline is to delineate a series of elements that will be undertaken primarily by the Upper River Area entities, but in cooperation with United such that there is ultimately an integrated and coordinated data base, as well as agreed-upon technical tools such as a numerical groundwater flow model, to allow a continued regional understanding of water resources along the Santa Clara River. In that light, the following program includes elements which address data collection (monitoring and testing), database management, groundwater modeling, operational yield analyses, and report preparation and presentation.

**DATA COLLECTION (MONITORING AND TESTING)**

Historically, data on groundwater and related hydrologic conditions have been collected on varying frequencies and in varying formats throughout the Upper River Area. Fortunately, more than sufficient data have historically been collected on groundwater levels, quality, and production (pumpage) to permit general assessment of groundwater conditions, in some detail in the widely developed Alluvial aquifer and to a lesser extent the Saugus Formation aquifer. In order to expand on the general assessment of groundwater conditions, historical data collection efforts will be updated and formalized in the following areas.

*Groundwater Levels and Quality* - Wells in which historical and current water level data are available will be "qualified" (to confirm locations, depths, well completion details, annular seals, etc.) to confirm their utility for ongoing monitoring of water level and/or water quality in a particular aquifer. Based on a combination of qualified well details and available historical and current data, a network of existing and future wells will be developed for ongoing monitoring of groundwater levels (initially on a semi-annual frequency) and groundwater quality (initially on an annual to triennial frequency, depending on the use of the well) in both the Alluvium and the Saugus Formation aquifers. The water level and water quality monitoring networks may not be identical (as with most basins, the number of water level monitoring points will likely be greater than the number of water quality monitoring points). Also, in light of the relative differences in development of the two aquifer systems, there will be more monitoring points in the Alluvium than in the Saugus. However, as future development of the Saugus increases, particularly as the spatial extent of the Saugus "well field" expands, the Saugus monitoring network will evolve and expand accordingly. Water quality details are expected to begin with what historical analyses have been made; monitored details are expected to increase as the use of local Groundwater continues to change from irrigation supply to municipal supply, with the addition of organic and other hazardous chemical analyses of drinking water supplies in recent years. Finally, such as any dedicated monitoring wells are installed in the

area, for specific site investigation or other purposes, they will be added to the qualified well network as appropriate.

*Groundwater Pumpage* - Essentially all pumpage in the Upper Area (except small capacity individual domestic and similar wells) is metered or directly estimated from electrical power records, and the results are maintained in a decentralized data base. Metered measurement of all substantial capacity wells (all municipal and agricultural, as well as other private wells, e.g. golf course irrigation wells) will be continued on at least an annual basis, with progression to monthly data collection as appropriate for particular analyses that may be undertaken.

*Surface Water Flows and Quality* - Historical stream gage sites will be preserved as possible to allow ongoing surface water gaging of stream inflows to the Upper River area, stream outflows from the Upper River area into Ventura County, and return flows to the River system from in-area wastewater treatment plant discharges. Surface water quality at the same points will also be sampled on some frequency to continue historical records as appropriate or to document episodic or other (e.g. treated wastewater discharges) surface water flows into or out of the Upper River area.

*Well and Aquifer Characteristics* - Recently constructed wells, in both the Alluvium and Saugus Formation, have been tested, in some cases with the benefit of nearby monitoring wells, to determine well yields and aquifer hydraulic properties (e.g. transmissivity and storage coefficient). In limited cases, production logging and depth-specific water quality sampling has been undertaken to examine variations in aquifer productivity and quality with depth. Such as there is a need for additional spatial or vertical distribution of well yield or aquifer characteristic data, selected qualified wells will be tested in the Alluvium and Saugus aquifers. In general, all new production wells will be tested to determine the yields of the wells and the hydraulic characteristics of the aquifer materials in which they are completed at various locations in the Upper River area.

*Precipitation* - The locations of historical precipitation gaging will be verified and the quality of the

gaging stations will be assessed. Continuation of historical gaging will be a primary goal, with additions as appropriate to assess inflow of water within the Upper River area as well as distribution of precipitation throughout the area.

**DATABASE MANAGEMENT**

*Geographic Information System - There* is a good start on a regional GIS from the US Geological Survey's Regional Aquifer Study. For instance, roads, streams and other basic geographic features are in the USGS GIS that has been maintained and expanded by United Water Conservation District. United has commercial digital air photo coverage of Ventura County that includes a small portion of western Los Angeles County; additional digital imagery will be sought from agencies in Los Angeles County.

Most of the wells in the Valencia/Santa Clarita area are also in a USGS GIS coverage that includes well construction information. The wells are identified by owners designations as well as state well number. By using the state well number in identifying all monitoring data, information from the databases can be linked directly to the GIS well coverage.

*Water Level Database* - Monitoring data will be collected together in common databases, using an easily accessible program such as Microsoft Access. Groundwater level information is presently in a variety of forms, including paper copy, spreadsheet files, and agency databases. The digital information will be incorporated into a master database, but the data on paper copies will have to be entered into a computer. This will be accomplished by prioritizing the order in which this information is entered. Historic groundwater level data will be obtained from as many wells as possible, public and private, to ensure meaningful area coverage.

*Water Quality Database* - Water quality information may be a larger chore to organize in a database than water levels because each water sample collected is commonly analyzed for a large number of constituents. For water quality data collected in the future, analytical labs can provide results in digital form for ease of integration into a database. Historical water quality information is available digitally from the California Department of Health Services for public water supply wells (data is available for about the past ten years). For the rest of the historical water quality data, prioritizing the order of manual data entry would be necessary. Constituents of concern are obviously the first to be entered. Whether to enter all historical data will need to be addressed; this information is valuable in identifying long-term trends, but data entry takes time. United Water now has all historic water quality data for seven basins in Ventura County in a database, but it took several years to do this.

Water quality data from surface sources such as streams will also be included in the main water quality database. A location identifier can be used to tie the sample to the monitoring location in a GIS coverage. The approximate flow of the surface water source at the time of measurement should accompany each water quality data entry.

*Pumpage Database* - Pumpage data from individual wells is key to assessing both water level and water quality trends. This information is also required to construct a groundwater model. Some of this information has already been entered in computer files and can be readily imported into a database. Other information will likely have to be obtained on a cooperative basis. If pumpers do not have their own metered pumping records, pumpage will be estimated from other sources such as utility bills. For wells where no records have been kept, probable pumping quantities can be estimated through land use records and, in the case of irrigated agriculture, from irrigation methods and practices. This calculated information should not be entered directly in the pumpage database.

*Streamflow Database* - There should be a database of streamflow measured at various monitoring points. For USGS gauges, much of this information is already in digital form. Other agencies, such as County Flood Control, may also have digital data.

## GROUNDWATER FLOW MODELING

As part of the technical analysis of water supply alternatives to meet projected water demands of the proposed Newhall Ranch project in the Upper River area, a numerical groundwater flow model was prepared for that project's proponent. That model was developed to focus on the feasibility and impacts of a potential storage and recovery project in the Saugus Formation, including the impacts of injection and recovery pumping in the Saugus on the overlying Alluvium, and the resultant impacts on Santa Clara River flows out of the Upper River area. The current model is calibrated for a steady state condition, including the addition of some focused injection and pumping. As a result, it represents a useful initial modeling effort of the overall aquifer system in the Upper River area. Depending on its availability for other uses in the Upper River area, that initial model will be subjected to transient calibration efforts and additional calibration of the Alluvial aquifer. The model will then become an evolving tool for analysis of ongoing groundwater development and recharge, in conjunction with imported surface water, and the resultant impacts on groundwater conditions in the Upper River area, as well as on surface outflows to the downstream basins on the Santa Clara River.

## OPERATIONAL YIELD OF THE BASIN

A primary objective of the monitoring efforts, database management efforts, and modeling efforts described above is to assess groundwater basin conditions in the Upper River area in the context of the long term sustainability of the Alluvium aquifer and the generally underlying Saugus Formation, and to operate the basin such that the operating yield is not exceeded over a multi-year wet/dry cycle. This operational yield includes flexibility of groundwater use by allowing increased groundwater use during dry periods and increased recharge (direct or in-lieu) with supplemental water when it is

available. The operational yield protects the aquifer by assuring that groundwater supplies are adequately replenished from one wet/dry cycle to the next. Historical groundwater data demonstrates that the Alluvium has been, and continues to be developed within its long-term sustainability (i.e. no chronic lowering of water levels, no notable trend toward degradation of groundwater quality, etc.). Limited historical data in the Saugus Formation shows no lowering of water levels or degradation of water quality where it has been developed.

While current planning places future pumping of the Alluvium in the same range as has historically occurred for several decades, with anticipated similar results in terms of Alluvial water levels, storage, and quality, the model described above will be a useful tool to quantify the impacts in water budget terms and to analyze a range of scenarios as appropriate to optimize the use of the high-yielding Alluvium. The Saugus Formation is alternately being considered for short-term dry-period water supply at capacities higher than have historically been pumped from that formation, and for injection, storage and recovery of water as part of the overall water supply of the Upper Santa Clara River area. The model will also be used to determine the operational yield of the Saugus under a wide-ranging set of low to high pumping capacities (during wet to dry years, respectively), and with varying aquifer storage (recharge), to avoid undesirable impacts and assure that the operating yield is not exceeded over a multi-year wet/dry cycle.

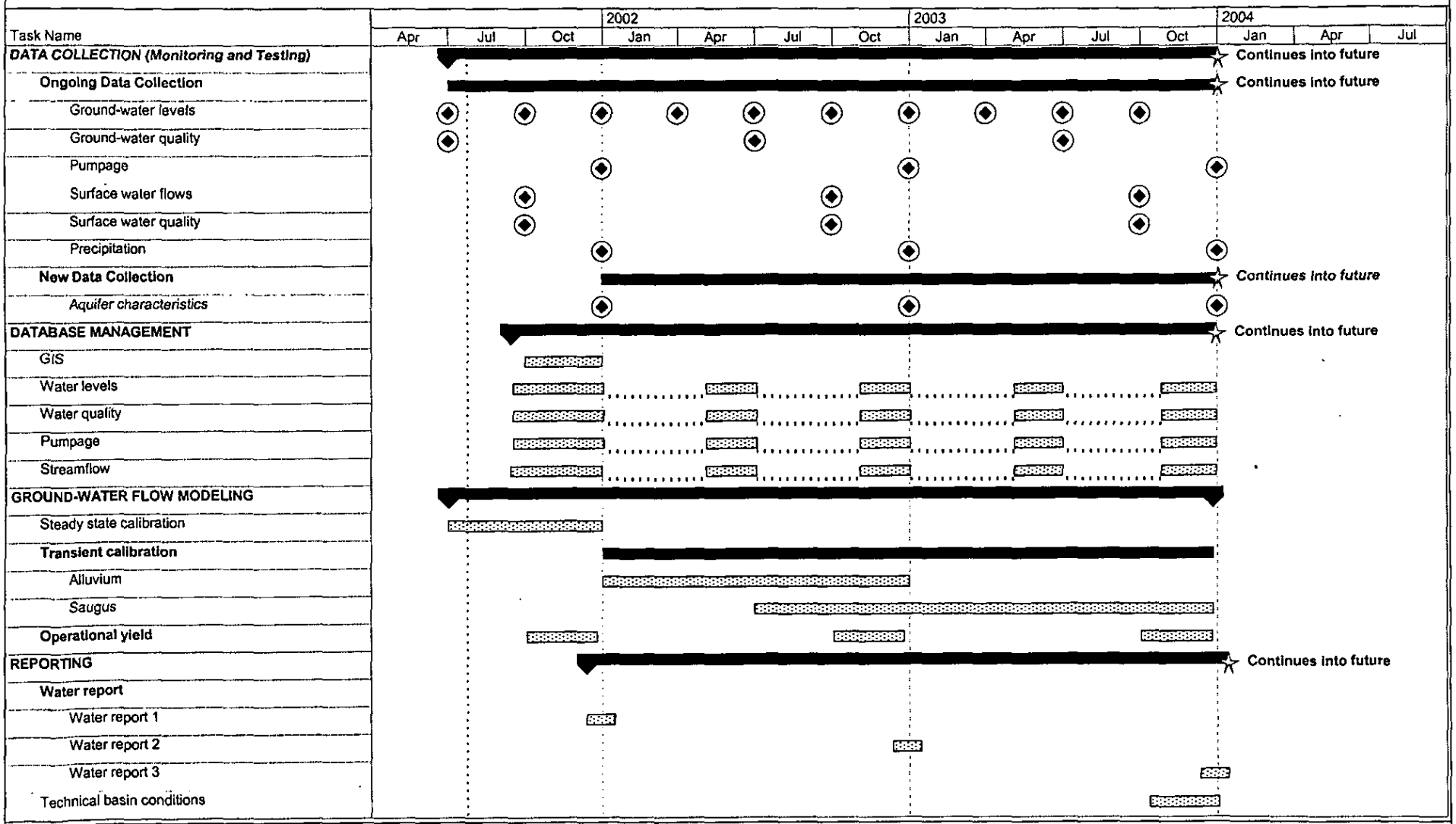
**REPORTING**

Beginning in 1998, an annual report on water supply conditions in the Upper Santa Clara River area has been prepared by the water purveyors in the Upper River area. Those reports have focused on a planning-level discussion of current and immediate future water demands, and the availability of local Groundwater and imported surface water to meet those demands. The overall primary objectives of the reports have been to provide some documentation, to local and County planners as

well as County Supervisors, on the water supply conditions in the Santa Clarita Valley and to present a general assessment of the status of groundwater conditions in both the Alluvial and Saugus aquifer systems, with a focus of that assessment on historical and recent groundwater development within operating yield parameters.

As the water resource monitoring program described above is implemented and evolves, it is planned that reporting on groundwater basin conditions will evolve in two generally parallel ways: 1) a continuation of the annual reporting on current water supply conditions, as a basis for current planning and consideration of development proposals; and 2) the addition of less frequent, more technically oriented reports on the geologic and hydrologic aspects of the groundwater resources of the Upper River area, including documentation of: a) groundwater basin conditions, b) development and application of modeling efforts to assess operational yield and the impacts of long-term planned utilization of local groundwater as part of the overall water supply, and c) assessment of actual versus predicted impacts on groundwater and surface water, including basin outflows, combined with ongoing updated assessments of the adequacy of local groundwater management actions and identification of any needed changes which are identified over time. As needed, the resource monitoring program and technical reports will be coordinated with interested regulatory agencies such as the Regional Water Quality Control Board, the California Department of Health Services and the California Department of Toxics and Substance Control.

# Exhibit 2
# WATER RESOURCE MONITORING PROGRAM
# UPPER SANTA CLARA RIVER AREA

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# Appendix B
# Description of the Santa Clarita Valley Regional Groundwater Flow Model

APPENDIX B

# Description of the Santa Clarita Valley Regional Groundwater Flow Model

## B.1 Introduction

The Santa Clarita Valley Regional Groundwater Flow Model (hereafter referred to as the Regional Model) is a three-dimensional, numerical model of groundwater flow that covers the entire area underlain by the Saugus Formation, plus the portions of the Alluvial Aquifer that lie beyond the limits of the Saugus Formation. A Surface Water Routing Model (SWRM) was also developed specifically for this basin as a pre- and post-processor for the Regional Model.

The approach to developing the Regional Model included the following steps:

1. Compiling information on the geology and hydrogeology of the valley and developing a conceptual understanding of the groundwater flow system
2. Creating a variety of data sets to conduct steady-state and transient calibrations
3. Constructing the Regional Model using the MicroFEM® finite-element groundwater flow code (Hemker and de Boer, 2003), and also using the available database and geographic information system (GIS) information for the Santa Clarita Valley
4. Calibrating the Regional Model
5. Performing sensitivity tests on the Regional Model

This appendix provides an overview of the Regional Model's construction and calibration. The construction and calibration of the Regional Model and the SWRM are described in detail in the *Regional Groundwater Flow Model for the Santa Clarita Valley, Santa Clarita, California* (CH2M HILL, 2004a).

## B.2 Model Construction

### B.2.1 Software

The Regional Model was constructed using the three-dimensional, finite-element groundwater modeling software MicroFEM® (Hemker and de Boer, 2003). MicroFEM® operates in a Windows™ environment and can be used to solve groundwater flow problems for unconfined, semi-confined, or confined aquifer systems. This software simulates steady-state or transient flow conditions in up to a 20-layer aquifer system; the finite-element mesh may contain as many as 50,000 nodes in each model layer. The software contains several different methods for simulating groundwater/surface water interactions. MicroFEM® is based on software developed in the Netherlands during the 1980s for use in evaluating the effects of groundwater pumping in areas with complicated meandering rivers. Further

details regarding this software's design, capabilities, and functionality can be found on the Internet at www.microfem.com and in two reviews of the software by Diodato (1997, 2000).

### B.2.2 Model Grid

The Regional Model is based on a finite-element mesh consisting of 7 layers, with 17,103 nodes and 32,496 elements in each layer. The nodes are spaced 500 feet apart in the majority of the modeled area. However, a finer node spacing (150 feet) was used along the Santa Clara River and its tributaries to allow a more exact simulation of surface water/ groundwater exchanges. Additionally, specific nodes were placed within this regional grid at the locations of production and monitoring wells.

### B.2.3 Layering

The upper model layer simulates the Alluvial Aquifer, or the upper portion of the Saugus Formation wherever the Alluvial Aquifer is not present. The six underlying layers simulate the underlying freshwater Saugus Formation and the Sunshine Ranch Member. The northern and southern edges of the model domain are defined by the geologic contacts mapped by Richard C. Slade and Associates, LLC (2002), formerly known as Richard C. Slade, Consulting Groundwater Geologist (both hereafter referred to as RCS), for the Alluvial Aquifer and the Saugus Formation.

The saturated thickness of the Alluvial Aquifer was defined from the average base elevation of the aquifer and the water level elevations measured during the fall of 1985 and the spring of 2000, as described by RCS (1986 and 2002). Along the Santa Clara River, the typical saturated thickness of the Alluvial Aquifer is as much as 130 feet in the western (down-gradient) portion of the basin and between 80 and 90 feet in the eastern (upgradient) portion of the basin, though it can be notably less in this area during droughts. Saturated thicknesses can be less than 60 feet in some tributary canyons, particularly along the South Fork Santa Clara River, where all production wells are constructed in the Saugus Formation, rather than the alluvium (RCS, 2002).

The Saugus Formation is generally a bowl-shaped structure that thins at its margins and has its greatest thickness (about 5,500 feet) in the center of the basin. The upper, freshwater-bearing portion of the Saugus Formation was simulated using 500-foot-thick model layers to depths as great as 2,500 feet in the center of the basin (RCS, 1988 and 2002). The deepest active model layer at any given location represented the Sunshine Ranch Member of the Saugus Formation, which is of marine origin and is, therefore, more saline and thought to have lower water-bearing potential than the overlying Saugus Formation deposits that are terrestrial in origin.

### B.2.4 Boundary Conditions

The following boundary conditions were used in the Regional Model:

1. **Specified flux for precipitation within the model grid.** Deep percolation of precipitation was simulated using the precipitation top-system package contained in MicroFEM®.
2. **Specified flux for irrigation.** Deep percolation of agricultural irrigation and urban irrigation in developed areas was simulated using the precipitation top-system package contained in MicroFEM®.

3. **Specified flux and head-dependent flux along ephemeral streams**. With respect to groundwater discharges to streams, the Santa Clara River was modeled as an ephemeral, predominantly losing stream at and upstream of the mouth of San Francisquito Canyon, and as a perennial, predominantly gaining stream downstream of San Francisquito Canyon. The tributaries to the Santa Clara River were modeled as ephemeral streams, using the precipitation top-system package to specify stream leakage to groundwater. For these tributaries and the ephemeral reach of the Santa Clara River, groundwater recharge rates were estimated from precipitation records, stream-flow records, watershed maps, topographic maps, and aerial photography using the SWRM, which was developed specifically to calculate time-varying recharge at each stream node from these data. Aerial photos and historical observations indicated that under high water table conditions, groundwater can locally discharge into Castaic Creek and the ephemeral reach of the Santa Clara River wherever Alluvial groundwater levels rise above the riverbed elevation. Consequently, the drain package in MicroFEM® was used in these streams to allow for drainage of any groundwater that was calculated by MicroFEM® to be above the riverbed elevation in any given river node at any given time step.

4. **Specified flux and head-dependent flux along perennial Santa Clara River**. The perennial reach of the Santa Clara River was modeled using the wadi top-system package contained in MicroFEM®. The wadi package allows groundwater to discharge to the river whenever groundwater elevations are higher than the specified river stage. When groundwater levels are below the river stage, the river recharges the Alluvial Aquifer. The rate of recharge is proportional to the difference between the river stage elevation and the model-calculated groundwater elevation. However, after the groundwater elevation drops below the streambed sediments, the rate of leakage from the stream is constant (i.e., does not vary as the groundwater elevation fluctuates). For the Regional Model, each node along the perennial reach of the Santa Clara River was assigned a river stage 1 foot higher than the mapped bed elevation of the river. The riverbed permeability, or conductance, which helps control the model-calculated groundwater/surface water exchange rates, was adjusted during model calibration by calibrating to streamflow data collected at the County Line gage.

5. **Specified flux for pumping**. Pumping rates and locations for wells completed in the Alluvial Aquifer and the Saugus Formation were directly imported into the Regional Model from the Upper Santa Clara River Groundwater Basin database. For model calibration, pumping rates were assigned from water use records maintained by the Upper Basin Water Purveyors; estimates of monthly water demand for urban water use and agricultural water use; and well construction records, which were needed to determine which model layers at each individual well should be assigned pumping

6. **Specified flux at upgradient Alluvial Aquifer boundaries.** Where there is Alluvial groundwater flow into the study area from beneath Castaic Dam, the magnitude of the specified flux was adjusted during the model calibration process using groundwater elevations and gradients published by RCS (1986 and 2002).

7. **Specified groundwater elevation in the Alluvial Aquifer at the county line.** The groundwater elevation (805 feet) was obtained from water level contour maps for the

Alluvial Aquifer prepared by RCS (1986, 2002). (See Figure 2-7 in the main text for groundwater elevation contours during Spring 2000, as mapped by RCS [2002].)

8. **Specified groundwater elevation in the Alluvial Aquifer at the Lang gage.** The groundwater elevation (1,746 feet) was derived from topographic maps of the elevation of the Santa Clara River bed. As discussed in CH2M HILL in *Final Report: Analysis of Perchlorate Containment in Groundwater Near the Whittaker-Bermite Property* (2004b), the boundary condition at this location was converted to a constant-head boundary shortly after completion of the model development report. This change was made based on results from field reconnaissance that was performed in April and May of 2004, when the Santa Clara River was dry at the Lang gage. At that time, groundwater was locally discharging from the bed of the Santa Clara River in isolated locations where the riverbed intersects the water table, then seeping back into the riverbed nearby. Significant phreatophyte growth was also present along the riverbed in this same area (just downstream of the Lang gage). Additionally, water was present and actively flowing in the river east (upstream) of the Santa Clarita Valley (in the area between the Santa Clarita Valley and the upstream Acton Basin). Based on these observations, a specified groundwater elevation of 1,746 feet was established in the Alluvial Aquifer at the eastern boundary of the Regional Model to simulate subsurface flow beneath the channel of the Santa Clara River at the Lang gage. This specified elevation was held constant throughout the simulation period.

9. **Head-dependent flux for evapotranspiration (ET).** ET from the water table by riparian vegetation was simulated using the evaporation top-system package contained in MicroFEM®. This package requires specification of the maximum rooting depth for the riparian vegetation, the maximum potential ET rate, and the ground surface elevation.

10. **No-flow boundaries**. In general, the outermost line of nodes that form the model boundary and the bottom of the model are no-flow boundaries. The exceptions are the western model boundary (specified head) and the specified-flux nodes representing underflow into the Alluvial Aquifer from beneath Castaic Dam. Also, all nodes on the model boundary are assigned specified fluxes due to precipitation and, in some cases, ephemeral streamflow.

### B.2.5 Aquifer Parameters

The selection of the aquifer parameter values (horizontal and vertical hydraulic conductivity, storage coefficients, streambed conductance, and ET parameters) is described in detail in Sections 4 and 5 of the Regional Model development report (CH2M HILL, 2004a). Initial estimates of, and ranges of values for, these parameters were defined during initial model development and adjusted on an as-needed basis, and within certain limits, during model calibration. Additionally, the calibration process adjusted the coefficients for an empirical power-function equation (Turner, 1986) that was used in the SWRM to define the relationship between precipitation, stormwater flow, and the amount of stormwater flow available for potential infiltration to groundwater.

# B.3 Model Calibration

## B.3.1 Calibration Process

Calibration of the Regional Model involved matching both steady-state and transient conditions in the Alluvial Aquifer and the Saugus Formation. The steady-state calibration was performed for calendar years 1980 through 1985, and the transient calibration was performed for calendar years 1980 through 1999. The goals of the initial calibration process were generally to match groundwater flow directions, groundwater gradients, and groundwater elevations that were measured throughout the 20-year simulation period at wells across the valley. An additional calibration goal was to match the patterns of total flow in the Santa Clara River and estimated groundwater discharge rates to the river. The Alluvial Aquifer and the Saugus Formation were each subdivided into zones to facilitate parameter selection and model calibration. Model variables were adjusted in a manner that sought to honor independent estimates of parameter values while resulting in the best possible calibration.

## B.3.2 Calibration Quality

The Regional Model meets most of the qualitative and quantitative goals that were established for the calibration process. For the steady-state model, statistical goals for the head residuals, which are equal to the modeled minus measured groundwater elevations, were easily met for the Alluvial Aquifer and adequately met for the Saugus Formation. For the transient model, trends in groundwater elevations were generally well matched, and groundwater discharges to the river were simulated well for both the steady-state and transient models. However, during the middle and late 1990s, the model tended to simulate too much decline in Alluvial Aquifer groundwater elevations in the eastern-most portion of the valley. This is the area where local droughts have the greatest effect on the Upper Basin Water Purveyors' ability to pump groundwater, so this deviation is acceptable because predictive simulations of various groundwater pumping strategies will not overestimate the degree to which groundwater can be pumped from the Alluvial Aquifer in this area during periods of below-normal rainfall.

The groundwater budget for the 20-year transient calibration period showed that recharge from precipitation and streamflows varied considerably from year to year, ranging from less than 15,000 acre-feet per year (AF/yr) in the driest years to as much as 270,000 AF/yr in the wettest years. In contrast, total groundwater discharges were less variable, ranging from approximately 61,000 AF/yr at the end of the late 1980s/early 1990s drought to 116,000 AF/yr during 1998. This variability in groundwater discharge did not follow the year-to-year pumping patterns, but instead was caused by year-to-year fluctuations in ET and groundwater discharges to the river. These fluctuations, in turn, correlated well with groundwater recharge patterns. During the 20-year transient calibration period, changes in the volume of groundwater stored in the combined Alluvial-Saugus aquifer system varied primarily according to year-to-year variations in regional rainfall. No long-term decline in groundwater storage was observed in the field or simulated by the Regional Model during the calibration period.

### B.3.3 Calibration Update

In a recent technical memorandum (CH2M HILL, 2005), the calibration of the Regional Model was extended an additional 62 months (from January 2000 through February 2005) to update and test the model's calibration against an independent data set consisting of recently observed hydrologic and pumping conditions in the basin. Examination of groundwater elevation hydrographs for the Alluvial Aquifer and the Saugus Formation indicated that the model showed a similar overall ability to simulate conditions during the recent 5-year period, as was the case for the preceding 20-year period to which the model was originally calibrated.

## B.4 Model Sensitivity

Sensitivity analyses were performed to evaluate whether further changes in the values of key model parameters would improve the calibration quality of the Regional Model. Variables that were tested were the hydraulic properties (horizontal and vertical hydraulic conductivities and storage coefficients) for the Alluvial Aquifer and the Saugus Formation, the riverbed leakage terms for the Santa Clara River and Castaic Creek, and the ET parameters. The sensitivity analysis indicated that the Regional Model is calibrated well and that it is sensitive to the choices of horizontal hydraulic conductivity in both aquifers and the vertical hydraulic conductivity values in the Saugus Formation. The model is also sensitive to the surface water parameters, specifically the choice of empirical coefficients used by the Turner (1986) equation to estimate stormwater flows from rainfall data and the riverbed leakage terms in both the eastern (groundwater recharge) and western (groundwater discharge) portions of the basin. The model is relatively insensitive to the choice of ET parameters.

## B.5 Model Applicability

The process of developing the conceptual model of the local groundwater basin, developing a detailed numerical model, calibrating the model to a 20-year period of groundwater elevation and streamflow data, and independently testing the calibration against a recent set of basin conditions has resulted in a groundwater flow model that is suitable for its intended applications, which are evaluating groundwater management strategies, groundwater sustainability, artificial recharge options, and restoration of contaminated water supplies. The primary design and calibration attributes that make the Regional Model appropriate for its intended uses are as follows:

1. Its ability to simulate historical trends in groundwater elevations and river flows during a 2-decade period that reflects increased urbanization, increased State Water Project water imports (from outside the valley), and associated changes in land use and water use
2. Its ability to simulate trends in smaller geographic areas of interest within the valley (for example, near the Whittaker-Bermite property)
3. Its use of an integrated model of the watershed to define the amount of rainfall and stormwater that is potentially available to recharge the groundwater system

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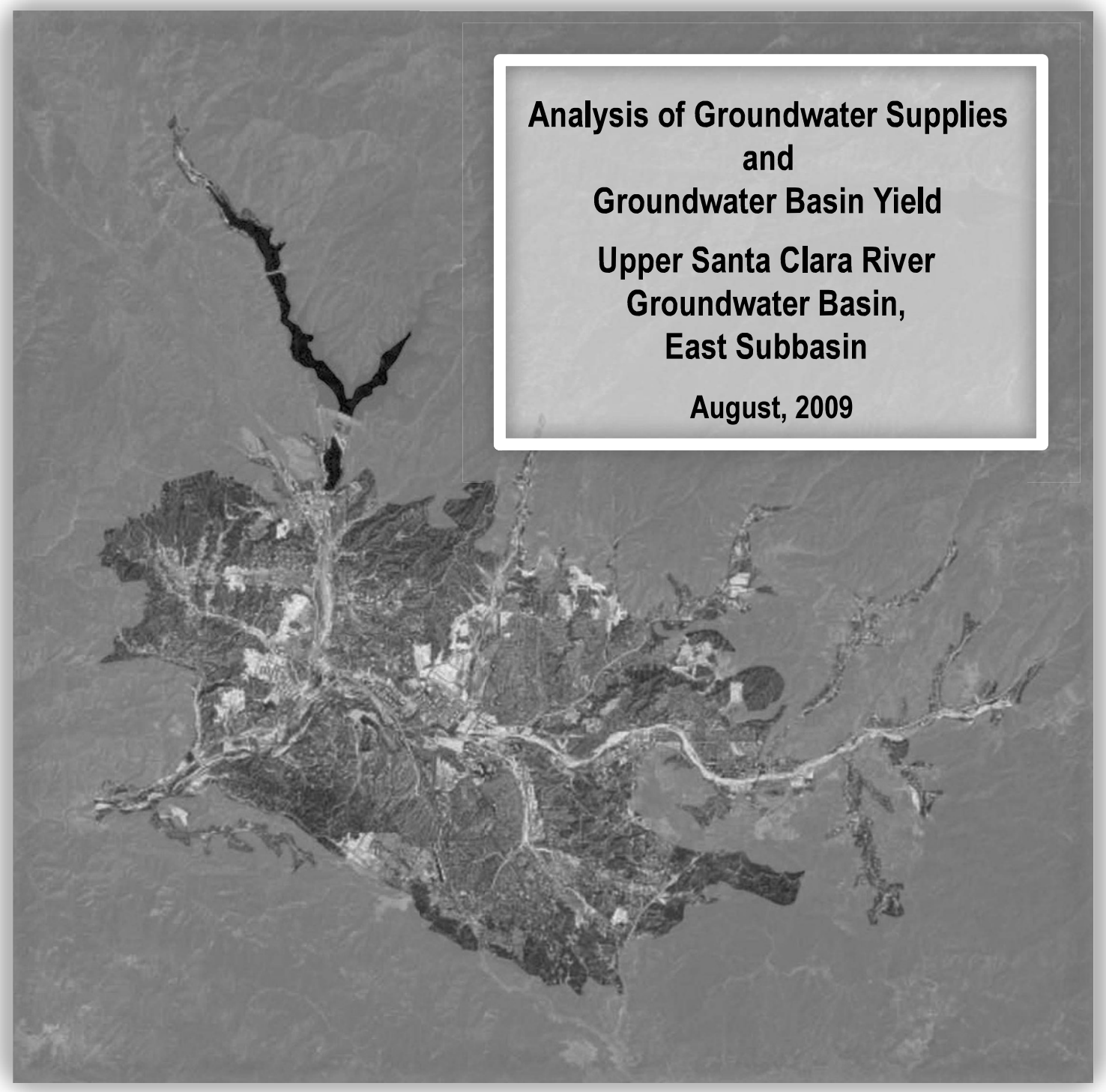
**Analysis of Groundwater Supplies and Groundwater Basin Yield**
**Upper Santa Clara River Groundwater Basin, East Subbasin**
**(2009 Basin Yield Update)**



# Analysis of Groundwater Supplies and Groundwater Basin Yield

## Upper Santa Clara River Groundwater Basin, East Subbasin

August, 2009

prepared for

**Santa Clarita Valley Municipal Water Purveyors**

prepared by

LUHDORFF & SCALMANINI CONSULTING ENGINEERS

GSI Water Solutions, Inc.

# Analysis of Groundwater Supplies and Groundwater Basin Yield

# Upper Santa Clara River Groundwater Basin, East Subbasin

**prepared for**

## Santa Clarita Valley Municipal Water Purveyors

prepared by

Luhdorff & Scalmanini,
Consulting Engineers

GSI Water Solutions, Inc.,

August, 2009

# Table of Contents


Page

**Acronyms and Abbreviations ..... vii**

**I. Introduction ..... I-1**
1.1 Background ..... I-2
1.2 Scope of Updated Analysis ..... I-4
1.3 Report Organization ..... I-5

**II. Updated Model Calibration ..... II-1**
2.1 Model Description ..... II-1
2.2 Calibration Update Approach ..... II-2
2.3 Results from the Calibration Update Process ..... II-3

**III. Modeling Approach for Analyzing Basin Yield ..... III-1**
3.1 Modeling Approach ..... III-1
3.2 Simulation Period ..... III-1
3.2.1 Original Simulation Period ..... III-1
3.2.2 Current Simulation Period and Associated Hydrology ..... III-2
3.3 2008 Operating Plan ..... III-4
3.3.1 General Description of 2008 Operating Plan ..... III-4
3.3.2 Alluvial Aquifer Pumping ..... III-5
3.3.3 Saugus Aquifer Pumping ..... III-6
3.3.4 Monthly Allocation of Pumping ..... III-8
3.3.5 Total Available Potable Water Supply Under the 2008 Operating Plan ..... III-8
3.4 2008 Operating Plan with Pumping Redistribution ..... III-9
3.5 Potential Future Operating Plan ..... III-9
3.6 Simulation of Other Local Hydrologic Processes ..... III-10
3.6.1 Recharge from Urban Irrigation ..... III-10
3.6.2 Recharge from Agricultural Irrigation ..... III-10
3.6.3 Precipitation Recharge ..... III-11
3.6.4 Stormwater Flows and Recharge from Streams ..... III-11
3.6.5 WRP Discharges to the Santa Clara River ..... III-11
3.6.6 Monthly Assignment and Tracking of Surface Water Budget ..... III-12
3.7 Running the Model and Evaluating Results ..... III-12

**IV. Sustainability of Operating Plans ..... IV-1**
4.1 Groundwater Elevations ..... IV-1
4.1.1 2008 Operating Plan ..... IV-1
4.1.2 2008 Operating Plan with Pumping Redistribution ..... IV-3
4.1.3 Potential Operating Plan ..... IV-4
4.2 Groundwater Recharge, Discharge, and Storage ..... IV-5
4.3 River Flows ..... IV-6
4.4 Relationship of Simulation Results to Future Conditions ..... IV-6

## Table of Contents, continued


Page

**V. Climate Change Considerations ..... V-1**
5.1 Objectives ..... V-1
5.2 Approach ..... V-2
5.2.1 Evaluation and Selection of Climate Change Scenarios ..... V-2
5.2.2 Simulation Period ..... V-3
5.2.3 Hydrologic Processes for Climate Change Scenarios ..... V-3
5.3 2008 Operating Plan under Climate Change Scenarios ..... V-4
5.3.1 Drying Climate Trend (Climate Scenario 1) ..... V-4
5.3.2 Wetter Climate Trend (Climate Scenario 9) ..... V-4
5.3.3 Average Climate Trend (Climate Scenario 6) ..... V-5
5.4 Climate Change Summary ..... V-5

**VI. Local Artificial Recharge Projects ..... VI-1**
6.1 Los Angeles County Flood Control District Study ..... VI-1
6.2 Project Locations Relative to Aquifer System ..... VI-1
6.3 Conceptual Project Operation and Impacts ..... VI-2

**VII. Conclusions ..... VII-1**

**References**


### Appendices


Appendix A Description of the Santa Clarita Valley Groundwater Flow Model
Appendix B Updated Santa Clarita Valley Groundwater Flow Model Calibration Tables and Hydrographs
Appendix C Modeled Groundwater Elevation Hydrographs 2008 and Potential Operating Plans
Appendix D Climate Change Literature Review and Model Simulations
Appendix E Simulated Climate Change Groundwater Elevation Hydrographs

# List of Figures and Tables

## Figures


Figure 1-1 Basin Location Map

Figure 2-1 Model Grid
Figure 2-2 Schematic Cross-Sections
Figure 2-3 Rainfall-Recharge Relationship for the Groundwater Flow Model
Figure 2-4 Alluvial Subareas and Well Locations

Figure 3-1 Annual Rainfall (Newhall-Soledad Rain Gage)
Figure 3-2 Annual Rainfall and Cumulative Departure from Average Rainfall (Newhall-Soledad Rain Gage)
Figure 3-3 Simulated Groundwater Pumping for 2008 Groundwater Operating Plan
Figure 3-4 Simulated Water Supplies For 2008 Groundwater Operating Plan (Excluding Recycled Water)
Figure 3-5 Simulated Groundwater Pumping for Potential Groundwater Operating Plan
Figure 3-6 Simulated Groundwater Pumping for 2008 and Potential Operating Plans
Figure 3-7 Simulated Water Supplies for Potential Groundwater Operating Plan (Excluding Recycled Water)

Figure 4-1 VWC-E15 Modeled Groundwater Elevations for 2008 and Potential Operating Plans (Alluvial Aquifer Below Valencia WRP)
Figure 4-2 VWC-S8 Modeled Groundwater Elevations for 2008 and Potential Operating Plans (Alluvial Aquifer Below Saugus WRP)
Figure 4-3 VWC-T7 Modeled Groundwater Elevations for 2008 and Potential Operating Plans (Alluvial Aquifer Above Saugus WRP)
Figure 4-4 SCWD-Sierra Modeled Groundwater Elevations for 2008 and Potential Operating Plans (Alluvial Aquifer Along Santa Clara River, At and Above Mint Canyon)
Figure 4-5 NCWD-Pinetree 1 Modeled Groundwater Elevations for 2008 and Potential Operating Plans (Alluvial Aquifer Along Santa Clara River, At and Above Mint Canyon)
Figure 4-6 NCWD-Castaic 7 Modeled Groundwater Elevations for 2008 and Potential Operating Plans (Alluvial Aquifer in Castaic Valley)
Figure 4-7 VWC-W11 Modeled Groundwater Elevations for 2008 and Potential Operating Plans (Alluvial Aquifer in San Francisquito Canyon)
Figure 4-8 SCWD-Clark Modeled Groundwater Elevations for 2008 and Potential Operating Plans (Alluvial Aquifer in Bouquet Canyon)
Figure 4-9 SCWD-Saugus 1 Modeled Groundwater Elevations for 2008 and Potential Operating Plans (Saugus Formation)
Figure 4-10 VWC-206 Modeled Groundwater Elevations for 2008 and Potential Operating Plans (Saugus Formation)
Figure 4-11 NCWD-13 Modeled Groundwater Elevations for 2008 and Potential Operating Plans (Saugus Formation)

Figure 4-12 VWC-T7 Modeled Groundwater Elevations for Initial and Modified 2008 Operating Plans (Alluvial Aquifer Above Saugus WRP)
Figure 4-13 SCWD-Clark Modeled Groundwater Elevations for Initial and Modified 2008 Operating Plans (Alluvial Aquifer in Bouquet Canyon)
Figure 4-14 SCWD-Sierra Modeled Groundwater Elevations for Initial and Modified 2008 Operating Plans (Alluvial Aquifer Along Santa Clara River, At and Above Mint Canyon)
Figure 4-15 NCWD – Pinetree3 Modeled Groundwater Elevations for Initial and Modified 2008 Operating Plans (Alluvial Aquifer Along Santa Clara River, At and Above Mint Canyon)
Figure 4-16 Comparison of Simulated Trends in Groundwater Recharge and Discharge Terms for the 2008 Operating Plan Under Historical Hydrology
Figure 4-17 Comparison of Simulated Trends in Groundwater Discharge Terms for the 2008 and Potential Operating Plans Under Historical Hydrology
Figure 4-18 Cumulative Change in Groundwater Storage Volume
Figure 4-19 Simulated Monthly Flow in the Santa Clara River at the County Line For the 2008 and Potential Operating Plans Under Historical Hydrology
Figure 4-20 Modeled and Estimated Monthly Groundwater Discharges to the Perennial Reach of the Santa Clara River (from Round Mountain to Blue Cut)
Figure 4-21 Streamflow During Driest Month of Each Year

Figure 5-1 2010-2098 Cumulative Departure from Average Annual Rainfall at Newhall-Soledad Rain Gage
Figure 5-2 VWC-E15 Modeled Groundwater Elevations for Various Climate Projections (Alluvial Aquifer Below Valencia WRP)
Figure 5-3 VWC-S8 Modeled Groundwater Elevations for Various Climate Projections (Alluvial Aquifer Below Saugus WRP)
Figure 5-4 VWC-T7 Modeled Groundwater Elevations for Various Climate Projections (Alluvial Aquifer Below Saugus WRP)
Figure 5-5 SCWD-Sierra Modeled Groundwater Elevations for Various Climate Projections (Alluvial Aquifer Along Santa Clara River, At and Above Mint Canyon)
Figure 5-6 NCWD-Pinetree 1 Modeled Groundwater Elevations for Various Climate Projections (Alluvial Aquifer Along Santa Clara River, At and Above Mint Canyon)
Figure 5-7 NCWD-Castaic 7 Modeled Groundwater Elevations for Various Climate Projections (Alluvial Aquifer in Castaic Valley)
Figure 5-8 VWC-W11 Modeled Groundwater Elevations for Various Climate Projections (Alluvial Aquifer in San Francisquito Canyon)
Figure 5-9 SCWD-Clark Modeled Groundwater Elevations for Various Climate Projections (Alluvial Aquifer in Bouquet Canyon)
Figure 5-10 Groundwater Elevation Trends at SCWD-Saugus1 for the 2008 Operating Plan Under Historical Climate and Climate Projections #1, #6, and #9
Figure 5-11 Groundwater Elevation Trends at VWC-206 for the 2008 Operating Plan Under Historical Climate and Climate Projections #1, #6, and #9

Figure 5-12 Groundwater Elevation Trends at NCWD-13 for the 2008 Operating Plan Under Historical Climate and Climate Projections #1, #6, and #9

Figure 6-1 Locations of LACFCD Planned Recharge Projects

## Tables

Table 3-1 Alluvial and Saugus Formation Pumping Patterns for the Simulation of 1922-2007 Historical Hydrology
Table 3-2 Local Hydrology and 2008 Operating Plan for the Alluvial Aquifer
Table 3-3 SWP Deliveries and 2008 Operating Plan for the Saugus Formation
Table 3-4 Pumping Rates Simulated for Individual Alluvial Aquifer Wells under the 2008 Groundwater Operating Plan
Table 3-5 Pumping Rates Simulated for Individual Saugus Formation Wells under the 2008 Groundwater Operating Plan
Table 3-6 Allocation of Pumping by Layer for Wells Completed in the Saugus Formation
Table 3-7 Allocation of Pumping, by Month, for Agricultural and Urban Production Wells
Table 3-8 Total Groundwater and SWP Supplies for 2008 Groundwater Operating Plan (Not Including Recycled Water and Other Water Supplies, e.g. Purchased or Banked Water)
Table 3-9 Pumping Rates Simulated for Individual Alluvial Aquifer Wells under the Redistributed 2008 Groundwater Operating Plan (Listed by Alluvial Subarea)
Table 3-10 Pumping Rates Simulated for Individual Alluvial Aquifer Wells under the Potential Groundwater Operating Plan
Table 3-11 Pumping Rates Simulated for Individual Saugus Formation Wells under the Potential Groundwater Operating Plan
Table 3-12 Total Groundwater and SWP Supplies for Potential Groundwater Operating Plan (Not Including Recycled Water and Other Water Supplies, e.g. Purchased or Banked Water)
Table 3-13 Simulated Monthly Precipitation at the Newhall County Water District Rain Gage for the 86-year Simulation
Table 3-14 Simulated Monthly Streamflows in the Santa Clara River at the Lang Gage for the 86-year Simulation
Table 3-15 Simulated Monthly Water Releases from Castaic Lagoon to Castaic Creek for the 86-year Simulation
Table 3-16 Water Demands and Indoor Water Use under Full Build-out Conditions (Excluding Newhall Ranch)
Table 3-17 Treated Water Discharges from the Saugus and Valencia WRPs to the Santa Clara River under Full Build-out Conditions
Table 3-18 Simulated Monthly Treated Wastewater Discharges from Santa Clarita Valley WRPs under Full Build-out Conditions

Table 4-1 Pumping Rates Simulated for Individual Alluvial Aquifer Wells Under the Re-Distributed 2008 Groundwater Operating Plan (Listed By Alluvial Subarea)

Table 5-1 Climate Projection #1 (Global Climate Model GFDL_cm2_0.1sresB1) Local Hydrology and Corresponding Pumping from the Alluvial Aquifer for the 86-year Simulation
Table 5-2 Climate Projection #6 (Global Climate Model NCAR_PCM1.3_sresA2) Local Hydrology and Corresponding Pumping from the Alluvial Aquifer for the 86-year Simulation
Table 5-3 Climate Projection #9 (Global Climate Model NCAR_PCM1.3_sresB1) Local Hydrology and Corresponding Pumping from the Alluvial Aquifer for the 86-year Simulation
Table 5-4 Climate Projection #1 (Global Climate Model GFDL_cm2_0.1sresB1) Alluvial and Saugus Formation Pumping for the Simulation of 1922-2007 Historical Hydrology
Table 5-5 Climate Projection #6 (Global Climate Model NCAR_PCM1.3_sresA2) Alluvial and Saugus Formation Pumping for the Simulation of 1922-2007 Historical Hydrology
Table 5-6 Climate Projection #9 (Global Climate Model NCAR_PCM1.3_sresB1) Alluvial and Saugus Formation Pumping for the Simulation of 1922-2007 Historical Hydrology

Table 6-1 Los Angeles County Flood Control District Stormwater Runoff Recharge Projects

## Acronyms and Abbreviations

| | |
|---|---|
| afy | acre-feet per year |
| AWRM | Alternative Water Resources Management program |
| CCCC | California Climate Change Center |
| CLWA | Castaic Lake Water Agency |
| CMIP3 | Climate Model Intercomparison Project 3 |
| DPH | California Department of Health Services |
| DTSC | California Department of Toxic Substances Control |
| DWR | California Department of Water Resources |
| ET | evapotranspiration |
| GCM | global climate model |
| GFDL | Geophysical Fluid Dynamics Laboratory |
| gpm | gallons per minute |
| in/yr | inches per year |
| IPCC | Intergovernmental Panel on Climate Change |
| LACFCD | Los Angeles County Flood Control District |
| LACSD | Los Angeles County Sanitation District |
| LARWQCB | Los Angeles Regional Water Quality Control Board |
| LLNL | Lawrence Livermore National Laboratory |
| LSCE | Luhdorff & Scalmanini Consulting Engineers |
| mg/L | milligrams per liter |
| mgd | million gallons per day |
| MOU | Memorandum of Understanding |
| NCAR | National Center for Atmospheric Research |
| NCWD | Newhall County Water District |
| NLF | Newhall Land & Farming Company |
| PCM1 | Parallel Climate Model |
| Purveyors | Upper Basin Water Purveyors |
| RCS | Richard C. Slade and Associates, LLC |
| SCVSD | Santa Clarita Valley Sanitation District of Los Angeles County |

| | |
|---|---|
| SCWD | Santa Clarita Water Division of CLWA |
| SRES | Special Report on Emissions Scenarios |
| SWP | State Water Project |
| SWRM | Surface Water Routing Model |
| TMDL | Total Maximum Daily Loads |
| UWMP | Urban Water Management Plan |
| VWC | Valencia Water Company |
| WCRP | World Climate Research Programme |
| WHR | Wayside Honor Rancho |
| WRP | water reclamation plant |
| UCAR | University Corporation for Atmospheric Research |
| WRP | water reclamation plant |

# I. Introduction

In 2003, the retail water Purveyors in the Santa Clarita Valley (herein the Purveyors[1]) commissioned efforts to develop, calibrate and utilize a numerical groundwater model for purposes of analyzing the sustainability of local groundwater as a component of overall water supply in the Valley. At that time, the question of groundwater sustainability was complemented by a question about whether part of overall groundwater pumping could be employed to achieve containment and removal of perchlorate contamination in the deeper aquifer, the Saugus Formation, beneath the Valley. The results of those modeling efforts concluded that a certain groundwater operating plan (rates and distributions of groundwater pumping under varying local hydrologic conditions) would be expected to produce long-term sustainable groundwater conditions, and that a certain focused part of overall pumping would be expected to both extract perchlorate-contaminated groundwater (for use after treatment) and contain the migration of perchlorate-impacted groundwater. The development and calibration of the numerical groundwater flow model is described in *Regional Groundwater Flow Model for the Santa Clarita Valley, Model Development and Calibration* (CH2M Hill, April 2004). Application of the model for extraction and containment of perchlorate-impacted groundwater is described in *Analysis of Perchlorate Containment in Groundwater Near the Whittaker-Bermite Property* (CH2M Hill, December 2004). And application of the model for analysis of basin yield, including sustainability of groundwater pumping consistent with that employed in the perchlorate containment analysis, is documented in *Analysis of Groundwater Basin Yield, Upper Santa Clara River Groundwater Basin, East Subbasin, Los Angeles County, California* (CH2M Hill and LSCE, August 2005).

The groundwater system in the Santa Clarita Valley, located in northwestern Los Angeles County, is identified by the California Department of Water Resources (DWR) as the Santa Clara River Valley Groundwater Basin, East Subbasin (Basin No. 4-4.07) and lies within the DWR-designated Upper Santa Clara River Hydrologic Area [Figure 1-1]. Groundwater in the basin is pumped from a shallow Alluvial Aquifer and from deeper groundwater resources that are present in an older, underlying unit called the Saugus Formation. Most groundwater pumping is by the Purveyors for municipal uses (in the range of approximately 23,000 to 33,000 acre-feet per year (afy) in recent years), with some continuing pumping by private landowners, primarily for irrigation uses (approximately 13,000 to 17,000 afy in recent years). The Purveyors also have access to other sources of water to supplement groundwater for municipal supply, including imported State Water Project (SWP) water, groundwater banking outside the basin, recycled water, short-term water exchanges, and dry-year water purchase programs. Those sources are described in the Purveyors' current *2005 Urban Water Management Plan* (Black & Veatch, et al., November 2005) and in a series of annual *Santa Clarita Valley Water Reports*, most recently for 2007 (LSCE, April 2008).

The water supply and water resource management practices of the Purveyors call for maximizing the use of Alluvial Aquifer and imported water during years of normal or above-normal

[1] The Santa Clarita Valley Purveyors are comprised of Los Angeles County Waterworks District 36, Newhall County Water District, Santa Clarita Water Division of the Castaic Lake Water Agency (formerly Santa Clarita Water Company, acquired by CLWA in 1999), and Valencia Water Company.

availability of these supplies, and limiting the use of the Saugus Formation during these periods, then temporarily increasing Saugus Formation pumping during years when supplemental imported water supplies are significantly reduced because of drought conditions. These local management practices have been called the local groundwater operating plan; that term has been adopted in this report to identify the previously analyzed operating plan (the 2004 Operating Plan) and subsequent iterations analyzed herein (the 2008 Operating Plan, the 2008 Operating Plan with Pumping Redistribution, and a Potential Operating Plan).

## 1.1 Background

The numerical groundwater model was originally developed as part of the work scope contained in an August 2001 Memorandum of Understanding (MOU) that was adopted by the Purveyors and the United Water Conservation District, located downstream in Ventura County. That MOU was a commitment by the Purveyors to expand on previous analyses of groundwater conditions such that the adequacy of the local groundwater supply could be better understood and questions about surface water and groundwater resources could be more readily addressed. The MOU initiated a collaborative and integrated approach to data collection; database management; evaluating groundwater conditions and the sustainability of the Purveyors' operating plan; groundwater flow modeling; annual reporting on basin conditions; and technical reporting focused on geologic and hydrologic aspects of the overall stream-aquifer system.

In 2003, subsequent to the MOU, Castaic Lake Water Agency (CLWA) prepared and adopted a formal Groundwater Management Plan (CLWA, 2003), which includes 14 elements intended to achieve four management objectives, or goals, for the groundwater basin. Those four management objectives include development of local groundwater for water supply; avoidance of overdraft and associated undesirable effects; preservation of groundwater quality; and preservation of interrelated surface water resources. The intent of the Groundwater Management Plan is to ensure that ongoing utilization of local groundwater continues to result in acceptable aquifer conditions, specifically avoidance of overdraft (Element 3 of the Plan), no degradation of quality (Element 6 of the Plan), and no adverse impacts to surface waters (Element 2 of the Plan). The Plan identified these objectives and elements as being accomplished via continued conjunctive use operations that have been ongoing since the initial importation of supplemental surface water in 1980 (Element 5 of the Plan) and via monitoring and interpretation of surface water and groundwater conditions on an ongoing basis (Elements 1 and 2 of the Plan).

The Purveyors initially agreed in the MOU, and the Purveyors subsequently committed in the Groundwater Management Plan, to develop and use a numerical groundwater flow model for the sustainability evaluation of the local groundwater operating plan. Prior to that, the available data showed that no long-term lowering of the water table or degradation of water quality had occurred during the 50 to 60 years of recorded historical groundwater development in the valley, and the various studies and water planning efforts performed up to that time had resulted in a local groundwater operating plan that placed future pumping of the Alluvial Aquifer in the same range as historical pumping. However, although the MOU recognized a need to formally analyze the Alluvial Aquifer, it identified that the primary question to be evaluated with the model would be the operational yield of the Saugus Formation, given that the Purveyors' operating plan called for dry-year pumping from that aquifer at rates higher than had historically

been pumped. For that reason, the MOU identified that the model would evaluate the effect of the current groundwater operating plan on groundwater conditions in both the Alluvial Aquifer and the Saugus Formation over a multi-year wet/dry cycle. The operational yield was defined in the MOU as an operating plan for the local groundwater basin that would allow continued pumping from the Alluvial Aquifer and Saugus Formation while assuring that groundwater supplies would be adequately replenished from one wet/dry cycle to the next.

As introduced above, a groundwater operating plan was formally analyzed with the groundwater model as part of the perchlorate containment analysis in 2004, and then specifically as the focus of basin yield analysis in 2005. In summary, that plan was as follows:

- Pumping from the Alluvial Aquifer in a given year is governed by local hydrologic conditions in the basin. Under the operating plan, pumping ranges between 30,000 and 40,000 afy during normal and above-normal rainfall years but, because of operational constraints in the eastern part of the basin, is reduced to between 30,000 and 35,000 afy during locally dry years.

- Pumping from the Saugus Formation in a given year is tied directly to the availability of other water supplies, particularly imported water from the SWP system. For the Saugus Formation, the operating plan consists of pumping between 7,500 and 15,000 afy during average-year to wet-year conditions within the SWP system. Planned dry-year pumping from the Saugus Formation ranges between 15,000 and 25,000 afy during a dry year, and increases to between 21,000 and 25,000 afy if SWP deliveries are reduced for two consecutive years, and between 21,000 and 35,000 afy if SWP deliveries are reduced for three consecutive years. Such high pumping would be followed by periods of reduced (average-year) pumping, at rates between 7,500 and 15,000 afy, to further enhance the effectiveness of natural recharge processes that would recover water levels and groundwater storage volumes in the Saugus Formation, as has been historically experienced.

Simulated groundwater basin response to groundwater pumping in accordance with the 2004 Operating Plan, over a long-term period of varying hydrologic conditions, was concluded to be sustainable based on a two-part definition of sustainability, which is continued in the updated analysis reported herein, as follows:

- lack of chronic, or sustained, depletion of groundwater storage, as indicated by projected groundwater levels, over a reasonable range of wet, normal, and dry hydrologic conditions

- maintenance of surface water flows in the western portion of the basin (which are partially maintained by groundwater discharge) and surface water outflow to downstream basins over the same range of hydrologic conditions

The primary conclusion from the modeling analysis of the 2004 Operating Plan was that it would not cause detrimental short-or long-term effects to the groundwater and surface water resources in the Valley and was, therefore, sustainable. In summary, the groundwater basin could be

expected to respond to the 2004 Operating Plan in a manner similar to what had been experienced over approximately the preceding 50 years: Use of water from the Alluvium, slightly decreased during locally drier periods, was projected to result in small to large fluctuations in Alluvial Aquifer groundwater levels from the middle to the eastern part of the basin, followed by full to near-full recovery in wet years or periods of years. Different from historically experienced conditions is in the Saugus Formation, where greater Saugus pumping during periods of significantly reduced imported water supplies was projected to cause larger fluctuations in groundwater levels during such pumping, with full to near-full recovery of Saugus water levels in subsequent years when the availability of imported water supplies was expected to return to normal.

After completion of the sustainability analysis, the 2004 Operating Plan was incorporated in the Purveyors' collective 2005 Urban Water Management Plan (UWMP) to reflect the groundwater component of overall water supplies available to meet current and projected water requirements over the planning horizon of the UWMP.

## 1.2 Scope of Updated Analysis

In 2008, partly in preparation for the next UWMP in 2010, and in part because of recent events that are expected to impact the future reliability of the principal supplemental water supply for Santa Clarita Valley, i.e., from the State Water Project, the Purveyors concluded that an updated analysis was needed to further assess groundwater development potential and possible augmentation of the groundwater operating plan. Near-term reductions in SWP water deliveries to CLWA are possible because of an August 2007 court ruling that is expected to reduce exports from the Bay-Delta by approximately 30 percent in the immediate future. Additionally, the National Marine Fisheries Service (NMFS) released its Biological Opinion and Conference Opinion on the Long-Term Operations of the Central Valley Project and State Water Project on June 4, 2009. The proposed regulatory actions will further restrict Delta export operations of the State Water Project, however, studies have not been completed quantifying impacts on SWP reliability. The duration of reductions are unknown and depend on a number of factors, including whether DWR can construct alternative facilities in the future to make up for reductions. Additionally, DWR is evaluating the potential magnitude of longer-term future reductions in SWP deliveries because of potential effects of global climate change.

A second consideration in conducting an updated analysis of the basin is that global climate change could alter local rainfall and associated recharge patterns, thus affecting local groundwater supplies, i.e. the yield of the basin. Finally, the Los Angeles County Flood Control District (LACFCD) is planning a number of small flood control projects in the Santa Clarita Valley; estimated amounts of conservation/groundwater recharge potential are being included for each of the individual projects in the overall LACFCD planning, and the Purveyors have interest in whether that potential could appreciably augment the yield of the basin.

In light of the above, the scope of the updated basin yield analysis, reported herein, includes the following:

- consider potential increased utilization of groundwater for regular (wet/normal) and/or dry-year water supply, including distribution of the yield by reach of the Santa Clara River alluvium and its various tributaries;

- consider potential augmentation of basin yield via initiation of artificial groundwater recharge using stormwater runoff in selected areas of the basin as being planned by LACFCD; and

- quantitatively or qualitatively, depending on the availability of technical reference material, describe general impacts of climate change on the groundwater basin and its yield.

## 1.3 Report Organization

To address the scope of the updated basin yield analysis outlined above, the remainder of this report is organized as follows:

**Chapter 2** discusses the extension of the numerical groundwater flow model from its previous calibration period of 1980 through 2004 to add three years and thus extend calibration through 2007; this section also describes some limited model recalibration after extension of the model through 2007.

**Chapter 3** describes the operating plans that were developed for updated analysis of basin yield, and the process that was used to simulate basin response to those plans and to evaluate the results.

**Chapter 4** discusses the results of the simulated basin response to the 2008 and Potential groundwater operating plans, including the sustainability and achievability of the plans.

**Chapter 5** describes climate change considerations, the selection of a range of potential climate change impacts on local hydrologic conditions, and the simulated effects of those resultant hydrologic conditions on the sustainability and achievability of the 2008 groundwater operating plan.

**Chapter 6** describes the potential groundwater recharge projects being planned by LACFCD and discusses the potential benefit to the yield of the basin.

**Chapter 7** summarizes the conclusions derived from the overall updated basin yield analysis, and the implications of those conclusions for long-term groundwater supply and groundwater management in the Santa Clarita Valley.

References and Appendices follow Section 7. The Appendices include a description of the Santa Clarita Valley numerical groundwater flow model, description of the updated model calibration, hydrographs to illustrate simulated basin response to the operating plans, and discussion of climate projections and their incorporation in the analyses reported herein.

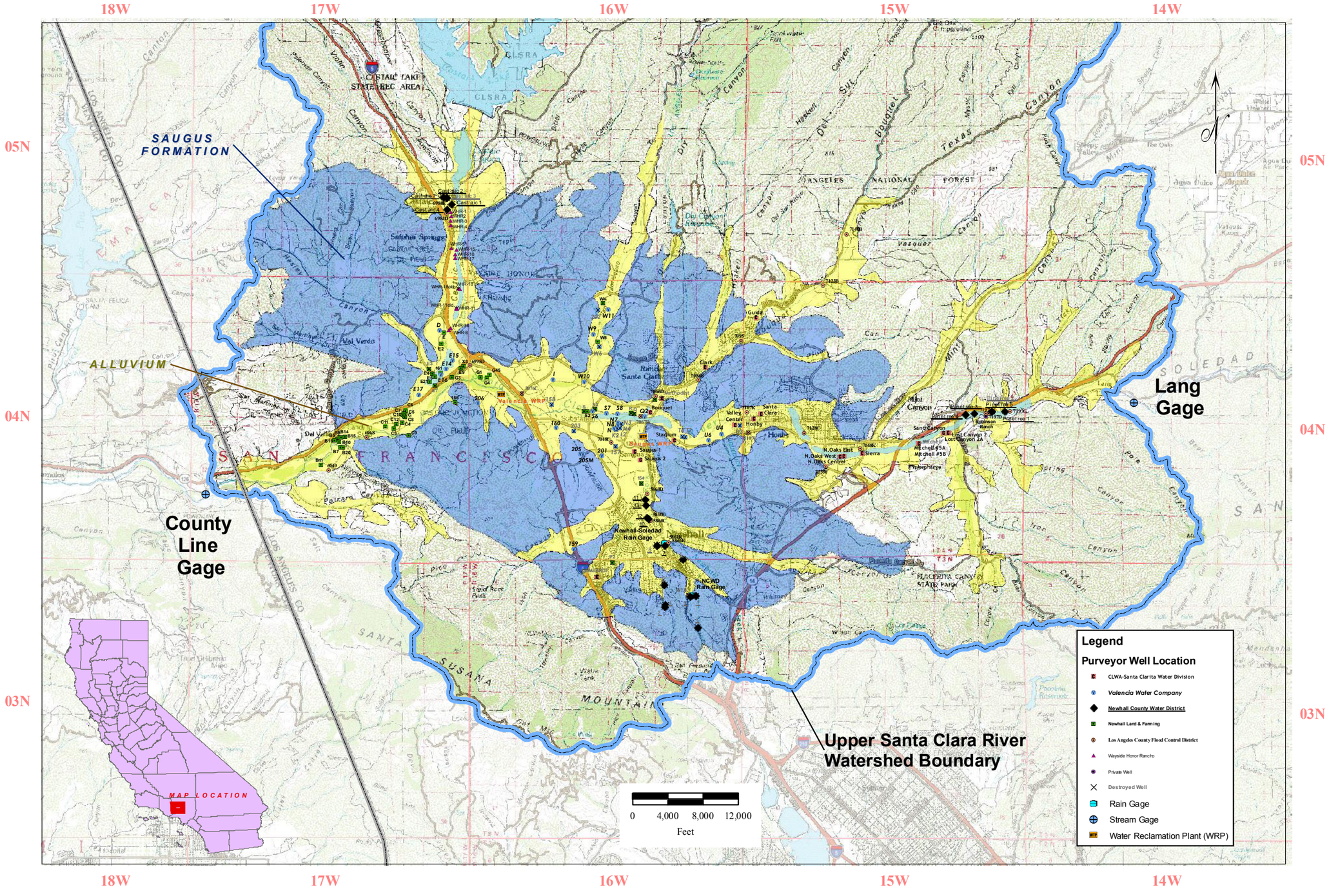



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**Figure 1-1**
**Basin Location Map**
**Upper Santa Clara River Valley Groundwater Basin, East Subbasin**

# II. Updated Model Calibration

## 2.1 Model Description

The Santa Clarita Valley groundwater flow model is a three-dimensional, numerical model that uses the MicroFEM® finite-element software (Hemker and de Boer, 2003). The model covers the entire area underlain by the Saugus Formation, plus the portions of the Alluvial Aquifer that lie beyond the limits of the Saugus Formation (Figure 3-1). The model's construction and calibration are summarized in Appendix A and discussed in detail in *Regional Groundwater Flow Model for the Santa Clarita Valley: Model Development and Calibration* (CH2M HILL, 2004a).

The model simulates groundwater conditions within an area that largely coincides with the Santa Clara River Valley Groundwater Basin, East Subbasin, delineated by DWR. This area extends from the Lang stream gage at the eastern end of the valley to the County Line stream gage area in the west. The model is based on a finite-element mesh consisting of seven layers, with 17,103 nodes and 32,496 elements in each layer (Figure 2-1). The upper model layer simulates the Alluvial Aquifer and also the upper portion of the Saugus Formation where the Alluvial Aquifer is not present. The underlying layers simulate the underlying freshwater Saugus Formation and its Sunshine Ranch Member. Figure 2-2 shows the model layering in three cross-sectional views.

The boundary conditions in the model consist of the following:

- Specified flux boundaries for the following:
  - precipitation
  - irrigation
  - recharge from ephemeral streams
  - pumping
  - underflow from beneath Castaic Dam

- Head-dependent flux boundaries for the following:
  - groundwater discharges to the perennial reach of the Santa Clara River
  - residual drainage of groundwater to the Santa Clara River in the ephemeral reach under high water table conditions
  - evapotranspiration (ET) by phreatophyte plants, which extract groundwater from the shallow water table that lies along riparian river corridors

- Constant-head boundaries for the following:
  - subsurface inflow in the Alluvial Aquifer at the eastern end of the valley, at the Lang gage[1]

[1] A constant-head boundary was established in the groundwater model at this location using recent field conditions that were observed after the model calibration report (CH2M HILL, 2004a) was published. This change improved the groundwater model's calibration in the Alluvial Aquifer in the upper reaches of Soledad Canyon and did not appreciably change the calibration quality elsewhere. See CH2M HILL (2005) for further details.

- subsurface outflow in the Alluvial Aquifer at the western end of the valley, at the County Line gage

Groundwater recharge rates are estimated using precipitation records, streamflow records, watershed maps, topographic maps, and aerial photography. These recharge rates are calculated using a detailed Surface Water Routing Model (SWRM), which was written specifically to provide time-dependent, spatially varying recharge rates as input to the groundwater model. The SWRM relies on streamflow records at the Lang and County Line gages; historical records of rainfall data from the NCWD rain gage (see Figure 1-1), spatial variations in rainfall across the basin, the rates and locations of future WRP discharges to the Santa Clara River, and irrigation from agricultural and urban water uses.

The depths from which production wells obtain water are defined in the groundwater model from well construction records. The rates and locations of pumping are based on the Purveyors' operating plan for the basin and on the surveyed location of each production well.

## 2.2 Calibration Update Approach

The calibration update process consisted of transient modeling that simulated monthly variations in pumping from, and recharge to, the Alluvial Aquifer and the Saugus Formation during the period January 2005 through December 2007. As with the original calibration effort, simulation results were compared to measured fluctuations in groundwater elevations and streamflows in the Santa Clara River.

Hydrologic input data for the calibration update simulation are tabulated in Appendix B and were as follows:

- Groundwater pumping data were provided by the Purveyors for each production well. Appendix Tables B-1 and B-2 show annual pumping for the Alluvial Aquifer and Saugus Formation, respectively, from 1980 through 2007. As with the initial model calibration effort, the monthly distribution of pumping was defined from information on the monthly distribution of urban and agricultural water demands, as listed in Appendix Table B-3.
- Groundwater recharge was defined using the SWRM, which was written specifically for the groundwater model during the original model development effort (see Appendix C of CH2M HILL, 2004a). The SWRM defined recharge from applied water use (i.e., irrigation)[2]; direct precipitation within the model domain (see Appendix Table B-4); Santa Clara River flows into the valley as measured at the Lang stream gage (see Appendix Table B-5); SWRM-estimated stormwater inflows into the model domain along ephemeral streams that are tributaries to the Santa Clara River; measured volumes of treated water discharge into the Santa Clara River from two Los Angeles County Sanitation District (LACSD) water reclamation plants (WRPs) (see Appendix Tables B-6

[2] Infiltration of applied water was simulated in the same locations as in the original model calibration effort, and at the 1999 rates described in the model development report (CH2M HILL, 2004a). These rates were 24.7 inches per year (in/yr) for irrigated agricultural land, 2.2 in/yr for residential areas, and 1.0 in/yr for retail/industrial lands and golf courses.

and B-7); and water released from Castaic Lagoon into Castaic Creek by DWR (see Appendix Table B-8).

- Coefficients for the riverbed leakage term at each river node vary over time in the model. For the years 2005 through 2007, the calibration update process initially used the same values as used for 1992, 1996, and 1989, respectively. These values were then adjusted as necessary during the calibration update process.

The quality of the model's calibration was evaluated as follows:

- Simulated groundwater elevation trends were compared with data collected at production wells where long-term records of groundwater elevations are available. These wells are referred to herein as target wells. As discussed in the model development report (CH2M HILL, 2004a), the calibration goal at target wells was to simulate groundwater elevations that were higher than the pumping elevations and as close as possible to the static elevations. Therefore, the hydrographs show the model-simulated groundwater elevations, the measured static groundwater elevations, and, for production wells, the measured pumping groundwater elevations. Additionally, the comparison of time-varying simulated and measured groundwater elevations was equally focused on the slopes of the hydrographs, not just the absolute values of the groundwater elevations at any given time.

- The groundwater budget was evaluated to compare simulation results with measured flows in the Santa Clara River at the west end of the basin (at the County Line gage; see Appendix Table B-9); and estimated volumes of groundwater discharge to the Santa Clara River (see Appendix Table B-10).

## 2.3 Results from the Calibration Update Process

The initial simulation of conditions during 2005 through 2007 produced findings that were deemed to require adjustments to the model's calibration of portions of the Alluvial Aquifer prior to conducting the predictive modeling necessary for the basin yield update analysis. Specifically, the results from the initial calibration update indicated that, from 2005 through 2007, the model simulated:

- too much groundwater level recovery in Castaic Valley at NCWD's Castaic wellfield during the high streamflow event of early 2005

- too much decline in groundwater levels in lower San Francisquito Canyon (at VWC's W9 and W11 wells)

- groundwater levels that were too high in lower Bouquet Canyon (at SCWD's Clark well) and below the mouth of Bouquet Canyon (at VWC's S6, S7, and S8 wells)

It was also noted that, the model simulated too little groundwater level decline immediately prior to 2005 in the eastern-most portions of the Alluvial Aquifer along the Santa Clara River (at and east of the mouth of Mint Canyon). Additionally, it was determined that, for NCWD's Pinetree wellfield, the groundwater level database contained incorrect reference elevations, which are

used to convert groundwater depths to groundwater elevations. As a result, it was concluded that the original calibration effort (during 2004) had compared simulation results with database-derived groundwater elevation values that were lower than the actual elevations of the water table throughout the entire simulation period (January 1980 to the present).

As a result of these findings, efforts were undertaken to improve the model's calibration quality in the eastern-most portion of the Alluvial Aquifer and in the tributary canyons noted above. This focused re-calibration process resulted in changes to the hydraulic conductivity in certain areas and riverbed leakage coefficients along certain reaches of Castaic Creek and the eastern reaches of the Santa Clara River. These changes were:

- increasing the hydraulic conductivity from 105 feet/day to between 250 and 500 feet/day in San Francisquito Canyon

- increasing the hydraulic conductivity from 245 feet/day to 300 feet/day in lower Bouquet Canyon

- introducing a zone of reduced hydraulic conductivity (250 feet/day) along the Santa Clara River at the mouth of Mint Canyon, to better simulate the hydraulic gradient between SCWD's Sierra and Mitchell wells

- reducing the hydraulic conductivity by 50 percent along the Santa Clara River from just east of NCWD's Pinetree wellfield upstream to the Lang gage at the eastern end of the valley (from 300 to 150 feet/day) and also in two nearby tributaries (Tick Canyon and Bee Canyon, from 150 to 75 feet/day)

- raising the Castaic Creek riverbed leakage coefficients during the high-flow events of 2001 and late 2004/early 2005

- raising the riverbed leakage coefficients in San Francisquito and Bouquet Canyons during and after the high-flow event of late 2004/early 2005

- raising the riverbed leakage coefficients for the reach of the Santa Clara River near SCWD's North Oaks and Sierra wells during the high-flow event of late 2004/early 2005

- revising the rainfall-runoff-recharge relationship for the basin. This relationship is based on a power-function equation developed by Turner (1986). As shown in Figure 2-3, the coefficients were revised slightly in a manner that, when compared with the original calibration (CH2M HILL, 2004a), generates slightly more recharge when annual precipitation is above normal. This increase in recharge ranges from about 0.25 inches to 1 inch for annual rainfall between 21 and 40 inches at the NCWD gage. For the wettest year on record at the NCWD gage (48.33 inches in calendar year 1983), annual recharge is 22.5 and 23.8 inches in the 2004 and 2008 calibrations, respectively, which is a difference of about 1.3 inches.

Appendix B contains groundwater elevation hydrographs comparing the model-simulated groundwater elevations with static and pumping groundwater elevations at the many production wells in the valley. Model simulation results are shown both for the original calibration (CH2M HILL, 2004a) and the updated calibration. The hydrographs are organized according to the primary subareas for the Alluvial Aquifer (see Figure 2-4 for the locations of these subareas) and by Purveyor for the Saugus Formation. The hydrographs show notable improvements in calibration quality in Castaic Valley, San Francisquito Canyon, and Bouquet Canyon. However, little improvement could be achieved at VWC's S-series wells without degrading the calibration quality in nearby wells (such as VWC's N-series wells). Along the Santa Clara River, substantial improvements to the model's simulation of drought periods in the Alluvial Aquifer were achieved at NCWD's Pinetree wellfield, and to a lesser extent at other wells further west (for example, SCWD's North Oaks, Sierra, and Honby wells).

In the Saugus Formation, the model simulates the trends in groundwater elevations quite well at each Saugus production well. The trends (hydrograph slopes) are particularly close in the NCWD wellfield (NCWD production wells 11, 12, and 13). Farther downgradient, the model tends to slightly over-predict groundwater elevations in SCWD's two production wells. However, the model closely simulates the groundwater elevation trends at these two wells, which is the primary consideration for evaluating the quality of the transient calibration process in the Saugus Formation. Groundwater elevations and trends are well-simulated at VWC's Saugus production wells (including the recently constructed VWC-206).

Appendix B also contains hydrographs comparing the simulated and measured values of 1) total river flow and 2) groundwater discharge to the river for the Santa Clara River at the County Line gage, where the river exits the valley and flows into Ventura County.[3] The hydrographs show that the model adequately replicates seasonal and year-to-year cycles of low and high river flows. Additionally, the model simulates temporal cycles in groundwater discharge to the river in a manner that is generally consistent with the cycles reflected in the estimates made from available stream gage data. As discussed in prior model development reports (CH2M HILL, 2004a and 2005), it is likely that differences between modeled and measured hydrographs for total river flow and groundwater discharges result from uncertainties in both the model and the County Line gage data, particularly during periods of low river flows.

[3] The "measured" groundwater discharges to the river are estimates that were derived from a hydrograph separation process, described by CH2M HILL (2004). This process estimated the monthly groundwater discharge to the river by examining the daily streamflow data at the County Line gage, the daily and monthly precipitation at local rain gages, monthly flows into Castaic Creek from Castaic Lagoon, and monthly flows into the Santa Clara River from the Saugus and Valencia WRPs.

# III. Modeling Approach for Analyzing Basin Yield

## 3.1 Modeling Approach

The process of designing the modeling analysis to evaluate the sustainability and achievability of a given operating plan consisted of the following five activities:

- Selecting a period over which to simulate groundwater conditions under each operating plan, including:
    - defining a sequence of varying local hydrology (rainfall, streamflows, and groundwater recharge) on a month-to-month basis throughout the simulation period
    - defining a sequence of varying availability of imported water supplies, as defined from availability studies of the State Water Project (SWP), on a month-to-month basis throughout the simulation period
- Defining pumping rates and schedules for each production well in the valley, including consideration of the varying local hydrology and SWP water availability
- Running the model to calculate time-varying (monthly) groundwater elevations and groundwater discharge terms throughout the multi-year simulation period
- Evaluating the modeling results by examining forecasted time-series plots (hydrographs) of water budget terms and groundwater elevations to evaluate the effects of the operating plan in the Alluvial Aquifer, the Saugus Formation, and the Santa Clara River

These activities are described in further detail below.

## 3.2 Simulation Period

The locations and temporal variation in pumping from the Alluvial Aquifer were defined in the model from the operating plan and from historical records of the year-to-year variability in local hydrology. Simulated pumping from the Saugus Formation was defined from the operating plan, historical pumping records, and operational constraints and historical patterns of SWP water supply availability.

### 3.2.1 Original Simulation Period

Because the operating plan for the Saugus Formation is linked to the hydrology and operational constraints for the SWP system, the year-to-year variability in Saugus Formation pumping is, to a great extent, dependent on the hydrology outside the valley (i.e., in northern California). As discussed in the original basin yield analysis report (CH2M HILL and LSCE, 2005), local hydrology affects the availability of Alluvial Aquifer groundwater, but is not always a good

indicator of local pumping conditions in the Saugus Formation, because local droughts and SWP droughts do not necessarily coincide with each other. Consequently, it was decided that the model would need to be run over several decades to capture the year-to-year differences between local hydrology and SWP hydrology and water availability, as well as the less frequent times when both systems experience similar hydrologic conditions (as occurred periodically during the 1960s and in 1994). Historical records were then analyzed to identify a simulation period that would be long enough to capture the variety of year-to-year and longer-term trends in local hydrology and imported water availability.

The original basin yield analysis was conducted using a synthetic 78-year period that replicated the historical hydrology from 1980 through 2003, followed by a replication of historical hydrology from 1950 through 2003. This synthetic time period simulated 24 years of reduced pumping from the Alluvial Aquifer, including two 3-year periods and one 4-year period of reduced pumping. For the Saugus Formation, this synthetic time period contained 18 "drought years" in which imported water volumes were sufficiently low to result in increased pumping from the Saugus Formation. These 18 years included two droughts lasting 2 years and two droughts lasting 3 years.

### 3.2.2 Current Simulation Period and Associated Hydrology

As introduced in Section 1.2, the update of the basin yield analysis was conducted in part because of the possibility of near-term reductions in SWP water deliveries to CLWA. The most recent analysis of the SWP's delivery reliability (DWR, 2008) includes year-to-year projections of delivery volumes under various development conditions, assuming both a repeat of historical climate and the potential effects of climate change. The analyses that are based on historical climate are reported for the climate that occurred from 1922 through 2003. These year-to-year projections had not been completed and published at the time of the original basin yield analysis in 2004 and 2005. Because these new analyses are now available, the basin yield update analysis simulated the historical record of climate and corresponding SWP delivery volumes for an 86-year period beginning in 1922 and ending in 2007, rather than using a synthetic time period. This 86-year period is characterized by:

- 14 years when deliveries are 35 percent or less of maximum Table A amounts, including 3 years when the deliveries do not exceed 10 percent of the Table A amounts

- Two droughts lasting 6 years (1929 through 1934, and 1987 through 1992)

Under the groundwater operating plan for the Santa Clarita Valley, the SWP delivery volume in any given year affects the amount of groundwater pumping that occurs from the Saugus Formation during that year. The amount of groundwater pumping from the Alluvial Aquifer is controlled by local hydrology, as determined by the amount of rainfall that occurs within the watershed during a given year. Figure 3-1 shows the historical pattern of annual rainfall on a calendar year basis from 1922 through 2007 at the Newhall-Soledad rain gage, which has the longest rainfall record of any location within the watershed. Values for 1922 through 1930 are estimated from RCS (2002). RCS personnel have since indicated that the source of data to 1931 is an unofficial record obtained in 2001 from a former California State Climatologist. The figure

also shows the average and median values of rainfall for the period 1931 through 2007 (18.16 and 15.82 inches per year, respectively). The estimated rainfall values from 1922 through 1930 were not included in the calculations of the average and median values. The figure shows that annual rainfall at the Newhall-Soledad rain gage since 1922 has ranged from about 4.1 inches in the driest years (in 1947 and 1972) to as much as 42.1 inches in the wettest years (1941 and 1978). 52 of the 86 years of record were characterized by below-average rainfall, and 36 years were particularly dry years characterized by rainfall values below 13.5 inches/year, which is 85 percent of the long-term median rainfall.

For annual rainfall at the Newhall-Soledad rain gage, Figure 3-2 shows the cumulative departure since 1922 from the 1931-2007 average rainfall. The cumulative departure refers to the cumulative (accumulated) amount of rainfall deficit or rainfall surplus over time, compared with long-term average rainfall. The slope of the cumulative departure plot is indicative of whether a given time period is characterized by generally dry conditions (downward slope), near-normal conditions (flat), or wetter-than-normal conditions (upward slope). The figure shows the following patterns in the local rainfall cycle:

- Generally dry conditions (downward-trending slope) after 1922 and continuing through 1935

- Generally wet conditions (upward-trending slope) from 1938 through 1944

- Thirty years of generally dry conditions (downward-trending slope) from 1947 through 1976, except for modestly wet conditions from 1965 through 1970

- Generally wet conditions (upward-trending slope) from 1977 through 2005, interrupted by drought conditions from 1984 through 1991 and from 1999 through 2004

An additional noteworthy feature of the cumulative departure plot is the 48-inch rainfall deficit that occurred from 1947 through 1951, which was not fully captured in the original basin yield analysis, but is modeled in its entirety in this updated analysis. The total rainfall deficit from 1947 through 1976 was approximately 86 inches (from a cumulative 31 inches above average in 1946 to a cumulative 55 inches below average in 1976). After 1976, the cumulative departure returned to a slightly positive value because of significant rainfall events in 1978, 1980, and 1983.

Table 3-1 shows the sequence of normal-year versus dry-year pumping conditions for the Alluvial Aquifer, as derived from the local rainfall records, and for the Saugus Formation as derived from the availability of SWP water. For the Alluvial Aquifer, the pumping year type is assumed to lag the local hydrology by one year. An examination of historical rainfall data and Alluvial Aquifer pumping patterns shows such a lag occurred in several years during the past two decades. The table shows dry-year pumping occurring in 55 years from the Alluvial Aquifer and 15 years from the Saugus Formation. During the 86-year simulation period, there are nine periods when dry-year pumping from the Alluvial Aquifer lasts more than two consecutive years, and two periods have dry-year Saugus pumping lasting more than one year. The longest dry-year pumping periods last for 7 years in the Alluvial Aquifer and 4 years in the Saugus Formation.

During the predominantly dry period from 1922 through 1978, only 16 of these 57 years (28 percent) were years in which normal pumping would have occurred from the Alluvial Aquifer.

## 3.3 2008 Operating Plan

Following are a general description of the 2008 Operating Plan and discussions of how pumping is distributed spatially and over time in the Alluvial Aquifer and the Saugus Formation under this plan. This plan was analyzed for its long-term sustainability by using the groundwater flow model to simulate the plan under the historical hydrology dating back to 1922. Actual historical pumping at the operating plan rates and for the current basin-wide network of production wells dates back only to the mid-1990s. Prior to that time, less pumping occurred in some years, while in other years pumping was limited to the western portion of the valley. Consequently, the modeling analysis was conducted in a manner to allow evaluation of how the basin might respond to the current operating plan and the current network of production wells, as might occur if past multi-decadal cycles of local and SWP hydrology (such as those measured as far back as 1922) were to repeat themselves in the future.

### 3.3.1 General Description of 2008 Operating Plan

As discussed in Section 1.1, the 2008 Operating Plan for the local groundwater basin is as follows:

- Pumping from the Alluvial Aquifer ranges between 30,000 and 40,000 afy during normal and above-normal rainfall years but, because of operational constraints in the eastern part of the basin, is reduced to between 30,000 and 35,000 afy during locally dry years. Table 3-2 shows the sequence of historical rainfall cycles and associated pumping from the Alluvial Aquifer, based on this operating plan and the 86-year simulation period that reflects historical rainfall in the valley from 1922 through 2007.

- Pumping from the Saugus Formation ranges between 7,500 and 15,000 afy during average-year to wet-year conditions within the SWP system. Planned dry-year pumping from the Saugus Formation ranges between 15,000 and 25,000 afy during a dry year, and increases to between 21,000 and 25,000 afy if SWP allocation is reduced to about 35 percent or less of the maximum Table A amount for two consecutive years, and between 21,000 and 35,000 afy if SWP allocation is reduced to about 35 percent or less of the maximum Table A amount for three consecutive years. Table 3-3 shows the sequence of SWP water availability and associated pumping from the Saugus Formation, based on this operating plan and the 86-year simulation period that reflects historical hydrology in the SWP system from 1922 through 2007.

Pumping rates for Purveyor-owned wells were assigned in accordance with the groundwater operating plan for the Santa Clarita Valley, which defines ranges of valley-wide annual pumping, given the water supply needs of the Purveyors. Pumping rates at individual wells were also assigned using the recent and planned production schedules for each well, information on the depths and lengths of the intake sections (open intervals) of each well, and by incorporating current plans addressing two other specific issues affecting Purveyor pumping:

- The presence of ammonium perchlorate in parts of the Saugus Formation and the Alluvial Aquifer

- Intermittent planned pumping from the Saugus Formation for the purpose of meeting regulatory objectives for chloride concentrations in the Santa Clara River.

These two issues and the details of how pumping was specified in the modeling analysis of the current operating plan are discussed further in Sections 3.3.2 and 3.3.3 below.

### 3.3.2 Alluvial Aquifer Pumping

Simulated pumping rates under the 2008 Operating Plan for production wells completed in the Alluvial Aquifer are listed in Table 3-4. The table provides this information for 8 wells owned by NCWD, 13 wells owned by SCWD, 15 wells owned by VWC, 16 wells owned by NLF, and private wells owned by Robinson Ranch and Wayside Honor Rancho. Most Alluvial Aquifer wells were specified to operate at similar rates regardless of year type, except in the eastern portion of the basin. Wells in this area (the Robinson Ranch well, the four Pinetree wells owned by NCWD, and 11 wells owned by SCWD) were assumed to have lower pumping capacities during dry years than non-drought years because of historically experienced lower groundwater elevations during dry periods.

The 2008 Operating Plan for the Alluvial Aquifer accounts for historical perchlorate detections in two alluvial wells, as the result of contamination emanating from the former Whittaker-Bermite property.

- In 2002, an Alluvial production well owned by SCWD (SCWD-Stadium) was shut down because of the detection of perchlorate. SCWD has recently drilled a replacement well (Valley Center) further to the east, north-northeast of the Whittaker-Bermite property.

- In March 2005, an Alluvial production well owned by VWC (VWC-Q2) was shut down because of perchlorate detection. After returning the well to service with wellhead treatment in October 2005, followed by nearly two years of operation with wellhead treatment, during which there was no detection of perchlorate, Valencia was authorized by the California Department of Public Health (DPH) to discontinue treatment. Well Q2 has since been operated without treatment and there has been no detection of perchlorate since discontinuation of wellhead treatment. Consequently, Well Q2 is included in the 2008 Operating Plan.

The 2008 Operating Plan for the Alluvial Aquifer also accounts for known private pumping at wells owned by the Newhall Land & Farming Company (NLF) for agricultural water supply; wells owned by Los Angeles County Water District No. 36 that provide potable water to the Wayside Honor Rancho; and a well in eastern Soledad Canyon owned by Robinson Ranch that is used for golf course irrigation. In the future, portions of the current pumping by NLF are planned to be converted to pumping by Valencia Water Company to supply potable water to the future Newhall Ranch development. However, for the purposes of the groundwater modeling analysis,

this pumping volume is indicated in Table 3-4 as continuing to be conducted by NLF, to reflect current ownership and current operating conditions. The planned change from agricultural to municipal supply is expected to result in only locally small changes in pumping locations (new municipal wells in close proximity to existing agricultural wells that will then be abandoned), resulting in practically similar spatial distribution of pumping and thus similar conditions as simulated in the 2008 Operating Plan.

The water management practices of the Purveyors also recognize ongoing Alluvial Aquifer pumping for other smaller private domestic and related pumping. For the last ten years of formal annual water report preparation in the Santa Clarita Valley, those reports have included estimates of the latter private pumping. Based on limited data provided by private well owners as part of the overall Groundwater Management Plan effort, it is estimated that small private pumping is within 500 afy, or approximately one percent of typical Alluvial Aquifer pumping by the Purveyors and other known private well owners (including agricultural pumpers) combined. However, the small private wells are not explicitly modeled in the basin yield analysis described herein because their locations and operations are not known, and their operation creates a pumping stress that is essentially negligible at the scale of the overall groundwater model. Ultimately, as discussed throughout this report, the intent is to maintain overall pumping, including private pumping, within the operating plan to result in sustainable groundwater conditions to support the combination of municipal (Purveyor), agricultural, and private groundwater use on an ongoing basis. Thus, private well owners in the basin, like the large municipal and agricultural pumpers, can expect groundwater supplies to continue to be available as they have been in the past, with some fluctuations in water levels through wet and dry periods, but no long-term depletion of supply.

### 3.3.3 Saugus Aquifer Pumping

Simulated pumping rates under the 2008 Operating Plan for production wells completed in the Saugus Formation are listed in Table 3-5. The table provides this information for two wells owned by NCWD, two wells owned by SCWD, six wells owned by VWC, and a private well at the Palmer golf course, located just north of Hasley Canyon. Pumping rates at specific Saugus Formation production wells were assigned for each type of year (normal, dry year 1, dry year 2, and dry year 3) using information on the capacity, recent and planned use, and location of each well[1]. Significant aspects of the pumping rate selection at each well are as follows:

- Pumping from most existing Saugus Formation production wells was based on recent and planned use of these wells, as defined by the Purveyors. The simulation included increased dry-year pumping from the Saugus Formation in the western portion of the basin, where it is anticipated that future wells will be installed.

- Each Saugus Formation production well has an intake section (open interval) that is significantly longer in vertical extent than the thicknesses of the individual layers that represent the Saugus Formation in the groundwater flow model. Consequently, the

[1] Table 3-5 only lists wells that are anticipated to be operating in the future. Existing wells that are not listed in this table (such as NCWD-7, NCWD-10, and NCWD-11) are currently not in service and, therefore, are not expected to provide significant quantities of water in the future.

Saugus pumping rates were assigned to multiple layers in the model by considering the depths of the intake section of each well and the transmissivity of each model layer. Table 3-6 shows the allocation of pumping in each model layer for each Saugus Formation production well, along with the intake sections of each well and the model-simulated transmissivity in each layer at each well location.

The 2008 Operating Plan for the Saugus Formation accounts for historical perchlorate detections and the resulting containment and remedial response activities that are being constructed at this time. In 1997, two Saugus Formation production wells owned by SCWD (wells SCWD-Saugus1 and SCWD-Saugus2), one Saugus Formation production well owned by NCWD (well NCWD-11), and one former Saugus Formation production well owned by VWC (well VWC-157) were removed from service because perchlorate was detected in groundwater at these wells[2]. Under oversight by the California Department of Toxic Substances Control (DTSC), and with ultimate approval by DPH, in accordance with its Policy 97-005 (for restoration of water supply from "severely impaired" water sources), the Purveyors developed a remedial strategy that will entail pumping of two impacted wells for containment of perchlorate migration; treatment and subsequent use of the pumped water for water supply; and installation of replacement wells in non-impacted portions of the basin to restore the remainder of groundwater supply impacted by perchlorate. A noteworthy detail of these activities is that the groundwater flow model was used to identify the design of a pumping scheme that would meet the Purveyors' objectives for perchlorate containment in the Saugus Formation (CH2M HILL, 2004b). The final containment plan specifies that wells SCWD-Saugus1 and SCWD-Saugus 2 operate at an instantaneous pumping rate of 1,200 gallons per minute (gpm) at each well (for a combined total of 2,400 gpm from the two wells). The annual pumping volume of 1,772 afy per well shown in Table 3-5 is based on this rate and also on the assumption that pumping will occur continuously, except for up to four weeks per year for maintenance purposes. Construction of facilities and pipelines necessary to implement the containment program and to restore inactivated well capacity, to be followed by operational start-up, are currently scheduled to occur in 2009.

The 2008 Operating Plan for the Saugus Formation also accounts for intermittent pumping from the Saugus Formation that is expected to occur for the purpose of meeting regulatory objectives for chloride in the Santa Clara River. This pumping program is one component of an Alternative Water Resources Management (AWRM) program to be implemented by the Santa Clarita Valley Sanitation District of Los Angeles County (SCVSD, a division of the Los Angeles County Sanitation District [LACSD]), the Purveyors, and other parties for the purpose of meeting Total Maximum Daily Loads (TMDLs) for chloride in the Santa Clara River in western Los Angeles County and eastern Ventura County. The AWRM program was finalized in the form of a Memorandum of Understanding (MOU) dated October 2008. Under the AWRM program, CLWA will develop a plan to provide imported water to replace Saugus Formation groundwater that will be pumped to provide supplemental water for the AWRM program. The supplemental pumped groundwater from the Saugus Formation will be released to the Santa Clara River near the Los Angeles County / Ventura County line to improve water quality conditions in the river

[2]As part of the ongoing implementation of perchlorate containment and restoration of impacted capacity, well VWC-157 was abandoned in January 2005 and replaced by new well VWC-206. Thus, this analysis includes planned pumping from replacement well VWC-206.

and to allow for attainment of the AWRM's stated water quality objectives for the river. Under the AWRM, the supplemental water will be directed to the river during years of extreme drought conditions in the SWP, defined as time periods when chloride concentrations equal or exceed 80 milligrams per liter (mg/L) in SWP water (Geomatrix, 2008; LARWQCB, 2008). Pumping under this program is planned to occur from well VWC-206 and from two future wells that will be drilled near VWC-206. This supplemental pumping is factored into the annual pumping volumes listed in Table 3-5. The pumping rates listed in Table 3-5 for the individual Saugus Formation wells will occur regardless of whether a portion of a given year's pumping is being directed to the AWRM program. Any volume of pumping directed to the AWRM program in a given year will be made up with imported water supplies, rather than from increased pumping of Alluvial or other Saugus groundwater. Technical analyses indicate that this pumping could occur in about 24 percent of all years, with total pumping occurring at rates ranging from less than 1 million gallons per day (mgd) to as much as 8 mgd (Geomatrix, 2008).

### 3.3.4 Monthly Allocation of Pumping

The model simulations that evaluated the operating plan were conducted by modeling groundwater recharge and pumping on a monthly basis. Consequently, the annual pumping volumes specified in the groundwater operating plan were converted to monthly values at each well for modeling purposes. The allocation of pumping, by month, for agricultural and urban production wells in both the Alluvial Aquifer and the Saugus Formation is listed in Table 3-7. Separate monthly distributions were used because agricultural demands are for exclusively outdoor uses, whereas urban demands are for both indoor and outdoor uses. As discussed in the model development report (CH2M HILL, 2004a), the monthly distribution of agricultural pumping was derived from crop consumptive use requirements published by the California Irrigation Management Information Service. The monthly distribution of urban demand was determined by examining historical monthly flow records for the two water reclamation plants (WRPs) that are present in the valley, and also by examining the distributions of monthly water consumption recorded by the Purveyors within their service areas during the past several years.

### 3.3.5 Total Available Potable Water Supply Under the 2008 Operating Plan

For the 2008 Operating Plan and the 1922-2007 simulation period, Table 3-8 lists the annual volumes of water available from each potable water source (Alluvial Aquifer, Saugus groundwater, and SWP imports), along with their combined total. The combined pumping from the Alluvial Aquifer and the Saugus Formation averages 51,400 afy and ranges between 47,335 and 73,577 under the 2008 Operating Plan. Year-by-year pumping from each aquifer is shown in Figure 3-3, along with total groundwater pumping.

Figure 3-4 compares total groundwater pumping with SWP water supply availability and the resulting total volume of water from a combination of local groundwater and imported SWP water (not including other water supplies, for example, purchased water, water banked in other groundwater basins, etc.). The total water supply from those two sources is as low as 64,858 afy during the driest years in the SWP system, when SWP deliveries are below 10,000 afy. For the 86-year simulation period, the total available supply from local groundwater and imported SWP water averages about 110,000 afy and can exceed 140,000 afy in the wettest years.

## 3.4 2008 Operating Plan with Pumping Redistribution

The 2008 Operating Plan with Pumping Redistribution was developed in response to model simulation results (discussed in Section 4 of this report) that identified a potential lack of achievability in maintaining alluvial pumping in the eastern portion of the basin, due to decline in groundwater levels below the intake sections of wells. The model simulations of the 2008 operating plan indicated that such declines, and the associated potential lack of achievability, could occur during periods which experience prolonged dry conditions, such as occurred from the mid-1940s through the mid-1970s, when there were few years of significantly greater-than-average rainfall. For this three-decade period, the model simulation found the 2008 Operating Plan to not be achievable in the most eastern part of the basin, the "Above Mint Canyon" subarea. However, it was also recognized that achievability might be accomplished by redistributing some pumping to other areas, specifically to reduce pumping stress in the far east and replace it with increased pumping farther west in the basin. This redistribution may not be necessary during other historical periods that were characterized by intermittent years of significant rainfall, streamflow, and associated groundwater recharge (such as occurred periodically from the late 1970s through 2005).

This variation of the 2008 Operating Plan was examined as follows. Recognizing that SCWD is in the midst of constructing new or replacement wells (e.g. to replace its perchlorate-impacted Stadium well) to the west of the "Above Mint Canyon" subarea, a redistribution of some SCWD pumping, as analyzed in the 2008 Operating Plan, was crafted whereby 1,600 afy of pumping was moved from three SCWD wells in the "Above Mint Canyon" subarea (near the mouth of Sand Canyon) to the replacement SCWD Santa Clara and Bouquet wells, located in the "Above Saugus WRP" and "Bouquet Canyon" subareas, respectively. Table 3-9 shows the resulting pumping plan for each Alluvial well under this redistribution scheme.

Besides the pumping redistribution in these Alluvial wells, all other aspects of Alluvial and Saugus pumping remains unchanged from the 2008 Operating Plan.

## 3.5 Potential Future Operating Plan

A third operating plan was analyzed at the request of the Purveyors. This plan is referred to herein as the Potential Operating Plan and contemplates increased utilization of groundwater during both regular (wet/normal) years and dry years. Target pumping volumes and locations under this plan were provided by the Purveyors and are summarized in Table 3-10 for the Alluvial Aquifer and Table 3-11 for the Saugus Formation. Under this plan, Alluvial Aquifer pumping would be on the order of 47,500 afy in normal/wet years and would be reduced to about 41,500 afy following two or more years of below-normal rainfall locally. Saugus Formation pumping would be on the order of 16,350 afy during years of normal SWP water availability and would increase to over 39,500 afy in the third year of reduced SWP water availability.

Consequently, total groundwater pumping under this plan would be almost 64,000 afy during normal years (compared with about 51,000 afy in the 2008 Operating Plan) and could be as high as about 87,000 afy during the highest pumping years (compared with about 73,500 afy in the 2008 Operating Plan). Figure 3-5 shows the fluctuation during the 86-year simulation period in

total groundwater pumping under this Potential Operating Plan, as well as the fluctuations in total Alluvial pumping and total Saugus pumping. Figure 3-6 compares the year-to-year pumping volumes, as well as the 86-year total pumping, for the potential plan and the 2008 plan. Total groundwater pumping during the 86-year simulation period would be about 1 million acre-feet, or about 80 percent, higher under the Potential Operating Plan.

The Potential Operating Plan differs from the 2008 Operating Plan only in the amount of groundwater being extracted. Both plans assume the same amount of SWP water availability. As shown in Table 3-12 and Figure 3-7, under the Potential Operating Plan, the total contemplated volume of available potable water supply from a combination of local groundwater and imported SWP water (not including other water supplies, for example, purchased water, water banked in other groundwater basins, etc.) ranges between about 77,000 afy and 156,000 afy, and averages nearly 122,000 afy for the 86-year simulation period. This represents an approximate 10 percent increase in water supply from those two sources during average and wet years, compared with the 2008 Operating Plan. During years of reduced SWP imports, the Potential Operating Plan contemplates almost 20 percent more potable water availability from local groundwater and imported SWP water during the driest years, compared with the 2008 Operating Plan.

## 3.6 Simulation of Other Local Hydrologic Processes

In addition to groundwater pumping, infiltration from irrigation (from urban and agricultural lands), precipitation, and streamflows (stormwater and WRP discharges) were also modeled. These other local hydrologic processes were defined using the Surface Water Routing Model (SWRM), which is described in Appendix C to the model development and calibration report (CH2M HILL, 2004a). The procedures used to derive these terms were the same as in the original basin yield analysis (CH2M HILL and LSCE, 2005) and are described in the following sections.

### 3.6.1 Recharge from Urban Irrigation

Under existing land use and water use conditions, the estimated long-term infiltration rates of applied irrigation water beneath urban areas, under full build-out conditions in the valley, were estimated to be 1.0 in/yr for industrial and retail lands, 2.2 in/yr for residential developments and parks, and 4.6 in/yr for golf courses (CH2M HILL, 2004a; CH2M HILL and LSCE, 2005). These rates were applied during each year (and each month) of the 86-year simulation period. The areas over which these rates were applied were larger than under current conditions. The areas were defined from recent land use data and LACSD mapping of projected future land uses in the rest of the Santa Clarita Valley under full build-out conditions[3] (CH2M HILL and LSCE, 2005).

[3]LACSD land use mapping indicates that, including Newhall Ranch, approximately 14,000 acres of currently undeveloped land will be urbanized in the future within the model simulation area. Additional urbanization will also occur in areas that are within the watershed, but outside the model's boundaries.

### 3.6.2 Recharge from Agricultural Irrigation

As discussed in the *Newhall Ranch Updated Water Resources Impact Evaluation* (CH2M HILL, 2002), irrigation of lands owned by NLF results in existing agricultural return flows. The source of most irrigation water is groundwater pumping from the Alluvial Aquifer, with some limited pumping occurring from one Saugus Formation well (NLF-156) prior to 2008, when this well was taken out of service. Under full Valley build-out conditions, the currently irrigated lands will no longer be irrigated because their water source will be used as part of the water supply for Newhall Ranch. Therefore, under full build-out conditions, no agricultural irrigation will occur within the area simulated by the model.

### 3.6.3 Precipitation Recharge

Infiltration from direct precipitation within the model domain was defined using data from the Newhall-Soledad and NCWD rain gages, an isohyet map of rainfall throughout the watershed, and the Turner (1986) power-function equation that describes the relationship between annual rainfall and annual groundwater recharge within the valley. Details concerning the derivation of precipitation infiltration rates from these data are contained in Appendix C to the model development and calibration report (CH2M HILL, 2004a). Table 3-13 lists the simulated monthly precipitation at the NCWD rain gage for the 86-year model period[4].

### 3.6.4 Stormwater Flows and Recharge from Streams

For each month of the simulation, the SWRM calculated the amounts of stormwater flow and groundwater recharge in all streams, plus the amount of flow and groundwater recharge arising from projected future WRP discharges to the Santa Clara River (including from the future Newhall WRP, which will service the planned Newhall Ranch development). For the Santa Clara River, the volume of streamflow was defined from measured and estimated streamflow data at the Lang gage (Table 3-14). For Castaic Creek, the volume of streamflow was defined from historical DWR operations and consideration of the hydrologic year type (Table 3-15). For the remaining Santa Clara River tributaries, streamflow volumes were defined by the SWRM using monthly rainfall data and the Turner (1986) relationship between rainfall, ET, and the subsequent yield from each watershed.

### 3.6.5 WRP Discharges to the Santa Clara River

Treated water is discharged to the Santa Clara River from the two WRPs that are present in the Valley. The Saugus WRP discharges to the river immediately above the mouth of the South Fork Santa Clara River, and the Valencia WRP discharges to the river just west of Interstate 5. The planned Newhall WRP will discharge to the river just east of the Los Angeles / Ventura County line for limited durations in the winter months.

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[4]The simulated monthly precipitation was defined from measurements at the NCWD rain gage from 1979 through 2003, as well as by combining the isohyet map with measurements at the Newhall-Soledad rain gage from prior to 1979.

Under full Valley build-out conditions, future flows into and from WRPs will be higher than historical flows because of increased development and the associated increase in indoor water use volumes. Additionally, a portion of the future treated water will be reclaimed, as described in CLWA's recycled water master plan (Kennedy/Jenks Consultants, 2002). In the original basin yield analysis work (CH2M HILL and LSCE, 2005), future inflows to the Saugus and Valencia WRPs were estimated from projected future water demands and from comparisons of historical water use and measured inflows to both WRPs. Table 3-16 shows the derivation of urban water demands outside the Newhall Ranch development (which will be served by a new, separate WRP). Table 3-17 shows the total amount of treated water generated by the Saugus and Valencia WRPs, and the amount of this water that is reclaimed and discharged to the river, by month. These values are the same as were used in the original basin yield analysis work. The values in Table 3-17 assume that the reclaimed water volume will be no more than 16,000 afy, to maintain existing flow volumes in the Santa Clara River. For the Newhall Ranch WRP, discharges to the river will be 286 afy, occurring primarily in December and January, when demands for reclaimed water are at their seasonal low. The total combined volumes of treated water discharged to the Santa Clara River under full Valley build-out conditions (including Newhall Ranch) are summarized, by month, in Table 3-18. These rates, which were used in the original basin yield analysis, were carried forward and used in each year of the 86-year simulation for the basin yield update analysis.

### 3.6.6 Monthly Assignment and Tracking of Surface Water Budget

The month-by-month assignment of the rates and locations of surface water infiltration to the underlying Alluvial Aquifer system was performed by the SWRM using the procedures described in Section C.8.5 of Appendix C to the model development and calibration report (CH2M HILL, 2004a). Streambed infiltration capacities for the last 28 years of the 86-year simulation period (calendar years 1980 through 2007) were the same as those used in the calibrated model. For the prior 58 years (1922 through 1979), the monthly streambed infiltration capacity values for a given year were selected by using one of the calibration years as a prototype year. Rainfall and streamflow records were used to identify the best prototype year and to subsequently specify the corresponding streambed infiltration rates.

For each month of the 86-year simulation period, the SWRM also tracked the volume of surface water that does not infiltrate to groundwater from a given stream because of gaining stream conditions (i.e., rejected stream leakage). This rejected stream leakage was calculated to remain as surface water in the Santa Clara River and to eventually exit the model domain at the west end of the Valley, at the County Line gage.

## 3.7 Running the Model and Evaluating Results

As discussed in the previous sections, the modeling evaluations were performed by simulating conditions on a monthly basis for the 86-year simulation period. The first step in this process consisted of running the SWRM to calculate the monthly distribution of recharge to the Alluvial Aquifer system (from rainfall, streamflow, irrigation, and WRP discharges) and recharge to the Saugus Formation (from rainfall and irrigation) in areas where the Alluvial Aquifer is not

present. The output from the SWRM consisted of monthly files that assigned recharge to each node in the model grid.

The model was then run using monthly time steps, in which pumping and recharge terms were varied each month. For each sub-interval of time, the model was run by solving the groundwater flow equations for a given month, using a convergence criterion of 0.005 foot for groundwater elevations and a water budget convergence criterion of 2 cubic feet per day. The model results were then evaluated by generating time-series plots (hydrographs) of water budget terms and groundwater elevations to evaluate the potential effects of the groundwater operating plan across the basin. The hydrographs were used to evaluate whether the operating plan is consistent with the objective of operating the basin in a manner that maintains long-term stability in groundwater levels and river flows. This analysis and its findings are presented in the following Chapter 4.

**Table 3-1**

Alluvial and Saugus Formation Pumping Patterns for the Simulation of 1922-2007 Historical Hydrology

| Calendar Year | Local Rainfall (inches)[a] | SWP Water Availability[b] | Simulated Pumping Conditions | |
|---|---|---|---|---|
| | | | Alluvium | Saugus |
| 1922 | ~ 32 | 89% | Normal | Normal |
| 1923 | ~ 14 | 76% | Normal | Normal |
| 1924 | ~ 8 | 10% | Dry Year 1 | Dry Year 1 |
| 1925 | ~ 7 | 40% | Dry Year 2 | Normal |
| 1926 | ~ 26 | 53% | Dry Year 3 | Normal |
| 1927 | ~ 24 | 89% | Normal | Normal |
| 1928 | ~ 10 | 50% | Normal | Normal |
| 1929 | ~ 12 | 18% | Dry Year 1 | Dry Year 1 |
| 1930 | ~ 12 | 49% | Dry Year 2 | Normal |
| 1931 | 24.41 | 27% | Dry Year 3 | Dry Year 2 |
| 1932 | 13.73 | 32% | Normal | Dry Year 3 |
| 1933 | 20.52 | 48% | Dry Year 1 | Dry Year 4 |
| 1934 | 18.05 | 32% | Dry Year 2 | Dry Year 5 |
| 1935 | 12.21 | 81% | Dry Year 3 | Normal |
| 1936 | 20.47 | 76% | Dry Year 4 | Normal |
| 1937 | 17.92 | 78% | Dry Year 5 | Normal |
| 1938 | 32.75 | 82% | Dry Year 6 | Normal |
| 1939 | 11.27 | 79% | Normal | Normal |
| 1940 | 21.37 | 77% | Dry Year 1 | Normal |
| 1941 | 42.14 | 61% | Dry Year 2 | Normal |
| 1942 | 7.10 | 77% | Normal | Normal |
| 1943 | 37.03 | 76% | Dry Year 1 | Normal |
| 1944 | 24.63 | 71% | Normal | Normal |
| 1945 | 14.56 | 75% | Normal | Normal |
| 1946 | 21.71 | 77% | Normal | Normal |
| 1947 | 4.16 | 56% | Normal | Normal |
| 1948 | 9.13 | 63% | Dry Year 1 | Normal |
| 1949 | 9.93 | 31% | Dry Year 2 | Dry Year 1 |
| 1950 | 6.84 | 60% | Dry Year 3 | Normal |
| 1951 | 12.42 | 85% | Dry Year 4 | Normal |
| 1952 | 34.19 | 63% | Dry Year 5 | Normal |
| 1953 | 4.88 | 80% | Normal | Normal |
| 1954 | 15.82 | 77% | Dry Year 1 | Normal |
| 1955 | 13.91 | 28% | Dry Year 2 | Dry Year 1 |
| 1956 | 14.21 | 87% | Dry Year 3 | Normal |
| 1957 | 22.85 | 62% | Dry Year 4 | Normal |
| 1958 | 23.14 | 73% | Dry Year 5 | Normal |
| 1959 | 9.81 | 84% | Normal | Normal |
| 1960 | 11.64 | 35% | Dry Year 1 | Dry Year 1 |
| 1961 | 8.82 | 57% | Dry Year 2 | Normal |
| 1962 | 21.22 | 72% | Dry Year 3 | Normal |
| 1963 | 12.79 | 82% | Dry Year 4 | Normal |
| 1964 | 10.09 | 53% | Dry Year 5 | Normal |
| 1965 | 32.28 | 69% | Dry Year 6 | Normal |
| 1966 | 14.57 | 79% | Normal | Normal |
| 1967 | 23.23 | 72% | Dry Year 1 | Normal |
| 1968 | 6.90 | 80% | Dry Year 2 | Normal |
| 1969 | 32.42 | 64% | Dry Year 3 | Normal |
| 1970 | 23.19 | 79% | Normal | Normal |
| 1971 | 13.75 | 80% | Normal | Normal |
| 1972 | 4.15 | 41% | Dry Year 1 | Normal |
| 1973 | 19.79 | 75% | Dry Year 2 | Normal |
| 1974 | 18.04 | 77% | Dry Year 3 | Normal |
| 1975 | 10.92 | 78% | Dry Year 4 | Normal |
| 1976 | 14.02 | 63% | Dry Year 5 | Normal |
| 1977 | 20.87 | 6% | Dry Year 6 | Dry Year 3 |
| 1978 | 42.17 | 87% | Dry Year 7 | Normal |
| 1979 | 21.47 | 76% | Normal | Normal |
| 1980 | 27.00 | 66% | Normal | Normal |
| 1981 | 13.42 | 76% | Normal | Normal |
| 1982 | 20.20 | 71% | Dry Year 1 | Normal |
| 1983 | 39.07 | 60% | Normal | Normal |
| 1984 | 12.86 | 78% | Normal | Normal |
| 1985 | 8.37 | 77% | Dry Year 1 | Normal |
| 1986 | 18.02 | 56% | Dry Year 2 | Normal |
| 1987 | 14.45 | 68% | Normal | Normal |
| 1988 | 16.92 | 12% | Dry Year 1 | Dry Year 1 |
| 1989 | 7.56 | 76% | Dry Year 2 | Normal |
| 1990 | 6.98 | 9% | Dry Year 3 | Dry Year 2 |
| 1991 | 17.21 | 18% | Dry Year 4 | Dry Year 3 |
| 1992 | 32.03 | 26% | Dry Year 5 | Dry Year 4 |
| 1993 | 32.72 | 90% | Normal | Normal |
| 1994 | 10.27 | 51% | Normal | Normal |
| 1995 | 29.15 | 72% | Dry Year 1 | Normal |
| 1996 | 15.88 | 83% | Normal | Normal |
| 1997 | 13.35 | 75% | Normal | Normal |
| 1998 | 30.73 | 73% | Normal | Normal |
| 1999 | 8.96 | 83% | Normal | Normal |
| 2000 | 14.04 | 84% | Normal | Normal |
| 2001 | 22.24 | 28% | Dry Year 1 | Dry Year 1 |
| 2002 | 7.90 | 52% | Dry Year 2 | Normal |
| 2003 | 15.70 | 71% | Dry Year 3 | Normal |
| 2004 | 22.79 | 65% | Dry Year 4 | Normal |
| 2005 | 37.15 | 90% | Normal | Normal |
| 2006 | 13.89 | 100% | Normal | Normal |
| 2007 | 5.78 | 60% | Dry Year 1 | Normal |

aFrom records at Newhall-Soledad rain gage (Station No. FC32CE). Pumping year type lags local rainfall by one year. Dry year pumping occurs when rainfall in prior year is 12.5 inches or less, and may continue until after a year with high rainfall (well above normal) has occurred.

[b]Values for 1922-2003 are from Table B.3 in DWR (2008) and are for SWP Table A Deliveries under current (2007) conditions. Values in 2004 through 2007 are actual historical deliveries during those years.

**TABLE 3-2**

Local Hydrology and 2008 Operating Plan for the Alluvial Aquifer

| Calendar Year | Local Rainfall (inches)[a] | Year Type | Alluvial Aquifer Pumping under the Groundwater Operating Plan (afy) |
|---|---|---|---|
| 1922 | ~ 32 | Normal | 35,000-40,000 |
| 1923 | ~ 14 | Normal | 35,000-40,000 |
| 1924 | ~ 8 | Dry Year 1 | 30,000-35,000 |
| 1925 | ~ 7 | Dry Year 2 | 30,000-35,000 |
| 1926 | ~ 26 | Dry Year 3 | 30,000-35,000 |
| 1927 | ~ 24 | Normal | 35,000-40,000 |
| 1928 | ~ 10 | Normal | 35,000-40,000 |
| 1929 | ~ 12 | Dry Year 1 | 30,000-35,000 |
| 1930 | ~ 12 | Dry Year 2 | 30,000-35,000 |
| 1931 | 24.41 | Dry Year 3 | 30,000-35,000 |
| 1932 | 13.73 | Normal | 35,000-40,000 |
| 1933 | 20.52 | Dry Year 1 | 30,000-35,000 |
| 1934 | 18.05 | Dry Year 2 | 30,000-35,000 |
| 1935 | 12.21 | Dry Year 3 | 30,000-35,000 |
| 1936 | 20.47 | Dry Year 4 | 30,000-35,000 |
| 1937 | 17.92 | Dry Year 5 | 30,000-35,000 |
| 1938 | 32.75 | Dry Year 6 | 30,000-35,000 |
| 1939 | 11.27 | Normal | 35,000-40,000 |
| 1940 | 21.37 | Dry Year 1 | 30,000-35,000 |
| 1941 | 42.14 | Dry Year 2 | 30,000-35,000 |
| 1942 | 7.10 | Normal | 35,000-40,000 |
| 1943 | 37.03 | Dry Year 1 | 30,000-35,000 |
| 1944 | 24.63 | Normal | 35,000-40,000 |
| 1945 | 14.56 | Normal | 35,000-40,000 |
| 1946 | 21.71 | Normal | 35,000-40,000 |
| 1947 | 4.16 | Normal | 35,000-40,000 |
| 1948 | 9.13 | Dry Year 1 | 30,000-35,000 |
| 1949 | 9.93 | Dry Year 2 | 30,000-35,000 |
| 1950 | 6.84 | Dry Year 3 | 30,000-35,000 |
| 1951 | 12.42 | Dry Year 4 | 30,000-35,000 |
| 1952 | 34.19 | Dry Year 5 | 30,000-35,000 |
| 1953 | 4.88 | Normal | 35,000-40,000 |
| 1954 | 15.82 | Dry Year 1 | 30,000-35,000 |
| 1955 | 13.91 | Dry Year 2 | 30,000-35,000 |
| 1956 | 14.21 | Dry Year 3 | 30,000-35,000 |
| 1957 | 22.85 | Dry Year 4 | 30,000-35,000 |
| 1958 | 23.14 | Dry Year 5 | 30,000-35,000 |
| 1959 | 9.81 | Normal | 35,000-40,000 |
| 1960 | 11.64 | Dry Year 1 | 30,000-35,000 |
| 1961 | 8.82 | Dry Year 2 | 30,000-35,000 |
| 1962 | 21.22 | Dry Year 3 | 30,000-35,000 |
| 1963 | 12.79 | Dry Year 4 | 30,000-35,000 |
| 1964 | 10.09 | Dry Year 5 | 30,000-35,000 |
| 1965 | 32.28 | Dry Year 6 | 30,000-35,000 |
| 1966 | 14.57 | Normal | 35,000-40,000 |
| 1967 | 23.23 | Dry Year 1 | 30,000-35,000 |
| 1968 | 6.90 | Dry Year 2 | 30,000-35,000 |
| 1969 | 32.42 | Dry Year 3 | 30,000-35,000 |
| 1970 | 23.19 | Normal | 35,000-40,000 |
| 1971 | 13.75 | Normal | 35,000-40,000 |
| 1972 | 4.15 | Dry Year 1 | 30,000-35,000 |
| 1973 | 19.79 | Dry Year 2 | 30,000-35,000 |
| 1974 | 18.04 | Dry Year 3 | 30,000-35,000 |
| 1975 | 10.92 | Dry Year 4 | 30,000-35,000 |
| 1976 | 14.02 | Dry Year 5 | 30,000-35,000 |
| 1977 | 20.87 | Dry Year 6 | 30,000-35,000 |
| 1978 | 42.17 | Dry Year 7 | 30,000-35,000 |
| 1979 | 21.47 | Normal | 35,000-40,000 |
| 1980 | 27.00 | Normal | 35,000-40,000 |
| 1981 | 13.42 | Normal | 35,000-40,000 |
| 1982 | 20.20 | Dry Year 1 | 30,000-35,000 |
| 1983 | 39.07 | Normal | 35,000-40,000 |
| 1984 | 12.86 | Normal | 35,000-40,000 |
| 1985 | 8.37 | Dry Year 1 | 30,000-35,000 |
| 1986 | 18.02 | Dry Year 2 | 30,000-35,000 |
| 1987 | 14.45 | Normal | 35,000-40,000 |
| 1988 | 16.92 | Dry Year 1 | 30,000-35,000 |
| 1989 | 7.56 | Dry Year 2 | 30,000-35,000 |
| 1990 | 6.98 | Dry Year 3 | 30,000-35,000 |
| 1991 | 17.21 | Dry Year 4 | 30,000-35,000 |
| 1992 | 32.03 | Dry Year 5 | 30,000-35,000 |
| 1993 | 32.72 | Normal | 35,000-40,000 |
| 1994 | 10.27 | Normal | 35,000-40,000 |
| 1995 | 29.15 | Dry Year 1 | 30,000-35,000 |
| 1996 | 15.88 | Normal | 35,000-40,000 |
| 1997 | 13.35 | Normal | 35,000-40,000 |
| 1998 | 30.73 | Normal | 35,000-40,000 |
| 1999 | 8.96 | Normal | 35,000-40,000 |
| 2000 | 14.04 | Normal | 35,000-40,000 |
| 2001 | 22.24 | Dry Year 1 | 30,000-35,000 |
| 2002 | 7.90 | Dry Year 2 | 30,000-35,000 |
| 2003 | 15.70 | Dry Year 3 | 30,000-35,000 |
| 2004 | 22.79 | Dry Year 4 | 30,000-35,000 |
| 2005 | 37.15 | Normal | 35,000-40,000 |
| 2006 | 13.89 | Normal | 35,000-40,000 |
| 2007 | 5.78 | Dry Year 1 | 30,000-35,000 |

aFrom records at Newhall-Soledad rain gage (Station No. FC32CE). Pumping year type lags local rainfall by one year. Dry year pumping occurs when rainfall in prior year is 12.5 inches or less, and may continue until after a year with high rainfall (well above normal) has occurred.

afy = acre-feet per year

**TABLE 3-3**

SWP Deliveries and 2008 Operating Plan for the Saugus Formation

| Calendar Year | Historical SWP Hydrology | SWP Water Delivery from the California Bay-Delta: Percent of Maximum Table A Deliveries (Current Conditions) | Design of Updated Basin Analysis: Saugus Pumping: Year Type | Design of Updated Basin Analysis: Saugus Operating Plan Pumping Volume (afy) | |
|---|---|---|---|---|---|
| 1922 | Above Normal | 89% | Normal | 11,000 | |
| 1923 | Below Normal | 76% | Normal | 11,000 | |
| 1924 | Critical | 10% | Dry Year 1 | 15,000 | Mild Single Dry Year |
| 1925 | Dry | 40% | Normal | 11,000 | |
| 1926 | Dry | 53% | Normal | 11,000 | |
| 1927 | Wet | 89% | Normal | 11,000 | |
| 1928 | Above Normal | 50% | Normal | 11,000 | |
| 1929 | Critical | 18% | Dry Year 1 | 15,000 | 6-Year Drought (1929-1934) and 4-Year Drought (1931-1934) |
| 1930 | Dry | 49% | Normal | 11,000 | |
| 1931 | Critical | 27% | Dry Year 2 | 25,000 | |
| 1932 | Dry | 32% | Dry Year 3 | 35,000 | |
| 1933 | Critical | 48% | Dry Year 4 | 35,000 | |
| 1934 | Critical | 32% | Dry Year 5 | 35,000 | |
| 1935 | Below Normal | 81% | Normal | 11,000 | |
| 1936 | Below Normal | 76% | Normal | 11,000 | |
| 1937 | Below Normal | 78% | Normal | 11,000 | |
| 1938 | Wet | 82% | Normal | 11,000 | |
| 1939 | Dry | 79% | Normal | 11,000 | |
| 1940 | Above Normal | 77% | Normal | 11,000 | |
| 1941 | Wet | 61% | Normal | 11,000 | |
| 1942 | Wet | 77% | Normal | 11,000 | |
| 1943 | Wet | 76% | Normal | 11,000 | |
| 1944 | Dry | 71% | Normal | 11,000 | |
| 1945 | Below Normal | 75% | Normal | 11,000 | |
| 1946 | Below Normal | 77% | Normal | 11,000 | |
| 1947 | Dry | 56% | Normal | 11,000 | |
| 1948 | Below Normal | 63% | Normal | 11,000 | |
| 1949 | Dry | 31% | Dry Year 1 | 15,000 | Mild Single Dry Year |
| 1950 | Below Normal | 60% | Normal | 11,000 | |
| 1951 | Above Normal | 85% | Normal | 11,000 | |
| 1952 | Wet | 63% | Normal | 11,000 | |
| 1953 | Wet | 80% | Normal | 11,000 | |
| 1954 | Above Normal | 77% | Normal | 11,000 | |
| 1955 | Dry | 28% | Dry Year 1 | 15,000 | Mild Single Dry Year |
| 1956 | Wet | 87% | Normal | 11,000 | |
| 1957 | Above Normal | 62% | Normal | 11,000 | |
| 1958 | Wet | 73% | Normal | 11,000 | |
| 1959 | Below Normal | 84% | Normal | 11,000 | |
| 1960 | Dry | 35% | Dry Year 1 | 15,000 | Mild Single Dry Year |
| 1961 | Dry | 57% | Normal | 11,000 | |
| 1962 | Below Normal | 72% | Normal | 11,000 | |
| 1963 | Wet | 82% | Normal | 11,000 | |
| 1964 | Dry | 53% | Normal | 11,000 | |
| 1965 | Wet | 69% | Normal | 11,000 | |
| 1966 | Below Normal | 79% | Normal | 11,000 | |
| 1967 | Wet | 72% | Normal | 11,000 | |
| 1968 | Below Normal | 80% | Normal | 11,000 | |
| 1969 | Wet | 64% | Normal | 11,000 | |
| 1970 | Wet | 79% | Normal | 11,000 | |
| 1971 | Wet | 80% | Normal | 11,000 | |
| 1972 | Below Normal | 41% | Normal | 11,000 | |
| 1973 | Above Normal | 75% | Normal | 11,000 | |
| 1974 | Wet | 77% | Normal | 11,000 | |
| 1975 | Wet | 78% | Normal | 11,000 | |
| 1976 | Critical | 63% | Normal | 11,000 | 2-year Drought (1976-1977); Single Critical Dry Year (1977) |
| 1977 | Critical | 6% | Dry Year 3 | 35,000 | |
| 1978 | Above Normal | 87% | Normal | 11,000 | |
| 1979 | Below Normal | 76% | Normal | 11,000 | |
| 1980 | Above Normal | 66% | Normal | 11,000 | |
| 1981 | Dry | 76% | Normal | 11,000 | |
| 1982 | Wet | 71% | Normal | 11,000 | |
| 1983 | Wet | 60% | Normal | 11,000 | |
| 1984 | Wet | 78% | Normal | 11,000 | |
| 1985 | Dry | 77% | Normal | 11,000 | |
| 1986 | Wet | 56% | Normal | 11,000 | |
| 1987 | Dry | 68% | Normal | 11,000 | 6-Year Drought (1987-1992) |
| 1988 | Critical | 12% | Dry Year 1 | 15,000 | |
| 1989 | Dry | 76% | Normal | 11,000 | |
| 1990 | Critical | 9% | Dry Year 2 | 25,000 | |
| 1991 | Critical | 18% | Dry Year 3 | 35,000 | |
| 1992 | Critical | 26% | Dry Year 4 | 35,000 | |
| 1993 | Above Normal | 90% | Normal | 11,000 | |
| 1994 | Critical | 51% | Normal | 11,000 | |
| 1995 | Wet | 72% | Normal | 11,000 | |
| 1996 | Wet | 83% | Normal | 11,000 | |
| 1997 | Wet | 75% | Normal | 11,000 | |
| 1998 | Wet | 73% | Normal | 11,000 | |
| 1999 | Wet | 83% | Normal | 11,000 | |
| 2000 | Above Normal | 84% | Normal | 11,000 | |
| 2001 | Dry | 28% | Dry Year 1 | 15,000 | Mild Single Dry Year |
| 2002 | Dry | 52% | Normal | 11,000 | |
| 2003 | Above Normal | 71% | Normal | 11,000 | |
| 2004 | Below Normal / Dry | 65% | Normal | 11,000 | |
| 2005 | Wet / Above Normal | 90% | Normal | 11,000 | |
| 2006 | Wet / Wet | 100% | Normal | 11,000 | |
| 2007 | Dry / Critical | 60% | Normal | 11,000 | |

[a]Values for 1922-2003 are from Table B.3 in DWR (2008) and are for SWP Table A Deliveries under current (2007) conditions.
Values in 2004 through 2007 are actual historical deliveries during those years. afy = acre-feet per year

TABLE 3-4
Pumping Rates Simulated for Individual Alluvial Aquifer Wells under the 2008 Groundwater Operating Plan

| Well Name | Alluvial Subarea | 2005 Operating Plan Normal | 2005 Operating Plan Dry | 2008 Operating Plan Normal | 2008 Operating Plan Dry Yr 1 | 2008 Operating Plan Dry Yr 2+ | Comments |
|---|---|---|---|---|---|---|---|
| NCWD-Castaic 1 | Castaic Valley | 385 | 345 | 350 | 300 | 250 | |
| NCWD-Castaic 2 | Castaic Valley | 166 | 125 | 100 | 100 | 100 | |
| NCWD-Castaic 4 | Castaic Valley | 100 | 45 | 100 | 0 | 0 | |
| NCWD-Castaic 7 | Castaic Valley | | | 300 | 200 | 200 | Assume similar pumping as at NCWD-Castaic3 during early 1980s |
| NCWD-Pinetree 1 | Above Mint Canyon | 164 | 0 | 150 | 0 | 0 | |
| NCWD-Pinetree 3 | Above Mint Canyon | 545 | 525 | 350 | 300 | 300 | |
| NCWD-Pinetree 4 | Above Mint Canyon | 300 | 0 | 300 | 200 | 200 | |
| NCWD-Pinetree 5 | Above Mint Canyon | | | 300 | 200 | 200 | |
| **NCWD Total** | | **1,660** | **1,040** | **1,950** | **1,300** | **1,250** | |
| NLF-161 | Below Valencia WRP | 485 | 485 | 1,000 | 1,000 | 1,000 | |
| NLF-B10 | Below Valencia WRP | 344 | 344 | 500 | 350 | 350 | |
| NLF-B11 | Below Valencia WRP | 232 | 232 | 100 | 200 | 200 | |
| NLF-B14 | Below Valencia WRP | | | 300 | 1,000 | 1,000 | |
| NLF-B20 | Below Valencia WRP | 584 | 584 | 350 | 500 | 500 | Pumping was assigned to former B7 well in 2005 analysis. |
| NLF-B5 | Below Valencia WRP | 1,582 | 1,582 | 2,400 | 1,900 | 1,900 | |
| NLF-B6 | Below Valencia WRP | 1,766 | 1,766 | 1,100 | 1,100 | 1,100 | |
| NLF-C | Below Valencia WRP | 1,373 | 1,373 | 1,100 | 1,000 | 1,000 | |
| NLF-C3 | Below Valencia WRP | 192 | 192 | 100 | 200 | 200 | |
| NLF-C4 | Below Valencia WRP | 809 | 809 | 200 | 450 | 450 | |
| NLF-C5 | Below Valencia WRP | 850 | 850 | 900 | 850 | 850 | |
| NLF-C7 | Below Valencia WRP | 1,107 | 1,107 | 350 | 300 | 300 | |
| NLF-C8 | Below Valencia WRP | 594 | 594 | 400 | 400 | 400 | |
| NLF-E5 | Below Valencia WRP | 750 | 750 | 100 | 150 | 150 | |
| NLF-E9 | Below Valencia WRP | 814 | 814 | 900 | 350 | 350 | |
| NLF-G45 | Below Valencia WRP | 390 | 390 | 350 | 400 | 400 | |
| **NLF Total** | | **11,872** | **11,872** | **10,150** | **10,150** | **10,150** | |
| SCWD-Clark | Bouquet Canyon | 782 | 700 | 700 | 700 | 700 | |
| SCWD-Guida | Bouquet Canyon | 1,320 | 1,230 | 1,300 | 1,250 | 1,200 | |
| SCWD-Honby | Above Saugus WRP | 696 | 870 | 1,000 | 850 | 700 | |
| SCWD-Lost Canyon 2 | Above Mint Canyon | 741 | 640 | 700 | 700 | 650 | |
| SCWD-Lost Canyon 2A | Above Mint Canyon | 1,034 | 590 | 700 | 650 | 600 | |
| SCWD-Mitchell #5A | Above Mint Canyon | 0 | 0 | 500 | 350 | 200 | |
| SCWD-Mitchell #5B | Above Mint Canyon | 557 | 0 | 800 | 550 | 300 | |
| SCWD-N. Oaks Central | Above Mint Canyon | 822 | 1,640 | 850 | 800 | 700 | |
| SCWD-N. Oaks East | Above Mint Canyon | 1,234 | 485 | 800 | 750 | 700 | |
| SCWD-N. Oaks West | Above Mint Canyon | 898 | 0 | 800 | 750 | 700 | |
| SCWD-Sand Canyon | Above Mint Canyon | 930 | 195 | 1,000 | 600 | 200 | |
| SCWD-Sierra | Above Mint Canyon | 846 | 0 | 1,100 | 900 | 700 | |
| SCWD-Valley Center | Above Saugus WRP | 800 | 800 | 800 | 800 | 800 | Pumping transferred from former well SCWD-Stadium |
| **SCWD Total** | | **10,660** | **7,150** | **11,050** | **9,650** | **8,150** | |
| VWC-D | Castaic Valley | 690 | 690 | 880 | 880 | 880 | |
| VWC-E15 | Below Valencia WRP | | | 800 | 800 | 800 | |
| VWC-N | Below Saugus WRP | 620 | 620 | 650 | 650 | 650 | |
| VWC-N7 | Below Saugus WRP | 1,160 | 1,160 | 1,160 | 1,160 | 1,160 | |
| VWC-N8 | Below Saugus WRP | 1,160 | 1,160 | 1,160 | 1,160 | 1,160 | |
| VWC-Q2 | Below Saugus WRP | 985 | 985 | 1,100 | 1,100 | 1,100 | |
| VWC-S6 | Below Saugus WRP | 865 | 865 | 1,000 | 1,000 | 1,000 | |
| VWC-S7 | Below Saugus WRP | 865 | 865 | 500 | 500 | 500 | |
| VWC-S8 | Below Saugus WRP | 865 | 865 | 500 | 500 | 500 | |
| VWC-T7 | Above Saugus WRP | 920 | 920 | 750 | 750 | 750 | Pumping transferred from former wells VWC-T2 and VWC-T4 |
| VWC-U4 | Above Saugus WRP | 935 | 935 | 800 | 800 | 800 | |
| VWC-U6 | Above Saugus WRP | 825 | 825 | 800 | 800 | 800 | Pumping transferred from former well VWC-U3 |
| VWC-W10 | San Francisquito Canyon | 865 | 865 | 1,000 | 1,000 | 1,000 | Pumping was assigned to former W6 well in 2005 analysis. |
| VWC-W11 | San Francisquito Canyon | 600 | 600 | 800 | 800 | 800 | |
| VWC-W9 | San Francisquito Canyon | 350 | 350 | 950 | 950 | 950 | |
| **VWC Total** | | **11,705** | **11,705** | **12,850** | **12,850** | **12,850** | |
| Robinson Ranch | Above Mint Canyon | 932 | 400 | 600 | 550 | 450 | |
| WHR | Castaic Valley | 1,600 | 1,600 | 2,000 | 2,000 | 2,000 | |
| **Purveyor Alluvial Usage** | | **24,025** | **19,895** | **25,850** | **23,800** | **22,250** | **2008 Operating Plan:** |
| **Other Alluvial Usage** | | **14,404** | **13,872** | **12,750** | **12,700** | **12,600** | **35,000 to 40,000 AF/yr in normal and wet years** |
| **Total Alluvial Pumping** | | **38,429** | **33,767** | **38,600** | **36,500** | **34,850** | **30,000 to 35,000 AF/yr in dry years** |

**Notes:**
All pumping volumes are listed in units of acre-feet per year (afy).
Wells that are not listed are assumed to not be pumping in the future.
NLF = Newhall Land & Farming Company
NCWD = Newhall County Water District
SCWD = Santa Clarita Division of Castaic Lake Water Agency
VWC = Valencia Water Company
WHR = Wayside Honor Rancho, whose wells are owned by the Los Angeles County Waterworks District No. 36
"Other Alluvial Usage" consists of pumping by NLF, WHR, and Robinson Ranch. An additional 500 afy of pumping by other private well owners is not included in this table.

TABLE 3-5

Pumping Rates Simulated for Individual Saugus Formation Wells under the 2008 Groundwater Operating Plan

| Owner | Well Name | Non-Drought Years | Drought Year 1 | Drought Year 2 | Drought Year 3 |
|---|---|---|---|---|---|
| NCWD | 12 | 1,765 | 2,494 | 2,494 | 2,494 |
| | 13 | 1,765 | 2,494 | 2,494 | 2,494 |
| **Total Pumping (NCWD Wells)** | | **3,530** | **4,988** | **4,988** | **4,988** |
| SCWD | Saugus1 | 1,772 | 1,772 | 1,772 | 1,772 |
| | Saugus2 | 1,772 | 1,772 | 1,772 | 1,772 |
| **Total Pumping (SCWD Wells)** | | **3,544** | **3,544** | **3,544** | **3,544** |
| Private | Palmer Golf Course | 500 | 500 | 500 | 500 |
| **Total Pumping (Future Golf)** | | **500** | **500** | **500** | **500** |
| VWC | 159 | 50 | 50 | 50 | 50 |
| | 160 (Municipal) | 500 | 830 | 830 | 830 |
| | 160 (Val. Ctry Club) | 500 | 500 | 500 | 500 |
| | 201 | 300 | 300 | 3,777 | 3,777 |
| | 205 | 1,211 | 2,945 | 4,038 | 4,038 |
| | 206 | 1,175 | 2,734 | 3,500 | 3,500 |
| | 207 | 1,175 | 2,734 | 3,500 | 3,500 |
| **Total Pumping (VWC Wells)** | | **4,911** | **10,093** | **16,195** | **16,195** |
| | Future #1 | 0 | 0 | 0 | 3,250 |
| | Future #2 | 0 | 0 | 0 | 3,250 |
| | Future #3 | 0 | 0 | 0 | 3,250 |
| **Total Pumping (Future Wells)** | | **0** | **0** | **0** | **9,750** |
| **Total Pumping (All Saugus Wells)** | | **12,485** | **19,125** | **25,227** | **34,977** |

**Notes:**

All pumping volumes are listed in units of acre-feet per year (afy).

Wells that are not listed are assumed to not be pumping in the future.

NLF = Newhall Land & Farming Company

SCWD = Santa Clarita Division of Castaic Lake Water Agency

NCWD = Newhall County Water District

VWC = Valencia Water Company

**TABLE 3-6**

**Allocation of Pumping by Layer for Wells Completed in the Saugus Formation**

| Well Owner - Well Name | Model Layer | Depth to Open Interval (feet) Top | Bottom | Length of Open Interval in Model Layer (feet) | Kh (ft/day) | T in Open Interval ($ft^2$/day) | Percentage of Yield from Model Layer |
|---|---|---|---|---|---|---|---|
| NCWD-12 | 2 | 485 | 1,280 | 15 | 10 | 150 | 8.8 |
| | 3 | | | 500 | 2 | 1,000 | 58.5 |
| | 4 | | | 280 | 2 | 560 | 32.7 |
| NCWD-13 | 2 | 420 | 750 | 80 | 10 | 800 | 61.5 |
| | 3 | | | 250 | 2 | 500 | 38.5 |
| SCWD-Saugus1 | 2 | 490 | 1,620 | 10 | 10 | 100 | 1.8 |
| | 3 | | | 500 | 6.5 | 3,250 | 59.9 |
| | 4 | | | 500 | 4 | 2,000 | 36.8 |
| | 5 | | | 20 | 4 | 80 | 1.5 |
| SCWD-Saugus2 | 2 | 490 | 1,591 | 10 | 10 | 100 | 1.7 |
| | 3 | | | 500 | 6.5 | 3,250 | 56.9 |
| | 4 | | | 500 | 4 | 2,000 | 35.0 |
| | 5 | | | 91 | 4 | 364 | 6.4 |
| Palmer Golf Course | 2 | | | 250 | 1 | 250 | 20.0 |
| | 3 | | | 500 | 1 | 500 | 40.0 |
| | 4 | | | 500 | 1 | 500 | 40.0 |
| VWC-159 | 3 | 662 | 1,900 | 338 | 0.025 | 8.45 | 27.3 |
| | 4 | | | 500 | 0.025 | 12.5 | 40.4 |
| | 5 | | | 400 | 0.025 | 10 | 32.3 |
| VWC-160 | 3 | 950 | 2,000 | 50 | 6.5 | 325 | 7.6 |
| | 4 | | | 500 | 4 | 2,000 | 46.2 |
| | 5 | | | 500 | 4 | 2,000 | 46.2 |
| VWC-201 | 3 | 540 | 1,670 | 460 | 6.5 | 2,990 | 52.7 |
| | 4 | | | 500 | 4 | 2,000 | 35.3 |
| | 5 | | | 170 | 4 | 680 | 12.0 |
| VWC-205 | 3 | 820 | 1,930 | 180 | 6.5 | 1,170 | 23.9 |
| | 4 | | | 500 | 4 | 2,000 | 40.9 |
| | 5 | | | 430 | 4 | 1,720 | 35.2 |
| VWC-206 | 3 | 500 | 2,000 | 500 | 6.5 | 3,250 | 44.8 |
| | 4 | | | 500 | 4 | 2,000 | 27.6 |
| | 5 | | | 500 | 4 | 2,000 | 27.6 |
| VWC-207* | 3 | 500 | 2,000 | 500 | 6.5 | 3,250 | 44.8 |
| | 4 | | | 500 | 4 | 2,000 | 27.6 |
| | 5 | | | 500 | 4 | 2,000 | 27.6 |
| Future Wells | 3 | 500 | 2,000 | 500 | 6.5 | 3,250 | 44.8 |
| Near VWC-206 | 4 | | | 500 | 4 | 2,000 | 27.6 |
| (Assumed) | 5 | | | 500 | 4 | 2,000 | 27.6 |

Notes:

* VWC-207 well construction information was not available at the time of this investigation and therefore the allocation of pumping was assumed to be similar to VWC-206.

Existing wells NCWD-7, NCWD-10, and NCWD-11 are assumed to no longer operate in the future.

Kh = horizontal hydraulic conductivity
ft/day = feet per day

T = transmissivity
$ft^2$/day = square feet per day

Table 3-7

Allocation of Pumping, by Month, for Agricultural and Urban Production Wells

| Month | Percent of Annual Water Use, Agricultural | Percent of Annual Water Use, Urban | Percent of May through October Water Use, Urban |
|---|---|---|---|
| January | 3.75 | 5.2 | |
| February | 5.1 | 3.7 | |
| March | 6.6 | 5.2 | |
| April | 9.1 | 6.6 | |
| May | 10.55 | 8.7 | 13.2 |
| June | 11.4 | 10.4 | 15.8 |
| July | 14.1 | 13 | 19.7 |
| August | 12.95 | 13.6 | 20.6 |
| September | 10.2 | 10.9 | 16.6 |
| October | 7.5 | 9.3 | 14.1 |
| November | 5 | 7.1 | |
| December | 3.75 | 6.3 | |
| **Total** | **100** | **100** | **100** |

**TABLE 3-8**

Total Groundwater and SWP Supplies for 2008 Groundwater Operating Plan (Not Including Recycled Water and Other Water Supplies, e.g. Purchased or Banked Water)

| Model Year | Based on Historical Year | SWP Hydrology [a] | SWP Allocations [b] (%) | SWP Deliveries (afy) | Simulated Pumping From Alluvial Aquifer (afy) | Simulated Pumping From Saugus Formation (afy) | Total Groundwater Pumping (afy) | SWP + Groundwater (afy) |
|---|---|---|---|---|---|---|---|---|
| 1 | 1922 | Above Normal | 89% | 82,227 | 38,600 | 12,485 | 51,085 | 133,312 |
| 2 | 1923 | Below Normal | 76% | 70,699 | 38,600 | 12,485 | 51,085 | 121,784 |
| 3 | 1924 | Critical | 10% | 8,960 | 36,500 | 19,125 | 55,625 | 64,585 |
| 4 | 1925 | Dry | 40% | 36,784 | 34,850 | 12,485 | 47,335 | 84,119 |
| 5 | 1926 | Dry | 53% | 48,929 | 34,850 | 12,485 | 47,335 | 96,264 |
| 6 | 1927 | Wet | 89% | 82,786 | 38,600 | 12,485 | 51,085 | 133,871 |
| 7 | 1928 | Above Normal | 50% | 46,079 | 38,600 | 12,485 | 51,085 | 97,164 |
| 8 | 1929 | Critical | 18% | 16,858 | 36,500 | 19,125 | 55,625 | 72,483 |
| 9 | 1930 | Dry | 49% | 45,379 | 34,850 | 12,485 | 47,335 | 92,714 |
| 10 | 1931 | Critical | 27% | 24,732 | 34,850 | 25,227 | 60,077 | 84,809 |
| 11 | 1932 | Dry | 32% | 29,204 | 38,600 | 34,977 | 73,577 | 102,781 |
| 12 | 1933 | Critical | 48% | 44,339 | 36,500 | 34,977 | 71,477 | 115,816 |
| 13 | 1934 | Critical | 32% | 29,424 | 34,850 | 34,977 | 69,827 | 99,251 |
| 14 | 1935 | Below Normal | 81% | 74,625 | 34,850 | 12,485 | 47,335 | 121,960 |
| 15 | 1936 | Below Normal | 76% | 69,911 | 34,850 | 12,485 | 47,335 | 117,246 |
| 16 | 1937 | Below Normal | 78% | 72,037 | 34,850 | 12,485 | 47,335 | 119,372 |
| 17 | 1938 | Wet | 82% | 75,970 | 34,850 | 12,485 | 47,335 | 123,305 |
| 18 | 1939 | Dry | 79% | 72,883 | 38,600 | 12,485 | 51,085 | 123,968 |
| 19 | 1940 | Above Normal | 77% | 70,837 | 36,500 | 12,485 | 48,985 | 119,822 |
| 20 | 1941 | Wet | 61% | 56,535 | 34,850 | 12,485 | 47,335 | 103,870 |
| 21 | 1942 | Wet | 77% | 70,890 | 38,600 | 12,485 | 51,085 | 121,975 |
| 22 | 1943 | Wet | 76% | 70,599 | 36,500 | 12,485 | 48,985 | 119,584 |
| 23 | 1944 | Dry | 71% | 65,569 | 38,600 | 12,485 | 51,085 | 116,654 |
| 24 | 1945 | Below Normal | 75% | 69,041 | 38,600 | 12,485 | 51,085 | 120,126 |
| 25 | 1946 | Below Normal | 77% | 71,596 | 38,600 | 12,485 | 51,085 | 122,681 |
| 26 | 1947 | Dry | 56% | 51,794 | 38,600 | 12,485 | 51,085 | 102,879 |
| 27 | 1948 | Below Normal | 63% | 58,403 | 36,500 | 12,485 | 48,985 | 107,388 |
| 28 | 1949 | Dry | 31% | 28,443 | 34,850 | 19,125 | 53,975 | 82,418 |
| 29 | 1950 | Below Normal | 60% | 55,099 | 34,850 | 12,485 | 47,335 | 102,434 |
| 30 | 1951 | Above Normal | 85% | 78,272 | 34,850 | 12,485 | 47,335 | 125,607 |
| 31 | 1952 | Wet | 63% | 57,855 | 34,850 | 12,485 | 47,335 | 105,190 |
| 32 | 1953 | Wet | 80% | 74,381 | 38,600 | 12,485 | 51,085 | 125,466 |
| 33 | 1954 | Above Normal | 77% | 71,652 | 36,500 | 12,485 | 48,985 | 120,637 |
| 34 | 1955 | Dry | 28% | 25,439 | 34,850 | 19,125 | 53,975 | 79,414 |
| 35 | 1956 | Wet | 87% | 80,155 | 34,850 | 12,485 | 47,335 | 127,490 |
| 36 | 1957 | Above Normal | 62% | 56,957 | 34,850 | 12,485 | 47,335 | 104,292 |
| 37 | 1958 | Wet | 73% | 67,806 | 34,850 | 12,485 | 47,335 | 115,141 |
| 38 | 1959 | Below Normal | 84% | 77,554 | 38,600 | 12,485 | 51,085 | 128,639 |
| 39 | 1960 | Dry | 35% | 32,679 | 36,500 | 19,125 | 55,625 | 88,304 |
| 40 | 1961 | Dry | 57% | 52,756 | 34,850 | 12,485 | 47,335 | 100,091 |
| 41 | 1962 | Below Normal | 72% | 66,287 | 34,850 | 12,485 | 47,335 | 113,622 |
| 42 | 1963 | Wet | 82% | 76,230 | 34,850 | 12,485 | 47,335 | 123,565 |
| 43 | 1964 | Dry | 53% | 49,474 | 34,850 | 12,485 | 47,335 | 96,809 |
| 44 | 1965 | Wet | 69% | 64,021 | 34,850 | 12,485 | 47,335 | 111,356 |
| 45 | 1966 | Below Normal | 79% | 73,083 | 38,600 | 12,485 | 51,085 | 124,168 |
| 46 | 1967 | Wet | 72% | 66,920 | 36,500 | 12,485 | 48,985 | 115,905 |
| 47 | 1968 | Below Normal | 80% | 73,794 | 34,850 | 12,485 | 47,335 | 121,129 |
| 48 | 1969 | Wet | 64% | 58,766 | 34,850 | 12,485 | 47,335 | 106,101 |
| 49 | 1970 | Wet | 79% | 72,904 | 38,600 | 12,485 | 51,085 | 123,989 |
| 50 | 1971 | Wet | 80% | 74,236 | 38,600 | 12,485 | 51,085 | 125,321 |
| 51 | 1972 | Below Normal | 41% | 38,213 | 36,500 | 12,485 | 48,985 | 87,198 |
| 52 | 1973 | Above Normal | 75% | 69,052 | 34,850 | 12,485 | 47,335 | 116,387 |
| 53 | 1974 | Wet | 77% | 71,257 | 34,850 | 12,485 | 47,335 | 118,592 |
| 54 | 1975 | Wet | 78% | 72,018 | 34,850 | 12,485 | 47,335 | 119,353 |
| 55 | 1976 | Critical | 63% | 58,273 | 34,850 | 12,485 | 47,335 | 105,608 |
| 56 | 1977 | Critical | 6% | 5,428 | 34,850 | 34,977 | 69,827 | 75,255 |
| 57 | 1978 | Above Normal | 87% | 80,556 | 34,850 | 12,485 | 47,335 | 127,891 |
| 58 | 1979 | Below Normal | 76% | 70,013 | 38,600 | 12,485 | 51,085 | 121,098 |
| 59 | 1980 | Above Normal | 66% | 60,652 | 38,600 | 12,485 | 51,085 | 111,737 |
| 60 | 1981 | Dry | 76% | 69,997 | 38,600 | 12,485 | 51,085 | 121,082 |
| 61 | 1982 | Wet | 71% | 65,809 | 36,500 | 12,485 | 48,985 | 114,794 |
| 62 | 1983 | Wet | 60% | 55,886 | 38,600 | 12,485 | 51,085 | 106,971 |
| 63 | 1984 | Wet | 78% | 72,233 | 38,600 | 12,485 | 51,085 | 123,318 |
| 64 | 1985 | Dry | 77% | 71,579 | 36,500 | 12,485 | 48,985 | 120,564 |
| 65 | 1986 | Wet | 56% | 51,344 | 34,850 | 12,485 | 47,335 | 98,679 |
| 66 | 1987 | Dry | 68% | 63,232 | 38,600 | 12,485 | 51,085 | 114,317 |
| 67 | 1988 | Critical | 12% | 10,665 | 36,500 | 19,125 | 55,625 | 66,290 |
| 68 | 1989 | Dry | 76% | 70,061 | 34,850 | 12,485 | 47,335 | 117,396 |
| 69 | 1990 | Critical | 9% | 8,056 | 34,850 | 25,227 | 60,077 | 68,133 |
| 70 | 1991 | Critical | 18% | 16,313 | 34,850 | 34,977 | 69,827 | 86,140 |
| 71 | 1992 | Critical | 26% | 24,330 | 34,850 | 34,977 | 69,827 | 94,157 |
| 72 | 1993 | Above Normal | 90% | 83,055 | 38,600 | 12,485 | 51,085 | 134,140 |
| 73 | 1994 | Critical | 51% | 47,101 | 38,600 | 12,485 | 51,085 | 98,186 |
| 74 | 1995 | Wet | 72% | 66,992 | 36,500 | 12,485 | 48,985 | 115,977 |
| 75 | 1996 | Wet | 83% | 76,979 | 38,600 | 12,485 | 51,085 | 128,064 |
| 76 | 1997 | Wet | 75% | 69,401 | 38,600 | 12,485 | 51,085 | 120,486 |
| 77 | 1998 | Wet | 73% | 67,316 | 38,600 | 12,485 | 51,085 | 118,401 |
| 78 | 1999 | Wet | 83% | 76,976 | 38,600 | 12,485 | 51,085 | 128,061 |
| 79 | 2000 | Above Normal | 84% | 77,238 | 38,600 | 12,485 | 51,085 | 128,323 |
| 80 | 2001 | Dry | 28% | 26,050 | 36,500 | 19,125 | 55,625 | 81,675 |
| 81 | 2002 | Dry | 52% | 48,382 | 34,850 | 12,485 | 47,335 | 95,717 |
| 82 | 2003 | Above Normal | 71% | 65,873 | 34,850 | 12,485 | 47,335 | 113,208 |
| 83 | 2004 | Below Normal / Dry | Actual was 65% | 60,125 | 34,850 | 12,485 | 47,335 | 107,460 |
| 84 | 2005 | Wet / Above Normal | Actual was 90% | 83,250 | 38,600 | 12,485 | 51,085 | 134,335 |
| 85 | 2006 | Wet / Wet | Actual was 100% | 92,500 | 38,600 | 12,485 | 51,085 | 143,585 |
| 86 | 2007 | Dry / Critical | Actual was 60% | 55,500 | 36,500 | 12,485 | 48,985 | 104,485 |

[a]Defined by water year, using DWR's Sacramento Valley Unimpaired Runoff Index: wet = wettest; critical = driest

[b]From Table B.3 in *The State Water Project Delivery Reliability Report 2007* (DWR, August 2008). This is for current (2007) conditions as defined in the DWR report. In any given year, the allocation may be made up, in part, of carryover water from the prior year.

afy = acre-feet per year SWP = State Water Project

Table 3-9

Pumping Rates Simulated for Individual Alluvial Aquifer Wells Under the Redistributed 2008 Groundwater Operating Plan (Listed By Alluvial Subarea)

| | | Original 2008 Operating Plan | | | Redistributed 2008 Operating Plan | | | |
|---|---|---|---|---|---|---|---|---|
| **Well Name** | **Alluvial Subarea** | **Normal** | **Dry Yr 1** | **Dry Yr 2+** | **Normal** | **Dry Yr 1** | **Dry Yr 2+** | **Comments** |
| NCWD-Pinetree 1 | Above Mint Canyon | 150 | 0 | 0 | 150 | 0 | 0 | |
| NCWD-Pinetree 3 | Above Mint Canyon | 350 | 300 | 300 | 350 | 300 | 300 | |
| NCWD-Pinetree 4 | Above Mint Canyon | 300 | 200 | 200 | 300 | 200 | 200 | |
| NCWD-Pinetree 5 | Above Mint Canyon | 300 | 200 | 200 | 300 | 200 | 200 | |
| Robinson Ranch | Above Mint Canyon | 600 | 550 | 450 | 600 | 550 | 450 | |
| **SCWD-Sand Canyon** | **Above Mint Canyon** | **1,000** | **600** | **200** | **200** | **150** | **0** | **Reduce these three wells by 1,600 afy in order to** |
| **SCWD-Lost Canyon 2** | **Above Mint Canyon** | **700** | **700** | **650** | **300** | **150** | **0** | **offset increased pumping at the SCWD-Santa Clara and** |
| **SCWD-Lost Canyon 2A** | **Above Mint Canyon** | **700** | **650** | **600** | **300** | **150** | **0** | **SCWD-Bouquet wells in the "Above Saugus WRP" area.** |
| SCWD-Mitchell #5A | Above Mint Canyon | 500 | 350 | 200 | 500 | 350 | 200 | |
| SCWD-Mitchell #5B | Above Mint Canyon | 800 | 550 | 300 | 800 | 550 | 300 | |
| SCWD-N. Oaks Central | Above Mint Canyon | 850 | 800 | 700 | 850 | 800 | 700 | |
| SCWD-N. Oaks East | Above Mint Canyon | 800 | 750 | 700 | 800 | 750 | 700 | |
| SCWD-N. Oaks West | Above Mint Canyon | 800 | 750 | 700 | 800 | 750 | 700 | |
| SCWD-Sierra | Above Mint Canyon | 1,100 | 900 | 700 | 1,100 | 900 | 700 | |
| **Mint Canyon Total** | | **8,950** | **7,300** | **5,900** | **7,350** | **5,800** | **4,450** | |
| SCWD-Honby | Above Saugus WRP | 1,000 | 850 | 700 | 1,000 | 850 | 700 | |
| SCWD-Santa Clara | Above Saugus WRP | 800 | 800 | 800 | 800 | 800 | 800 | |
| **SCWD-Valley Center** | **Above Saugus WRP** | **0** | **0** | **0** | **800** | **800** | **800** | **Pumps 800 afy moved from the "Above Mint Canyon" area.** |
| **SCWD-Bouquet** | **Above Saugus WRP** | **0** | **0** | **0** | **800** | **800** | **800** | **Pumps 800 afy moved from the "Above Mint Canyon" area.** |
| VWC-T7 | Above Saugus WRP | 750 | 750 | 750 | 750 | 750 | 750 | |
| VWC-U4 | Above Saugus WRP | 800 | 800 | 800 | 800 | 800 | 800 | |
| VWC-U6 | Above Saugus WRP | 800 | 800 | 800 | 800 | 800 | 800 | |
| **Above Saugus WRP Total** | | **4,150** | **4,000** | **3,850** | **5,750** | **5,600** | **5,450** | |
| VWC-N | Below Saugus WRP | 650 | 650 | 650 | 650 | 650 | 650 | |
| VWC-N7 | Below Saugus WRP | 1,160 | 1,160 | 1,160 | 1,160 | 1,160 | 1,160 | |
| VWC-N8 | Below Saugus WRP | 1,160 | 1,160 | 1,160 | 1,160 | 1,160 | 1,160 | |
| VWC-Q2 | Below Saugus WRP | 1,100 | 1,100 | 1,100 | 1,100 | 1,100 | 1,100 | |
| VWC-S6 | Below Saugus WRP | 1,000 | 1,000 | 1,000 | 1,000 | 1,000 | 1,000 | |
| VWC-S7 | Below Saugus WRP | 500 | 500 | 500 | 500 | 500 | 500 | |
| VWC-S8 | Below Saugus WRP | 500 | 500 | 500 | 500 | 500 | 500 | |
| **Below Saugus WRP Total** | | **6,070** | **6,070** | **6,070** | **6,070** | **6,070** | **6,070** | |
| NLF-161 | Below Valencia WRP | 1,000 | 1,000 | 1,000 | 1,000 | 1,000 | 1,000 | |
| NLF-B10 | Below Valencia WRP | 500 | 350 | 350 | 500 | 350 | 350 | |
| NLF-B11 | Below Valencia WRP | 100 | 200 | 200 | 100 | 200 | 200 | |
| NLF-B14 | Below Valencia WRP | 300 | 1,000 | 1,000 | 300 | 1,000 | 1,000 | |
| NLF-B20 | Below Valencia WRP | 350 | 500 | 500 | 350 | 500 | 500 | |
| NLF-B5 | Below Valencia WRP | 2,400 | 1,900 | 1,900 | 2,400 | 1,900 | 1,900 | |
| NLF-B6 | Below Valencia WRP | 1,100 | 1,100 | 1,100 | 1,100 | 1,100 | 1,100 | |
| NLF-C | Below Valencia WRP | 1,100 | 1,000 | 1,000 | 1,100 | 1,000 | 1,000 | |
| NLF-C3 | Below Valencia WRP | 100 | 200 | 200 | 100 | 200 | 200 | |
| NLF-C4 | Below Valencia WRP | 200 | 450 | 450 | 200 | 450 | 450 | |
| NLF-C5 | Below Valencia WRP | 900 | 850 | 850 | 900 | 850 | 850 | |
| NLF-C7 | Below Valencia WRP | 350 | 300 | 300 | 350 | 300 | 300 | |
| NLF-C8 | Below Valencia WRP | 400 | 400 | 400 | 400 | 400 | 400 | |
| NLF-E5 | Below Valencia WRP | 100 | 150 | 150 | 100 | 150 | 150 | |
| NLF-E9 | Below Valencia WRP | 900 | 350 | 350 | 900 | 350 | 350 | |
| NLF-G45 | Below Valencia WRP | 350 | 400 | 400 | 350 | 400 | 400 | |
| VWC-E15 | Below Valencia WRP | 800 | 800 | 800 | 800 | 800 | 800 | |
| **Below Valencia WRP Total** | | **10,950** | **10,950** | **10,950** | **10,950** | **10,950** | **10,950** | |
| SCWD-Clark | Bouquet Canyon | 700 | 700 | 700 | 700 | 700 | 700 | |
| SCWD-Guida | Bouquet Canyon | 1,300 | 1,250 | 1,200 | 1,300 | 1,250 | 1,200 | |
| **Bouquet Canyon Total** | | **2,000** | **1,950** | **1,900** | **2,000** | **1,950** | **1,900** | |
| VWC-W10 | San Francisquito Canyon | 1,000 | 1,000 | 1,000 | 1,000 | 1,000 | 1,000 | |
| VWC-W11 | San Francisquito Canyon | 800 | 800 | 800 | 800 | 800 | 800 | |
| VWC-W9 | San Francisquito Canyon | 950 | 950 | 950 | 950 | 950 | 950 | |
| **San Francisquito Canyon Total** | | **2,750** | **2,750** | **2,750** | **2,750** | **2,750** | **2,750** | |
| NCWD-Castaic 1 | Castaic Valley | 350 | 300 | 250 | 350 | 300 | 250 | |
| NCWD-Castaic 2 | Castaic Valley | 100 | 100 | 100 | 100 | 100 | 100 | |
| NCWD-Castaic 4 | Castaic Valley | 100 | 0 | 0 | 100 | 0 | 0 | |
| NCWD-Castaic 7 | Castaic Valley | 300 | 200 | 200 | 300 | 200 | 200 | |
| VWC-D | Castaic Valley | 880 | 880 | 880 | 880 | 880 | 880 | |
| WHR | Castaic Valley | 2,000 | 2,000 | 2,000 | 2,000 | 2,000 | 2,000 | |
| **Castaic Valley Total:** | | **3,730** | **3,480** | **3,430** | **3,730** | **3,480** | **3,430** | |
| **Total Alluvial Pumping** | | **38,600** | **36,500** | **34,850** | **38,600** | **36,600** | **35,000** | **Current Operating Plan:** |
| | | | | | | | | **35,000 to 40,000 AF/yr in normal and wet years** |
| | | | | | | | | **30,000 to 35,000 AF/yr in dry years** |

**Notes:**

All pumping volumes are listed in acre-feet per year (afy).

Wells that are not listed are assumed to not be pumping in the future.

NLF = Newhall Land & Farming Company

NCWD = Newhall County Water District

SCWD = Santa Clarita Division of Castaic Lake Water Agency

VWC = Valencia Water Company

WHR = Wayside Honor Rancho, whose wells are owned by the Los Angeles County Waterworks District No. 36

TABLE 3- 0

Pumping Rates Simulated for Individual Alluvial Aquifer Wells under the Potential Groundwater Operating Plan

| Well Name | Alluvial Subarea | Potential Operating Plan Normal | Dry Yr 1 | Dry Yr 2+ | Comments |
|---|---|---|---|---|---|
| NCWD-Castaic 1 | Castaic Valley | 450 | 400 | 400 | 100 to 150 afy more than 2008 operating plan. |
| NCWD-Castaic 2 | Castaic Valley | 300 | 200 | 100 | 0 to 200 afy more than 2008 operating plan. |
| NCWD-Castaic 4 | Castaic Valley | 150 | 100 | 50 | 50 to 100 afy more than 2008 operating plan. |
| NCWD-Castaic 7 | Castaic Valley | 1,800 | 1,800 | 1,800 | 1500 to 1600 afy more than 2008 operating plan. |
| NCWD-Pinetree 1 | Above Mint Canyon | 200 | 200 | 200 | 50 to 200 afy more than 2008 operating plan. |
| NCWD-Pinetree 3 | Above Mint Canyon | 450 | 450 | 450 | 100 to 150 afy more than 2008 operating plan. |
| NCWD-Pinetree 4 | Above Mint Canyon | 300 | 300 | 200 | 0 to 100 afy more than 2008 operating plan. |
| NCWD-Pinetree 5 | Above Mint Canyon | 300 | 300 | 200 | 0 to 100 afy more than 2008 operating plan. |
| **NCWD Total** | | **3,950** | **3,750** | **3,400** | **Total is 2,000 to 2,450 afy more than in the 2008 operating plan.** |
| NLF-B14 | Below Valencia WRP | 650 | 650 | 650 | Future agricultural supply for Newhall Land & Farming Co. |
| NLF-B15 | Below Valencia WRP | 650 | 650 | 650 | Future agricultural supply for Newhall Land & Farming Co. |
| NLF-B16 | Below Valencia WRP | 650 | 650 | 650 | Future agricultural supply for Newhall Land & Farming Co. |
| NLF-C10 | Below Valencia WRP | 650 | 650 | 650 | Future agricultural supply for Newhall Land & Farming Co. |
| NLF-C11 | Below Valencia WRP | 650 | 650 | 650 | Future agricultural supply for Newhall Land & Farming Co. |
| NLF-C12 | Below Valencia WRP | 650 | 650 | 650 | Future agricultural supply for Newhall Land & Farming Co. |
| NLF-E21 | Castaic Valley | 650 | 650 | 650 | Future agricultural supply for Newhall Land & Farming Co. |
| **NLF Total** | | **4,550** | **4,550** | **4,550** | **Total is 5,600 afy less than in the 2008 operating plan.** |
| SCWD-Clark | Bouquet Canyon | 800 | 750 | 700 | 0 to 100 afy more than 2008 operating plan. |
| SCWD-Guida | Bouquet Canyon | 1,500 | 1,400 | 1,300 | 100 to 200 afy more than 2008 operating plan. |
| SCWD-Honby | Above Saugus WRP | 1,200 | 1,000 | 700 | 0 to 200 afy more than 2008 operating plan. |
| SCWD-Lost Canyon 2 | Above Mint Canyon | 850 | 800 | 700 | 50 to 150 afy more than 2008 operating plan. |
| SCWD-Lost Canyon 2A | Above Mint Canyon | 800 | 700 | 600 | 0 to 100 afy more than 2008 operating plan. |
| SCWD-Mitchell #5A | Above Mint Canyon | 900 | 550 | 200 | 0 to 400 afy more than 2008 operating plan. |
| SCWD-Mitchell #5B | Above Mint Canyon | 1,000 | 900 | 800 | 200 to 500 afy more than 2008 operating plan. |
| SCWD-N. Oaks Central | Above Mint Canyon | 1,400 | 800 | 800 | 0 to 550 afy more than 2008 operating plan. |
| SCWD-N. Oaks East | Above Mint Canyon | 1,000 | 800 | 600 | 50 to 200 afy more than 2008 operating plan. |
| SCWD-N. Oaks West | Above Mint Canyon | 1,000 | 800 | 600 | 50 to 200 afy more than 2008 operating plan. |
| SCWD-Sand Canyon | Above Mint Canyon | 1,300 | 1,000 | 600 | 300 to 400 afy more than 2008 operating plan. |
| SCWD-Sierra | Above Mint Canyon | 1,400 | 1,100 | 800 | 100 to 300 afy more than 2008 operating plan. |
| SCWD-Santa Clara | Above Saugus WRP | 950 | 950 | 950 | Future well. |
| SCWD-Valley Center | Above Saugus WRP | 1,200 | 1,000 | 800 | 800 gpm (2008 plan) + 0 to 400 afy additional pumping. |
| SCWD-Bouquet | Above Saugus WRP | 1,200 | 1,100 | 1,100 | Future well. |
| **SCWD Total** | | **16,500** | **13,650** | **11,250** | **Total is 3,100 to 5,450 afy more than in the 2008 operating plan.** |
| VWC-D | Castaic Valley | 880 | 880 | 880 | Same as 2008 operating plan. |
| VWC-E14 | Castaic Valley | 1,175 | 1,175 | 1,175 | Future operations for Newhall Ranch. |
| VWC-E15 | Castaic Valley | 800 | 800 | 800 | Same as 2008 operating plan. |
| VWC-E16 | Castaic Valley | 1,175 | 1,175 | 1,175 | Future operations for Newhall Ranch. |
| VWC-E17 | Castaic Valley | 1,175 | 1,175 | 1,175 | Future operations for Newhall Ranch. |
| VWC-G1 | Below Valencia WRP | 1,175 | 1,175 | 1,175 | Future operations for Newhall Ranch. |
| VWC-G3 | Below Valencia WRP | 1,175 | 1,175 | 1,175 | Future operations for Newhall Ranch. |
| VWC-G4 | Below Valencia WRP | 1,175 | 1,175 | 1,175 | Future operations for Newhall Ranch. |
| VWC-N | Below Saugus WRP | 650 | 650 | 650 | Same as 2008 operating plan. |
| VWC-N7 | Below Saugus WRP | 1,160 | 1,160 | 1,160 | Same as 2008 operating plan. |
| VWC-N8 | Below Saugus WRP | 1,160 | 1,160 | 1,160 | Same as 2008 operating plan. |
| VWC-Q2 | Below Saugus WRP | 1,100 | 1,100 | 1,100 | Same as 2008 operating plan. |
| VWC-S6 | Below Saugus WRP | 1,000 | 1,000 | 1,000 | Same as 2008 operating plan. |
| VWC-S7 | Below Saugus WRP | 500 | 500 | 500 | Same as 2008 operating plan. |
| VWC-S8 | Below Saugus WRP | 500 | 500 | 500 | Same as 2008 operating plan. |
| VWC-T7 | Above Saugus WRP | 750 | 750 | 750 | Same as 2008 operating plan. |
| VWC-U4 | Above Saugus WRP | 800 | 800 | 800 | Same as 2008 operating plan. |
| VWC-U6 | Above Saugus WRP | 800 | 800 | 800 | Same as 2008 operating plan. |
| VWC-W10 | San Francisquito Canyon | 1,000 | 1,000 | 1,000 | Same as 2008 operating plan. |
| VWC-W11 | San Francisquito Canyon | 800 | 800 | 800 | Same as 2008 operating plan. |
| VWC-W9 | San Francisquito Canyon | 950 | 950 | 950 | Same as 2008 operating plan. |
| **VWC Total** | | **19,900** | **19,900** | **19,900** | **VWC and NLF total is 1,450 afy more than in the 2008 operating plan.** |
| Robinson Ranch | Above Mint Canyon | 600 | 550 | 450 | Same as 2008 operating plan. |
| WHR | Castaic Valley | 2,000 | 2,000 | 2,000 | Same as 2008 operating plan. |
| **Purveyor Alluvial Usage** | | **40,350** | **37,300** | **34,550** | **2008 Operating Plan:** |
| **Other Alluvial Usage** | | **7,150** | **7,100** | **7,000** | **35,000 to 40,000 afy in normal and wet years** |
| **Total Alluvial Pumping** | | **47,500** | **44,400** | **41,550** | **30,000 to 35,000 afy in dry years** |

**Notes:**

All pumping volumes are listed in units of acre-feet per year (afy).

Wells that are not listed are assumed to not be pumping in the future.

NLF = Newhall Land & Farming Company

NCWD = Newhall County Water District

SCWD = Santa Clarita Division of Castaic Lake Water Agency

VWC = Valencia Water Company

WHR = Wayside Honor Rancho, whose wells are owned by the Los Angeles County Waterworks District No. 36

"Other Alluvial Usage" consists of pumping by NLF, WHR, and Robinson Ranch. An additional 500 afy of pumping by other private well owners is not included in this table.

TABLE 3-11

Pumping Rates Simulated for Individual Saugus Formation Wells under the Potential Groundwater Operating Plan

| Owner | Well Name | Non-Drought Years | Drought Year 1 | Drought Year 2 | Drought Year 3 |
|---|---|---|---|---|---|
| NCWD | 12 | 1,765 | 2,494 | 2,494 | 2,494 |
| | 13 | 1,765 | 2,494 | 2,494 | 2,494 |
| | Future well | 1,765 | 2,494 | 2,494 | 2,494 |
| **Total Pumping (NCWD Wells)** | | **5,295** | **7,482** | **7,482** | **7,482** |
| SCWD | Saugus1 | 1,772 | 1,772 | 1,772 | 1,772 |
| | Saugus2 | 1,772 | 1,772 | 1,772 | 1,772 |
| | Future well | 1,800 | 1,800 | 1,800 | 1,800 |
| **Total Pumping (SCWD Wells)** | | **5,344** | **5,344** | **5,344** | **5,344** |
| LA County Water District #36 | Future well | 300 | 300 | 300 | 300 |
| **Total Pumping (LACWD #36)** | | **300** | **300** | **300** | **300** |
| Private (Palmer) | Future Golf Course | 500 | 500 | 500 | 500 |
| **Total Pumping (Future Golf)** | | **500** | **500** | **500** | **500** |
| VWC | 159 | 50 | 50 | 50 | 50 |
| | 160 (Municipal) | 500 | 830 | 830 | 830 |
| | 160 (Val. Ctry Club) | 500 | 500 | 500 | 500 |
| | 201 | 300 | 300 | 3,777 | 3,777 |
| | 205 | 1,211 | 2,945 | 4,038 | 4,038 |
| | 206 | 1,175 | 2,734 | 3,500 | 3,500 |
| | 207 | 1,175 | 2,734 | 3,500 | 3,500 |
| **Total Pumping (VWC Wells)** | | **4,911** | **10,093** | **16,195** | **16,195** |
| | Future #1 | 0 | 0 | 0 | 3,250 |
| | Future #2 | 0 | 0 | 0 | 3,250 |
| | Future #3 | 0 | 0 | 0 | 3,250 |
| **Total Pumping (Future Wells)** | | **0** | **0** | **0** | **9,750** |
| **Total Pumping (All Saugus Wells)** | | **16,350** | **23,719** | **29,821** | **39,571** |

**Notes:**

All pumping volumes are listed in units of acre-feet per year (afy).

Wells that are not listed are assumed to not be pumping in the future.

NLF = Newhall Land & Farming Company

SCWD = Santa Clarita Division of Castaic Lake Water Agency

NCWD = Newhall County Water District

VWC = Valencia Water Company

**TABLE 3-12**

Total Groundwater and SWP Supplies for Potential Groundwater Operating Plan (Not Including Recycled Water and Other Water Supplies, e.g. Purchased or Banked Water)

| Model Year | Based on Historical Year | SWP Hydrology [a] | SWP Allocations [b] (%) | SWP Deliveries (afy) | Simulated Pumping From Alluvial Aquifer (afy) | Simulated Pumping From Saugus Formation (afy) | Total Groundwater Pumping (afy) | SWP + Groundwater (afy) |
|---|---|---|---|---|---|---|---|---|
| 1 | 1922 | Above Normal | 89% | 82,227 | 47,500 | 16,350 | 63,850 | 146,077 |
| 2 | 1923 | Below Normal | 76% | 70,699 | 47,500 | 16,350 | 63,850 | 134,549 |
| 3 | 1924 | Critical | 10% | 8,960 | 44,400 | 23,719 | 68,119 | 77,079 |
| 4 | 1925 | Dry | 40% | 36,784 | 41,550 | 16,350 | 57,900 | 94,684 |
| 5 | 1926 | Dry | 53% | 48,929 | 41,550 | 16,350 | 57,900 | 106,829 |
| 6 | 1927 | Wet | 89% | 82,786 | 47,500 | 16,350 | 63,850 | 146,636 |
| 7 | 1928 | Above Normal | 50% | 46,079 | 47,500 | 16,350 | 63,850 | 109,929 |
| 8 | 1929 | Critical | 18% | 16,858 | 44,400 | 23,719 | 68,119 | 84,977 |
| 9 | 1930 | Dry | 49% | 45,379 | 41,550 | 16,350 | 57,900 | 103,279 |
| 10 | 1931 | Critical | 27% | 24,732 | 41,550 | 29,821 | 71,371 | 96,103 |
| 11 | 1932 | Dry | 32% | 29,204 | 47,500 | 39,571 | 87,071 | 116,275 |
| 12 | 1933 | Critical | 48% | 44,339 | 44,400 | 39,571 | 83,971 | 128,310 |
| 13 | 1934 | Critical | 32% | 29,424 | 41,550 | 39,571 | 81,121 | 110,545 |
| 14 | 1935 | Below Normal | 81% | 74,625 | 41,550 | 16,350 | 57,900 | 132,525 |
| 15 | 1936 | Below Normal | 76% | 69,911 | 41,550 | 16,350 | 57,900 | 127,811 |
| 16 | 1937 | Below Normal | 78% | 72,037 | 41,550 | 16,350 | 57,900 | 129,937 |
| 17 | 1938 | Wet | 82% | 75,970 | 41,550 | 16,350 | 57,900 | 133,870 |
| 18 | 1939 | Dry | 79% | 72,883 | 47,500 | 16,350 | 63,850 | 136,733 |
| 19 | 1940 | Above Normal | 77% | 70,837 | 44,400 | 16,350 | 60,750 | 131,587 |
| 20 | 1941 | Wet | 61% | 56,535 | 41,550 | 16,350 | 57,900 | 114,435 |
| 21 | 1942 | Wet | 77% | 70,890 | 47,500 | 16,350 | 63,850 | 134,740 |
| 22 | 1943 | Wet | 76% | 70,599 | 44,400 | 16,350 | 60,750 | 131,349 |
| 23 | 1944 | Dry | 71% | 65,569 | 47,500 | 16,350 | 63,850 | 129,419 |
| 24 | 1945 | Below Normal | 75% | 69,041 | 47,500 | 16,350 | 63,850 | 132,891 |
| 25 | 1946 | Below Normal | 77% | 71,596 | 47,500 | 16,350 | 63,850 | 135,446 |
| 26 | 1947 | Dry | 56% | 51,794 | 47,500 | 16,350 | 63,850 | 115,644 |
| 27 | 1948 | Below Normal | 63% | 58,403 | 44,400 | 16,350 | 60,750 | 119,153 |
| 28 | 1949 | Dry | 31% | 28,443 | 41,550 | 23,719 | 65,269 | 93,712 |
| 29 | 1950 | Below Normal | 60% | 55,099 | 41,550 | 16,350 | 57,900 | 112,999 |
| 30 | 1951 | Above Normal | 85% | 78,272 | 41,550 | 16,350 | 57,900 | 136,172 |
| 31 | 1952 | Wet | 63% | 57,855 | 41,550 | 16,350 | 57,900 | 115,755 |
| 32 | 1953 | Wet | 80% | 74,381 | 47,500 | 16,350 | 63,850 | 138,231 |
| 33 | 1954 | Above Normal | 77% | 71,652 | 44,400 | 16,350 | 60,750 | 132,402 |
| 34 | 1955 | Dry | 28% | 25,439 | 41,550 | 23,719 | 65,269 | 90,708 |
| 35 | 1956 | Wet | 87% | 80,155 | 41,550 | 16,350 | 57,900 | 138,055 |
| 36 | 1957 | Above Normal | 62% | 56,957 | 41,550 | 16,350 | 57,900 | 114,857 |
| 37 | 1958 | Wet | 73% | 67,806 | 41,550 | 16,350 | 57,900 | 125,706 |
| 38 | 1959 | Below Normal | 84% | 77,554 | 47,500 | 16,350 | 63,850 | 141,404 |
| 39 | 1960 | Dry | 35% | 32,679 | 44,400 | 23,719 | 68,119 | 100,798 |
| 40 | 1961 | Dry | 57% | 52,756 | 41,550 | 16,350 | 57,900 | 110,656 |
| 41 | 1962 | Below Normal | 72% | 66,287 | 41,550 | 16,350 | 57,900 | 124,187 |
| 42 | 1963 | Wet | 82% | 76,230 | 41,550 | 16,350 | 57,900 | 134,130 |
| 43 | 1964 | Dry | 53% | 49,474 | 41,550 | 16,350 | 57,900 | 107,374 |
| 44 | 1965 | Wet | 69% | 64,021 | 41,550 | 16,350 | 57,900 | 121,921 |
| 45 | 1966 | Below Normal | 79% | 73,083 | 47,500 | 16,350 | 63,850 | 136,933 |
| 46 | 1967 | Wet | 72% | 66,920 | 44,400 | 16,350 | 60,750 | 127,670 |
| 47 | 1968 | Below Normal | 80% | 73,794 | 41,550 | 16,350 | 57,900 | 131,694 |
| 48 | 1969 | Wet | 64% | 58,766 | 41,550 | 16,350 | 57,900 | 116,666 |
| 49 | 1970 | Wet | 79% | 72,904 | 47,500 | 16,350 | 63,850 | 136,754 |
| 50 | 1971 | Wet | 80% | 74,236 | 47,500 | 16,350 | 63,850 | 138,086 |
| 51 | 1972 | Below Normal | 41% | 38,213 | 44,400 | 16,350 | 60,750 | 98,963 |
| 52 | 1973 | Above Normal | 75% | 69,052 | 41,550 | 16,350 | 57,900 | 126,952 |
| 53 | 1974 | Wet | 77% | 71,257 | 41,550 | 16,350 | 57,900 | 129,157 |
| 54 | 1975 | Wet | 78% | 72,018 | 41,550 | 16,350 | 57,900 | 129,918 |
| 55 | 1976 | Critical | 63% | 58,273 | 41,550 | 16,350 | 57,900 | 116,173 |
| 56 | 1977 | Critical | 6% | 5,428 | 41,550 | 39,571 | 81,121 | 86,549 |
| 57 | 1978 | Above Normal | 87% | 80,556 | 41,550 | 16,350 | 57,900 | 138,456 |
| 58 | 1979 | Below Normal | 76% | 70,013 | 47,500 | 16,350 | 63,850 | 133,863 |
| 59 | 1980 | Above Normal | 66% | 60,652 | 47,500 | 16,350 | 63,850 | 124,502 |
| 60 | 1981 | Dry | 76% | 69,997 | 47,500 | 16,350 | 63,850 | 133,847 |
| 61 | 1982 | Wet | 71% | 65,809 | 44,400 | 16,350 | 60,750 | 126,559 |
| 62 | 1983 | Wet | 60% | 55,886 | 47,500 | 16,350 | 63,850 | 119,736 |
| 63 | 1984 | Wet | 78% | 72,233 | 47,500 | 16,350 | 63,850 | 136,083 |
| 64 | 1985 | Dry | 77% | 71,579 | 44,400 | 16,350 | 60,750 | 132,329 |
| 65 | 1986 | Wet | 56% | 51,344 | 41,550 | 16,350 | 57,900 | 109,244 |
| 66 | 1987 | Dry | 68% | 63,232 | 47,500 | 16,350 | 63,850 | 127,082 |
| 67 | 1988 | Critical | 12% | 10,665 | 44,400 | 23,719 | 68,119 | 78,784 |
| 68 | 1989 | Dry | 76% | 70,061 | 41,550 | 16,350 | 57,900 | 127,961 |
| 69 | 1990 | Critical | 9% | 8,056 | 41,550 | 29,821 | 71,371 | 79,427 |
| 70 | 1991 | Critical | 18% | 16,313 | 41,550 | 39,571 | 81,121 | 97,434 |
| 71 | 1992 | Critical | 26% | 24,330 | 41,550 | 39,571 | 81,121 | 105,451 |
| 72 | 1993 | Above Normal | 90% | 83,055 | 47,500 | 16,350 | 63,850 | 146,905 |
| 73 | 1994 | Critical | 51% | 47,101 | 47,500 | 16,350 | 63,850 | 110,951 |
| 74 | 1995 | Wet | 72% | 66,992 | 44,400 | 16,350 | 60,750 | 127,742 |
| 75 | 1996 | Wet | 83% | 76,979 | 47,500 | 16,350 | 63,850 | 140,829 |
| 76 | 1997 | Wet | 75% | 69,401 | 47,500 | 16,350 | 63,850 | 133,251 |
| 77 | 1998 | Wet | 73% | 67,316 | 47,500 | 16,350 | 63,850 | 131,166 |
| 78 | 1999 | Wet | 83% | 76,976 | 47,500 | 16,350 | 63,850 | 140,826 |
| 79 | 2000 | Above Normal | 84% | 77,238 | 47,500 | 16,350 | 63,850 | 141,088 |
| 80 | 2001 | Dry | 28% | 26,050 | 44,400 | 23,719 | 68,119 | 94,169 |
| 81 | 2002 | Dry | 52% | 48,382 | 41,550 | 16,350 | 57,900 | 106,282 |
| 82 | 2003 | Above Normal | 71% | 65,873 | 41,550 | 16,350 | 57,900 | 123,773 |
| 83 | 2004 | Below Normal / Dry | Actual was 65% | 60,125 | 41,550 | 16,350 | 57,900 | 118,025 |
| 84 | 2005 | Wet / Above Normal | Actual was 90% | 83,250 | 47,500 | 16,350 | 63,850 | 147,100 |
| 85 | 2006 | Wet / Wet | Actual was 100% | 92,500 | 47,500 | 16,350 | 63,850 | 156,350 |
| 86 | 2007 | Dry / Critical | Actual was 60% | 55,500 | 44,400 | 16,350 | 60,750 | 116,250 |

[a]Defined by water year, using DWR's Sacramento Valley Unimpaired Runoff Index: wet = wettest; critical = driest

[b]From Table B.3 in *The State Water Project Delivery Reliability Report 2007* (DWR, August 2008). This is for current (2007) conditions as defined in the DWR report. In any given year, the allocation may be made up, in part, of carryover water from the prior year.

afy = acre-feet per year SWP = State Water Project

**TABLE 3-13**

Simulated Monthly Precipitation at the Newhall County Water District Rain Gage for the 86-year Simulation

| Model Year | Historical Year | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Annual |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1922 | 3.28 | 16.64 | 9.73 | 0.15 | 0.34 | 0.00 | 0.30 | 0.00 | 0.00 | 1.55 | 0.00 | 7.25 | 39.24 |
| 2 | 1923 | 1.21 | 9.43 | 3.15 | 2.10 | 0.00 | 0.00 | 0.00 | 0.31 | 0.00 | 1.13 | 0.00 | 0.00 | 17.33 |
| 3 | 1924 | 2.89 | 4.23 | 0.22 | 0.48 | 0.88 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.63 | 0.01 | 9.34 |
| 4 | 1925 | 0.89 | 4.13 | 1.30 | 0.30 | 0.00 | 0.00 | 0.00 | 0.00 | 0.62 | 0.86 | 0.37 | 0.00 | 8.47 |
| 5 | 1926 | 10.36 | 14.63 | 4.84 | 0.36 | 0.40 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.36 | 31.95 |
| 6 | 1927 | 5.84 | 10.76 | 3.38 | 2.56 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.22 | 3.18 | 1.30 | 27.24 |
| 7 | 1928 | 1.55 | 0.51 | 0.38 | 0.05 | 0.12 | 0.01 | 0.00 | 0.00 | 0.02 | 0.00 | 3.01 | 5.85 | 11.50 |
| 8 | 1929 | 4.17 | 2.21 | 0.20 | 2.05 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 4.96 | 0.07 | 13.66 |
| 9 | 1930 | 4.17 | 2.21 | 0.20 | 2.05 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 4.96 | 0.07 | 13.66 |
| 10 | 1931 | 4.10 | 6.45 | 0.00 | 2.29 | 0.97 | 0.02 | 0.00 | 3.78 | 0.06 | 0.14 | 3.30 | 7.53 | 28.65 |
| 11 | 1932 | 4.81 | 9.42 | 0.18 | 0.46 | 0.21 | 0.00 | 0.00 | 0.00 | 0.08 | 0.06 | 0.00 | 0.89 | 16.11 |
| 12 | 1933 | 16.04 | 0.00 | 0.05 | 0.34 | 1.04 | 0.31 | 0.00 | 0.08 | 0.00 | 0.22 | 0.05 | 5.95 | 24.08 |
| 13 | 1934 | 6.54 | 2.93 | 0.11 | 0.00 | 0.02 | 0.59 | 0.00 | 0.00 | 0.01 | 2.17 | 2.25 | 6.56 | 21.18 |
| 14 | 1935 | 4.45 | 2.50 | 3.41 | 1.95 | 0.00 | 0.00 | 0.00 | 0.06 | 0.08 | 0.12 | 0.95 | 0.81 | 14.33 |
| 15 | 1936 | 0.06 | 8.40 | 1.84 | 0.36 | 0.00 | 0.00 | 0.06 | 0.00 | 0.01 | 2.45 | 0.01 | 10.82 | 24.02 |
| 16 | 1937 | 3.34 | 6.79 | 6.16 | 0.21 | 0.33 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 4.19 | 21.03 |
| 17 | 1938 | 0.62 | 12.79 | 11.37 | 0.84 | 0.05 | 0.12 | 0.00 | 0.00 | 0.15 | 0.07 | 0.01 | 12.40 | 38.43 |
| 18 | 1939 | 3.80 | 1.91 | 2.05 | 0.27 | 0.12 | 0.00 | 0.00 | 0.00 | 3.60 | 0.22 | 0.34 | 0.90 | 13.23 |
| 19 | 1940 | 3.29 | 6.25 | 1.43 | 2.12 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.29 | 0.07 | 10.62 | 25.08 |
| 20 | 1941 | 3.92 | 19.84 | 10.82 | 5.82 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 | 2.45 | 0.35 | 6.23 | 49.45 |
| 21 | 1942 | 0.14 | 0.88 | 1.64 | 2.73 | 0.00 | 0.00 | 0.00 | 0.68 | 0.00 | 0.93 | 0.23 | 1.09 | 8.33 |
| 22 | 1943 | 19.90 | 4.59 | 7.80 | 1.04 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.15 | 0.33 | 9.63 | 43.45 |
| 23 | 1944 | 1.20 | 16.38 | 3.76 | 0.54 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 5.82 | 1.20 | 28.90 |
| 24 | 1945 | 0.14 | 4.11 | 3.13 | 0.19 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.33 | 0.45 | 7.75 | 17.09 |
| 25 | 1946 | 0.19 | 2.42 | 5.95 | 0.61 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.75 | 10.87 | 4.69 | 25.48 |
| 26 | 1947 | 0.47 | 0.42 | 1.28 | 0.56 | 0.14 | 0.00 | 0.00 | 0.08 | 0.05 | 0.04 | 0.00 | 1.84 | 4.88 |
| 27 | 1948 | 0.00 | 1.87 | 3.49 | 1.56 | 0.00 | 0.09 | 0.00 | 0.00 | 0.00 | 0.14 | 0.00 | 3.57 | 10.71 |
| 28 | 1949 | 2.83 | 1.06 | 2.18 | 0.02 | 1.35 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.36 | 2.85 | 11.65 |
| 29 | 1950 | 2.58 | 1.69 | 1.27 | 0.86 | 0.01 | 0.00 | 0.00 | 0.00 | 0.32 | 0.36 | 0.73 | 0.21 | 8.03 |
| 30 | 1951 | 2.96 | 0.93 | 1.16 | 1.69 | 0.09 | 0.00 | 0.00 | 0.05 | 0.00 | 0.49 | 1.33 | 5.88 | 14.57 |
| 31 | 1952 | 17.68 | 0.61 | 10.30 | 1.80 | 0.00 | 0.00 | 0.00 | 0.00 | 0.12 | 0.00 | 4.52 | 5.09 | 40.12 |
| 32 | 1953 | 0.80 | 0.02 | 0.21 | 1.64 | 0.69 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 2.32 | 0.04 | 5.73 |
| 33 | 1954 | 6.38 | 3.36 | 4.86 | 0.12 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 2.38 | 1.47 | 18.56 |
| 34 | 1955 | 5.69 | 1.69 | 0.21 | 3.38 | 1.91 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.43 | 2.01 | 16.32 |
| 35 | 1956 | 7.55 | 1.00 | 0.00 | 5.90 | 1.82 | 0.00 | 0.11 | 0.00 | 0.00 | 0.15 | 0.00 | 0.15 | 16.68 |
| 36 | 1957 | 7.22 | 2.71 | 3.05 | 1.16 | 1.06 | 0.25 | 0.00 | 0.00 | 0.00 | 2.68 | 0.40 | 8.30 | 26.81 |
| 37 | 1958 | 2.11 | 10.42 | 5.82 | 7.18 | 0.00 | 0.00 | 0.00 | 0.00 | 0.04 | 1.35 | 0.23 | 0.00 | 27.15 |
| 38 | 1959 | 3.70 | 5.47 | 0.00 | 0.59 | 0.00 | 0.00 | 0.00 | 0.00 | 0.08 | 0.00 | 0.00 | 1.68 | 11.51 |
| 39 | 1960 | 4.17 | 2.21 | 0.20 | 2.05 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 4.96 | 0.07 | 13.66 |
| 40 | 1961 | 1.88 | 0.00 | 0.76 | 0.33 | 0.09 | 0.00 | 0.07 | 0.00 | 0.11 | 0.00 | 4.12 | 2.99 | 10.35 |
| 41 | 1962 | 3.86 | 19.44 | 1.53 | 0.00 | 0.02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.05 | 0.00 | 0.00 | 24.90 |
| 42 | 1963 | 0.99 | 3.63 | 4.10 | 2.23 | 0.06 | 0.43 | 0.00 | 0.00 | 0.77 | 0.50 | 2.29 | 0.01 | 15.01 |
| 43 | 1964 | 2.95 | 0.00 | 1.88 | 2.41 | 0.04 | 0.12 | 0.00 | 0.00 | 0.00 | 0.52 | 1.47 | 2.48 | 11.84 |
| 44 | 1965 | 0.25 | 0.07 | 1.65 | 9.14 | 0.00 | 0.02 | 0.26 | 0.16 | 0.95 | 0.00 | 17.49 | 7.89 | 37.88 |
| 45 | 1966 | 1.42 | 1.55 | 0.33 | 0.00 | 0.09 | 0.00 | 0.00 | 0.00 | 0.09 | 0.11 | 7.56 | 5.95 | 17.10 |

**TABLE 3-13**

Simulated Monthly Precipitation at the Newhall County Water District Rain Gage for the 86-year Simulation

| Model Year | Historical Year | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Annual |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 46 | 1967 | 6.76 | 0.22 | 3.23 | 5.41 | 0.19 | 0.00 | 0.00 | 0.00 | 0.50 | 0.00 | 9.36 | 1.58 | 27.26 |
| 47 | 1968 | 0.86 | 0.93 | 2.91 | 0.97 | 0.07 | 0.00 | 0.00 | 0.38 | 0.00 | 0.39 | 0.35 | 1.24 | 8.10 |
| 48 | 1969 | 19.53 | 13.89 | 0.82 | 1.16 | 0.05 | 0.05 | 0.18 | 0.00 | 0.00 | 0.00 | 2.32 | 0.05 | 38.04 |
| 49 | 1970 | 0.94 | 6.63 | 4.33 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.13 | 8.86 | 6.33 | 27.21 |
| 50 | 1971 | 1.23 | 1.41 | 0.48 | 0.94 | 0.15 | 0.00 | 0.00 | 0.00 | 0.47 | 0.50 | 0.38 | 10.57 | 16.14 |
| 51 | 1972 | 0.00 | 0.12 | 0.00 | 0.02 | 0.05 | 0.05 | 0.00 | 0.06 | 0.00 | 0.05 | 3.45 | 1.08 | 4.87 |
| 52 | 1973 | 5.19 | 11.74 | 3.29 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.15 | 1.83 | 1.03 | 23.22 |
| 53 | 1974 | 10.58 | 0.02 | 4.30 | 0.06 | 0.00 | 0.00 | 0.02 | 0.00 | 0.00 | 1.17 | 0.12 | 4.89 | 21.17 |
| 54 | 1975 | 0.28 | 3.02 | 6.04 | 2.96 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.39 | 0.04 | 0.09 | 12.81 |
| 55 | 1976 | 0.00 | 7.39 | 1.47 | 0.46 | 0.15 | 0.35 | 0.01 | 0.00 | 3.40 | 0.22 | 2.09 | 0.90 | 16.45 |
| 56 | 1977 | 5.75 | 0.12 | 2.15 | 0.00 | 5.27 | 0.00 | 0.00 | 2.68 | 0.02 | 0.05 | 0.06 | 8.40 | 24.49 |
| 57 | 1978 | 10.74 | 13.23 | 17.10 | 2.72 | 0.00 | 0.00 | 0.00 | 0.00 | 1.23 | 0.01 | 2.70 | 1.76 | 49.49 |
| 58 | 1979 | 12.44 | 3.20 | 6.01 | 0.00 | 0.02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.89 | 1.19 | 23.75 |
| 59 | 1980 | 10.36 | 14.63 | 4.84 | 0.36 | 0.40 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.36 | 31.95 |
| 60 | 1981 | 4.76 | 1.66 | 5.50 | 0.46 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.58 | 3.62 | 0.22 | 16.80 |
| 61 | 1982 | 3.33 | 1.21 | 9.50 | 1.09 | 0.13 | 0.00 | 0.00 | 0.00 | 1.02 | 0.25 | 5.34 | 2.95 | 24.82 |
| 62 | 1983 | 8.67 | 6.85 | 13.07 | 4.61 | 0.20 | 0.00 | 0.00 | 1.17 | 1.85 | 1.74 | 5.04 | 5.13 | 48.33 |
| 63 | 1984 | 0.00 | 0.00 | 0.27 | 0.07 | 0.00 | 0.00 | 0.00 | 0.00 | 0.05 | 0.16 | 3.87 | 8.13 | 12.55 |
| 64 | 1985 | 0.78 | 1.20 | 1.04 | 0.14 | 0.07 | 0.00 | 0.06 | 0.00 | 0.12 | 0.54 | 5.11 | 0.70 | 9.76 |
| 65 | 1986 | 5.84 | 6.65 | 5.39 | 0.88 | 0.00 | 0.00 | 0.05 | 0.00 | 1.78 | 0.68 | 1.55 | 0.24 | 23.06 |
| 66 | 1987 | 2.10 | 0.61 | 1.69 | 0.14 | 0.00 | 0.00 | 0.09 | 0.02 | 0.00 | 3.47 | 3.84 | 4.80 | 16.76 |
| 67 | 1988 | 3.27 | 3.39 | 1.16 | 3.98 | 0.09 | 0.00 | 0.00 | 0.00 | 0.10 | 0.00 | 0.92 | 7.14 | 20.05 |
| 68 | 1989 | 0.89 | 4.13 | 1.30 | 0.30 | 0.00 | 0.00 | 0.00 | 0.00 | 0.62 | 0.86 | 0.37 | 0.00 | 8.47 |
| 69 | 1990 | 2.89 | 4.23 | 0.22 | 0.48 | 0.88 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.63 | 0.01 | 9.34 |
| 70 | 1991 | 1.11 | 5.72 | 11.33 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.50 | 0.00 | 5.95 | 24.61 |
| 71 | 1992 | 3.28 | 16.64 | 9.73 | 0.15 | 0.34 | 0.00 | 0.30 | 0.00 | 0.00 | 1.55 | 0.00 | 7.25 | 39.24 |
| 72 | 1993 | 17.11 | 11.73 | 4.27 | 0.00 | 0.00 | 0.65 | 0.00 | 0.00 | 0.00 | 0.57 | 0.75 | 1.00 | 36.08 |
| 73 | 1994 | 0.48 | 5.31 | 2.33 | 0.42 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.78 | 0.71 | 1.94 | 11.97 |
| 74 | 1995 | 21.98 | 1.93 | 8.30 | 0.72 | 0.26 | 0.76 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 2.33 | 36.28 |
| 75 | 1996 | 2.97 | 6.73 | 2.08 | 0.13 | 0.68 | 0.00 | 0.00 | 0.00 | 0.00 | 1.30 | 1.06 | 8.70 | 23.65 |
| 76 | 1997 | 6.67 | 0.23 | 0.00 | 0.00 | 0.00 | 0.00 | 0.05 | 0.00 | 0.53 | 0.00 | 3.73 | 6.72 | 17.93 |
| 77 | 1998 | 3.49 | 22.00 | 3.98 | 2.28 | 5.50 | 0.06 | 0.00 | 0.00 | 0.21 | 0.33 | 1.36 | 1.39 | 40.60 |
| 78 | 1999 | 2.08 | 0.65 | 3.00 | 3.78 | 0.00 | 0.48 | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | 0.05 | 10.05 |
| 79 | 2000 | 1.21 | 9.43 | 3.15 | 2.10 | 0.00 | 0.00 | 0.00 | 0.31 | 0.00 | 1.13 | 0.00 | 0.00 | 17.33 |
| 80 | 2001 | 5.84 | 10.76 | 3.38 | 2.56 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.22 | 3.18 | 1.30 | 27.24 |
| 81 | 2002 | 1.55 | 0.51 | 0.38 | 0.05 | 0.12 | 0.01 | 0.00 | 0.00 | 0.02 | 0.00 | 3.01 | 5.85 | 11.50 |
| 82 | 2003 | 0.00 | 9.03 | 2.38 | 2.35 | 1.70 | 0.00 | 0.02 | 0.00 | 0.00 | 1.10 | 0.63 | 2.57 | 19.78 |
| 83 | 2004 | 0.65 | 8.07 | 0.37 | 0.20 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 4.79 | 0.64 | 8.54 | 23.26 |
| 84 | 2005 | 17.06 | 16.69 | 2.70 | 1.42 | 0.45 | 0.00 | 0.00 | 0.00 | 0.17 | 1.91 | 0.59 | 0.14 | 41.13 |
| 85 | 2006 | 3.27 | 3.78 | 5.68 | 4.22 | 0.99 | 0.00 | 0.00 | 0.00 | 0.00 | 0.42 | 0.05 | 0.83 | 19.24 |
| 86 | 2007 | 1.66 | 1.38 | 0.17 | 0.71 | 0.00 | 0.00 | 0.00 | 0.00 | 1.32 | 0.25 | 0.50 | 2.67 | 8.66 |

All precipitation values are listed in units of inches.

**TABLE 3-14**

Simulated Monthly Streamflows in the Santa Clara River at the Lang Gage for the 86-year Simulation

| Model Year | Historical Year | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Annual | Prototype Year |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1922 | 336 | 534 | 429 | 398 | 117 | 84 | 16 | 5 | 108 | 144 | 498 | 1,446 | 4,115 | 1992 |
| 2 | 1923 | 117 | 117 | 65 | 31 | 12 | 0 | 0 | 0 | 0 | 0 | 258 | 516 | 1,116 | 2000 |
| 3 | 1924 | 212 | 276 | 230 | 46 | 46 | 5 | 0 | 0 | 0 | 27 | 36 | 147 | 1,025 | 1990 |
| 4 | 1925 | 50 | 111 | 60 | 25 | 6 | 0 | 0 | 0 | 102 | 94 | 34 | 18 | 499 | 1989 |
| 5 | 1926 | 1,310 | 7,449 | 1,213 | 568 | 218 | 78 | 6 | 0 | 37 | 274 | 467 | 553 | 12,175 | 1980 |
| 6 | 1927 | 333 | 1,420 | 785 | 283 | 238 | 0 | 0 | 0 | 0 | 95 | 178 | 855 | 4,188 | 2001 |
| 7 | 1928 | 50 | 111 | 60 | 25 | 6 | 0 | 0 | 0 | 102 | 94 | 34 | 18 | 499 | 2002 |
| 8 | 1929 | 68 | 67 | 70 | 69 | 70 | 68 | 65 | 65 | 60 | 58 | 316 | 164 | 1,140 | 1960 |
| 9 | 1930 | 68 | 67 | 70 | 69 | 70 | 68 | 65 | 65 | 60 | 58 | 316 | 164 | 1,140 | 1960 |
| 10 | 1931 | 333 | 1,420 | 785 | 283 | 238 | 0 | 0 | 0 | 0 | 95 | 178 | 855 | 4,188 | 2001 |
| 11 | 1932 | 117 | 117 | 65 | 31 | 12 | 0 | 0 | 0 | 0 | 0 | 258 | 516 | 1,116 | 1987 |
| 12 | 1933 | 0 | 30 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 25 | 0 | 1,652 | 1,707 | 2004 |
| 13 | 1934 | 222 | 209 | 506 | 117 | 77 | 68 | 0 | 0 | 0 | 0 | 12 | 25 | 1,236 | 1988 |
| 14 | 1935 | 1,211 | 1,421 | 954 | 802 | 268 | 156 | 62 | 8 | 6 | 1 | 27 | 189 | 5,104 | 1995 |
| 15 | 1936 | 0 | 30 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 25 | 0 | 1,652 | 1,707 | 2004 |
| 16 | 1937 | 222 | 209 | 506 | 117 | 77 | 68 | 0 | 0 | 0 | 0 | 12 | 25 | 1,236 | 1988 |
| 17 | 1938 | 1,211 | 1,421 | 954 | 802 | 268 | 156 | 62 | 8 | 6 | 1 | 27 | 189 | 5,104 | 1995 |
| 18 | 1939 | 7,355 | 2,668 | 597 | 265 | 120 | 55 | 27 | 5 | 32 | 73 | 132 | 141 | 11,468 | Half of 1993 |
| 19 | 1940 | 0 | 30 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 25 | 0 | 1,652 | 1,707 | 2004 |
| 20 | 1941 | 13,686 | 11,359 | 11,699 | 2,378 | 1,458 | 721 | 322 | 120 | 77 | 128 | 179 | 206 | 42,333 | 2005 |
| 21 | 1942 | 50 | 111 | 60 | 25 | 6 | 0 | 0 | 0 | 102 | 94 | 34 | 18 | 499 | 1989 |
| 22 | 1943 | 18,997 | 8,508 | 3,837 | 961 | 667 | 347 | 81 | 91 | 70 | 139 | 190 | 186 | 34,074 | 1998 |
| 23 | 1944 | 1,211 | 1,421 | 954 | 802 | 268 | 156 | 62 | 8 | 6 | 1 | 27 | 189 | 5,104 | 1995 |
| 24 | 1945 | 517 | 346 | 140 | 85 | 33 | 5 | 4 | 50 | 66 | 240 | 566 | 809 | 2,859 | 1997 |
| 25 | 1946 | 1,211 | 1,421 | 954 | 802 | 268 | 156 | 62 | 8 | 6 | 1 | 27 | 189 | 5,104 | 1995 |
| 26 | 1947 | 332 | 250 | 131 | 90 | 50 | 22 | 32 | 6 | 0 | 0 | 11 | 58 | 983 | 1972 |
| 27 | 1948 | 50 | 111 | 60 | 25 | 6 | 0 | 0 | 0 | 102 | 94 | 34 | 18 | 499 | 2002 |
| 28 | 1949 | 50 | 111 | 60 | 25 | 6 | 0 | 0 | 0 | 102 | 94 | 34 | 18 | 499 | 2002 |
| 29 | 1950 | 83 | 198 | 184 | 126 | 105 | 83 | 51 | 54 | 56 | 53 | 43 | 42 | 1,078 | 1950 |
| 30 | 1951 | 49 | 40 | 66 | 91 | 98 | 84 | 79 | 72 | 57 | 71 | 47 | 53 | 807 | 1951 |
| 31 | 1952 | 9,629 | 636 | 7,091 | 2,114 | 895 | 326 | 153 | 138 | 86 | 97 | 178 | 313 | 21,656 | 1952 |
| 32 | 1953 | 300 | 282 | 271 | 237 | 165 | 134 | 102 | 86 | 85 | 83 | 74 | 68 | 1,888 | 1953 |
| 33 | 1954 | 145 | 278 | 404 | 356 | 181 | 108 | 110 | 99 | 91 | 90 | 80 | 75 | 2,017 | 1954 |
| 34 | 1955 | 103 | 156 | 157 | 128 | 153 | 99 | 78 | 76 | 74 | 68 | 66 | 62 | 1,220 | 1955 |
| 35 | 1956 | 69 | 85 | 130 | 137 | 139 | 98 | 86 | 80 | 77 | 76 | 67 | 69 | 1,113 | 1956 |
| 36 | 1957 | 67 | 55 | 78 | 90 | 93 | 80 | 78 | 78 | 76 | 79 | 66 | 71 | 910 | 1957 |
| 37 | 1958 | 66 | 329 | 743 | 4,550 | 825 | 283 | 130 | 108 | 95 | 145 | 146 | 116 | 7,536 | 1958 |
| 38 | 1959 | 246 | 351 | 189 | 127 | 111 | 92 | 84 | 86 | 83 | 69 | 68 | 68 | 1,575 | 1959 |
| 39 | 1960 | 68 | 67 | 70 | 69 | 70 | 68 | 65 | 65 | 60 | 58 | 316 | 164 | 1,140 | 1960 |
| 40 | 1961 | 124 | 91 | 38 | 38 | 36 | 32 | 28 | 33 | 22 | 19 | 19 | 119 | 597 | 1961 |
| 41 | 1962 | 139 | 1,904 | 791 | 449 | 329 | 169 | 97 | 82 | 80 | 84 | 82 | 82 | 4,287 | 1962 |
| 42 | 1963 | 85 | 142 | 145 | 131 | 104 | 86 | 79 | 74 | 66 | 65 | 62 | 58 | 1,096 | 1963 |
| 43 | 1964 | 69 | 50 | 51 | 62 | 66 | 54 | 53 | 53 | 54 | 45 | 43 | 41 | 640 | 1964 |
| 44 | 1965 | 30 | 23 | 25 | 46 | 43 | 36 | 31 | 34 | 37 | 35 | 1,305 | 3,300 | 4,944 | 1965 |
| 45 | 1966 | 1,765 | 1,014 | 778 | 450 | 308 | 115 | 68 | 54 | 45 | 63 | 91 | 523 | 5,274 | 1966 |

**TABLE 3-14**

Simulated Monthly Streamflows in the Santa Clara River at the Lang Gage for the 86-year Simulation

| Model Year | Historical Year | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Annual | Prototype Year |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 46 | 1967 | 757 | 489 | 1,028 | 2,295 | 1,880 | 729 | 212 | 104 | 89 | 73 | 255 | 487 | 8,397 | 1967 |
| 47 | 1968 | 300 | 247 | 276 | 180 | 72 | 32 | 32 | 30 | 25 | 133 | 208 | 851 | 2,384 | 1968 |
| 48 | 1969 | 13,797 | 2,856 | 1,005 | 489 | 320 | 147 | 98 | 98 | 46 | 318 | 392 | 399 | 19,966 | 1969 |
| 49 | 1970 | 461 | 550 | 1,168 | 465 | 290 | 169 | 74 | 60 | 58 | 27 | 501 | 1,338 | 5,161 | 1970 |
| 50 | 1971 | 614 | 524 | 556 | 397 | 262 | 167 | 70 | 25 | 5 | 30 | 200 | 420 | 3,270 | 1971 |
| 51 | 1972 | 332 | 250 | 131 | 90 | 50 | 22 | 32 | 6 | 0 | 0 | 11 | 58 | 983 | 1972 |
| 52 | 1973 | 153 | 1,717 | 950 | 471 | 226 | 71 | 18 | 12 | 8 | 3 | 8 | 44 | 3,679 | 1973 |
| 53 | 1974 | 608 | 229 | 392 | 190 | 129 | 49 | 17 | 6 | 0 | 3 | 19 | 87 | 1,728 | 1974 |
| 54 | 1975 | 53 | 90 | 228 | 181 | 104 | 31 | 15 | 3 | 0 | 0 | 0 | 0 | 704 | 1975 |
| 55 | 1976 | 0 | 110 | 63 | 39 | 33 | 12 | 0 | 0 | 1 | 0 | 0 | 0 | 258 | 1976 |
| 56 | 1977 | 28 | 7 | 28 | 19 | 60 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 147 | 1977 |
| 57 | 1978 | 744 | 9,486 | 11,412 | 1,696 | 2,736 | 1,154 | 418 | 209 | 101 | 264 | 422 | 86 | 28,730 | 1978 |
| 58 | 1979 | 1,254 | 433 | 1,113 | 506 | 246 | 190 | 178 | 111 | 125 | 90 | 120 | 558 | 4,925 | 1979 |
| 59 | 1980 | 1,310 | 7,449 | 1,213 | 568 | 218 | 78 | 6 | 0 | 37 | 274 | 467 | 553 | 12,175 | 1980 |
| 60 | 1981 | 594 | 98 | 339 | 240 | 107 | 18 | 18 | 12 | 338 | 321 | 258 | 394 | 2,739 | 1981 |
| 61 | 1982 | 333 | 1,420 | 785 | 283 | 238 | 0 | 0 | 0 | 0 | 95 | 178 | 855 | 4,188 | 1982 |
| 62 | 1983 | 1,922 | 16,971 | 2,755 | 2,576 | 958 | 523 | 639 | 512 | 0 | 0 | 0 | 0 | 26,855 | 1983 |
| 63 | 1984 | 0 | 596 | 405 | 240 | 143 | 166 | 228 | 411 | 154 | 220 | 904 | 578 | 4,044 | 1984 |
| 64 | 1985 | 483 | 461 | 274 | 215 | 77 | 0 | 0 | 0 | 12 | 179 | 221 | 301 | 2,224 | 1985 |
| 65 | 1986 | 483 | 1,138 | 488 | 283 | 107 | 6 | 0 | 12 | 6 | 12 | 80 | 129 | 2,744 | 1986 |
| 66 | 1987 | 117 | 117 | 65 | 31 | 12 | 0 | 0 | 0 | 0 | 0 | 258 | 516 | 1,116 | 1987 |
| 67 | 1988 | 222 | 209 | 506 | 117 | 77 | 68 | 0 | 0 | 0 | 0 | 12 | 25 | 1,236 | 1988 |
| 68 | 1989 | 50 | 111 | 60 | 25 | 6 | 0 | 0 | 0 | 102 | 94 | 34 | 18 | 499 | 1989 |
| 69 | 1990 | 212 | 276 | 230 | 46 | 46 | 5 | 0 | 0 | 0 | 27 | 36 | 147 | 1,025 | 1990 |
| 70 | 1991 | 162 | 775 | 879 | 736 | 145 | 142 | 14 | 0 | 45 | 69 | 62 | 263 | 3,291 | 1991 |
| 71 | 1992 | 336 | 534 | 429 | 398 | 117 | 84 | 16 | 5 | 108 | 144 | 498 | 1,446 | 4,115 | 1992 |
| 72 | 1993 | 14,709 | 5,336 | 1,194 | 530 | 239 | 110 | 54 | 10 | 64 | 145 | 264 | 281 | 22,937 | 1993 |
| 73 | 1994 | 388 | 493 | 497 | 319 | 163 | 80 | 20 | 7 | 37 | 102 | 193 | 941 | 3,239 | 1994 |
| 74 | 1995 | 1,211 | 1,421 | 954 | 802 | 268 | 156 | 62 | 8 | 6 | 1 | 27 | 189 | 5,104 | 1995 |
| 75 | 1996 | 666 | 896 | 730 | 315 | 151 | 46 | 7 | 0 | 54 | 154 | 307 | 510 | 3,836 | 1996 |
| 76 | 1997 | 517 | 346 | 140 | 85 | 33 | 5 | 4 | 50 | 66 | 240 | 566 | 809 | 2,859 | 1997 |
| 77 | 1998 | 18,997 | 8,508 | 3,837 | 961 | 667 | 347 | 81 | 91 | 70 | 139 | 190 | 186 | 34,074 | 1998 |
| 78 | 1999 | 92 | 85 | 204 | 224 | 197 | 107 | 80 | 46 | 52 | 54 | 31 | 80 | 1,252 | 1999 |
| 79 | 2000 | 117 | 117 | 65 | 31 | 12 | 0 | 0 | 0 | 0 | 0 | 258 | 516 | 1,116 | 1987 |
| 80 | 2001 | 333 | 1,420 | 785 | 283 | 238 | 0 | 0 | 0 | 0 | 95 | 178 | 855 | 4,188 | 1982 |
| 81 | 2002 | 50 | 111 | 60 | 25 | 6 | 0 | 0 | 0 | 102 | 94 | 34 | 18 | 499 | 1989 |
| 82 | 2003 | 666 | 896 | 730 | 315 | 109 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2,715 | 1996 and 2003 |
| 83 | 2004 | 0 | 30 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 25 | 0 | 1,652 | 1,707 | 2004 |
| 84 | 2005 | 13,686 | 11,359 | 11,699 | 2,378 | 1,458 | 721 | 322 | 120 | 77 | 128 | 179 | 206 | 42,333 | 2005 |
| 85 | 2006 | 418 | 352 | 510 | 920 | 381 | 69 | 0 | 0 | 0 | 0 | 0 | 0 | 2,650 | 2006 |
| 86 | 2007 | 1 | 57 | 30 | 20 | 0 | 0 | 0 | 0 | 0 | 3 | 8 | 6 | 125 | 2007 |

All simulated streamflow volumes are listed in units of acre-feet (af).

**TABLE 3-15**

Simulated Monthly Water Releases from Castaic Lagoon to Castaic Creek for the 86-year Simulation

| Model Year | Historical Year | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Annual | Prototype Year |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1922 | 0 | 0 | 580 | 3,052 | 667 | 127 | 24 | 0 | 0 | 0 | 0 | 0 | 4,450 | 1992 |
| 2 | 1923 | 0 | 660 | 855 | 0 | 2,087 | 3,484 | 0 | 0 | 0 | 0 | 0 | 0 | 7,086 | 2000 |
| 3 | 1924 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1990 |
| 4 | 1925 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1989 |
| 5 | 1926 | 0 | 0 | 0 | 0 | 0 | 834 | 1,052 | 919 | 0 | 0 | 0 | 0 | 2,805 | 1980 |
| 6 | 1927 | 0 | 389 | 1,218 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1,607 | 2001 |
| 7 | 1928 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2002 |
| 8 | 1929 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2002 |
| 9 | 1930 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1984 |
| 10 | 1931 | 0 | 389 | 1,218 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1,607 | 2001 |
| 11 | 1932 | 105 | 0 | 0 | 1,490 | 46 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1,641 | 1986 |
| 12 | 1933 | 0 | 59 | 1,004 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 60 | 1,123 | 2004 |
| 13 | 1934 | 0 | 0 | 809 | 341 | 900 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2,050 | 1988 |
| 14 | 1935 | 0 | 0 | 0 | 0 | 0 | 1,668 | 2,104 | 1,839 | 0 | 0 | 0 | 0 | 5,611 | 1995 |
| 15 | 1936 | 0 | 59 | 1,004 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 60 | 1,123 | 2004 |
| 16 | 1937 | 0 | 0 | 809 | 341 | 900 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2,050 | 1988 |
| 17 | 1938 | 0 | 0 | 0 | 0 | 0 | 1,668 | 2,104 | 1,839 | 0 | 0 | 0 | 0 | 5,611 | 1995 |
| 18 | 1939 | 0 | 70 | 93 | 1,516 | 951 | 318 | 171 | 169 | 407 | 0 | 0 | 171 | 3,863 | Half of 1993 |
| 19 | 1940 | 0 | 59 | 1,004 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 60 | 1,123 | 2004 |
| 20 | 1941 | 32,391 | 37,514 | 12,993 | 3,613 | 2,891 | 90 | 1,657 | 32 | 0 | 0 | 0 | 0 | 91,181 | 2005 |
| 21 | 1942 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1989 |
| 22 | 1943 | 1,186 | 19,545 | 10,747 | 4,566 | 7,561 | 47 | 1,370 | 436 | 464 | 302 | 652 | 926 | 47,802 | 1998 |
| 23 | 1944 | 0 | 0 | 0 | 0 | 0 | 1,668 | 2,104 | 1,839 | 0 | 0 | 0 | 0 | 5,611 | 1995 |
| 24 | 1945 | 0 | 0 | 8,701 | 873 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 310 | 9,884 | 1997 |
| 25 | 1946 | 0 | 0 | 0 | 0 | 0 | 1,668 | 2,104 | 1,839 | 0 | 0 | 0 | 0 | 5,611 | 1995 |
| 26 | 1947 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1989 |
| 27 | 1948 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2002 |
| 28 | 1949 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2002 |
| 29 | 1950 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2007 |
| 30 | 1951 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1984 |
| 31 | 1952 | 0 | 140 | 186 | 3,031 | 1,901 | 635 | 341 | 337 | 813 | 0 | 0 | 341 | 7,725 | 1993 |
| 32 | 1953 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1989 |
| 33 | 1954 | 0 | 0 | 0 | 4,961 | 671 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5,632 | 1996 |
| 34 | 1955 | 105 | 0 | 0 | 1,490 | 46 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1,641 | 1986 |
| 35 | 1956 | 105 | 0 | 0 | 1,490 | 46 | 0 | 0 | 0 | 0 | 0 | 212 | 0 | 1,853 | 1987 |
| 36 | 1957 | 0 | 0 | 0 | 0 | 0 | 667 | 842 | 735 | 0 | 0 | 0 | 0 | 2,244 | 1982 |
| 37 | 1958 | 0 | 0 | 0 | 0 | 0 | 667 | 842 | 735 | 0 | 0 | 0 | 0 | 2,244 | 1982 |
| 38 | 1959 | 210 | 0 | 0 | 2,979 | 93 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3,282 | 1994 |
| 39 | 1960 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1984 |
| 40 | 1961 | 612 | 691 | 0 | 3,187 | 1,191 | 149 | 0 | 0 | 0 | 0 | 0 | 0 | 5,830 | 1999 |
| 41 | 1962 | 0 | 0 | 0 | 0 | 0 | 667 | 842 | 735 | 0 | 0 | 0 | 0 | 2,244 | 1982 |
| 42 | 1963 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1984 |
| 43 | 1964 | 210 | 0 | 0 | 2,979 | 93 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3,282 | 1994 |
| 44 | 1965 | 0 | 0 | 580 | 3,052 | 667 | 127 | 24 | 0 | 0 | 0 | 0 | 0 | 4,450 | 1992 |
| 45 | 1966 | 105 | 0 | 0 | 1,490 | 46 | 0 | 0 | 0 | 0 | 0 | 212 | 0 | 1,853 | 1987 |

**TABLE 3-15**

Simulated Monthly Water Releases from Castaic Lagoon to Castaic Creek for the 86-year Simulation

| Model Year | Historical Year | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Annual | Prototype Year |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 46 | 1967 | 0 | 0 | 0 | 0 | 0 | 667 | 842 | 735 | 0 | 0 | 0 | 0 | 2,244 | 1982 |
| 47 | 1968 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2007 |
| 48 | 1969 | 0 | 140 | 186 | 3,031 | 1,901 | 635 | 341 | 337 | 813 | 0 | 0 | 341 | 7,725 | 1993 |
| 49 | 1970 | 0 | 0 | 0 | 0 | 0 | 667 | 842 | 735 | 0 | 0 | 0 | 0 | 2,244 | 1982 |
| 50 | 1971 | 105 | 0 | 0 | 1,490 | 46 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1,641 | 1986 |
| 51 | 1972 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1989 |
| 52 | 1973 | 0 | 0 | 0 | 0 | 0 | 667 | 842 | 735 | 0 | 0 | 0 | 0 | 2,244 | 1982 |
| 53 | 1974 | 105 | 0 | 0 | 1,490 | 46 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1,641 | 1986 |
| 54 | 1975 | 210 | 0 | 0 | 2,979 | 93 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3,282 | 1994 |
| 55 | 1976 | 105 | 0 | 0 | 1,490 | 46 | 0 | 0 | 0 | 0 | 0 | 212 | 0 | 1,853 | 1987 |
| 56 | 1977 | 0 | 0 | 0 | 0 | 0 | 667 | 842 | 735 | 0 | 0 | 0 | 0 | 2,244 | 1982 |
| 57 | 1978 | 0 | 0 | 0 | 0 | 0 | 1,168 | 1,473 | 1,287 | 0 | 0 | 0 | 0 | 3,928 | 1983 |
| 58 | 1979 | 0 | 0 | 0 | 0 | 0 | 667 | 842 | 735 | 0 | 0 | 0 | 0 | 2,244 | 1982 |
| 59 | 1980 | 0 | 0 | 0 | 0 | 0 | 834 | 1,052 | 919 | 0 | 0 | 0 | 0 | 2,805 | 1980 |
| 60 | 1981 | 105 | 0 | 0 | 1,490 | 46 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1,641 | 1986 |
| 61 | 1982 | 0 | 0 | 0 | 0 | 0 | 667 | 842 | 735 | 0 | 0 | 0 | 0 | 2,244 | 1982 |
| 62 | 1983 | 0 | 0 | 0 | 0 | 0 | 1,168 | 1,473 | 1,287 | 0 | 0 | 0 | 0 | 3,928 | 1983 |
| 63 | 1984 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1984 |
| 64 | 1985 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1985 |
| 65 | 1986 | 105 | 0 | 0 | 1,490 | 46 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1,641 | 1986 |
| 66 | 1987 | 105 | 0 | 0 | 1,490 | 46 | 0 | 0 | 0 | 0 | 0 | 212 | 0 | 1,853 | 1987 |
| 67 | 1988 | 0 | 0 | 809 | 341 | 900 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2,050 | 1988 |
| 68 | 1989 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1989 |
| 69 | 1990 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1990 |
| 70 | 1991 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 66 | 66 | 1991 |
| 71 | 1992 | 0 | 0 | 580 | 3,052 | 667 | 127 | 24 | 0 | 0 | 0 | 0 | 0 | 4,450 | 1992 |
| 72 | 1993 | 0 | 140 | 186 | 3,031 | 1,901 | 635 | 341 | 337 | 813 | 0 | 0 | 341 | 7,725 | 1993 |
| 73 | 1994 | 210 | 0 | 0 | 2,979 | 93 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3,282 | 1994 |
| 74 | 1995 | 0 | 0 | 0 | 0 | 0 | 1,668 | 2,104 | 1,839 | 0 | 0 | 0 | 0 | 5,611 | 1995 |
| 75 | 1996 | 0 | 0 | 0 | 4,961 | 671 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5,632 | 1996 |
| 76 | 1997 | 0 | 0 | 8,701 | 873 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 310 | 9,884 | 1997 |
| 77 | 1998 | 1,186 | 19,545 | 10,747 | 4,566 | 7,561 | 47 | 1,370 | 436 | 464 | 302 | 652 | 926 | 47,802 | 1998 |
| 78 | 1999 | 612 | 691 | 0 | 3,187 | 1,191 | 149 | 0 | 0 | 0 | 0 | 0 | 0 | 5,830 | 1999 |
| 79 | 2000 | 0 | 660 | 855 | 0 | 2,087 | 3,484 | 0 | 0 | 0 | 0 | 0 | 0 | 7,086 | 2000 |
| 80 | 2001 | 0 | 389 | 1,218 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1,607 | 2001 |
| 81 | 2002 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2002 |
| 82 | 2003 | 0 | 0 | 0 | 2,286 | 418 | 315 | 0 | 0 | 0 | 0 | 0 | 0 | 3,019 | 2003 |
| 83 | 2004 | 0 | 59 | 1,004 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 60 | 1,123 | 2004 |
| 84 | 2005 | 32,391 | 37,514 | 12,993 | 3,613 | 2,891 | 90 | 1,657 | 32 | 0 | 0 | 0 | 0 | 91,181 | 2005 |
| 85 | 2006 | 1,403 | 2,185 | 2,648 | 5,906 | 3,395 | 2,307 | 0 | 0 | 0 | 0 | 0 | 0 | 17,844 | 2006 |
| 86 | 2007 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2007 |

All simulated water releases are listed in units of acre-feet (af).

Table 3-16

Water Demands and Indoor Water Use under Full Build-out Conditions (Excluding Newhall Ranch)

| Year 2000 Actual (afy) | Full Build-out Conditions (afy) | Comments |
|---|---|---|
| **Annual Urban Water Use Outside Newhall Ranch** | | |
| 60,988 | 123,038 | Year 2000 value is retail purveyor demand plus other demands in Table II-6 of the *2004 Santa Clarita Valley Water Report* (LSCE, 2005a).<br><br>Year 2045 value is from Table 2.5-4 of the *Newhall Ranch Draft Additional Analysis* (Impact Sciences, Inc., 2001). Consists of 89,805 AF/yr Development Monitoring System[a] demand, plus 55,995 AF/yr additional urban demand, minus 14,480 AF/yr conservation, minus 5,193 AF/yr agricultural uses and 3,089 AF/yr "other" uses. Does not include 4,500 AF/yr for aquifer storage and recovery or 17,680 AF/yr of demand for the Newhall Ranch Specific Plan. |
| **Annual Indoor Water Use Outside Newhall Ranch (Equal to LACSD WRP Influent Volumes)** | | |
| 18,723 | 40,313 (average year) | The year 2000 volume is from the Saugus and Valencia WRPs for the period January 2000 through December 2000. The long-term current generated effluent volume is based on the influent volume estimated from water balance calculations performed for the chloride mass balance analysis. The effluent volume is 32.8 percent of the total urban water production of 123,038 AF/yr, which includes other uses. |

[a]Development Monitoring System water demands are demands associated with future build-out of developments identified in Los Angeles County's Development Monitoring System for the Santa Clarita Valley.

Table 3-17

Treated Water Discharges from the Saugus and Valencia WRPs to the Santa Clara River under Full Build-out Conditions

| Month | Treated Water Volume (2000)[a] | Treated Water Volume (Full Build-out Conditions)[b] | Percent of Annual Outdoor Demand | Reclaimed Volume under Full Build-out Conditions (Before Maintaining Existing Streamflows) | Reclaimed Volume under Full Build-out Conditions (After Maintaining Existing Streamflows) | WRP Discharges to River under Full Build-out Conditions[c] | Month |
|---|---|---|---|---|---|---|---|
| January | 1,503 | 3,237 | 3.75 | 637 | 637 | 2,600 | January |
| February | 1,443 | 3,106 | 5.1 | 867 | 867 | 2,239 | February |
| March | 1,528 | 3,290 | 6.6 | 1,122 | 1,122 | 2,168 | March |
| April | 1,505 | 3,240 | 9.1 | 1,547 | 1,547 | 1,693 | April |
| May | 1,569 | 3,379 | 10.55 | 1,794 | 1,794 | 1,585 | May |
| June | 1,543 | 3,322 | 11.4 | 1,938 | 1,781 | 1,541 | June |
| July | 1,606 | 3,459 | 14.1 | 2,397 | 1,854 | 1,605 | July |
| August | 1,649 | 3,550 | 12.95 | 2,202 | 1,902 | 1,648 | August |
| September | 1,593 | 3,430 | 10.2 | 1,734 | 1,734 | 1,696 | September |
| October | 1,631 | 3,512 | 7.5 | 1,275 | 1,275 | 2,237 | October |
| November | 1,546 | 3,329 | 5 | 850 | 850 | 2,479 | November |
| December | 1,607 | 3,459 | 3.75 | 637 | 637 | 2,822 | December |
| **Total Annual** | **18,723** | **40,313** | **100** | **17,000** | **16,000** | **24,313** | **Total Annual** |

[a]Values shown are the actual volumes of treated water discharged to the Santa Clara River from the Saugus and Valencia WRPs during calendar year 2000. (See also Table 3-16.)

[b]Values shown are the combined treated water volumes estimated to be produced by the Saugus and Valencia WRPs for full build-out conditions in the Santa Clarita Valley. These values do not include the future Newhall Ranch WRP, which will be operated by LACSD.

[c]Values shown do not include discharges of treated water to the river from the future Newhall Ranch WRP. These volumes are 10 acre-feet in November, 138 acre-feet in December, and 138 acre-feet in January. During the other nine months of the year, this WRP will not discharge treated water to the river (see the *Newhall Ranch Draft Additional Analysis* [Impact Sciences, Inc., 2001] for further details). The combined total discharge from the Saugus, Valencia, and Newhall Ranch WRPs is summarized in Table 3-18.

Note: All volumes are in acre-feet.

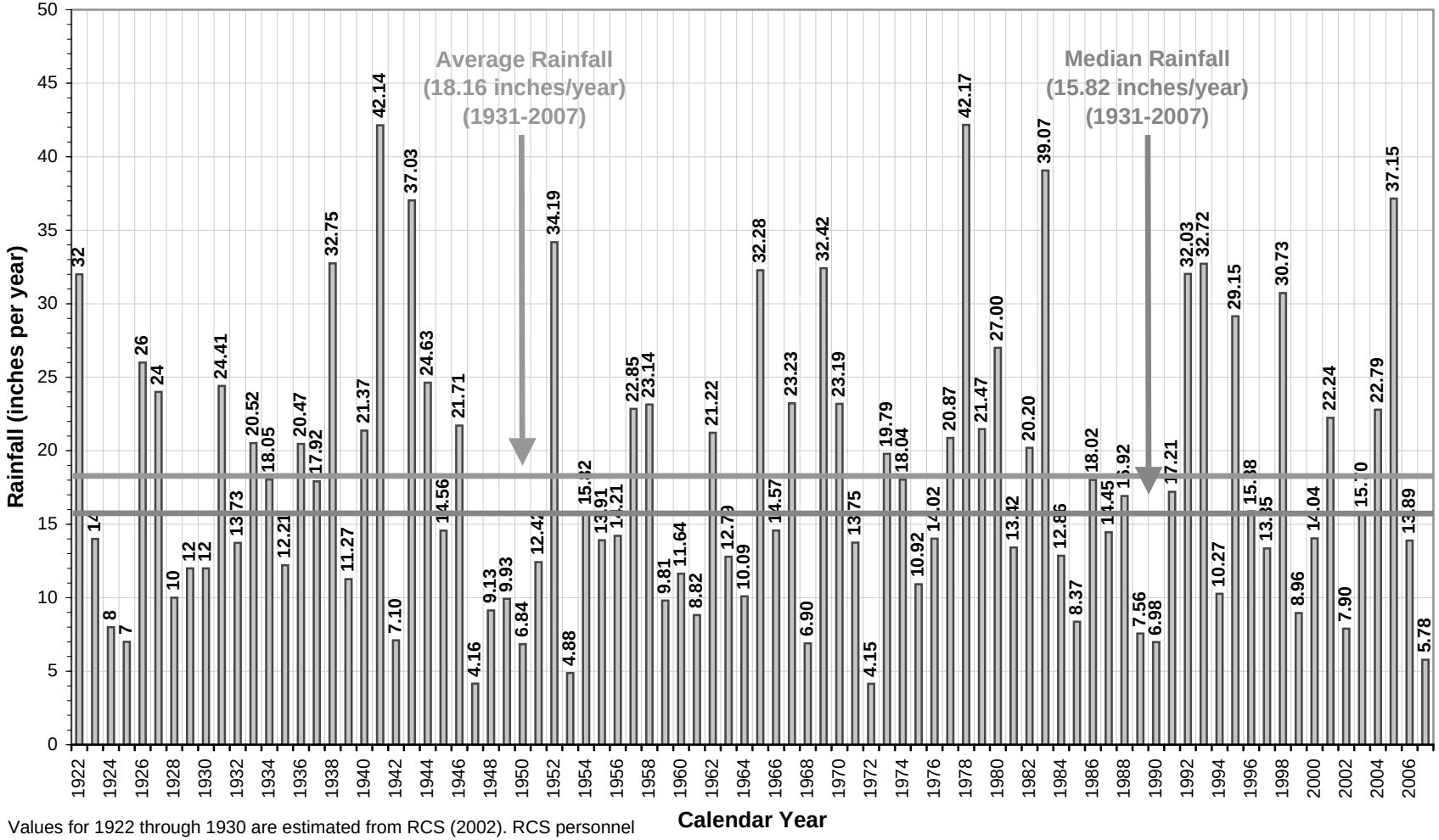
Table 3-18

Simulated Monthly Treated Wastewater Discharges from Santa Clarita Valley WRPs under Full Build-out Conditions

| WRP | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Annual |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Saugus | 493 | 487 | 500 | 490 | 503 | 466 | 457 | 508 | 586 | 555 | 514 | 596 | **6,155** |
| Valencia | 2,107 | 1,752 | 1,668 | 1,203 | 1,082 | 1,075 | 1,148 | 1,140 | 1,110 | 1,682 | 1,965 | 2,226 | **18,158** |
| Newhall | 138 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | 138 | **286** |
| **Total** | **2,738** | **2,239** | **2,168** | **1,693** | **1,585** | **1,541** | **1,605** | **1,648** | **1,696** | **2,237** | **2,489** | **2,960** | **24,599** |

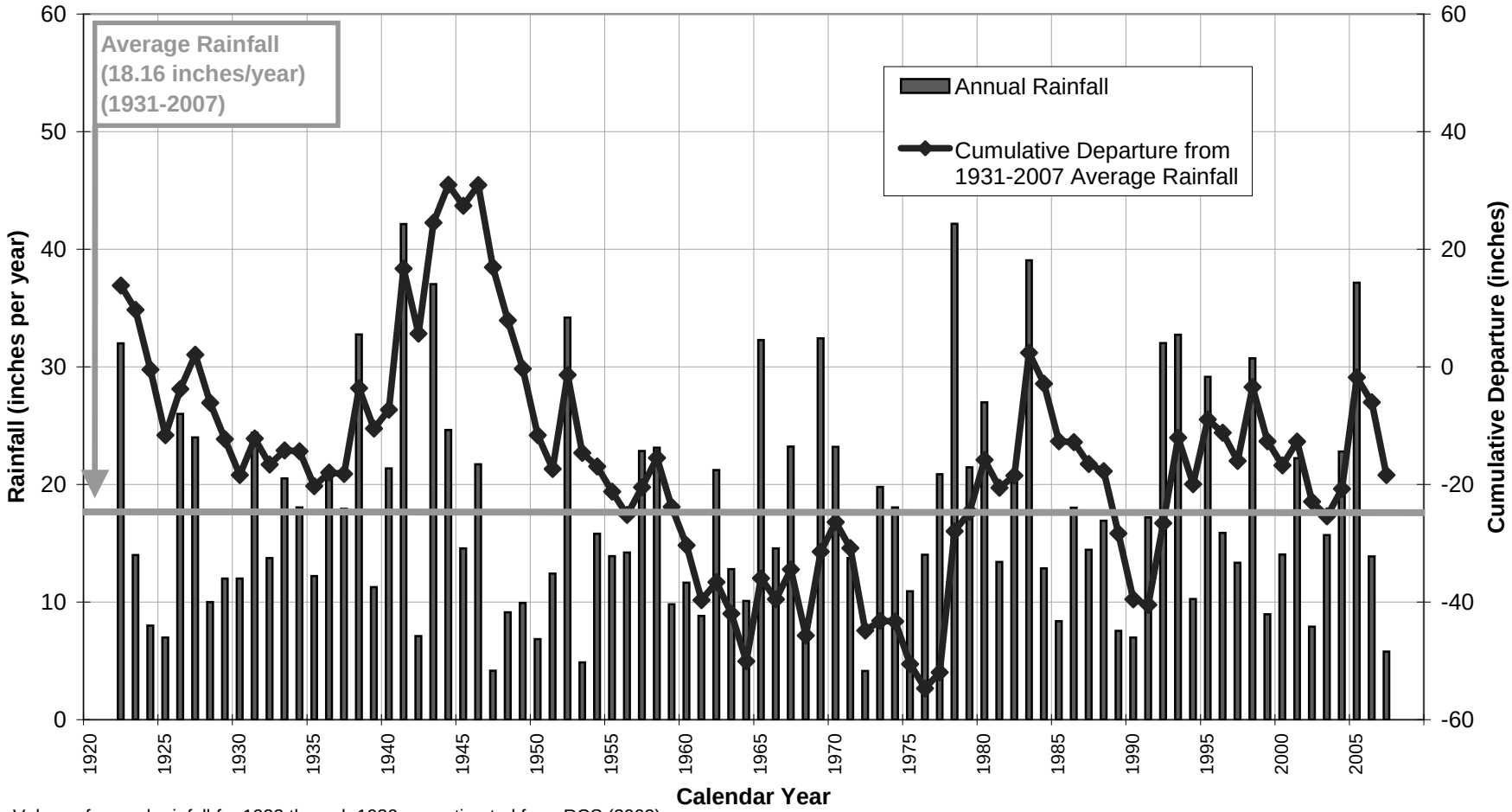
Note: All volumes are in acre-feet.

**Figure 3-1**
**Annual Rainfall**
**(Newhall-Soledad Rain Gage)**




Values for 1922 through 1930 are estimated from RCS (2002). RCS personnel have since indicated that the source of data to 1931 is an unofficial record obtained in 2001 from a former California State Climatologist.

**Figure 3-2**
**Annual Rainfall and Cumulative Departure from Average Rainfall**
**(Newhall-Soledad Rain Gage)**




Values of annual rainfall for 1922 through 1930 are estimated from RCS (2002). RCS personnel have since indicated that the source of data to 1931 is an unofficial record obtained in 2001 from a former California State Climatologist.

**Figure 3-3**
**Simulated Groundwater Pumping for 2008 Groundwater Operating Plan**

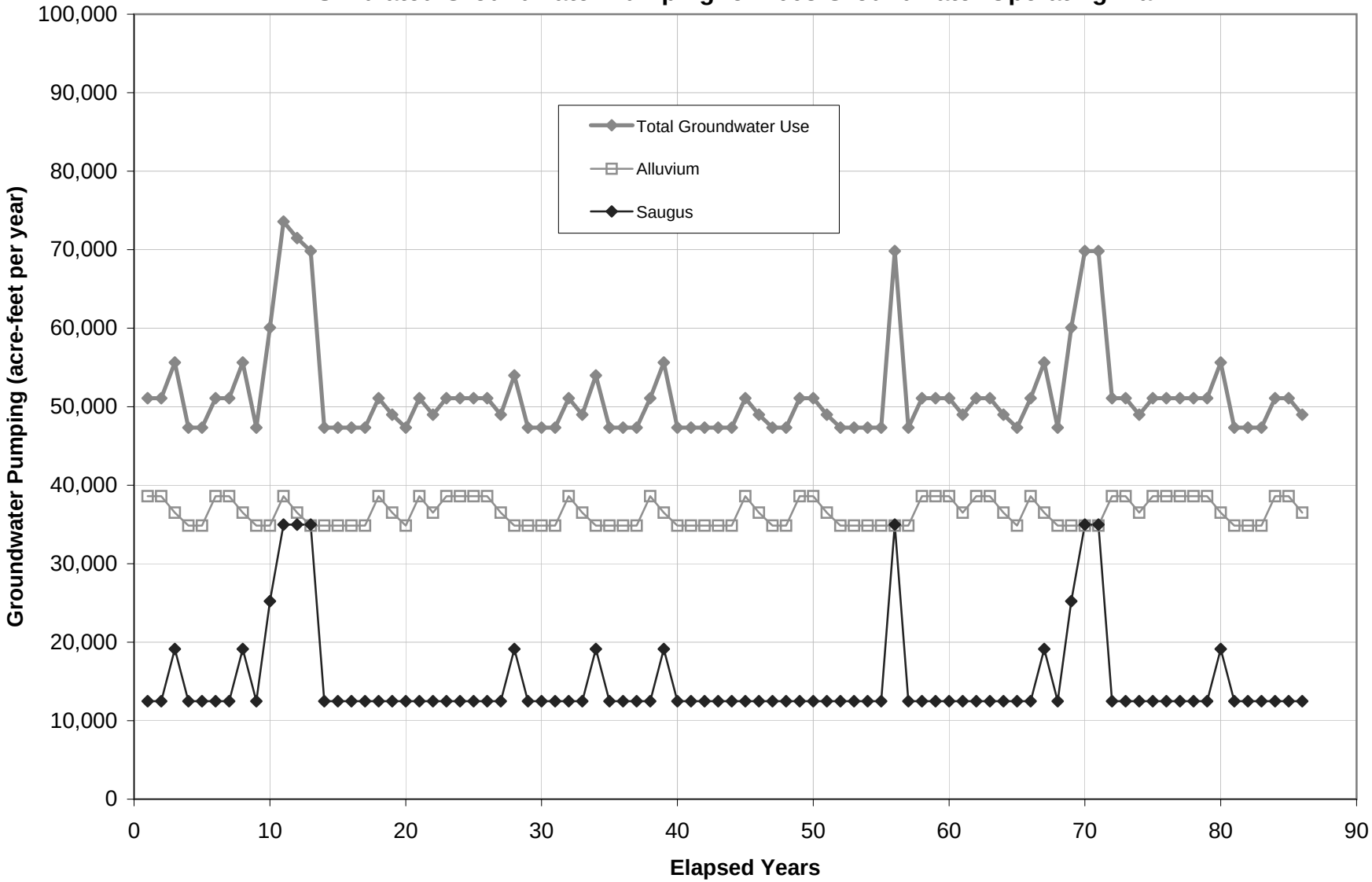


**Figure 3-4**
**Simulated Water Supplies For 2008 Groundwater Operating Plan (Excluding Recycled Water)**

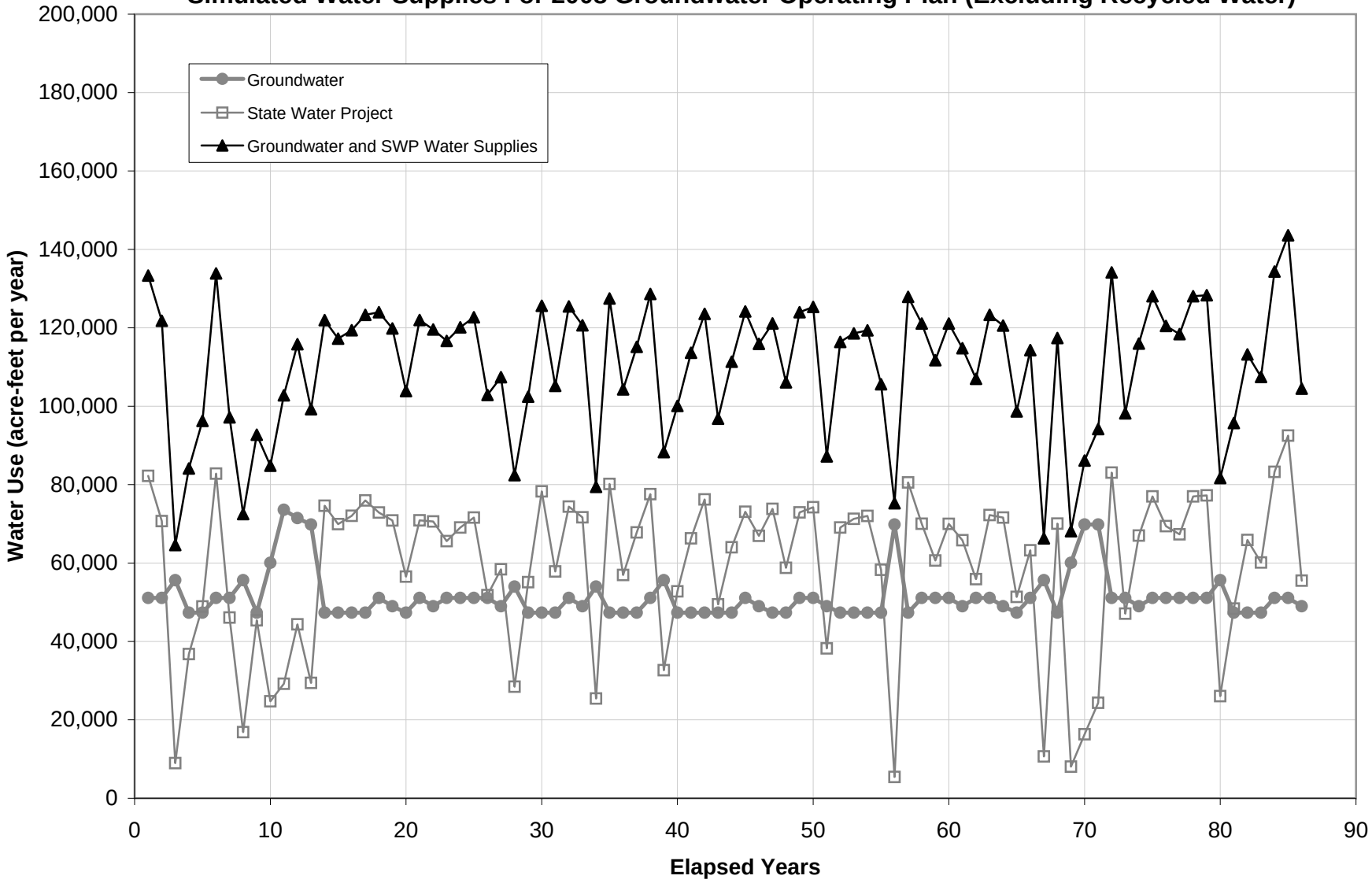


**Figure 3-5**
**Simulated Groundwater Pumping For Potential Groundwater Operating Plan**

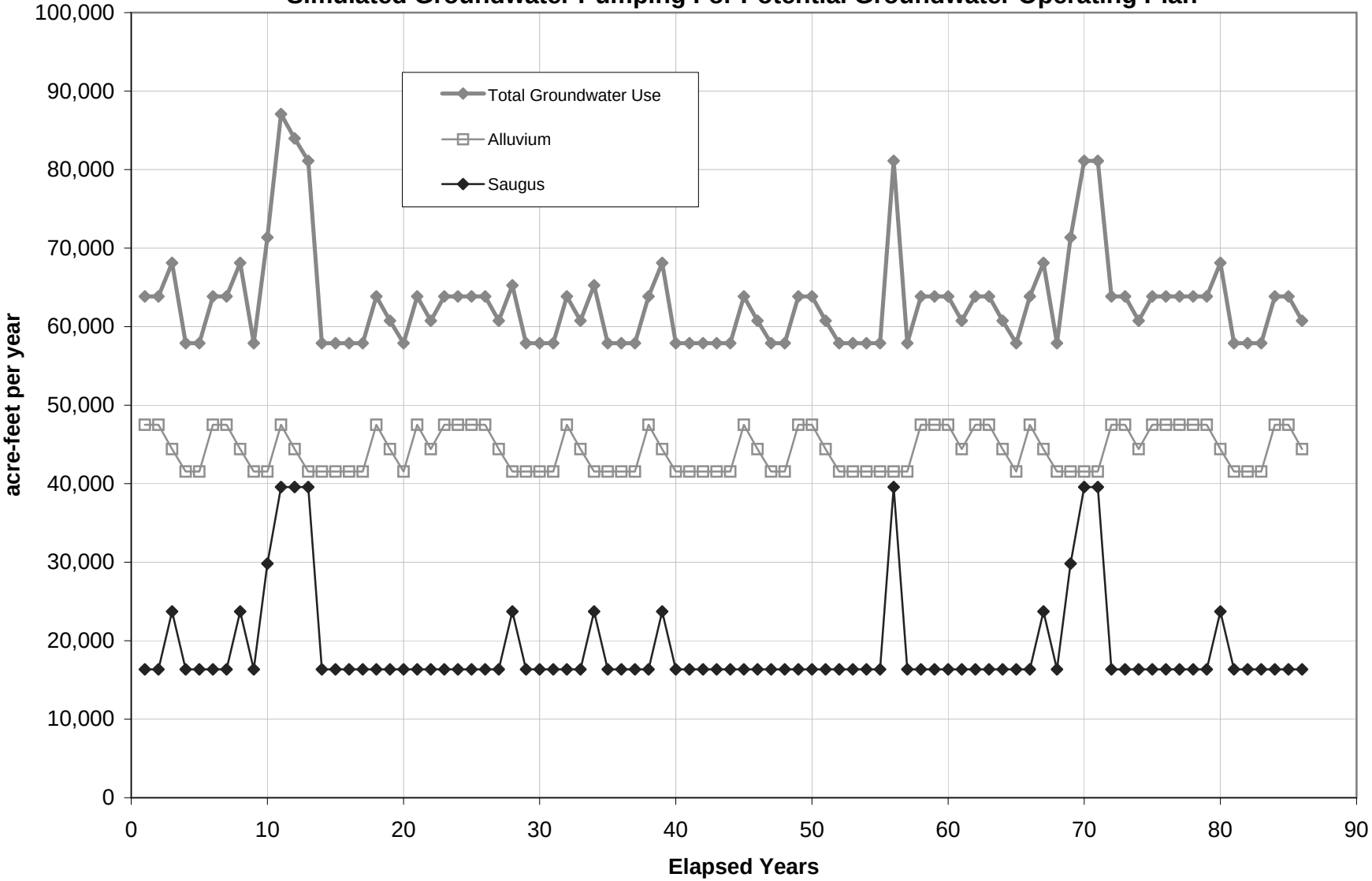


**Figure 3-6**
**Simulated Groundwater Pumping For 2008 and Potential Groundwater Operating Plans**

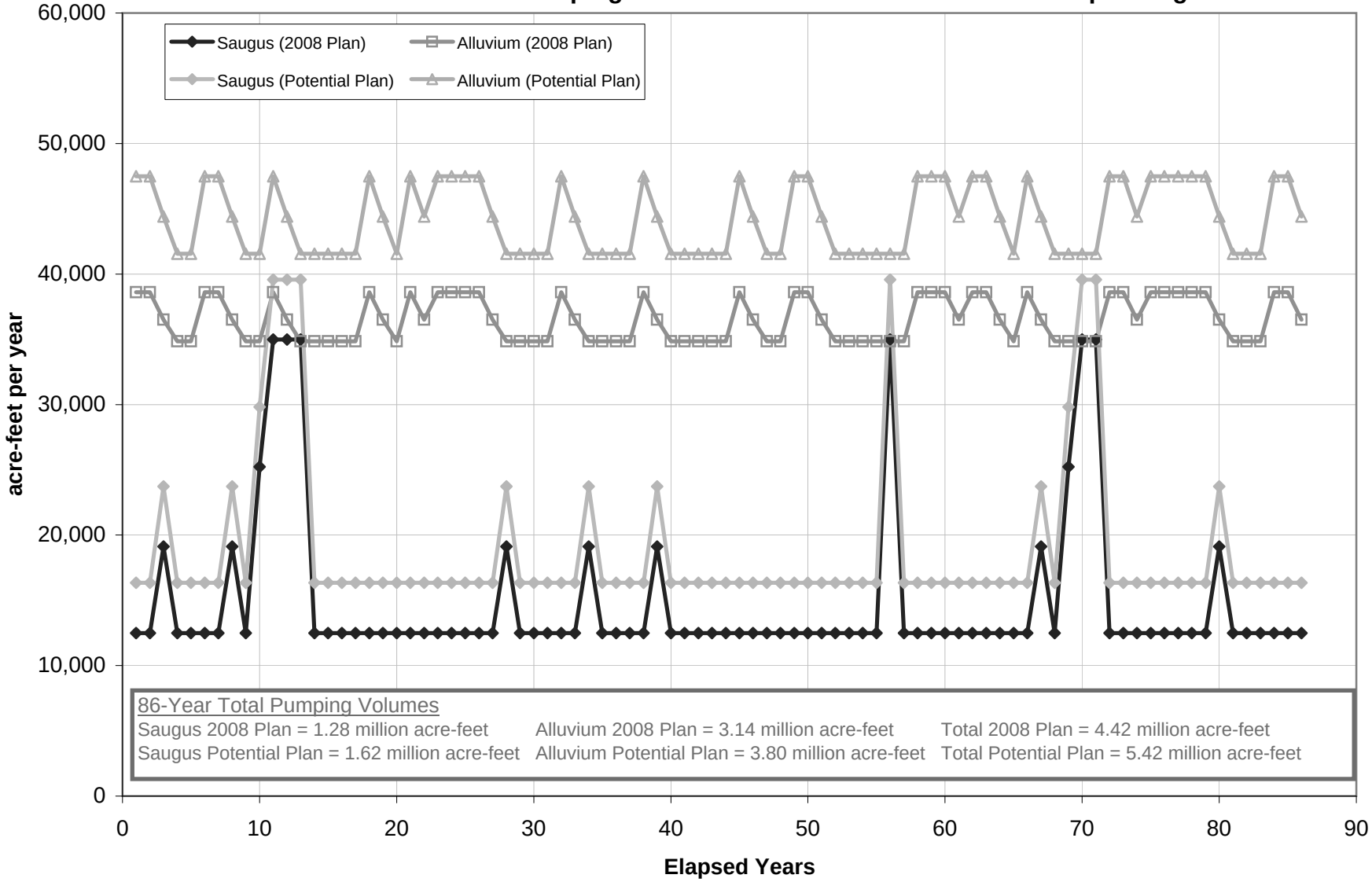
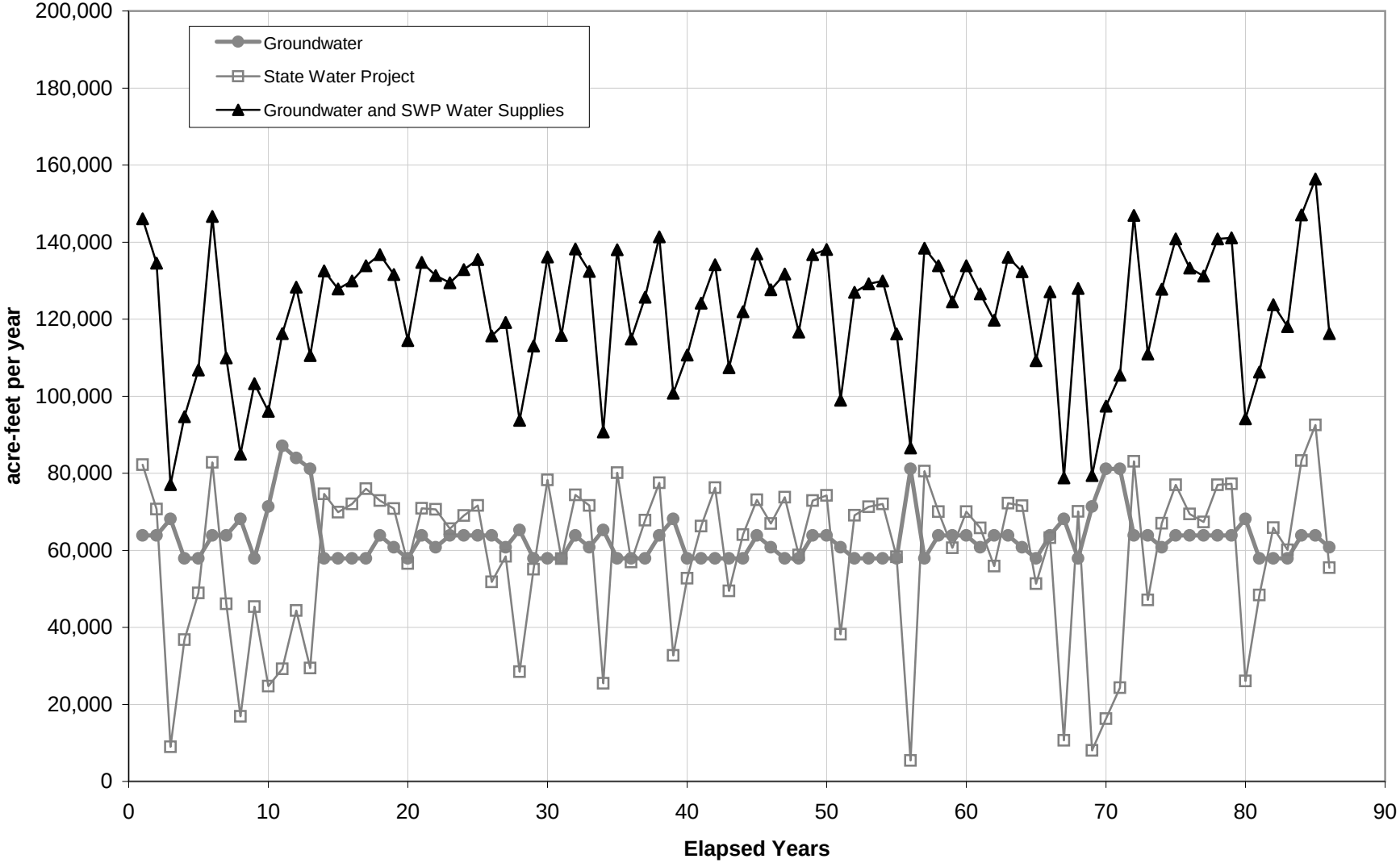


**Figure 3-7**
**Simulated Water Supplies For Potential Groundwater Operating Plan**
**(Excluding Recycled Water)**



# IV. Sustainability of Operating Plans

This section of the report presents and discusses time-series plots (hydrographs) of simulated groundwater elevations, groundwater budget terms, and Santa Clara River flows for the 86-year modeling period. The results for the 2008 Operating Plan, the 2008 Operating Plan with Pumping Redistribution, and the future Potential Operating Plan are presented and discussed together.

## 4.1 Groundwater Elevations

As introduced above, groundwater elevation trends are considered to be the key indicator of long-term sustainability of an operating plan. A sustainable plan is characterized by the absence of long-term declines in groundwater levels or, if declines occur initially, subsequent long-term stabilization of groundwater levels. Concurrent with sustainability considerations, i.e. groundwater resource response to a certain level of pumping, is whether an operating plan is physically achievable. An achievable plan is one in which target pumping capacities and long-term (monthly and/or annual) target pumping volumes can be expected to be pumped without exceeding practical well and pump performance. Achievability of the plan at a given well can be evaluated by comparing groundwater elevations and trends against historical levels and against the depths in the aquifer to which the well is open (i.e., the depth interval for the well screen or the perforated steel casing).

Sections 4.1.1 through 4.1.3 discuss sustainability and achievability of the 2008 Operating Plan, the 2008 Operating Plan with Pumping Redistribution, and the Potential Operating Plan, respectively. Hydrographs illustrating basin response to each operating plan at each production well location in the Valley are contained in Appendix C.

### 4.1.1 2008 Operating Plan

Selected groundwater elevation hydrographs for different portions of the Alluvial Aquifer are presented on Figures 4-1 through 4-8. Each figure presents hydrographs for wells that are considered representative of conditions in the following alluvial subareas:

- Along the Santa Clara River, below the Valencia WRP (well VWC-E15)
- Along the Santa Clara River, below the Saugus WRP (well VWC-S8)
- Along the Santa Clara River, above the Saugus WRP (well VWC-T7)
- Along the Santa Clara River, at and above Mint Canyon (wells SCWD-Sierra and NCWD-Pinetree1)
- Castaic Valley (well NCWD-Castaic7)
- San Francisquito Canyon (well VWC-W11)
- Bouquet Canyon (well SCWD-Clark)

Each set of hydrographs in Figures 4-1 through 4-8 shows the simulated monthly groundwater elevations for both operating plans, as well as three sets of historical groundwater elevations

from 1980-2007 (static [non-pumping] groundwater elevations, groundwater elevations measured during pumping, and the model's simulation of historical conditions from 1980-2007).

Key findings from the simulated hydrographs for the 2008 Operating Plan are as follows:

The model simulates distinct multi-year periods of overall declining or overall increasing groundwater elevations resulting from cycles of below-normal and above-normal rainfall periods. This variation is consistent with historical observations of the relationship between rainfall and groundwater level fluctuations (CH2M HILL, 2004a; CH2M HILL and LSCE, 2005) and is particularly pronounced in much of the Alluvial Aquifer.

The 2008 Operating Plan is sustainable, but not fully achievable, in the Alluvial Aquifer as configured. Specifically:

- Alluvial Aquifer wells in each subarea do not show sustained long-term declines in groundwater elevations. Groundwater elevations decline notably in some areas during drought periods, but eventually recover in response to significant rainfall/recharge events that occur periodically, marking the end of a given drought cycle.

- The 2008 plan is achievable in most Alluvial Aquifer subareas in that the groundwater elevations remain similar to historical groundwater elevations, do not drop appreciably into the open intervals of the wells or, at wells such as SCWD-Clark, where groundwater levels are already within the open interval, are only modestly below levels observed in recent years. This means that groundwater levels in most areas are not expected to pose operational difficulties that would significantly reduce the pumping capacities of individual wells.

- However, a notable exception is in the "Above Mint Canyon" subarea, where groundwater elevations are simulated to be within the open intervals of wells during most of the simulation period. In some instances, the simulated groundwater elevations are predicted to drop below the bottom of the well, meaning that the pumping rates programmed into the model at, and prior to, that time are not expected to be physically achievable. As shown by the hydrographs, the 2008 Operating Plan is predicted to not be fully achievable in the "Above Mint Canyon" subarea under the types of drought cycles such as were observed from the mid-1920s through the late 1930s and from the mid-1940s through the mid-1970s.

- It is important to note that, because the model simulates more pumping than can physically be achieved in the "Above Mint Canyon" alluvial subarea during drought periods, actual groundwater elevations will be higher at the ends of the drought cycles than predicted by the model (because actual pumping will have to be less than what is simulated by the model). This in turn means that the relatively low groundwater elevations depicted on the hydrographs between 1976 and the early 1990s are lower than will actually occur. It also means that, while pumping at the rates contemplated in the 2008 Operating Plan may not be achievable, some lower extraction rates can likely be achieved in the "Above Mint Canyon" area, with the possibility that reductions in this

area could be offset by increased pumping in other parts of the basin. This idea is supported by a group of focused test simulations that were conducted during the course of evaluating the 2008 Operating Plan. Results are discussed in the following Section 4.1.2.

Figures 4-9 through 4-11 contain groundwater elevation hydrographs for three representative wells in the Saugus Formation (SCWD-Saugus1 just south of Bouquet Junction; NCWD-13 further to the south, along the South Fork Santa Clara River; and VWC-206 near the Valencia WRP). The principal observations from these hydrographs are:

- Groundwater elevations show long-term stability under the 2008 Operating Plan, with no sustained declines being evident. At each well, the groundwater elevations under this operating plan are slightly below the historical static elevations that were observed from 1980 through 2007, reflecting greater use of Saugus wells under the 2008 Operating Plan than has occurred historically (in particular, greater use of SCWD-Saugus1 and SCWD-Saugus2, which will begin pumping under the perchlorate containment plan described in Section 3.3.3). Nonetheless, the groundwater elevations are at or above historically recorded pumping elevations, and notably above the top of the open interval of each well, indicating that the 2008 Operating Plan should be achievable at each well and sustainable in the long-run.

### 4.1.2 2008 Operating Plan with Pumping Redistribution

During the prolonged dry period from the mid-1940s through the mid-1970s, when there were few years of significantly greater-than-average rainfall, the 2008 Operating Plan might have been achievable if pumping in the “Above Mint Canyon” alluvial subarea had been lower than the pumping volume contemplated in the 2008 Operating Plan. This reduction would not have been necessary during other historical periods that were characterized by intermittent years of significant rainfall, streamflow, and associated groundwater recharge (such as occurred periodically from the late 1970s through 2005).

This possibility was examined as follows. Recognizing that SCWD is in the midst of constructing new or replacement wells (e.g. to replace its perchlorate-impacted Stadium well) to the west of the “Above Mint Canyon” subarea, a potential redistribution of some SCWD pumping, as analyzed in the 2008 Operating Plan, was crafted whereby 1,600 afy of pumping was moved from three SCWD wells in the “Above Mint Canyon” subarea (near the mouth of Sand Canyon) to the replacement SCWD Santa Clara and Bouquet wells, located in the “Above Saugus WRP” and “Bouquet Canyon” subareas, respectively (Table 3-9). The resultant impact on groundwater levels to the west was nearly insignificant, indicating no adverse effect on either sustainability or achievability of groundwater at a higher pumping rate in those subareas (Figures 4-12 through 4-15). However, in the “Above Mint Canyon” area to the east, while there was appreciable improvement, in places up to 20 feet of higher groundwater levels through prolonged dry periods, the redistribution of 1,600 afy from this alluvial subarea is not predicted to significantly improve operating conditions at most of the production wells in this area, as groundwater levels are still predicted to decline close to, or below, the open intervals of many of the existing production wells under the historical hydrologic conditions observed from the mid-1940s through the mid-1970s (see Figures 4-12 through 4-15).

The preceding "redistribution" analysis suggests that the Purveyors can expect that the "Above Mint Canyon" subarea will suffer from significantly depressed groundwater levels through extended dry periods that will, in turn, physically limit the amount of groundwater pumping in that area, most notably from the SCWD wells in that subarea. The "redistribution" analysis indicates that increased pumping to the west, to offset reduced pumping in the "Above Mint Canyon" area, is both sustainable and achievable. The residual "Above Mint Canyon" pumping (a total of 4,450 afy in multiple dry years; 3,300 afy by SCWD, 700 afy by NCWD, and 450 afy by Robinson Ranch) in the 2008 Operating Plan does not appear to be fully achievable through those dry periods. Implications are likely to be in the following range of possibilities. One possibility is that additional redistribution can be achieved by further increasing pumping to the west; that would tend to keep the total groundwater supply near the upper end (35,000 afy) of the dry-year range in the Operating Plan (Section 3.3.1). Model results of limited redistribution above indicate the probability that such can be accomplished with small decreases in groundwater levels that will not have an adverse effect on overall sustainability and achievability. A second possibility is that pumping is not increased to the west, even if pumping is reduced in the "Above Mint Canyon" area; in that case, the total achievable pumping in dry periods would be near the lower end (30,000 afy) of the dry-year range in the Operating Plan. Additionally, in this second case, because of the absence of episodic recharge events during such a prolonged period, pumping during or after years of near-normal rainfall may also require reduction to this same low end of the range in the Operating Plan (30,000 afy).

In summary, the 2008 Operating Plan, as originally crafted, would utilize groundwater in a sustainable manner, but is not expected to be fully achievable due to depressed groundwater levels at the eastern end of the basin, i.e. in the "Above Mint Canyon" area, through extended dry periods. As pumping in that area declines due to depressed groundwater levels, total Alluvial pumping can be expected to remain within the overall dry-period range in the 2008 Operating Plan (30,000 to 35,000 afy). With redistribution of pumping to the west, Alluvial pumping can be achieved toward the upper end of that range. However, without pumping redistribution to the west, Alluvial pumping can be expected to decrease toward the lower end of that range during most years until an episodic rainfall and recharge event occurs that substantially recharges the aquifer in the "Above Mint Canyon" area.

### 4.1.3 Potential Operating Plan

The Potential Operating Plan is not sustainable or achievable in the Alluvial Aquifer as configured. Although there are local areas where groundwater conditions would appear sustainable, overall the Potential Operating Plan is not sustainable or achievable because several of the Alluvial Aquifer subareas show groundwater elevations that are distinctly lower during most of the 86-year simulation period than under the 2008 Operating Plan, and show a continued decline over time (Figures 4-1 through 4-8).

The Potential Operating Plan shows modest long-term declines in Saugus Formation groundwater elevations at each Saugus production well, as indicated by comparing the relatively high groundwater elevations in the mid-1940s (following the drought of the mid-1920s through late 1930s) with the relatively high, but slightly lower, groundwater elevations of the mid-1980s

(following the drought of the mid-1940s through mid-1970s). The hydrographs in Figures 4-9 through 4-11 indicate that pumping during the next several decades from the Saugus Formation under the Potential Operating Plan would likely be achievable, but the long-term decline indicates that the Potential Operating Plan may not be sustainable beyond the next several decades.

## 4.2 Groundwater Recharge, Discharge, and Storage

The sustainability of each operating plan can also be evaluated by examining trends in groundwater recharge and groundwater discharge during the 86-year simulation period. The magnitudes of individual groundwater recharge mechanisms at any given time are the same for the 2008 Operating Plan and the Potential Operating Plan, because recharge is an input to the model and is not affected by groundwater pumping. However, the groundwater discharge terms are different for the two plans because of the different groundwater pumping rates and the corresponding differences between the two plans in how they affect groundwater levels and, therefore, the magnitudes of the various components of groundwater discharge.

Figure 4-16 compares the magnitudes and trends in groundwater recharge and groundwater discharge for the 2008 Operating Plan. The figure shows that groundwater recharge rates vary greatly from year to year because of year-to-year variations in precipitation and stormwater generation within the groundwater basin and in the contiguous upstream watersheds. In contrast, total groundwater discharge is much less variable from year to year, with variations arising from increased pumping during drought years and increased evapotranspiration and groundwater discharge to the Santa Clara River during wet years. The groundwater discharge plot shows no obvious downward trend over time in groundwater discharges to streams or other discharge terms, and total discharges are do not show a continued downward trend over time. This indicates that the 2008 Operating Plan is sustainable in the long-term, a conclusion that is consistent with the examination of the groundwater elevation hydrographs discussed previously in Section 4.1.1.

Figure 4-17 compares the groundwater discharge terms for the 2008 and Potential Operating Plans. The figure shows that total groundwater discharges and discharges to streams are lower under the Potential Operating Plan than under the 2008 Operating Plan. The discharges to streams appear to decline gradually over time under the Potential Operating Plan, whereas these discharges appear more stable under the 2008 plan after the 1940s and early 1950s. This difference in groundwater discharge trends between the two operating plans is also evident in a plot showing the cumulative change in groundwater storage over time during the 86-year simulation period (Figure 4-18). The cumulative change in groundwater storage is a measure of the longer-term trends in the amount of groundwater in storage, and is plotted on a monthly basis. The 2008 Operating Plan shows a recovery of groundwater storage volumes beginning in the late 1970s, after the droughts of prior years. While the Potential Operating Plan also shows some recovery in the late 1970s, the curve as a whole remains lower in value after the 1940s than during the first two decades of the simulation.

In summary, the differences between the two operating plans' groundwater discharge trends and groundwater storage trends during the 86-year simulation period is consistent with the observed

trends in groundwater elevations and the associated conclusions about sustainability discussed above.

## 4.3 River Flows

Figure 4-19 shows the total flows estimated by the model for the Santa Clara River at the County Line gage, which is located at the western end of the Valley. The figure contains both a linear plot and a semi-logarithmic plot, to better illustrate the flows during low-flow periods. As shown by both plots, total flow in the river at the County Line varies considerably over time. This variation occurs because of temporal variations in rainfall, streamflow, and groundwater discharges to the river.

The influences of the local hydrology and the groundwater operating plans on the Santa Clara River are also shown by Figure 4-20, which displays the model-calculated volumes of monthly groundwater discharge to the river. Groundwater discharges to the river occur along the river reach lying downstream of the mouth of San Francisquito Canyon. The figure shows that the groundwater discharge rates to the river also vary over time, both seasonally and over multi-year periods. For the 2008 Operating Plan, the model simulates no groundwater discharge to the river at certain times during the droughts of the mid-1930s and the mid-1940s to mid-1970s. In contrast, the Potential Operating Plan not only results in smaller discharges to the river at most times, but also results in many more months of no groundwater discharge to the river compared with the 2008 Operating Plan.

As discussed by CH2M HILL (2004a), the river baseflow (flow other than from stormwater runoff) gage has increased at the County Line since water imports into the Valley began in 1980. Figure 4-21 shows the historically recorded monthly flow during the driest month of each year since 1950 and compares this flow with the driest-month flow predicted to occur each year under the 2008 and Potential Operating Plans. The plot shows that under the local, ambient hydrologic conditions observed from 1922 through 1979, the 2008 Operating Plan would have maintained river flows at levels higher than were actually recorded during those years (prior to the importation of water). The Potential Operating Plan also would have maintained higher river flow in most years, with a few years (1969, 1972, and 1975) showing similar driest-month river flows as were historically recorded. This indicates that both operating plans, and in particular the 2008 Operating Plan, will maintain river flows at higher levels than occurred prior to urbanization of the Valley.

## 4.4 Relationship of Simulation Results to Future Conditions

The curves presented on Figures 4-1 through 4-21 provide a general indication of the types of fluctuations in groundwater conditions that could be expected to occur in the future in the Santa Clarita Valley over a period of many years under the two operating plans. However, these curves have been derived using an assumed sequence of local hydrologic conditions that is based on the sequence of rainfall and streamflow volumes that were measured during the past several decades. In the future, the year-to-year volumes and trends in rainfall and streamflow could vary from those observed in the past because of 1) changes in the timing and magnitude of multi-decadal cycles of drought and wetter-than-normal conditions such as those that have been observed in the

past; and/or 2) because of global-scale changes in climate. The latter topic and its potential effect on the sustainability of the 2008 Operating Plan are discussed in the following Chapter 5 of this report.

Ta le 4-

Pumping Rates Simulated for Individual Alluvial Aquifer Wells nder the Re- istri uted 2008 Groundwater Operating Plan Listed B Alluvial Su area

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| Well Name | Alluvial Subarea | Original 2008 Operating Plan Normal | Dry Yr 1 | Dry Yr 2+ | Re-Distributed 2008 Operating Plan Normal | Dry Yr 1 | Dry Yr 2+ | Comments |
|---|---|---|---|---|---|---|---|---|
| NCWD-Pinetree 1 | Above Mint Canyon | 150 | 0 | 0 | 150 | 0 | 0 | |
| NCWD-Pinetree 3 | Above Mint Canyon | 350 | 300 | 300 | 350 | 300 | 300 | |
| NCWD-Pinetree 4 | Above Mint Canyon | 300 | 200 | 200 | 300 | 200 | 200 | |
| NCWD-Pinetree 5 | Above Mint Canyon | 300 | 200 | 200 | 300 | 200 | 200 | |
| Robinson Ranch | Above Mint Canyon | 600 | 550 | 450 | 600 | 550 | 450 | |
| **SCWD-Sand Canyon** | **Above Mint Canyon** | **1,000** | **600** | **200** | **200** | **150** | **0** | **Reduce these three wells by 1,600 afy in order to** |
| **SCWD-Lost Canyon 2** | **Above Mint Canyon** | **700** | **700** | **650** | **300** | **150** | **0** | **offset increased pumping at the SCWD-Santa Clara and** |
| **SCWD-Lost Canyon 2A** | **Above Mint Canyon** | **700** | **650** | **600** | **300** | **150** | **0** | **SCWD-Bouquet wells in the "Above Saugus WRP" area.** |
| SCWD-Mitchell #5A | Above Mint Canyon | 500 | 350 | 200 | 500 | 350 | 200 | |
| SCWD-Mitchell #5B | Above Mint Canyon | 800 | 550 | 300 | 800 | 550 | 300 | |
| SCWD-N. Oaks Central | Above Mint Canyon | 850 | 800 | 700 | 850 | 800 | 700 | |
| SCWD-N. Oaks East | Above Mint Canyon | 800 | 750 | 700 | 800 | 750 | 700 | |
| SCWD-N. Oaks West | Above Mint Canyon | 800 | 750 | 700 | 800 | 750 | 700 | |
| SCWD-Sierra | Above Mint Canyon | 1,100 | 900 | 700 | 1,100 | 900 | 700 | |
| **Mint Canyon Total** | | **8,950** | **7,300** | **5,900** | **7,350** | **5,800** | **4,450** | |
| SCWD-Honby | Above Saugus WRP | 1,000 | 850 | 700 | 1,000 | 850 | 700 | |
| SCWD-Santa Clara | Above Saugus WRP | 800 | 800 | 800 | 800 | 800 | 800 | |
| **SCWD-Valley Center** | **Above Saugus WRP** | **0** | **0** | **0** | **800** | **800** | **800** | **Pumps 800 afy moved from the "Above Mint Canyon" area.** |
| **SCWD-Bouquet** | **Above Saugus WRP** | **0** | **0** | **0** | **800** | **800** | **800** | **Pumps 800 afy moved from the "Above Mint Canyon" area.** |
| VWC-T7 | Above Saugus WRP | 750 | 750 | 750 | 750 | 750 | 750 | |
| VWC-U4 | Above Saugus WRP | 800 | 800 | 800 | 800 | 800 | 800 | |
| VWC-U6 | Above Saugus WRP | 800 | 800 | 800 | 800 | 800 | 800 | |
| **Above Saugus WRP Total** | | **4,150** | **4,000** | **3,850** | **5,750** | **5,600** | **5,450** | |
| VWC-N | Below Saugus WRP | 650 | 650 | 650 | 650 | 650 | 650 | |
| VWC-N7 | Below Saugus WRP | 1,160 | 1,160 | 1,160 | 1,160 | 1,160 | 1,160 | |
| VWC-N8 | Below Saugus WRP | 1,160 | 1,160 | 1,160 | 1,160 | 1,160 | 1,160 | |
| VWC-Q2 | Below Saugus WRP | 1,100 | 1,100 | 1,100 | 1,100 | 1,100 | 1,100 | |
| VWC-S6 | Below Saugus WRP | 1,000 | 1,000 | 1,000 | 1,000 | 1,000 | 1,000 | |
| VWC-S7 | Below Saugus WRP | 500 | 500 | 500 | 500 | 500 | 500 | |
| VWC-S8 | Below Saugus WRP | 500 | 500 | 500 | 500 | 500 | 500 | |
| **Below Saugus WRP Total** | | **6,070** | **6,070** | **6,070** | **6,070** | **6,070** | **6,070** | |
| NLF-161 | Below Valencia WRP | 1,000 | 1,000 | 1,000 | 1,000 | 1,000 | 1,000 | |
| NLF-B10 | Below Valencia WRP | 500 | 350 | 350 | 500 | 350 | 350 | |
| NLF-B11 | Below Valencia WRP | 100 | 200 | 200 | 100 | 200 | 200 | |
| NLF-B14 | Below Valencia WRP | 300 | 1,000 | 1,000 | 300 | 1,000 | 1,000 | |
| NLF-B20 | Below Valencia WRP | 350 | 500 | 500 | 350 | 500 | 500 | |
| NLF-B5 | Below Valencia WRP | 2,400 | 1,900 | 1,900 | 2,400 | 1,900 | 1,900 | |
| NLF-B6 | Below Valencia WRP | 1,100 | 1,100 | 1,100 | 1,100 | 1,100 | 1,100 | |
| NLF-C | Below Valencia WRP | 1,100 | 1,000 | 1,000 | 1,100 | 1,000 | 1,000 | |
| NLF-C3 | Below Valencia WRP | 100 | 200 | 200 | 100 | 200 | 200 | |
| NLF-C4 | Below Valencia WRP | 200 | 450 | 450 | 200 | 450 | 450 | |
| NLF-C5 | Below Valencia WRP | 900 | 850 | 850 | 900 | 850 | 850 | |
| NLF-C7 | Below Valencia WRP | 350 | 300 | 300 | 350 | 300 | 300 | |
| NLF-C8 | Below Valencia WRP | 400 | 400 | 400 | 400 | 400 | 400 | |
| NLF-E5 | Below Valencia WRP | 100 | 150 | 150 | 100 | 150 | 150 | |
| NLF-E9 | Below Valencia WRP | 900 | 350 | 350 | 900 | 350 | 350 | |
| NLF-G45 | Below Valencia WRP | 350 | 400 | 400 | 350 | 400 | 400 | |
| VWC-E15 | Below Valencia WRP | 800 | 800 | 800 | 800 | 800 | 800 | |
| **Below Valencia WRP Total** | | **10,950** | **10,950** | **10,950** | **10,950** | **10,950** | **10,950** | |
| SCWD-Clark | Bouquet Canyon | 700 | 700 | 700 | 700 | 700 | 700 | |
| SCWD-Guida | Bouquet Canyon | 1,300 | 1,250 | 1,200 | 1,300 | 1,250 | 1,200 | |
| **Bouquet Canyon Total** | | **2,000** | **1,950** | **1,900** | **2,000** | **1,950** | **1,900** | |
| VWC-W10 | San Francisquito Canyon | 1,000 | 1,000 | 1,000 | 1,000 | 1,000 | 1,000 | |
| VWC-W11 | San Francisquito Canyon | 800 | 800 | 800 | 800 | 800 | 800 | |
| VWC-W9 | San Francisquito Canyon | 950 | 950 | 950 | 950 | 950 | 950 | |
| **San Francisquito Canyon Total** | | **2,750** | **2,750** | **2,750** | **2,750** | **2,750** | **2,750** | |
| NCWD-Castaic 1 | Castaic Valley | 350 | 300 | 250 | 350 | 300 | 250 | |
| NCWD-Castaic 2 | Castaic Valley | 100 | 100 | 100 | 100 | 100 | 100 | |
| NCWD-Castaic 4 | Castaic Valley | 100 | 0 | 0 | 100 | 0 | 0 | |
| NCWD-Castaic 7 | Castaic Valley | 300 | 200 | 200 | 300 | 200 | 200 | |
| VWC-D | Castaic Valley | 880 | 880 | 880 | 880 | 880 | 880 | |
| WHR | Castaic Valley | 2,000 | 2,000 | 2,000 | 2,000 | 2,000 | 2,000 | |
| **Castaic Valley Total:** | | **3,730** | **3,480** | **3,430** | **3,730** | **3,480** | **3,430** | |
| **Total Alluvial Pumping** | | **38,600** | **36,500** | **34,850** | **38,600** | **36,600** | **35,000** | **Current Operating Plan:** |
| | | | | | | | | **35,000 to 40,000 AF/yr in normal and wet years** |
| | | | | | | | | **30,000 to 35,000 AF/yr in dry years** |

**Notes:**

All pumping volumes are listed in acre-feet per year (afy).

Wells that are not listed are assumed to not be pumping in the future.

NLF = Newhall Land & Farming Company

NCWD = Newhall County Water District

SCWD = Santa Clarita Division of Castaic Lake Water Agency

VWC = Valencia Water Company

WHR = Wayside Honor Rancho, whose wells are owned by the Los Angeles County Waterworks District No. 36

**Figure 4-1: VWC-E15 Modeled Groundwater Elevations for 2008 and Potential Operating Plans (Alluvial Aquifer Below Valencia WRP)**

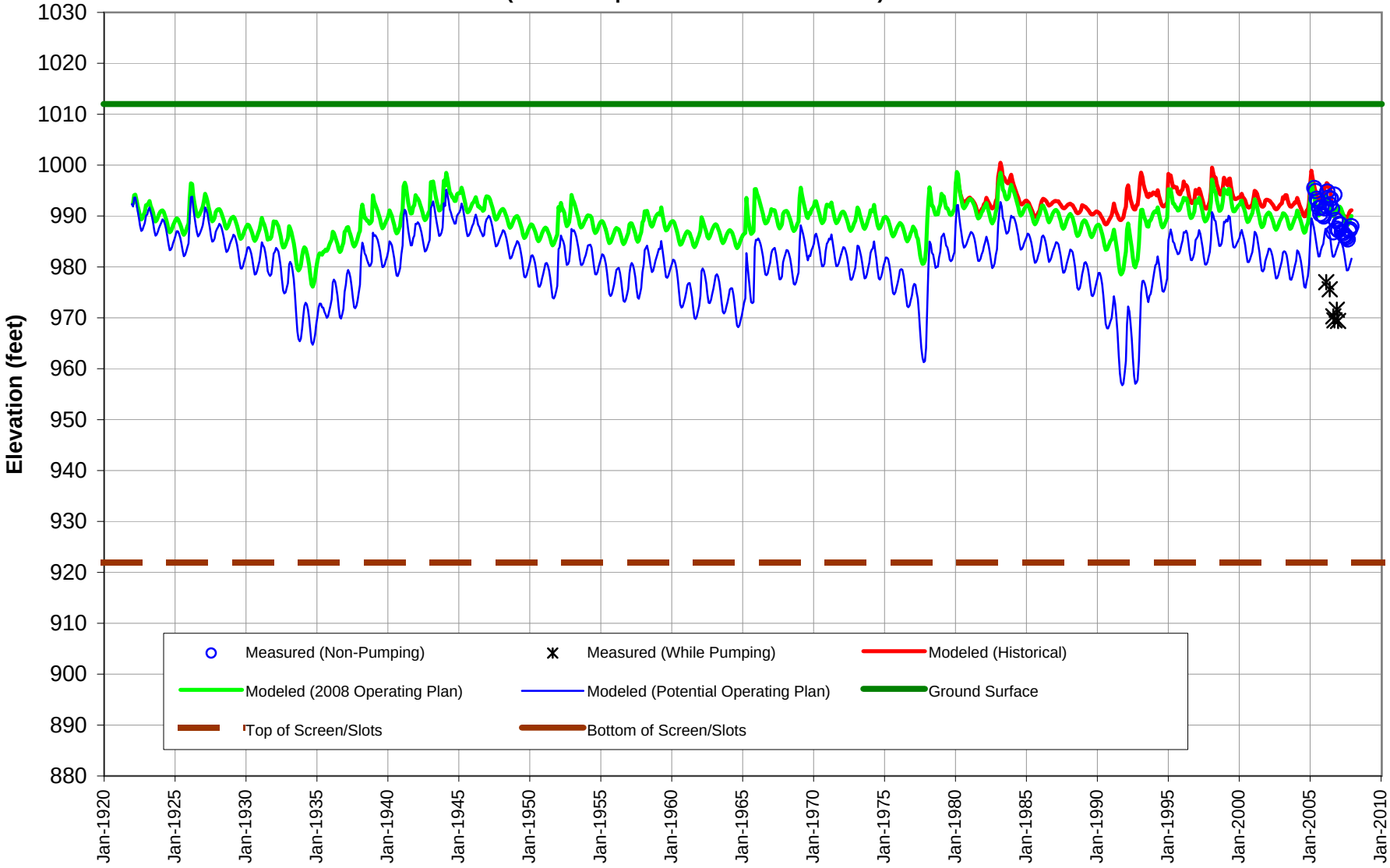


**Figure 4-2: VWC-S8 Modeled Groundwater Elevations for 2008 and Potential Operating Plans (Alluvial Aquifer Below Saugus WRP)**

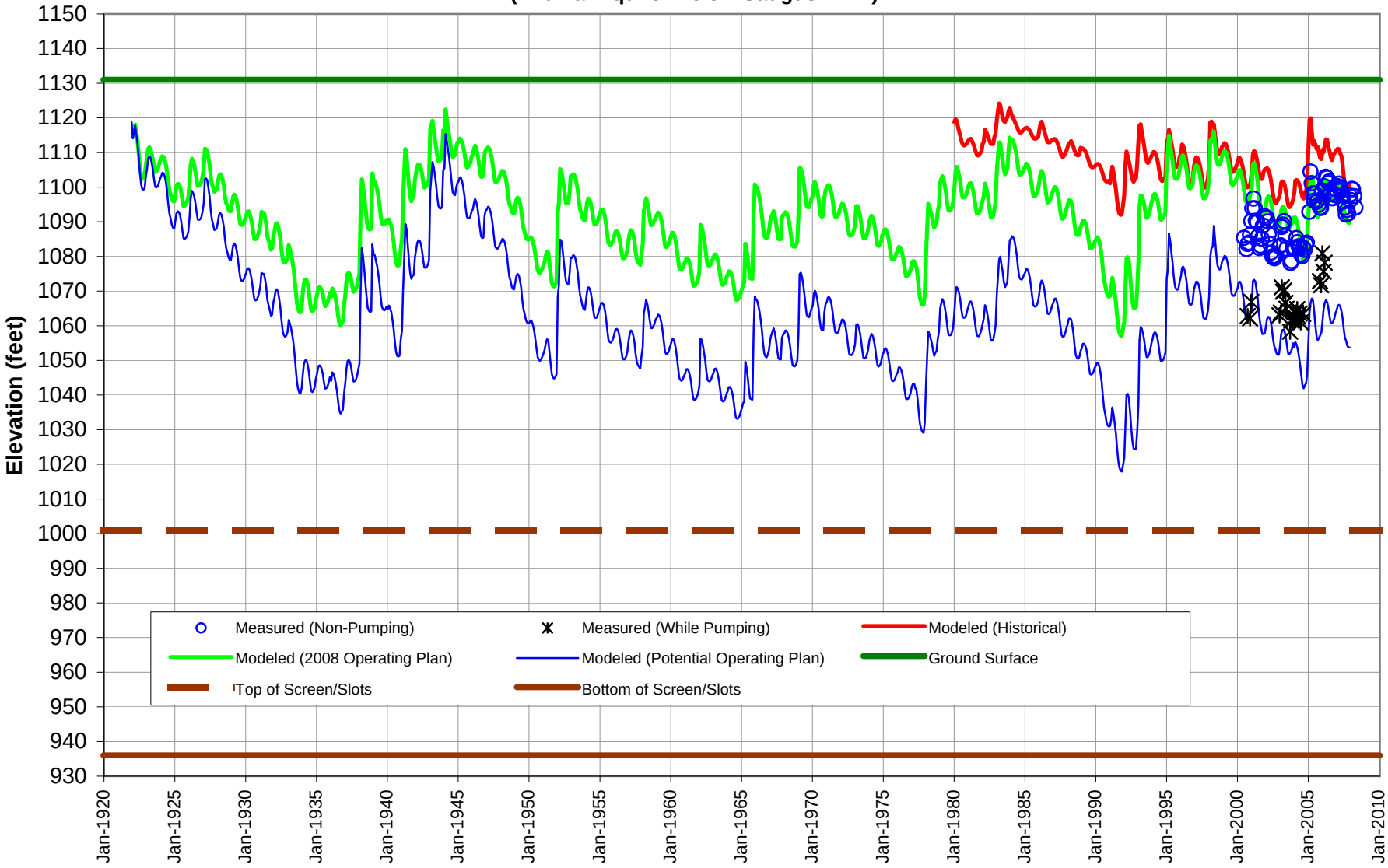


**Figure 4-3: VWC-T7 Modeled Groundwater Elevations for 2008 and Potential Operating Plans (Alluvial Aquifer Above Saugus WRP)**

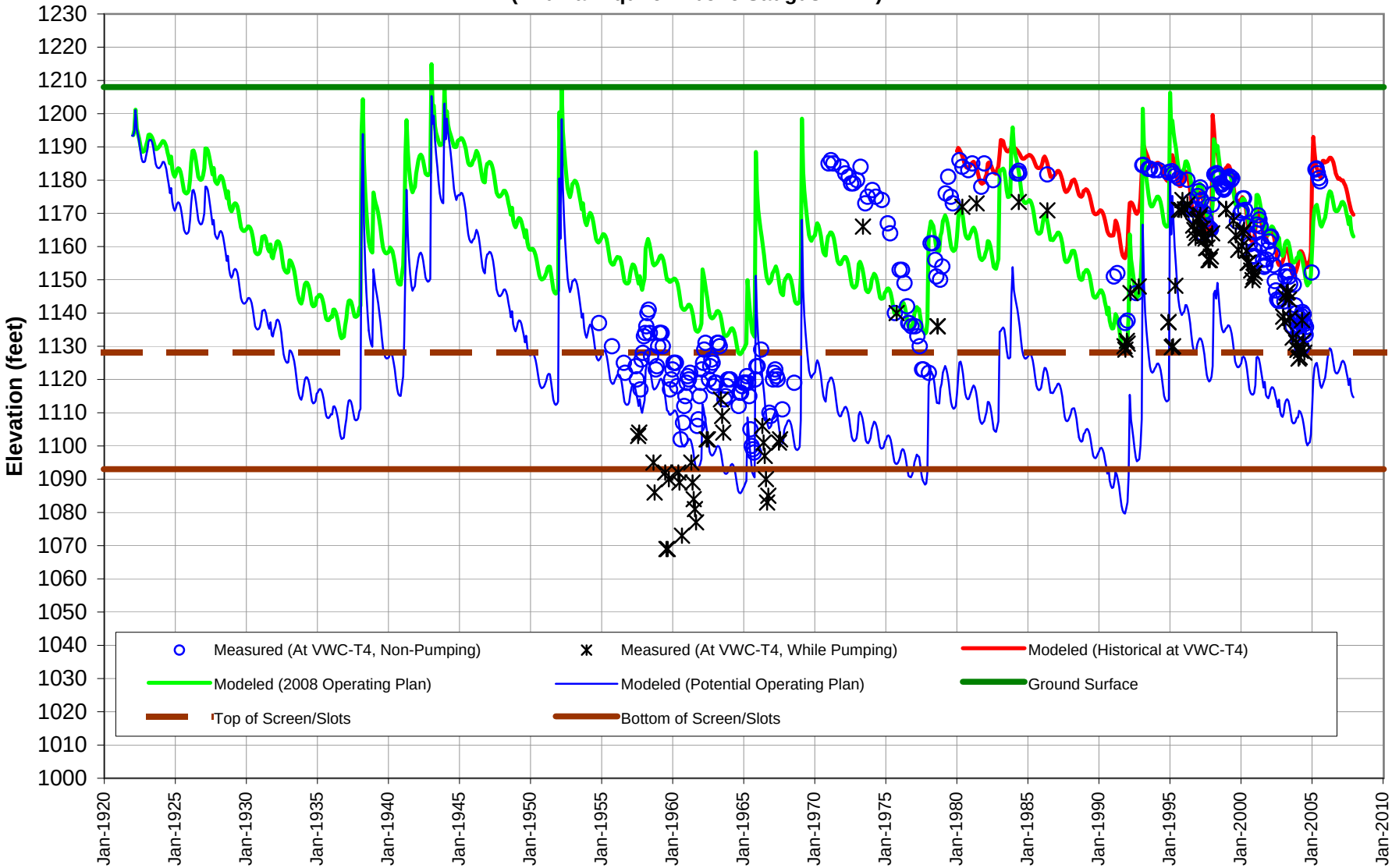


**Figure 4-4: SCWD - Sierra Modeled Groundwater Elevations for 2008 and Potential Operating Plans (Alluvial Aquifer Along Santa Clara River, At and Above Mint Canyon)**

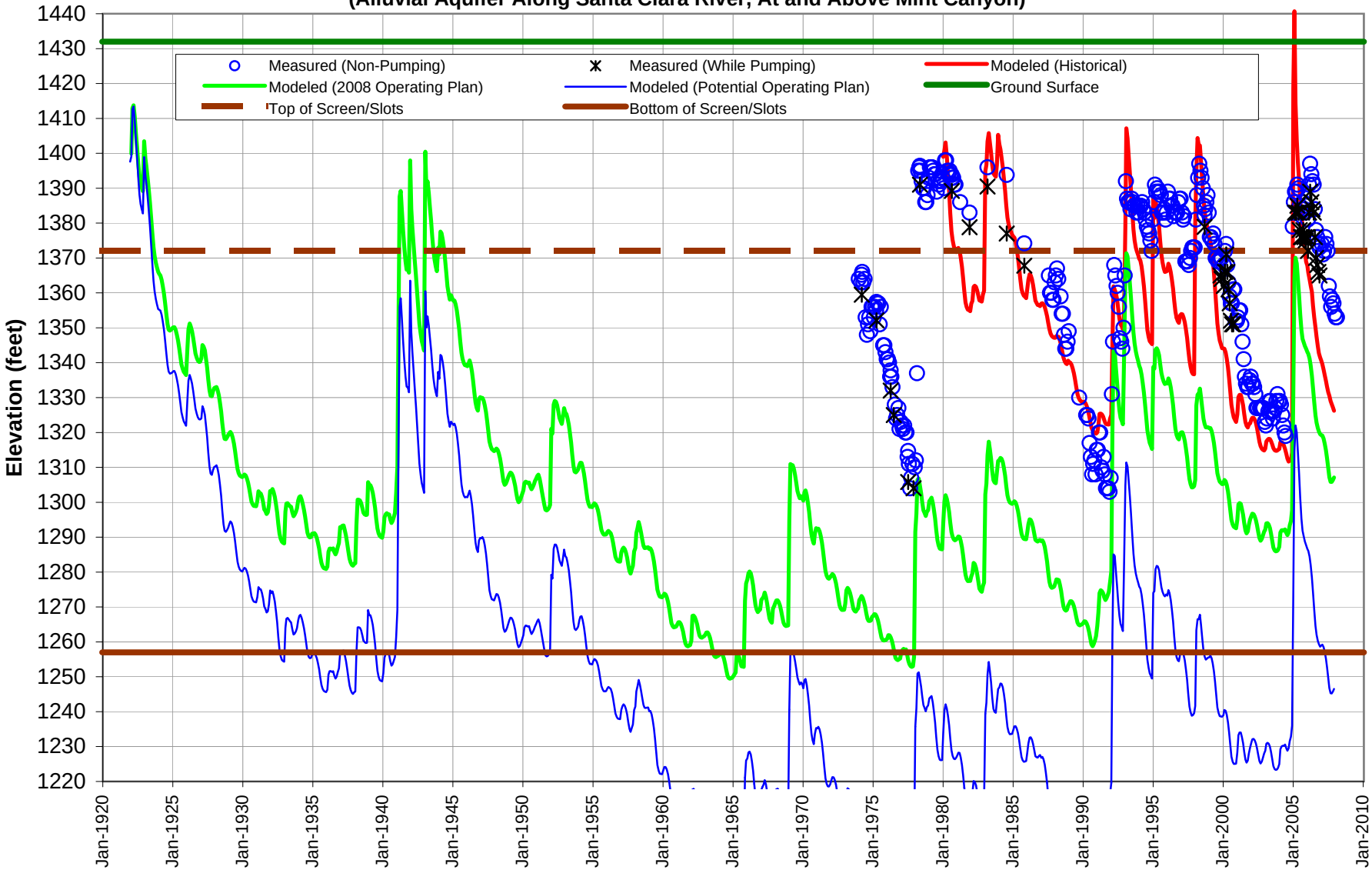


**Figure 4-5: NCWD - Pinetree 1 Modeled Groundwater Elevations for 2008 and Potential Operating Plans (Alluvial Aquifer Along Santa Clara River, At and Above Mint Canyon)**

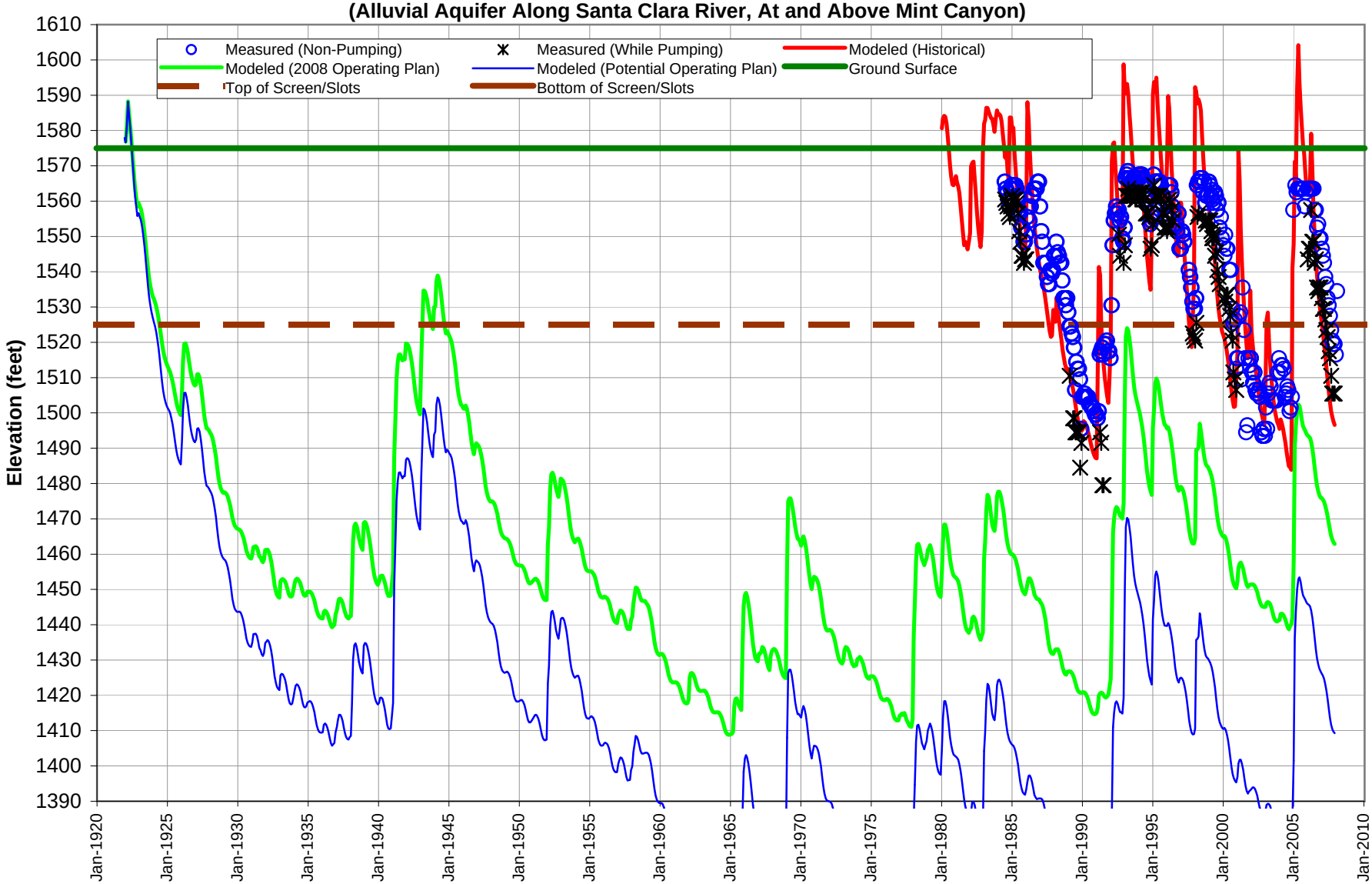


**Figure 4-6: NCWD - Castaic 7 Modeled Groundwater Elevations for 2008 and Potential Operating Plans (Alluvial Aquifer in Castaic Valley)**

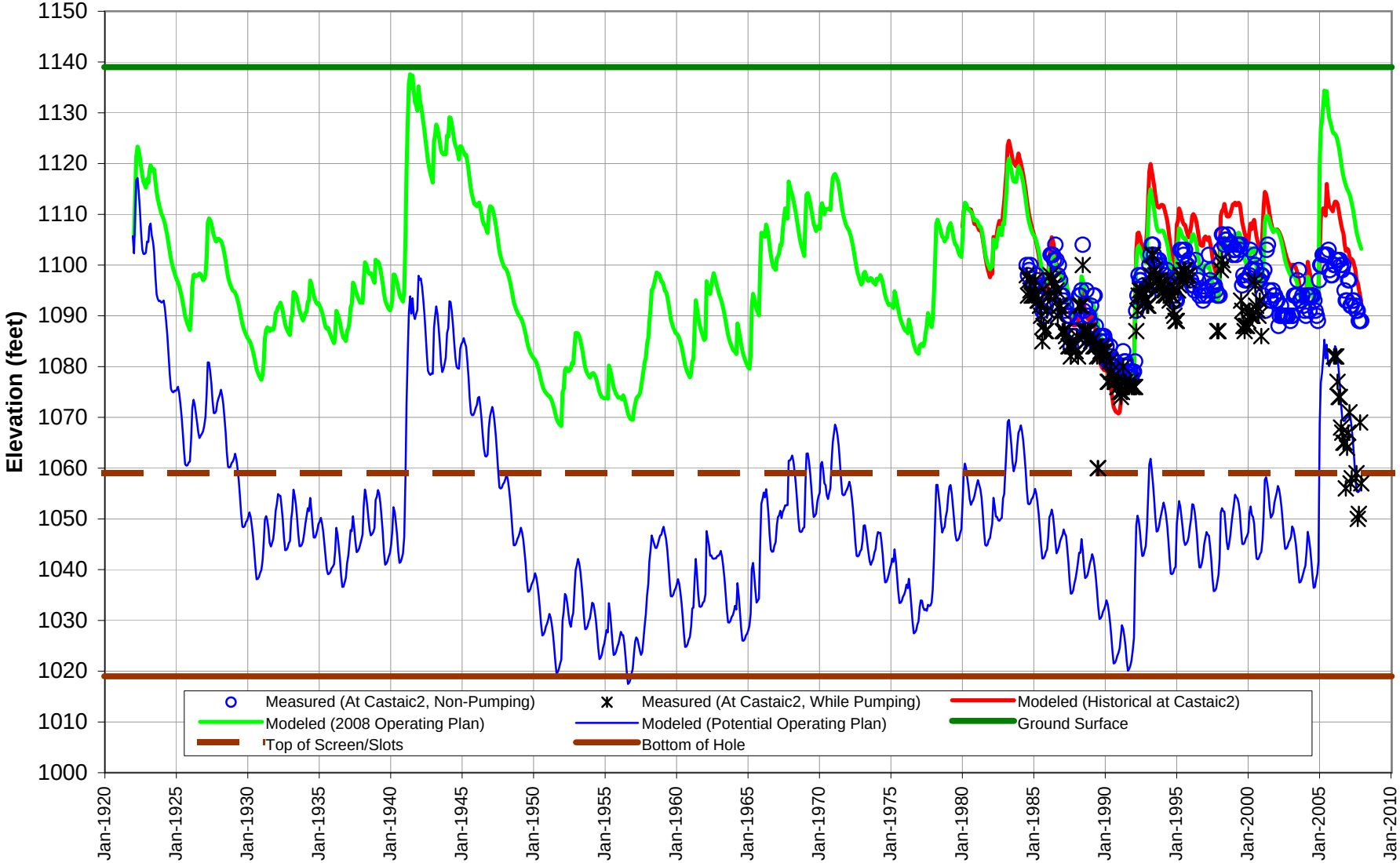


**Figure 4-7: VWC-W11 Modeled Groundwater Elevations for 2008 and Potential Operating Plans (Alluvial Aquifer in San Francisquito Canyon)**

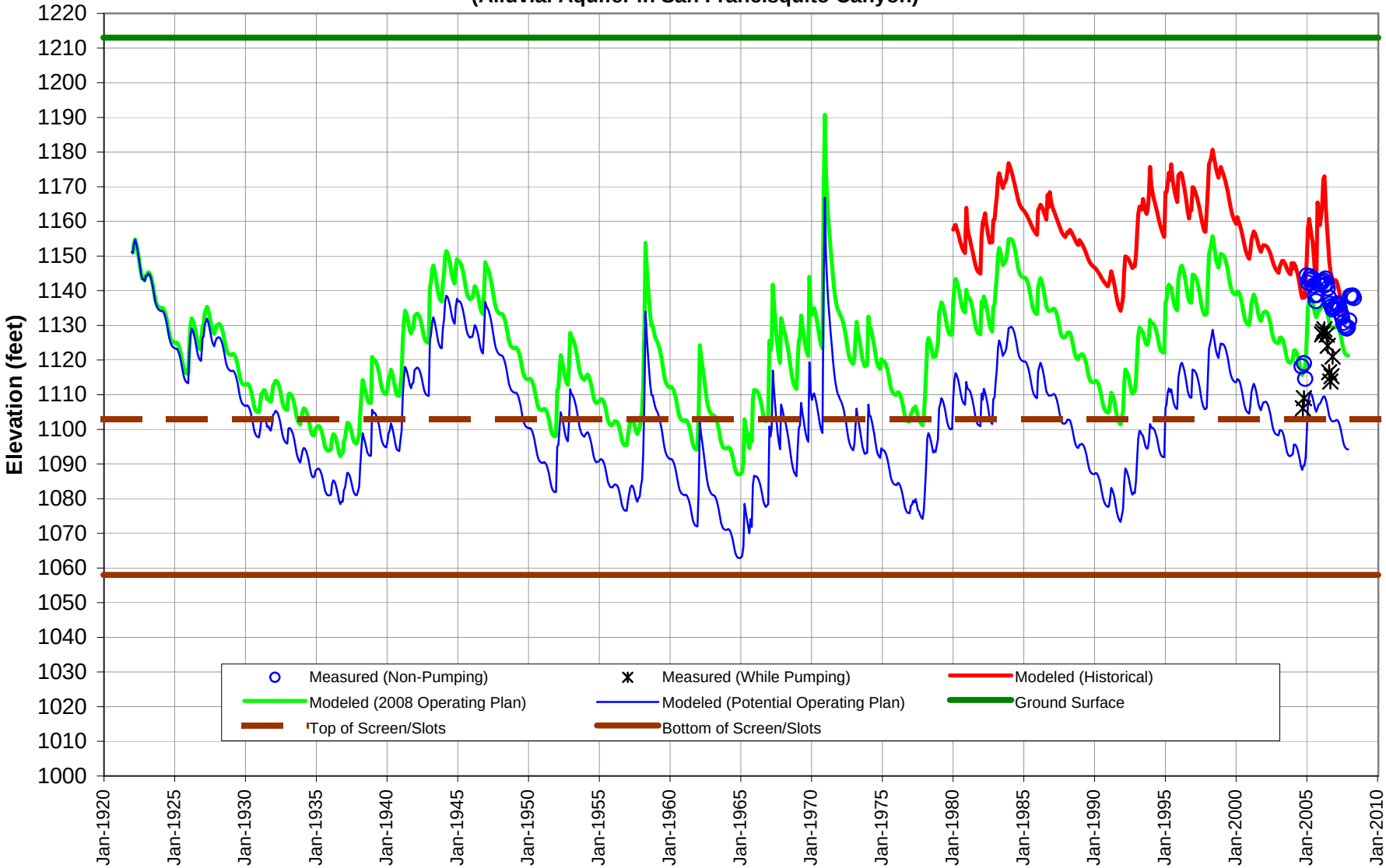


**Figure 4-8: SCWD - Clark Modeled Groundwater Elevations for 2008 and Potential Operating Plans (Alluvial Aquifer in Bouquet Canyon)**

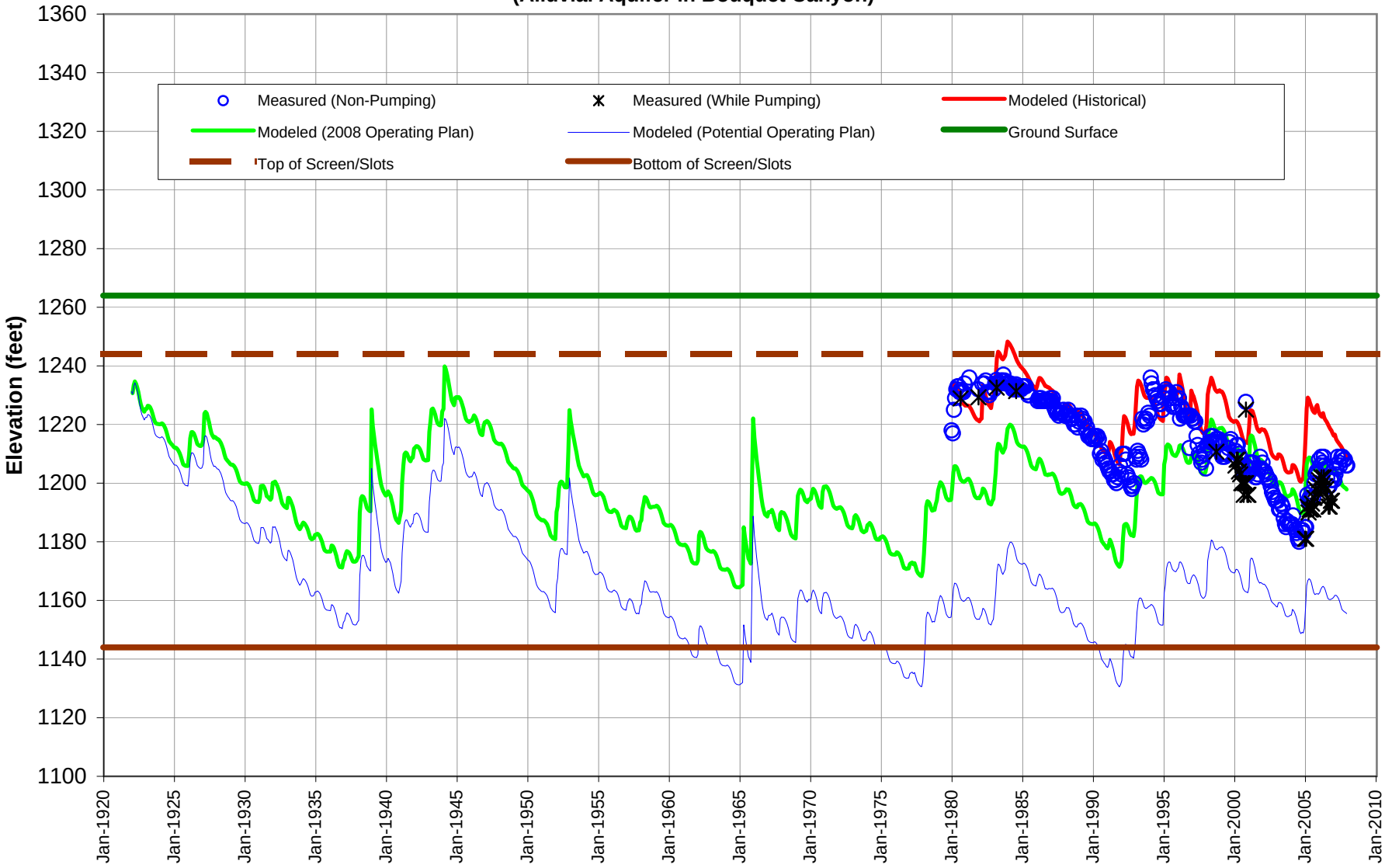


**Figure 4-9: SCWD-Saugus1 Modeled Groundwater Elevations for 2008 and Potential Operating Plans (Saugus Formation)**

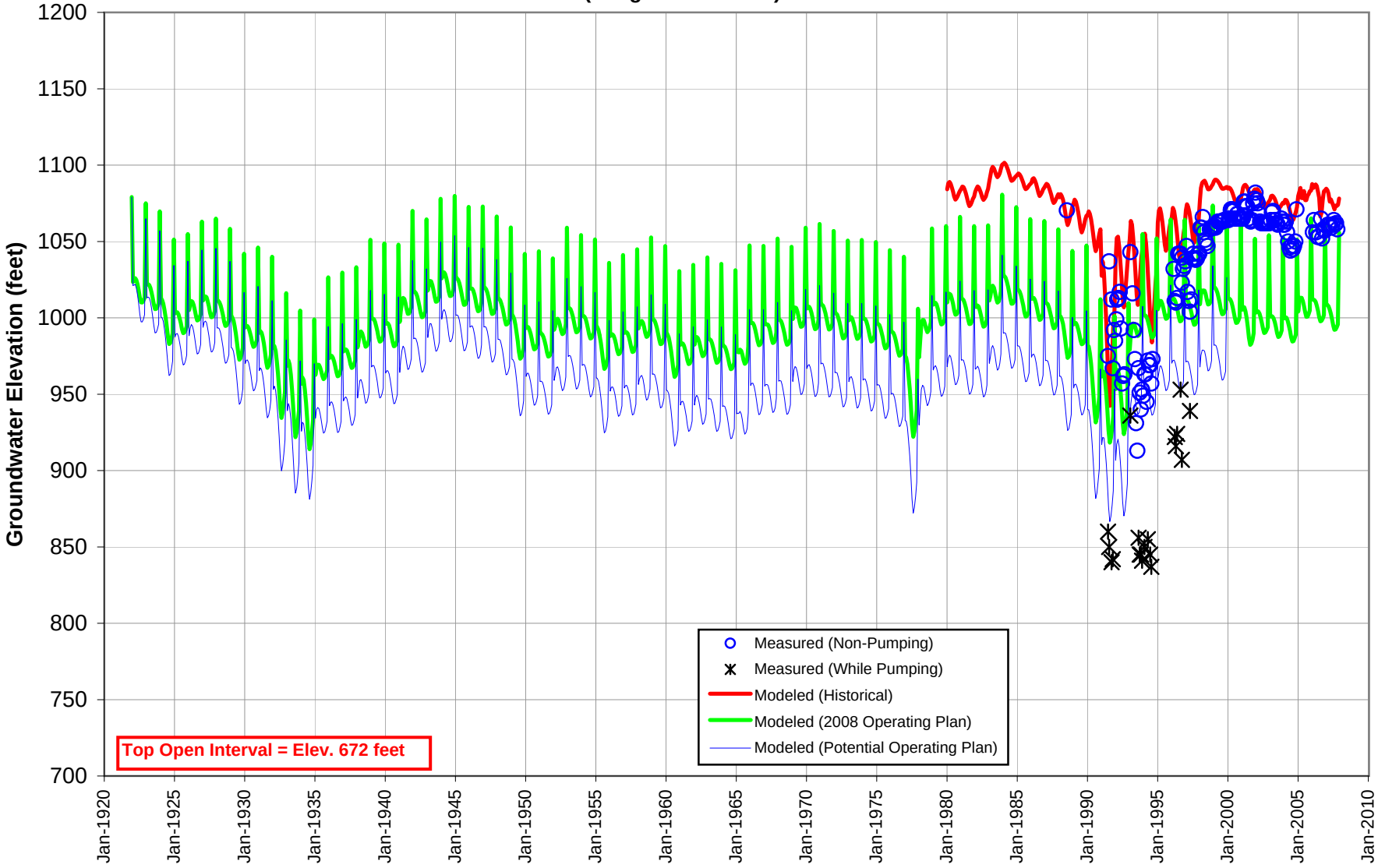


**Figure 4-10: VWC-206 Modeled Groundwater Elevations for 2008 and Potential Operating Plans (Saugus Formation)**

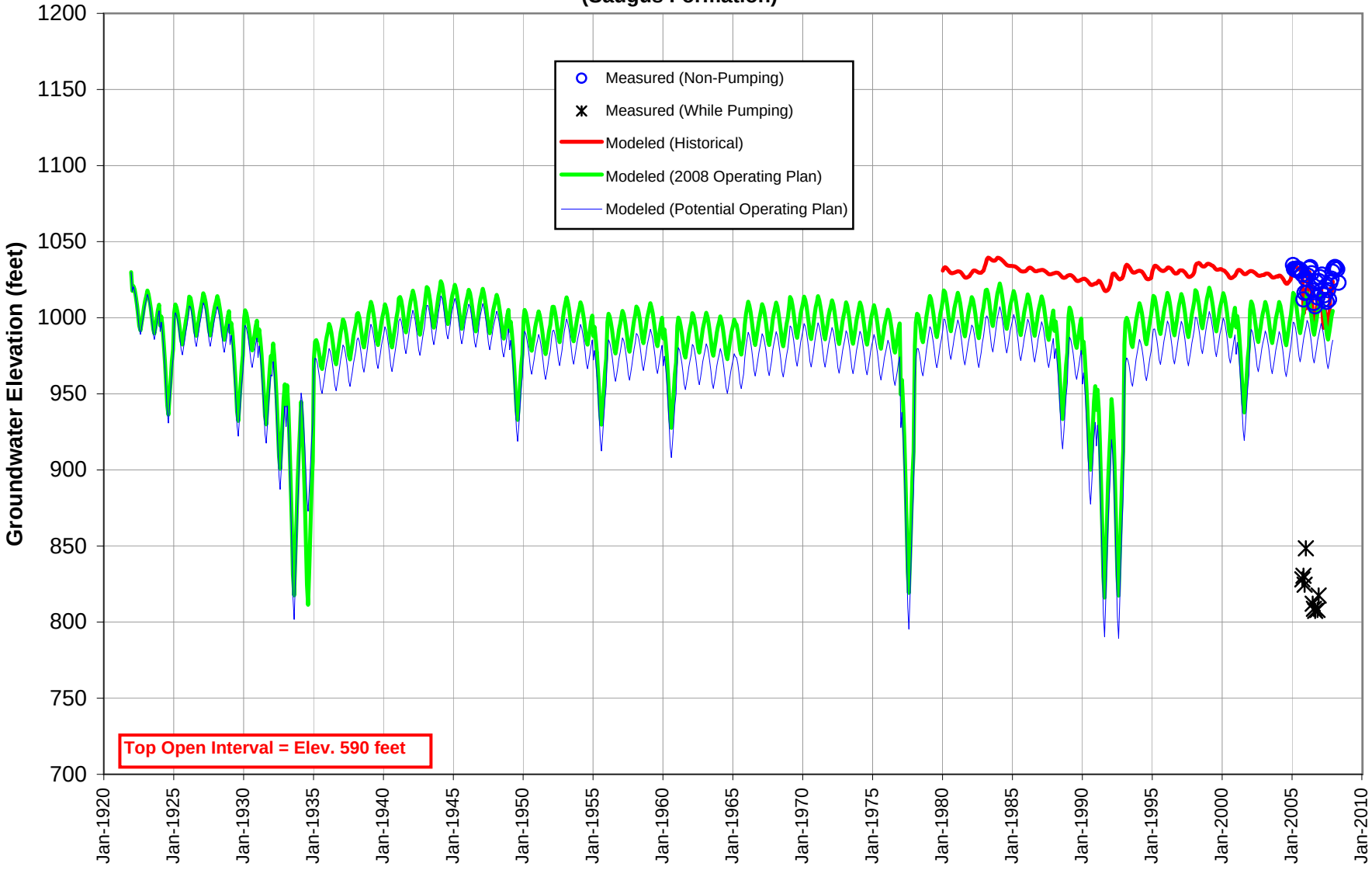


**Figure 4-11: NCWD-13 Modeled Groundwater Elevations for 2008 and Potential Operating Plans (Saugus Formation)**

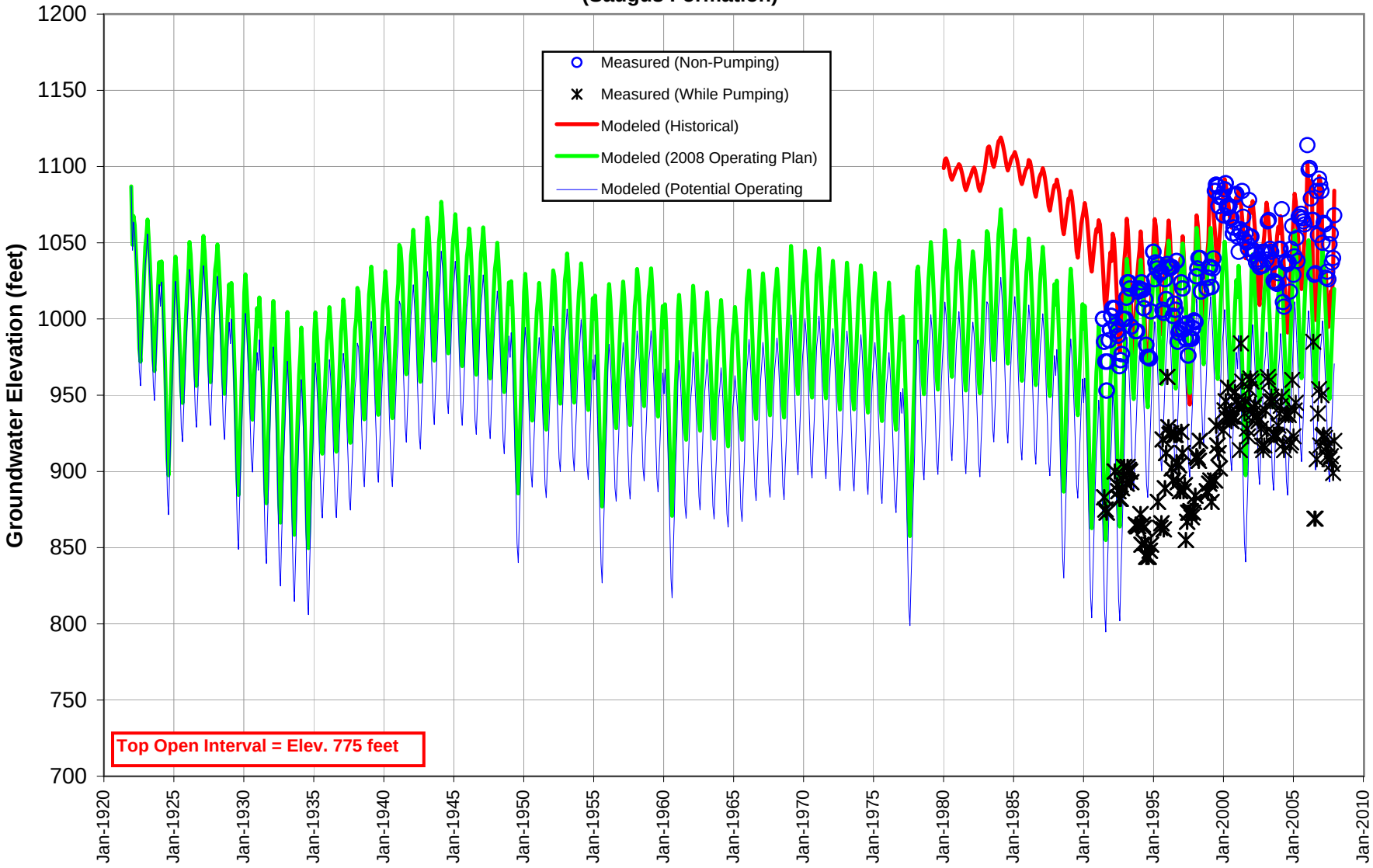


**Figure 4-12: VWC-T7 Modeled Groundwater Elevations for Initial and Modified 2008 Operating Plans (Alluvial Aquifer Above Saugus WRP)**

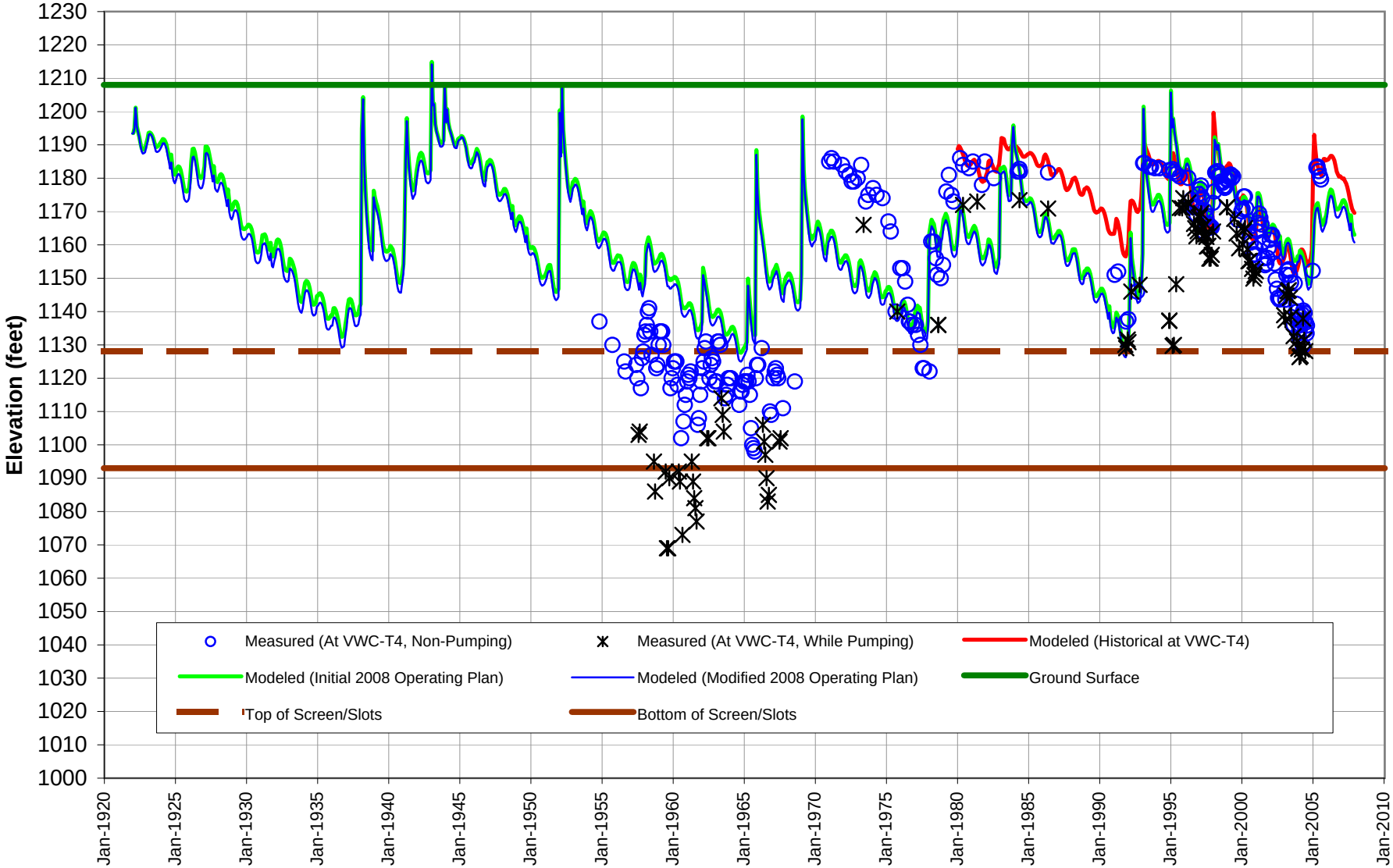


**Figure 4-13: SCWD-Clark Modeled Groundwater Elevations for Initial and Modified 2008 Operating Plans (Alluvial Aquifer in Bouquet Canyon)**

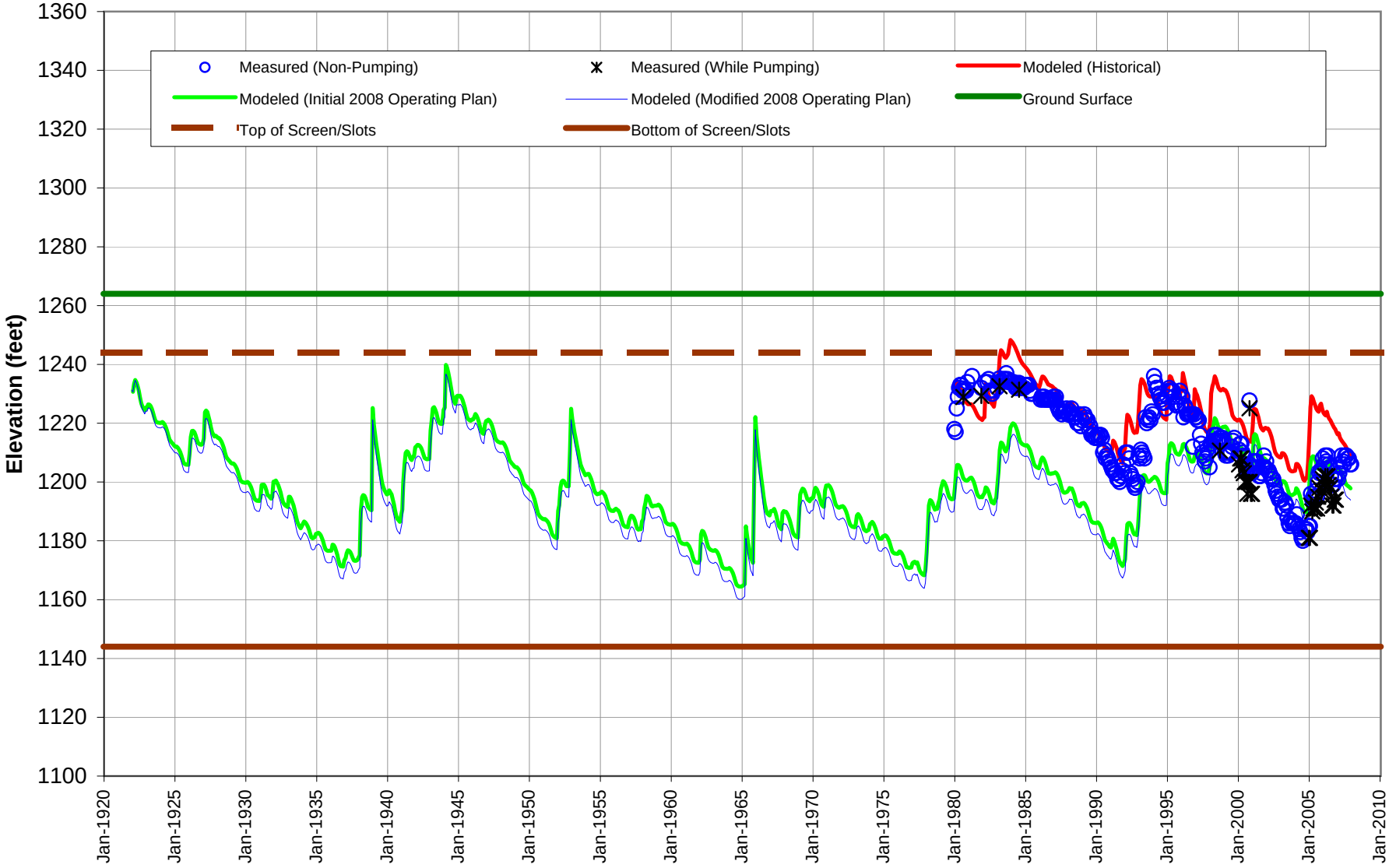


**Figure 4-14: SCWD-Sierra Modeled Groundwater Elevations for Initial and Modified 2008 Operating Plans (Alluvial Aquifer Along Santa Clara River, At and Above Mint Canyon)**

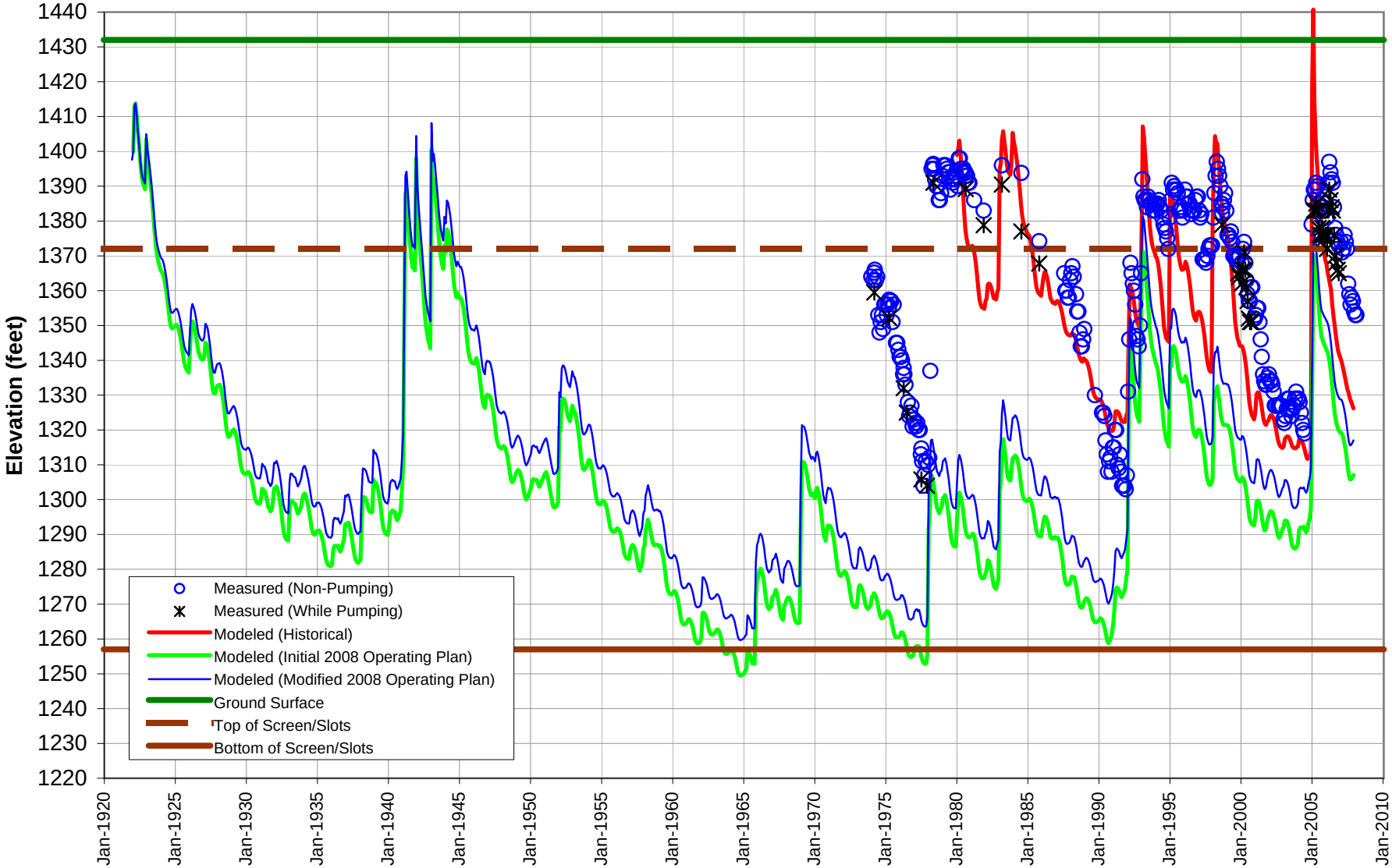


**Figure 4-15: NCWD-Pinetree3 Modeled Groundwater Elevations for Initial and Modified 2008 Operating Plans (Alluvial Aquifer Along Santa Clara River, At and Above Mint Canyon)**

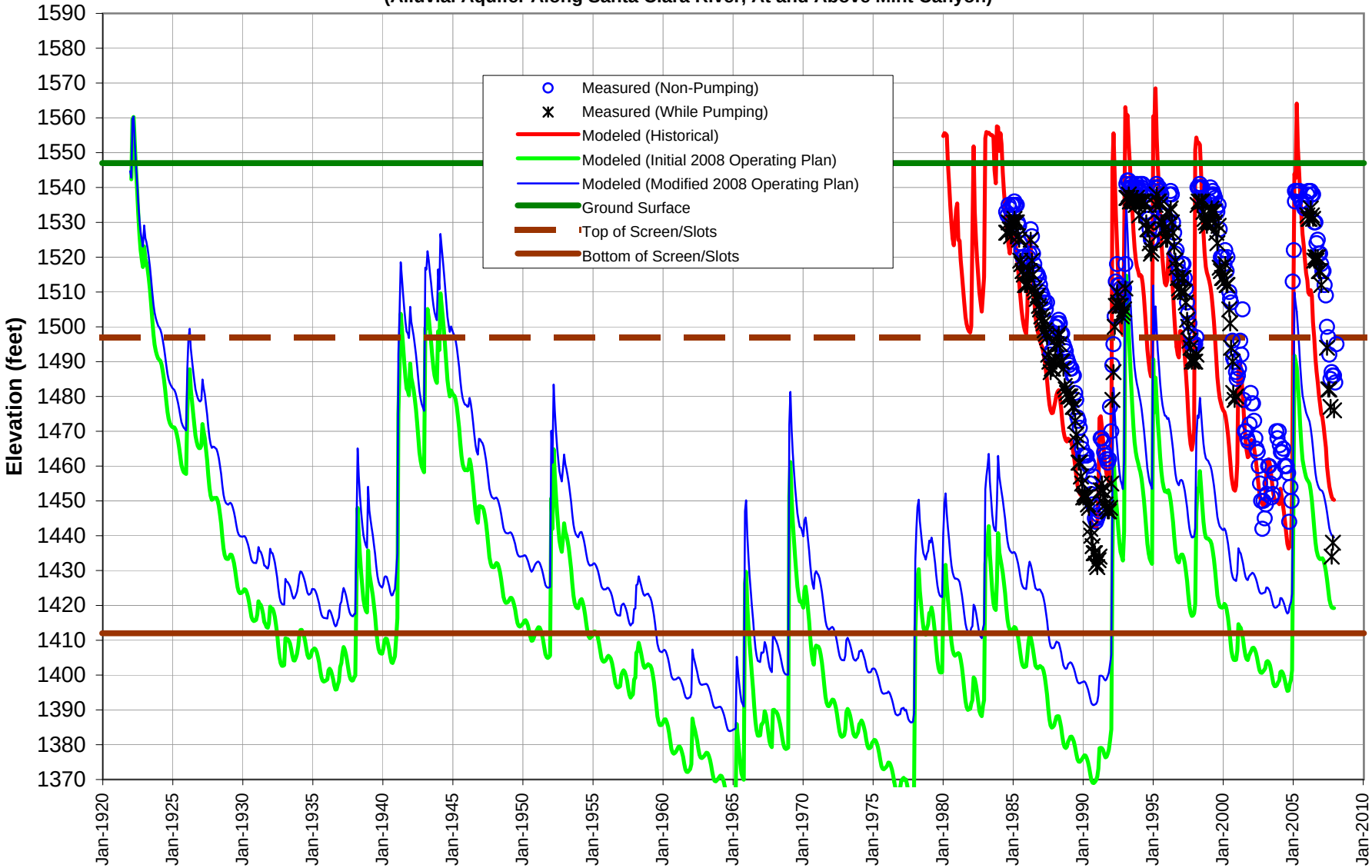
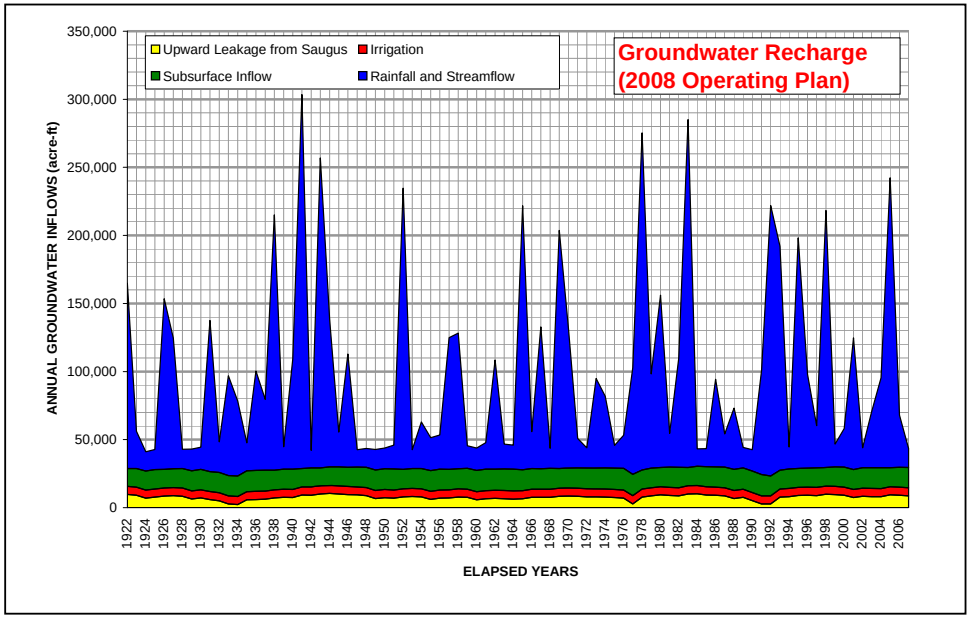
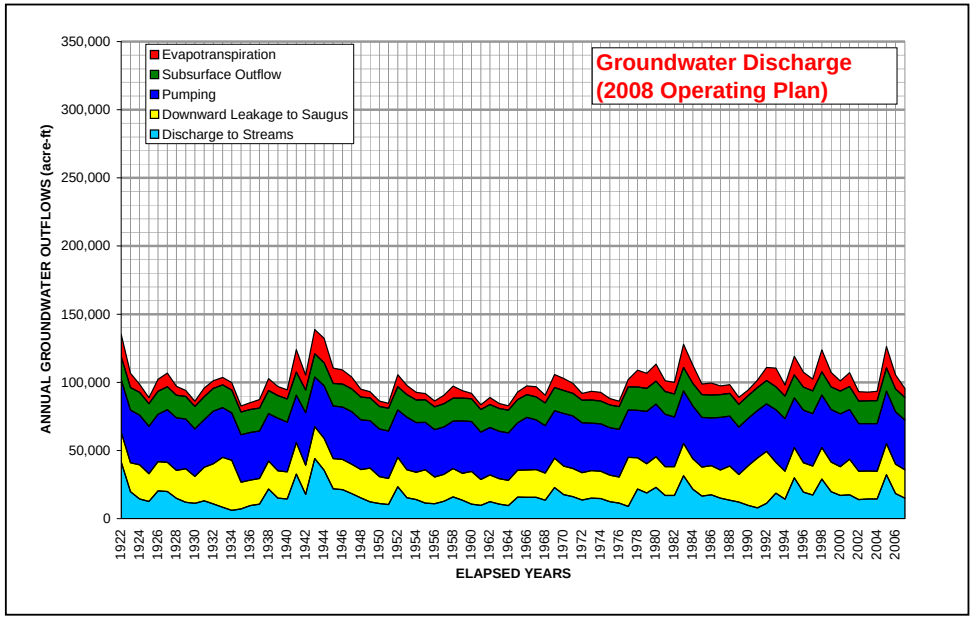


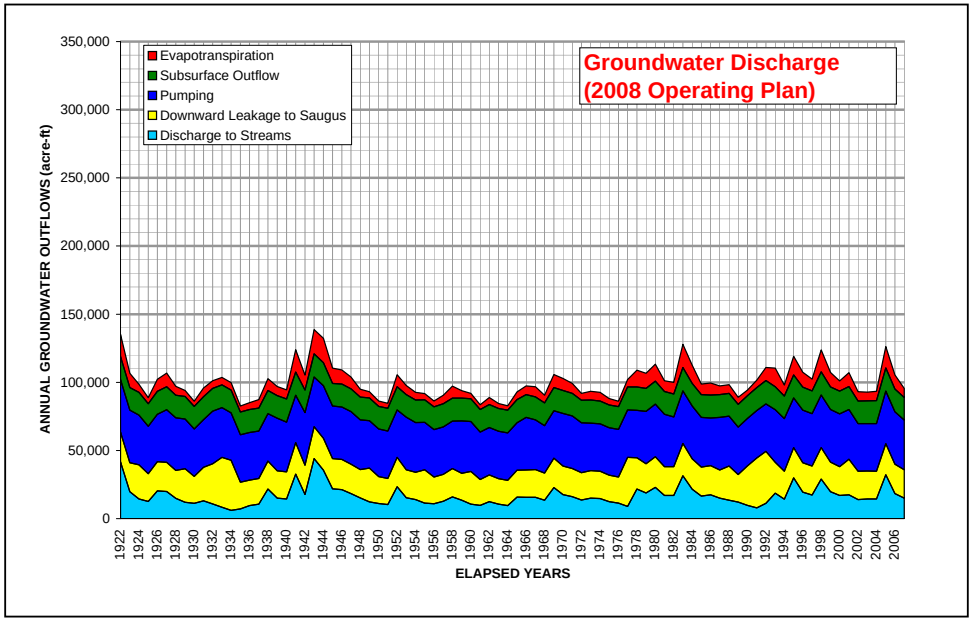
**Figure 4-16: Comparison of Simulated Trends in Groundwater Recharge and Discharge Terms for the 2008 Operating Plan Under Historical Hydrology**

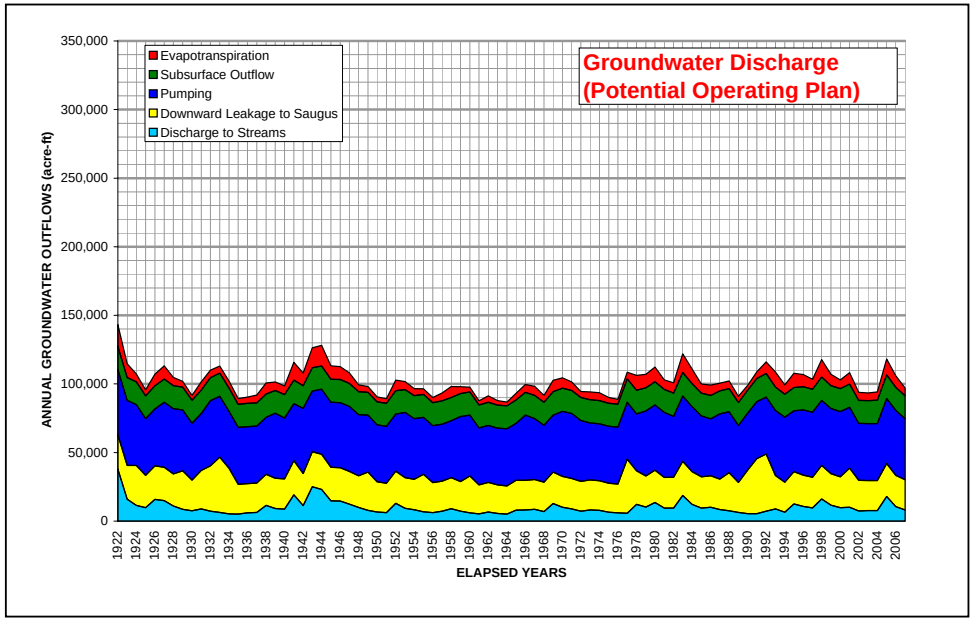



Figures_Section4_Part3_WaterBudget.xls/Figure4-16

**Figure 4-17: Comparison of Simulated Trends in Groundwater Discharge Terms for the 2008 and Potential Operating Plans Under Historical Hydrology**




Figures_Section4_Part3_WaterBudget.xls/Figure4-17

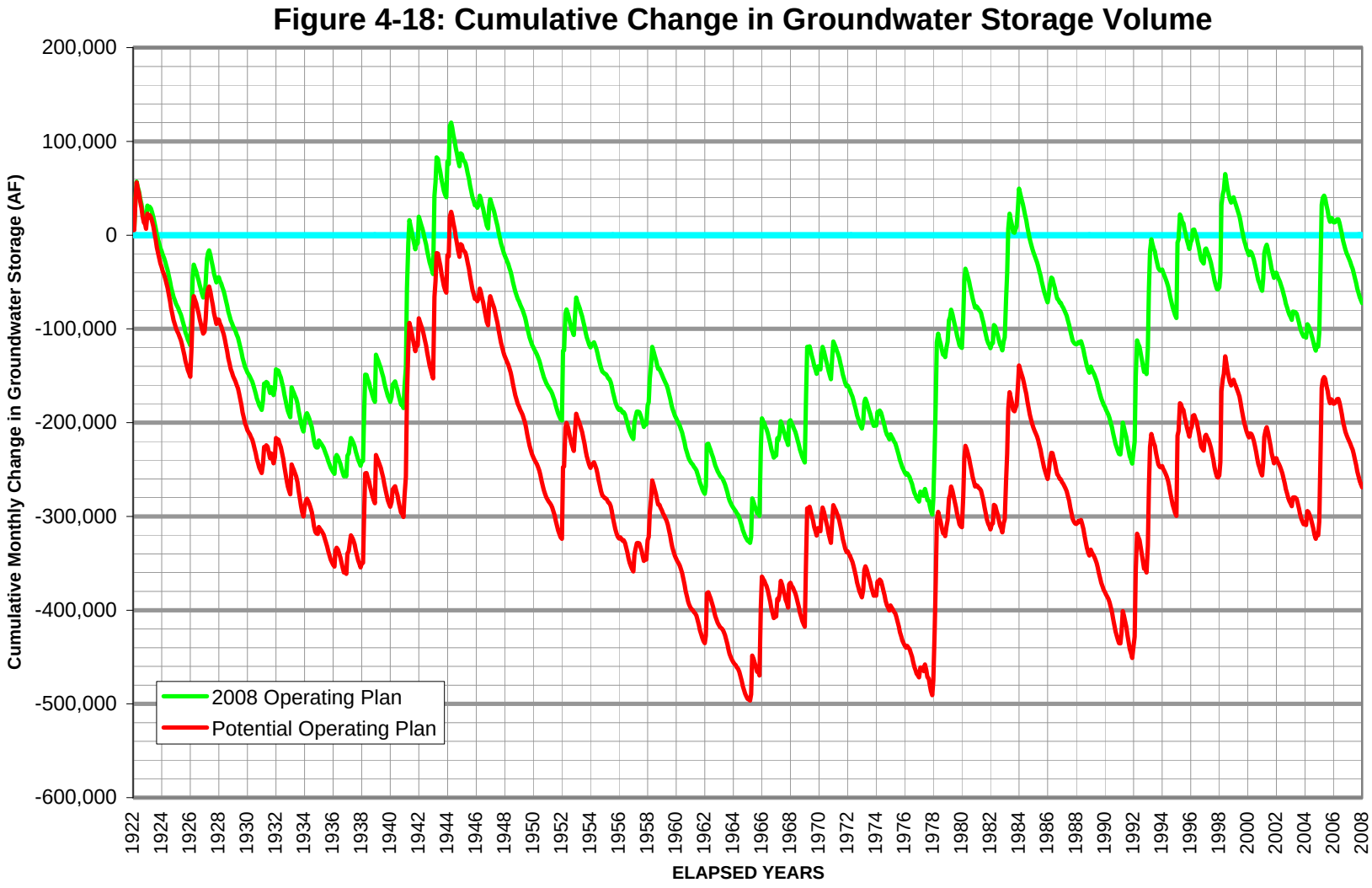


Figure 4-18: Cumulative Change in Groundwater Storage Volume
Cumulative Monthly Change in Groundwater Storage (AF)
200,000
100,000
0
-100,000
-200,000
-300,000
-400,000
-500,000
-600,000
1922
1924
1926
1928
1930
1932
1934
1936
1938
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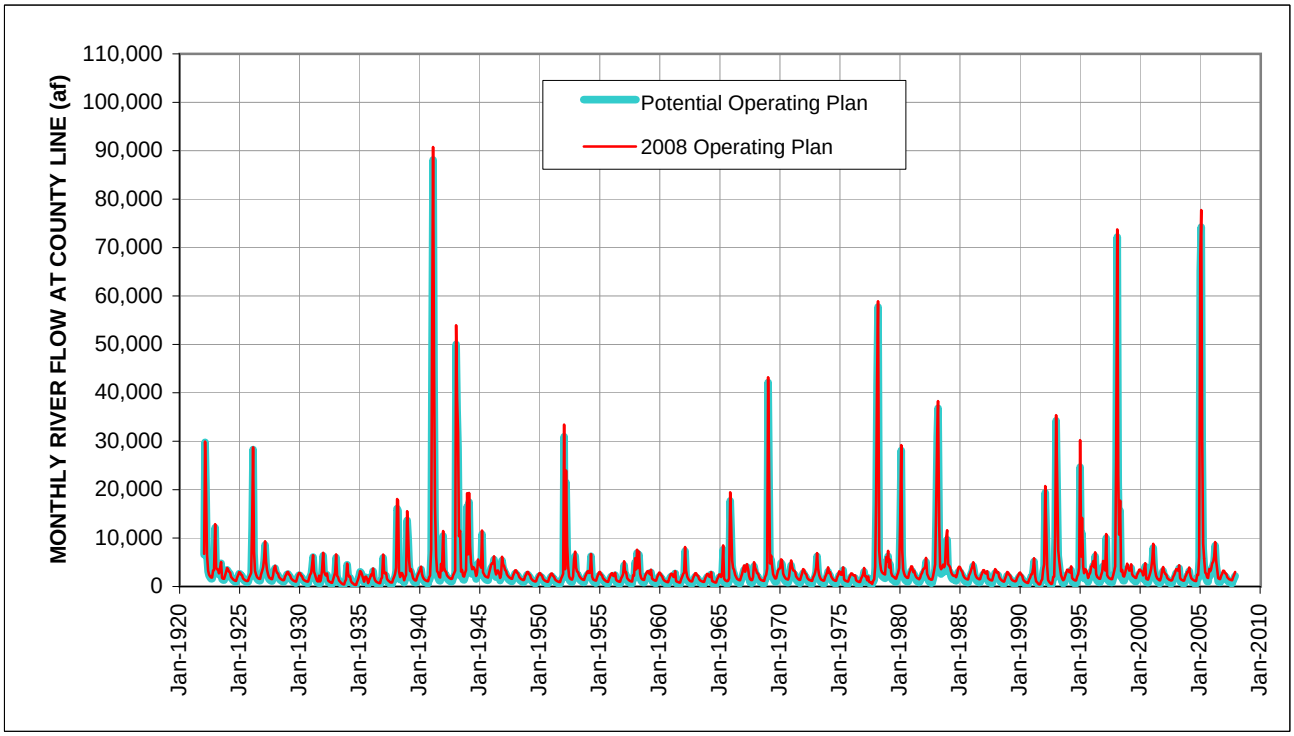
1970
1972
1974
1976
1978
1980
1982
1984
1986
1988
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
ELAPSED YEARS
2008 Operating Plan
Potential Operating Plan

**Figure 4-19**
**Simulated Monthly Flow in the Santa Clara River at the County Line**
**For the 2008 and Potential Operating Plans Under Historical Hydrology**



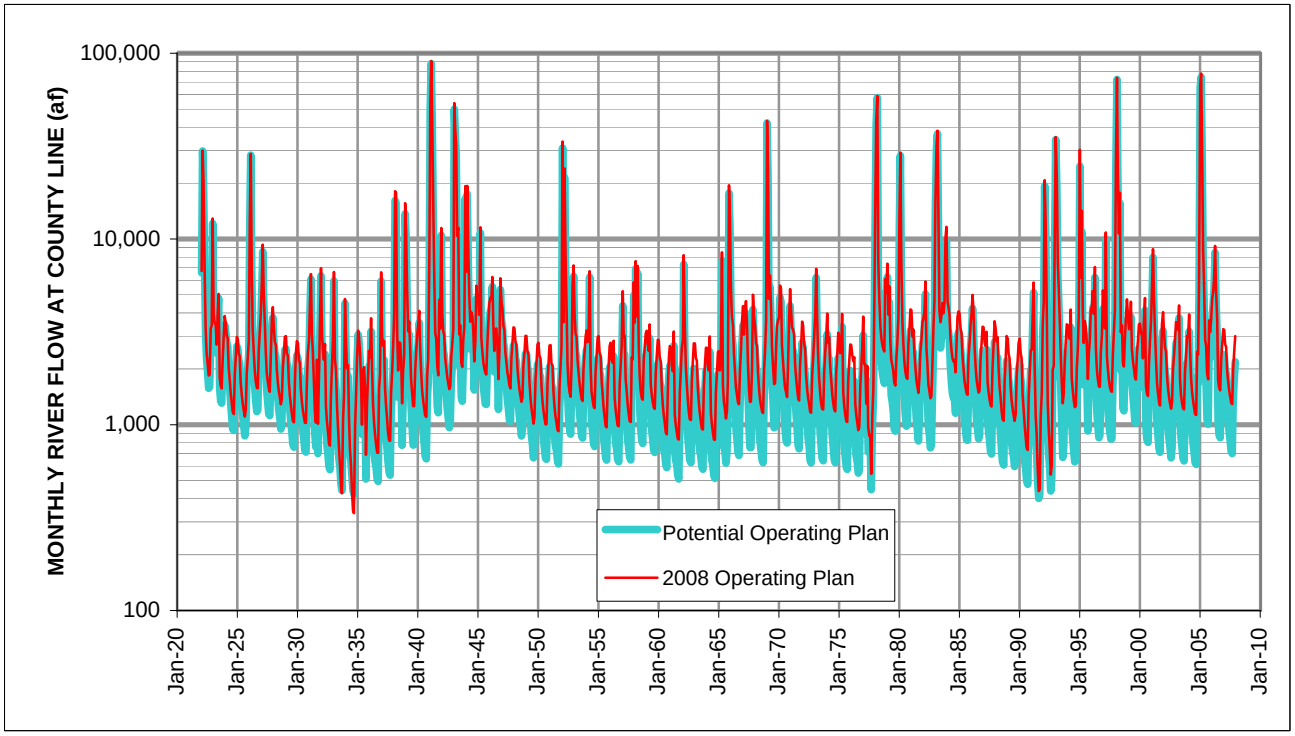



**Figure 4-20**
**Modeled and Estimated Monthly Groundwater Discharges to the Perennial Reach of the Santa Clara River (from Round Mountain to Blue Cut)**

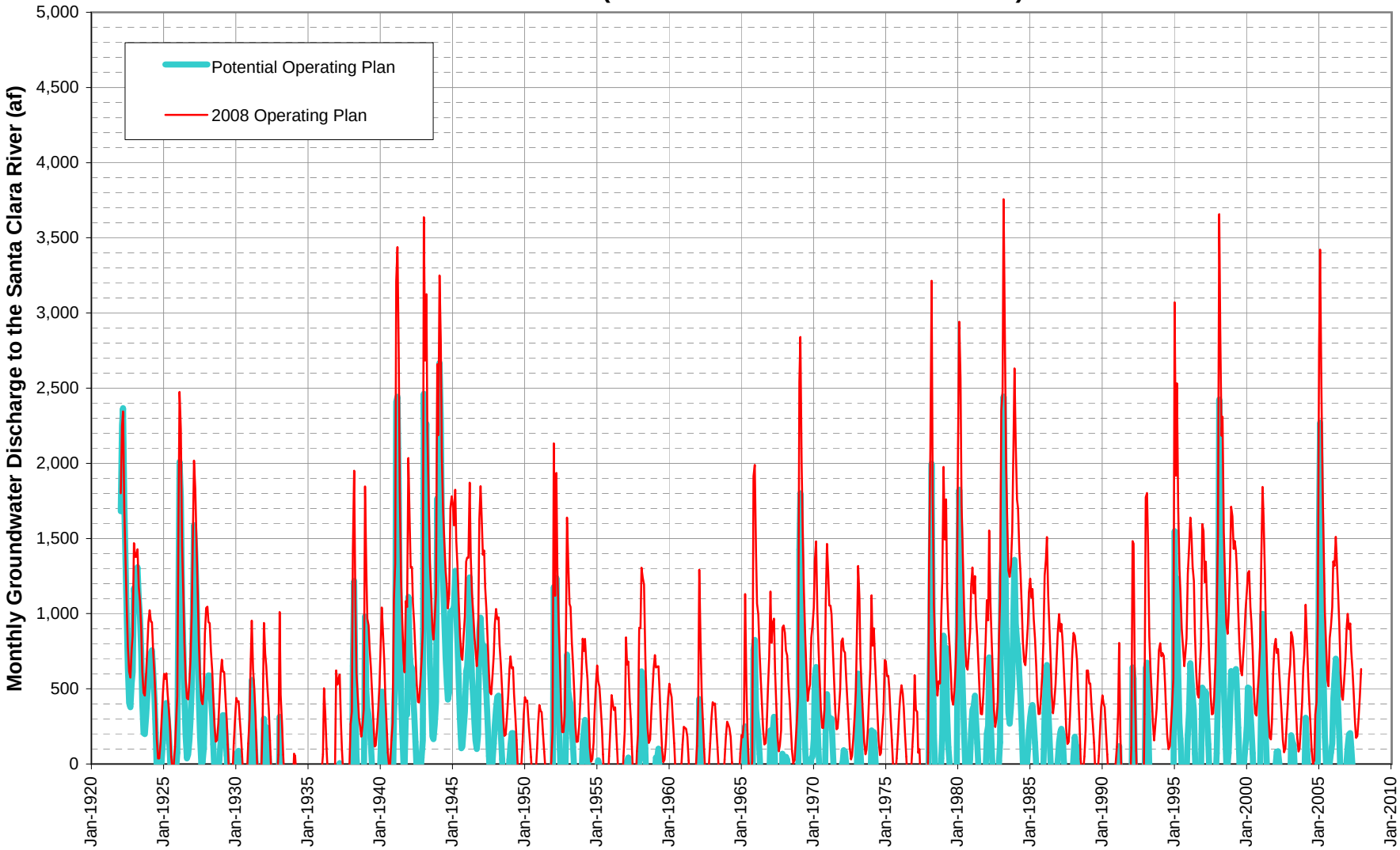
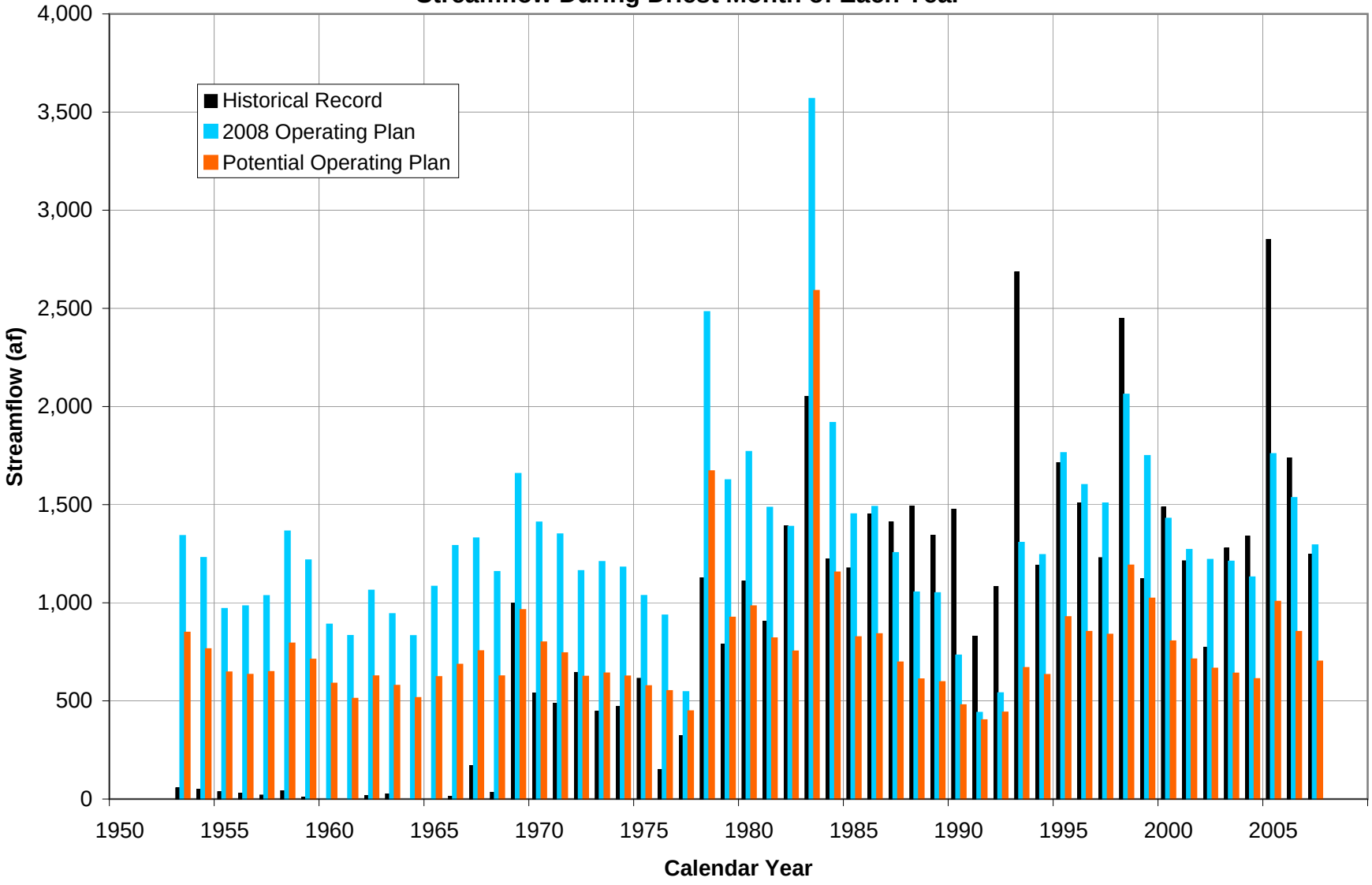


**Figure 4-21**
**Streamflow During Driest Month of Each Year**



# V. Climate Change Considerations

This section of the report describes an analysis of the potential impacts of climate change on the 2008 Operating Plan for the Santa Clarita Valley. The analysis simulates a group of different potential future groundwater recharge events arising from a suite of published spatial-temporal distributions of future rainfall, as derived from global climate models that in turn have been scaled to watershed scales throughout California, including at the scale of the Santa Clarita Valley. The rainfall distributions, which are also known as rainfall projections, account for a variety of possible changes in global climate and have been published by climatologists conducting research and modeling of possible changes in climate arising from historic and potential future greenhouse gas emissions.

Following are discussions of the objectives of the analysis, a description of the technical approach that was used to simulate potential climate change effects on the local groundwater system in the Santa Clarita Valley, and the results of the modeling evaluation as they pertain to the 2008 Operating Plan. An overview of the current understanding regarding potential climate change in southern California is contained in Appendix D, along with details regarding the projections of future rainfall that were used in the groundwater model to evaluate potential climate change effects on local groundwater.

## 5.1 Objectives

As recently noted by California's state climatologist (Anderson, 2009), the scientific community's research on global climate processes "includes the expectation that climate will be changing over the course of the next century to an extent that these changes must be accounted for in the water resources planning process". The need to understand and plan for climate change was recognized in 2007 by the Purveyors who, in commissioning the updated basin yield analysis specified that this study should include an evaluation of the potential significance of climate change on local groundwater supplies.

As discussed below in Section 5.2, there are many different climate models, each with its own strengths and limitations. Additionally, the international scientific community has formally identified multiple scenarios for future greenhouse gas emissions. Each scenario has different assumptions about the magnitude and timing of these emissions. Consequently, absolute predictions regarding future climatic conditions and subsequent effect on local groundwater are not possible. Instead, the primary objective of the analysis reported herein is to quantitatively, or qualitatively, describe general impacts of climate change on the groundwater basin and its yield. As the work has progressed, this general objective has focused on understanding whether the yield of the basin, operated in accordance with the 2008 Operating Plan, might be different for future climate change scenarios than for the historical rainfall patterns under which the 2008 Operating Plan was evaluated in Chapter 4. The general objective and the more specific objective together seek to understand the sensitivity of the aquifer and the 2008 Operating Plan to climate change, rather than to make predictions about future climate and groundwater conditions.

## 5.2 Approach

The analysis was conducted by selecting a small number of published projections regarding possible future patterns of monthly rainfall over time between now and the year 2099. An 86-year time period from 2010 through 2095 was then simulated with the groundwater model, using monthly variations in groundwater recharge that were derived from the monthly projections of future rainfall patterns under a given climate change scenario. Details regarding this process are summarized below and described in greater detail in Appendix D.

### 5.2.1 Evaluation and Selection of Climate Change Scenarios

Nine of 112 published climate projections were studied for potential use in the Santa Clarita groundwater model. The nine projections that were studied are the same group of projections (models) that were evaluated by DWR in its most recent report on the reliability of State Water Project water deliveries (DWR, 2008).

The nine rainfall projections were studied for their ability to reasonably replicate recent historical rainfall at the Newhall-Soledad rain gage. More importantly, the projections were studied to ascertain the degree to which they show different or similar trends and magnitudes of rainfall at various times (during the Purveyor's UWMP planning time frame [20 to 25 years], and beyond that time frame); and the degree to which they project generally dry, wet, or average conditions over the long-term (through the next 86-year period). This trend evaluation was conducted by examining the cumulative departure of rainfall on a monthly basis for each projection, compared with the 1931-2007 long-term average rainfall. Figure 5-1 displays the cumulative departure from mean precipitation, beginning in 2010, for the nine projections that were studied and for the three projections that were selected for evaluating potential climate-change impacts on groundwater in the Santa Clarita Valley. The figure shows that the nine projections exhibit a broad range in the cumulative departure over time, with an increase in the range of predicted values as time goes on. This increase with time arises in part from differences between the emissions scenarios beginning in about the year 2030, as well as from the general increase in predictive uncertainty that exists in each climate model as it projects into the future the many physical processes that affect climate.

The three projections that were evaluated using the groundwater model were selected because they display a variety of rainfall cycles during the UWMP planning horizon and beyond. In particular:

- Over the course of the UWMP planning horizon, projection #1 shows considerable fluctuation and is generally wetter than normal, while projections #6 and #9 show less fluctuation and are generally drier than normal.

- Afterwards, the three projections show a variety of trends. Projection #1 shows a sustained long-term progressive drying of the climate, with rainfall generally below the historical average. Projection #9 shows the opposite trend: sustained long-term progressive wetting of the climate with more rainfall than the historical average.

Projection #6 shows wet conditions immediately after the UWMP planning horizon, then fluctuating cycles of below-normal and above-normal rainfall, with no net departure from historical average rainfall by the end of the projection time frame.

### 5.2.2 Simulation Period

An 86-year period beginning in 2010 and continuing through the year 2095 was evaluated with the model, using the local monthly rainfall projections specific to each of these years to define groundwater recharge terms and Alluvial Aquifer pumping patterns. The same pattern of Saugus Formation pumping that was used for the 2008 Operating Plan (representing SWP water availability from 1922 through 2007) was utilized in conjunction with the 2010-2095 simulation of conditions in the Alluvial Aquifer to assess the basin's response to a combination of pumping dictated by local and SWP hydrologic conditions plus runoff/recharge in the Valley resulting from local rainfall conditions.

### 5.2.3 Hydrologic Processes for Climate Change Scenarios

Four separate hydrologic processes were varied in the groundwater flow model for each climate change scenario. The four processes and the methods by which they were varied were as follows.

- **Groundwater pumping pattern -** Different approaches were taken for the Alluvium versus the Saugus.

  The sequence of normal-year versus dry-year pumping from the alluvium was defined from the prior year's rainfall, as contained in the particular climate projection being evaluated. Tables 5-1 through 5-3 list the alluvial year types for each of the three climate runs that were evaluated.

  The Saugus pumping pattern and pumping rates were specified to be the same as for the 1922-2007 period that was evaluated for the 2008 Operating Plan. Tables 5-4 through 5-6 compare the Saugus pumping pattern with the pumping pattern for the Alluvial Aquifer.

- **Infiltration of direct precipitation -** The month-by-month rainfall from a given climate projection was used by the SWRM to calculate this term for the uppermost layer in the model grid. This is calculated at each node in the grid.

- **Infiltration from stormwater generated within the watershed and from Santa Clara River flows entering the eastern end of the Valley (at the Lang gage) -** For a given future year, these terms were estimated by first identifying one or more similar rainfall years in the historic record, which were treated as prototypical years for the purpose of defining annual and monthly streamflow at each stream node. If more than one year was identified as a possible prototype for a given future year, then the prototypical year was selected by further considering whether hydrologic conditions were generally dry or generally wet. Infiltration from streamflow during a given year was then calculated by the SWRM model from the prototypical year's monthly flow rates and monthly riverbed infiltration rates.

- **Infiltration from water released by DWR from Castaic Lagoon to Castaic Creek -** The prototype-year method was used to identify this term, using the same general procedure as described above for Santa Clara River flows at the Lang gage.

## 5.3 2008 Operating Plan under Climate Change Scenarios

Hydrographs of simulated groundwater levels, at the locations of each production well, are included in Appendix E to show the simulated response of the groundwater system to the three modeled rainfall projections. Extracted from the complete set in Appendix E, Figures 5-2 through 5-9 are illustrative groundwater elevation hydrographs for each Alluvial Aquifer subarea, using the same set of representative wells as shown for the sustainability discussions in Chapter 4. Figures 5-10 through 5-12 are groundwater elevation hydrographs for the three representative Saugus Formation production wells discussed in Chapter 4.

Based on simulated aquifer response to a combination of pumping in accordance with the 2008 Operating Plan and the range of climate change hydrology, the potential effects of climate change on the yield of the local groundwater basin and the associated availability of groundwater as part of the Valley's overall water supply can be summarized as follows. In all cases, it should be noted that specific short-term patterns of precipitation, as projected by the climate models, significantly influence the potential sustainability of overall groundwater yield and/or the achievability, i.e. the physical ability to extract groundwater at the operating plan rates, of the operating plan in certain subareas of the overall basin.

### 5.3.1 Drying Climate Trend (Climate Scenario 1)

In the short term, i.e. through the horizon of current UWMP planning, a long-term drying trend in the local climate would not be expected to result in unsustainable groundwater conditions, but could result in unachievable pumping in the "Above Mint Canyon" area at the rates specified in the 2008 Operating Plan. Beyond that planning horizon, the prevailing trend of drier climate would be expected to result in a general long-term lowering of groundwater levels in most of the basin, indicative that pumping in accordance with the 2008 Operating Plan would not be considered sustainable. Directly related to the latter long-term lowering of groundwater levels, the prevailing trend of drier climate would be expected to result in groundwater levels sufficiently lowered in several parts of the basin (e.g. at and above Mint Canyon, below the Saugus WRP, and in Bouquet and San Francisquito Canyon) that the wells in those areas would no longer support the pumping rates in the 2008 Operating Plan. On a long-term basis, then, the drying climate trend analyzed herein would be expected to result in a smaller local groundwater supply over time.

### 5.3.2 Wetter Climate Trend (Climate Scenario 9)

A tendency toward wetter local hydrologic conditions would logically suggest that the 2008 Operating Plan, considered sustainable through historical hydrologic conditions, would continue to be sustainable. Simulated basin response supports that expectation. Ironically, however, primarily as a result of the specific patterns of precipitation as projected by this climate model,

near-term conditions through the UWMP planning horizon, could appear to be unsustainable, i.e. general declining trend in groundwater levels. Subsequent wetter conditions ultimately lead to the long-term appearance of groundwater sustainability at the pumping rates in the 2008 Operating Plan.

Over both the short term (UWMP planning horizon) and the long term simulated herein, the wetter climate trend appears to result in local issues with regard to achievability of 2008 Operating Plan pumping, commonly in the eastern part of the basin at and above Mint Canyon, and also in San Francisquito Canyon in the near term.

For the most part, the wetter climate trend analyzed herein would be expected to result in a sustainable local groundwater supply at the rates in the 2008 Operating Plan, albeit with some short-term challenges to physically extracting full pumping rates in the eastern part of the basin.

### 5.3.3 Average Climate Trend (Climate Scenario 6)

A climate tendency toward general continuation of a climate similar, on average, to historically experienced conditions would logically suggest that the 2008 Operating Plan, considered sustainable through historical hydrologic conditions, would continue to be sustainable. Simulated basin response supports that expectation. Similar also to expected response under historical hydrologic conditions, there would be expected challenges to the achievability of the 2008 Operating Plan, notably in the near-term UWMP planning horizon, under a climate "change" that continues long-term average historical precipitation. In summary, a "climate change" that results in essential continuation of long-term average precipitation would be expected to result in a sustainable local groundwater supply at the rates in the 2008 Operating Plan, with basically the same local issues relative to actual pumping capability as derived from the analysis of that operating plan through historical hydrologic conditions.

## 5.4 Climate Change Summary

Examination of the three simulated climate change scenarios was undertaken to provide a level of quantification to the possible impact of climate change on local groundwater basin yield and availability of groundwater as part of overall water supply to the Valley. In light of the range of global climate model output that was considered for development of the local scenarios analyzed herein, it is obvious that there is neither a unique result that can be expected to become a representative hydrologic condition in the Valley, nor is there a unique result that can be expected in terms of basin yield and associated sustainable groundwater supply as an outcome of climate change. Obviously, the Valley does not get to "choose" a future climate scenario, but rather will have to manage within whatever future patterns of rainfall actually occur over time, whether the future rainfall exhibit wet-dry cycles that are similar to or different from historically recorded conditions. Perhaps most useful in the consideration of climate change effects analyzed herein is with respect to results over the UWMP planning horizon of 20 to 25 years. For the range of relatively wet to relatively dry conditions analyzed herein, all three scenarios suggest that the 2008 Operating Plan can be considered sustainable and, with the same local exceptions as simulated through a repetition of historical hydrology (e.g. mainly at and above Mint Canyon), achievable over the UWMP planning horizon. Beyond that horizon, greater uncertainty

exists because the global climate models use different emissions scenarios and also become increasingly uncertain over time because of predictive uncertainty pertaining to the forward-looking representation of the many physical processes that affect climate into the future. As a result, for time periods beyond the UWMP planning horizon, some models predict long-term drying and subsequent sustained declines in groundwater levels, which would result in a smaller local groundwater supply over time, while other models predict hydrologic conditions similar to or wetter than those that have been historically observed, in which case the 2008 Operating Plan can be considered sustainable, albeit with some local issues relative to actual pumping capability at certain times (mainly in the Alluvium at the eastern end of the Valley).

**Table 5-1**

**Climate Projection #1 (Global Climate Model GFDL_cm2_0.1_sresB1)**

Local Hydrology and Corresponding Pumping from the Alluvial Aquifer for the 86-year Simulation

| Model Year | Calendar Year | Local Rainfall (inches)[a] | Year Type | Alluvial Aquifer Pumping under the Groundwater Operating Plan (AF/yr) |
|---|---|---|---|---|
| 1 | 2010 | 18.27 | Normal | 35,000-40,000 |
| 2 | 2011 | 19.17 | Normal | 35,000-40,000 |
| 3 | 2012 | 43.26 | Normal | 35,000-40,000 |
| 4 | 2013 | 20.63 | Normal | 35,000-40,000 |
| 5 | 2014 | 13.96 | Normal | 35,000-40,000 |
| 6 | 2015 | 11.24 | Normal | 35,000-40,000 |
| 7 | 2016 | 13.80 | Dry Year 1 | 30,000-35,000 |
| 8 | 2017 | 22.80 | Dry Year 2 | 30,000-35,000 |
| 9 | 2018 | 15.37 | Normal | 35,000-40,000 |
| 10 | 2019 | 23.75 | Normal | 35,000-40,000 |
| 11 | 2020 | 45.78 | Normal | 35,000-40,000 |
| 12 | 2021 | 38.53 | Normal | 35,000-40,000 |
| 13 | 2022 | 43.23 | Normal | 35,000-40,000 |
| 14 | 2023 | 25.37 | Normal | 35,000-40,000 |
| 15 | 2024 | 24.15 | Normal | 35,000-40,000 |
| 16 | 2025 | 9.65 | Normal | 35,000-40,000 |
| 17 | 2026 | 20.35 | Dry Year 1 | 30,000-35,000 |
| 18 | 2027 | 15.10 | Normal | 35,000-40,000 |
| 19 | 2028 | 17.37 | Normal | 35,000-40,000 |
| 20 | 2029 | 22.37 | Normal | 35,000-40,000 |
| 21 | 2030 | 14.77 | Normal | 35,000-40,000 |
| 22 | 2031 | 14.56 | Normal | 35,000-40,000 |
| 23 | 2032 | 9.17 | Dry Year 1 | 30,000-35,000 |
| 24 | 2033 | 31.25 | Dry Year 2 | 30,000-35,000 |
| 25 | 2034 | 31.80 | Normal | 35,000-40,000 |
| 26 | 2035 | 10.36 | Normal | 35,000-40,000 |
| 27 | 2036 | 12.98 | Dry Year 1 | 30,000-35,000 |
| 28 | 2037 | 13.51 | Dry Year 2 | 30,000-35,000 |
| 29 | 2038 | 28.59 | Dry Year 3 | 30,000-35,000 |
| 30 | 2039 | 16.63 | Normal | 35,000-40,000 |
| 31 | 2040 | 12.83 | Normal | 35,000-40,000 |
| 32 | 2041 | 20.67 | Dry Year 1 | 30,000-35,000 |
| 33 | 2042 | 16.41 | Normal | 35,000-40,000 |
| 34 | 2043 | 9.38 | Normal | 35,000-40,000 |
| 35 | 2044 | 24.67 | Dry Year 1 | 30,000-35,000 |
| 36 | 2045 | 29.24 | Normal | 35,000-40,000 |
| 37 | 2046 | 17.91 | Normal | 35,000-40,000 |
| 38 | 2047 | 10.47 | Normal | 35,000-40,000 |
| 39 | 2048 | 15.97 | Dry Year 1 | 30,000-35,000 |
| 40 | 2049 | 19.69 | Dry Year 2 | 30,000-35,000 |
| 41 | 2050 | 27.84 | Dry Year 3 | 30,000-35,000 |
| 42 | 2051 | 12.19 | Normal | 35,000-40,000 |
| 43 | 2052 | 20.08 | Dry Year 1 | 30,000-35,000 |
| 44 | 2053 | 14.02 | Normal | 35,000-40,000 |
| 45 | 2054 | 33.91 | Dry Year 1 | 30,000-35,000 |
| 46 | 2055 | 19.94 | Normal | 35,000-40,000 |
| 47 | 2056 | 14.32 | Normal | 35,000-40,000 |
| 48 | 2057 | 14.01 | Normal | 35,000-40,000 |
| 49 | 2058 | 28.83 | Dry Year 1 | 30,000-35,000 |
| 50 | 2059 | 35.10 | Normal | 35,000-40,000 |
| 51 | 2060 | 11.01 | Normal | 35,000-40,000 |
| 52 | 2061 | 9.40 | Dry Year 1 | 30,000-35,000 |
| 53 | 2062 | 20.34 | Dry Year 2 | 30,000-35,000 |
| 54 | 2063 | 10.66 | Dry Year 3 | 30,000-35,000 |
| 55 | 2064 | 9.63 | Dry Year 4 | 30,000-35,000 |
| 56 | 2065 | 17.94 | Dry Year 5 | 30,000-35,000 |
| 57 | 2066 | 18.07 | Dry Year 6 | 30,000-35,000 |
| 58 | 2067 | 13.68 | Dry Year 7 | 30,000-35,000 |
| 59 | 2068 | 7.10 | Dry Year 8 | 30,000-35,000 |
| 60 | 2069 | 20.97 | Dry Year 9 | 30,000-35,000 |
| 61 | 2070 | 14.49 | Dry Year 10 | 30,000-35,000 |
| 62 | 2071 | 17.87 | Dry Year 11 | 30,000-35,000 |
| 63 | 2072 | 20.27 | Dry Year 12 | 30,000-35,000 |
| 64 | 2073 | 11.02 | Dry Year 13 | 30,000-35,000 |
| 65 | 2074 | 23.74 | Dry Year 14 | 30,000-35,000 |
| 66 | 2075 | 20.98 | Normal | 35,000-40,000 |
| 67 | 2076 | 8.79 | Normal | 35,000-40,000 |
| 68 | 2077 | 12.56 | Dry Year 1 | 30,000-35,000 |
| 69 | 2078 | 21.59 | Dry Year 2 | 30,000-35,000 |
| 70 | 2079 | 30.22 | Dry Year 3 | 30,000-35,000 |
| 71 | 2080 | 12.53 | Normal | 35,000-40,000 |
| 72 | 2081 | 21.67 | Dry Year 1 | 30,000-35,000 |
| 73 | 2082 | 17.97 | Normal | 35,000-40,000 |
| 74 | 2083 | 36.13 | Normal | 35,000-40,000 |
| 75 | 2084 | 32.25 | Normal | 35,000-40,000 |
| 76 | 2085 | 18.51 | Normal | 35,000-40,000 |
| 77 | 2086 | 20.78 | Normal | 35,000-40,000 |
| 78 | 2087 | 30.97 | Normal | 35,000-40,000 |
| 79 | 2088 | 8.45 | Normal | 35,000-40,000 |
| 80 | 2089 | 32.79 | Dry Year 1 | 30,000-35,000 |
| 81 | 2090 | 34.48 | Normal | 35,000-40,000 |
| 82 | 2091 | 18.49 | Normal | 35,000-40,000 |
| 83 | 2092 | 7.60 | Normal | 35,000-40,000 |
| 84 | 2093 | 21.56 | Dry Year 1 | 30,000-35,000 |
| 85 | 2094 | 16.99 | Normal | 35,000-40,000 |
| 86 | 2095 | 21.56 | Normal | 35,000-40,000 |

aThe values from the global climate model were extrapolated to the location of the Newhall County Water District Rain Gage.

**Table 5-2**

**Climate Projection #6 (Global Climate Model NCAR_PCM1.3_sresA2)**

Local Hydrology and Corresponding Pumping from the Alluvial Aquifer for the 86-year Simulation

| Model Year | Calendar Year | Local Rainfall (inches)[a] | Year Type | Alluvial Aquifer Pumping under the Groundwater Operating Plan (AF/yr) |
|---|---|---|---|---|
| 1 | 2010 | 17.22 | Normal | 35,000-40,000 |
| 2 | 2011 | 13.37 | Normal | 35,000-40,000 |
| 3 | 2012 | 16.14 | Dry Year 1 | 30,000-35,000 |
| 4 | 2013 | 16.53 | Dry Year 2 | 30,000-35,000 |
| 5 | 2014 | 15.33 | Dry Year 3 | 30,000-35,000 |
| 6 | 2015 | 40.92 | Dry Year 4 | 30,000-35,000 |
| 7 | 2016 | 20.24 | Normal | 35,000-40,000 |
| 8 | 2017 | 19.50 | Normal | 35,000-40,000 |
| 9 | 2018 | 10.68 | Normal | 35,000-40,000 |
| 10 | 2019 | 15.15 | Dry Year 1 | 30,000-35,000 |
| 11 | 2020 | 24.58 | Dry Year 2 | 30,000-35,000 |
| 12 | 2021 | 16.38 | Normal | 35,000-40,000 |
| 13 | 2022 | 22.64 | Normal | 35,000-40,000 |
| 14 | 2023 | 21.29 | Normal | 35,000-40,000 |
| 15 | 2024 | 13.37 | Normal | 35,000-40,000 |
| 16 | 2025 | 19.50 | Dry Year 1 | 30,000-35,000 |
| 17 | 2026 | 12.05 | Dry Year 2 | 30,000-35,000 |
| 18 | 2027 | 18.89 | Dry Year 3 | 30,000-35,000 |
| 19 | 2028 | 11.56 | Dry Year 4 | 30,000-35,000 |
| 20 | 2029 | 8.46 | Dry Year 5 | 30,000-35,000 |
| 21 | 2030 | 16.41 | Dry Year 6 | 30,000-35,000 |
| 22 | 2031 | 19.44 | Dry Year 7 | 30,000-35,000 |
| 23 | 2032 | 18.66 | Dry Year 8 | 30,000-35,000 |
| 24 | 2033 | 30.29 | Dry Year 9 | 30,000-35,000 |
| 25 | 2034 | 42.86 | Normal | 35,000-40,000 |
| 26 | 2035 | 16.39 | Normal | 35,000-40,000 |
| 27 | 2036 | 17.74 | Dry Year 1 | 30,000-35,000 |
| 28 | 2037 | 50.04 | Dry Year 2 | 30,000-35,000 |
| 29 | 2038 | 35.50 | Normal | 35,000-40,000 |
| 30 | 2039 | 39.98 | Normal | 35,000-40,000 |
| 31 | 2040 | 28.83 | Normal | 35,000-40,000 |
| 32 | 2041 | 23.15 | Normal | 35,000-40,000 |
| 33 | 2042 | 22.57 | Normal | 35,000-40,000 |
| 34 | 2043 | 22.20 | Normal | 35,000-40,000 |
| 35 | 2044 | 16.25 | Normal | 35,000-40,000 |
| 36 | 2045 | 34.88 | Normal | 35,000-40,000 |
| 37 | 2046 | 20.82 | Normal | 35,000-40,000 |
| 38 | 2047 | 14.35 | Normal | 35,000-40,000 |
| 39 | 2048 | 12.06 | Dry Year 1 | 30,000-35,000 |
| 40 | 2049 | 12.16 | Dry Year 2 | 30,000-35,000 |
| 41 | 2050 | 11.37 | Dry Year 3 | 30,000-35,000 |
| 42 | 2051 | 28.47 | Dry Year 4 | 30,000-35,000 |
| 43 | 2052 | 26.84 | Normal | 35,000-40,000 |
| 44 | 2053 | 25.59 | Normal | 35,000-40,000 |
| 45 | 2054 | 15.97 | Normal | 35,000-40,000 |
| 46 | 2055 | 21.26 | Normal | 35,000-40,000 |
| 47 | 2056 | 23.32 | Normal | 35,000-40,000 |
| 48 | 2057 | 13.55 | Normal | 35,000-40,000 |
| 49 | 2058 | 23.32 | Dry Year 1 | 30,000-35,000 |
| 50 | 2059 | 13.04 | Normal | 35,000-40,000 |
| 51 | 2060 | 22.71 | Dry Year 1 | 30,000-35,000 |
| 52 | 2061 | 10.15 | Normal | 35,000-40,000 |
| 53 | 2062 | 20.52 | Dry Year 1 | 30,000-35,000 |
| 54 | 2063 | 71.95 | Dry Year 2 | 30,000-35,000 |
| 55 | 2064 | 33.61 | Normal | 35,000-40,000 |
| 56 | 2065 | 13.39 | Normal | 35,000-40,000 |
| 57 | 2066 | 25.96 | Dry Year 1 | 30,000-35,000 |
| 58 | 2067 | 28.69 | Normal | 35,000-40,000 |
| 59 | 2068 | 18.22 | Normal | 35,000-40,000 |
| 60 | 2069 | 11.17 | Normal | 35,000-40,000 |
| 61 | 2070 | 18.25 | Dry Year 1 | 30,000-35,000 |
| 62 | 2071 | 17.85 | Dry Year 2 | 30,000-35,000 |
| 63 | 2072 | 19.30 | Dry Year 3 | 30,000-35,000 |
| 64 | 2073 | 14.70 | Normal | 35,000-40,000 |
| 65 | 2074 | 9.82 | Dry Year 1 | 30,000-35,000 |
| 66 | 2075 | 14.96 | Dry Year 2 | 30,000-35,000 |
| 67 | 2076 | 29.84 | Dry Year 3 | 30,000-35,000 |
| 68 | 2077 | 19.05 | Normal | 35,000-40,000 |
| 69 | 2078 | 45.70 | Normal | 35,000-40,000 |
| 70 | 2079 | 25.20 | Normal | 35,000-40,000 |
| 71 | 2080 | 31.12 | Normal | 35,000-40,000 |
| 72 | 2081 | 29.50 | Normal | 35,000-40,000 |
| 73 | 2082 | 27.59 | Normal | 35,000-40,000 |
| 74 | 2083 | 15.50 | Normal | 35,000-40,000 |
| 75 | 2084 | 8.74 | Normal | 35,000-40,000 |
| 76 | 2085 | 18.76 | Dry Year 1 | 30,000-35,000 |
| 77 | 2086 | 13.07 | Dry Year 2 | 30,000-35,000 |
| 78 | 2087 | 22.89 | Dry Year 3 | 30,000-35,000 |
| 79 | 2088 | 50.06 | Normal | 35,000-40,000 |
| 80 | 2089 | 27.24 | Normal | 35,000-40,000 |
| 81 | 2090 | 12.53 | Normal | 35,000-40,000 |
| 82 | 2091 | 9.14 | Dry Year 1 | 30,000-35,000 |
| 83 | 2092 | 10.81 | Dry Year 2 | 30,000-35,000 |
| 84 | 2093 | 23.07 | Dry Year 3 | 30,000-35,000 |
| 85 | 2094 | 12.91 | Dry Year 4 | 30,000-35,000 |
| 86 | 2095 | 26.47 | Dry Year 5 | 30,000-35,000 |

aThe values from the global climate model were extrapolated to the location of the Newhall County Water District Rain Gage.

**Table 5-3**

**Climate Projection #9 (Global Climate Model NCAR_PCM1.3_sresB1)**

Local Hydrology and Corresponding Pumping from the Alluvial Aquifer for the 86-year Simulation

| Model Year | Calendar Year | Local Rainfall (inches)[a] | Year Type | Alluvial Aquifer Pumping under the Groundwater Operating Plan (AF/yr) |
|---|---|---|---|---|
| 1 | 2010 | 22.14 | Normal | 35,000-40,000 |
| 2 | 2011 | 28.62 | Normal | 35,000-40,000 |
| 3 | 2012 | 18.21 | Normal | 35,000-40,000 |
| 4 | 2013 | 18.42 | Normal | 35,000-40,000 |
| 5 | 2014 | 17.85 | Normal | 35,000-40,000 |
| 6 | 2015 | 22.34 | Normal | 35,000-40,000 |
| 7 | 2016 | 17.51 | Normal | 35,000-40,000 |
| 8 | 2017 | 16.21 | Normal | 35,000-40,000 |
| 9 | 2018 | 11.56 | Dry Year 1 | 30,000-35,000 |
| 10 | 2019 | 11.83 | Dry Year 2 | 30,000-35,000 |
| 11 | 2020 | 37.62 | Dry Year 3 | 30,000-35,000 |
| 12 | 2021 | 16.56 | Normal | 35,000-40,000 |
| 13 | 2022 | 15.17 | Normal | 35,000-40,000 |
| 14 | 2023 | 22.88 | Normal | 35,000-40,000 |
| 15 | 2024 | 13.18 | Normal | 35,000-40,000 |
| 16 | 2025 | 20.34 | Dry Year 1 | 30,000-35,000 |
| 17 | 2026 | 26.96 | Dry Year 2 | 30,000-35,000 |
| 18 | 2027 | 26.47 | Normal | 35,000-40,000 |
| 19 | 2028 | 18.04 | Normal | 35,000-40,000 |
| 20 | 2029 | 18.04 | Normal | 35,000-40,000 |
| 21 | 2030 | 16.49 | Normal | 35,000-40,000 |
| 22 | 2031 | 22.51 | Dry Year 1 | 30,000-35,000 |
| 23 | 2032 | 22.84 | Normal | 35,000-40,000 |
| 24 | 2033 | 15.01 | Normal | 35,000-40,000 |
| 25 | 2034 | 13.40 | Dry Year 1 | 30,000-35,000 |
| 26 | 2035 | 18.72 | Dry Year 2 | 30,000-35,000 |
| 27 | 2036 | 26.43 | Dry Year 3 | 30,000-35,000 |
| 28 | 2037 | 11.11 | Normal | 35,000-40,000 |
| 29 | 2038 | 12.97 | Dry Year 1 | 30,000-35,000 |
| 30 | 2039 | 41.47 | Dry Year 2 | 30,000-35,000 |
| 31 | 2040 | 18.62 | Normal | 35,000-40,000 |
| 32 | 2041 | 39.65 | Normal | 35,000-40,000 |
| 33 | 2042 | 33.75 | Normal | 35,000-40,000 |
| 34 | 2043 | 57.56 | Normal | 35,000-40,000 |
| 35 | 2044 | 14.63 | Normal | 35,000-40,000 |
| 36 | 2045 | 15.63 | Dry Year 1 | 30,000-35,000 |
| 37 | 2046 | 15.41 | Dry Year 2 | 30,000-35,000 |
| 38 | 2047 | 24.66 | Dry Year 3 | 30,000-35,000 |
| 39 | 2048 | 53.80 | Normal | 35,000-40,000 |
| 40 | 2049 | 14.70 | Normal | 35,000-40,000 |
| 41 | 2050 | 9.79 | Dry Year 1 | 30,000-35,000 |
| 42 | 2051 | 38.49 | Dry Year 2 | 30,000-35,000 |
| 43 | 2052 | 19.57 | Normal | 35,000-40,000 |
| 44 | 2053 | 20.65 | Normal | 35,000-40,000 |
| 45 | 2054 | 10.40 | Normal | 35,000-40,000 |
| 46 | 2055 | 12.58 | Dry Year 1 | 30,000-35,000 |
| 47 | 2056 | 17.80 | Dry Year 2 | 30,000-35,000 |
| 48 | 2057 | 15.56 | Dry Year 3 | 30,000-35,000 |
| 49 | 2058 | 45.18 | Dry Year 4 | 30,000-35,000 |
| 50 | 2059 | 26.78 | Normal | 35,000-40,000 |
| 51 | 2060 | 23.78 | Normal | 35,000-40,000 |
| 52 | 2061 | 47.61 | Normal | 35,000-40,000 |
| 53 | 2062 | 28.90 | Normal | 35,000-40,000 |
| 54 | 2063 | 30.43 | Normal | 35,000-40,000 |
| 55 | 2064 | 18.15 | Normal | 35,000-40,000 |
| 56 | 2065 | 30.15 | Normal | 35,000-40,000 |
| 57 | 2066 | 13.65 | Normal | 35,000-40,000 |
| 58 | 2067 | 16.34 | Dry Year 1 | 30,000-35,000 |
| 59 | 2068 | 10.60 | Dry Year 2 | 30,000-35,000 |
| 60 | 2069 | 60.56 | Dry Year 3 | 30,000-35,000 |
| 61 | 2070 | 20.56 | Normal | 35,000-40,000 |
| 62 | 2071 | 15.31 | Normal | 35,000-40,000 |
| 63 | 2072 | 33.67 | Normal | 35,000-40,000 |
| 64 | 2073 | 46.34 | Normal | 35,000-40,000 |
| 65 | 2074 | 33.69 | Normal | 35,000-40,000 |
| 66 | 2075 | 15.71 | Normal | 35,000-40,000 |
| 67 | 2076 | 14.36 | Normal | 35,000-40,000 |
| 68 | 2077 | 21.25 | Dry Year 1 | 30,000-35,000 |
| 69 | 2078 | 37.14 | Normal | 35,000-40,000 |
| 70 | 2079 | 31.87 | Normal | 35,000-40,000 |
| 71 | 2080 | 8.14 | Normal | 35,000-40,000 |
| 72 | 2081 | 25.22 | Dry Year 1 | 30,000-35,000 |
| 73 | 2082 | 32.82 | Normal | 35,000-40,000 |
| 74 | 2083 | 28.25 | Normal | 35,000-40,000 |
| 75 | 2084 | 7.23 | Normal | 35,000-40,000 |
| 76 | 2085 | 11.37 | Dry Year 1 | 30,000-35,000 |
| 77 | 2086 | 27.47 | Dry Year 2 | 30,000-35,000 |
| 78 | 2087 | 20.97 | Normal | 35,000-40,000 |
| 79 | 2088 | 16.12 | Normal | 35,000-40,000 |
| 80 | 2089 | 64.70 | Normal | 35,000-40,000 |
| 81 | 2090 | 21.30 | Normal | 35,000-40,000 |
| 82 | 2091 | 12.38 | Normal | 35,000-40,000 |
| 83 | 2092 | 22.06 | Dry Year 1 | 30,000-35,000 |
| 84 | 2093 | 19.32 | Normal | 35,000-40,000 |
| 85 | 2094 | 20.91 | Normal | 35,000-40,000 |
| 86 | 2095 | 21.05 | Normal | 35,000-40,000 |

aThe values from the global climate model were extrapolated to the location of the Newhall County Water District Rain Gage.

Ta le -4

**Climate Projection #1 (Global Climate Model GFDL_cm2_0.1_sresB1)**

llu ial an Saugus For ation Pu ing for t e Si ulation of 1 22-2 istorical rolog

| Model Year | Alluvium Year | Saugus Year | Year Name for Model Run | Simulated Pumping Conditions | |
|---|---|---|---|---|---|
| | | | | Alluvium | Saugus |
| 1 | 2010 | 1922 | 1922 | Normal | Normal |
| 2 | 2011 | 1923 | 1923 | Normal | Normal |
| 3 | 2012 | 1924 | 1924 | Normal | Dry Year 1 |
| 4 | 2013 | 1925 | 1925 | Normal | Normal |
| 5 | 2014 | 1926 | 1926 | Normal | Normal |
| 6 | 2015 | 1927 | 1927 | Normal | Normal |
| 7 | 2016 | 1928 | 1928 | Dry Year 1 | Normal |
| 8 | 2017 | 1929 | 1929 | Dry Year 2 | Dry Year 1 |
| 9 | 2018 | 1930 | 1930 | Normal | Normal |
| 10 | 2019 | 1931 | 1931 | Normal | Dry Year 1 |
| 11 | 2020 | 1932 | 1932 | Normal | Dry Year 2 |
| 12 | 2021 | 1933 | 1933 | Normal | Dry Year 3 |
| 13 | 2022 | 1934 | 1934 | Normal | Dry Year 4 |
| 14 | 2023 | 1935 | 1935 | Normal | Normal |
| 15 | 2024 | 1936 | 1936 | Normal | Normal |
| 16 | 2025 | 1937 | 1937 | Normal | Normal |
| 17 | 2026 | 1938 | 1938 | Dry Year 1 | Normal |
| 18 | 2027 | 1939 | 1939 | Normal | Normal |
| 19 | 2028 | 1940 | 1940 | Normal | Normal |
| 20 | 2029 | 1941 | 1941 | Normal | Normal |
| 21 | 2030 | 1942 | 1942 | Normal | Normal |
| 22 | 2031 | 1943 | 1943 | Normal | Normal |
| 23 | 2032 | 1944 | 1944 | Dry Year 1 | Normal |
| 24 | 2033 | 1945 | 1945 | Dry Year 2 | Normal |
| 25 | 2034 | 1946 | 1946 | Normal | Normal |
| 26 | 2035 | 1947 | 1947 | Normal | Normal |
| 27 | 2036 | 1948 | 1948 | Dry Year 1 | Normal |
| 28 | 2037 | 1949 | 1949 | Dry Year 2 | Dry Year 1 |
| 29 | 2038 | 1950 | 1950 | Dry Year 3 | Normal |
| 30 | 2039 | 1951 | 1951 | Normal | Normal |
| 31 | 2040 | 1952 | 1952 | Normal | Normal |
| 32 | 2041 | 1953 | 1953 | Dry Year 1 | Normal |
| 33 | 2042 | 1954 | 1954 | Normal | Normal |
| 34 | 2043 | 1955 | 1955 | Normal | Dry Year 1 |
| 35 | 2044 | 1956 | 1956 | Dry Year 1 | Normal |
| 36 | 2045 | 1957 | 1957 | Normal | Normal |
| 37 | 2046 | 1958 | 1958 | Normal | Normal |
| 38 | 2047 | 1959 | 1959 | Normal | Normal |
| 39 | 2048 | 1960 | 1960 | Dry Year 1 | Dry Year 1 |
| 40 | 2049 | 1961 | 1961 | Dry Year 2 | Normal |
| 41 | 2050 | 1962 | 1962 | Dry Year 3 | Normal |
| 42 | 2051 | 1963 | 1963 | Normal | Normal |
| 43 | 2052 | 1964 | 1964 | Dry Year 1 | Normal |
| 44 | 2053 | 1965 | 1965 | Normal | Normal |
| 45 | 2054 | 1966 | 1966 | Dry Year 1 | Normal |
| 46 | 2055 | 1967 | 1967 | Normal | Normal |
| 47 | 2056 | 1968 | 1968 | Normal | Normal |
| 48 | 2057 | 1969 | 1969 | Normal | Normal |
| 49 | 2058 | 1970 | 1970 | Dry Year 1 | Normal |
| 50 | 2059 | 1971 | 1971 | Normal | Normal |
| 51 | 2060 | 1972 | 1972 | Normal | Normal |
| 52 | 2061 | 1973 | 1973 | Dry Year 1 | Normal |
| 53 | 2062 | 1974 | 1974 | Dry Year 2 | Normal |
| 54 | 2063 | 1975 | 1975 | Dry Year 3 | Normal |
| 55 | 2064 | 1976 | 1976 | Dry Year 4 | Normal |
| 56 | 2065 | 1977 | 1977 | Dry Year 5 | Dry Year 1 |
| 57 | 2066 | 1978 | 1978 | Dry Year 6 | Normal |
| 58 | 2067 | 1979 | 1979 | Dry Year 7 | Normal |
| 59 | 2068 | 1980 | 1980 | Dry Year 8 | Normal |
| 60 | 2069 | 1981 | 1981 | Dry Year 9 | Normal |
| 61 | 2070 | 1982 | 1982 | Dry Year 10 | Normal |
| 62 | 2071 | 1983 | 1983 | Dry Year 11 | Normal |
| 63 | 2072 | 1984 | 1984 | Dry Year 12 | Normal |
| 64 | 2073 | 1985 | 1985 | Dry Year 13 | Normal |
| 65 | 2074 | 1986 | 1986 | Dry Year 14 | Normal |
| 66 | 2075 | 1987 | 1987 | Normal | Normal |
| 67 | 2076 | 1988 | 1988 | Normal | Dry Year 1 |
| 68 | 2077 | 1989 | 1989 | Dry Year 1 | Normal |
| 69 | 2078 | 1990 | 1990 | Dry Year 2 | Dry Year 2 |
| 70 | 2079 | 1991 | 1991 | Dry Year 3 | Dry Year 3 |
| 71 | 2080 | 1992 | 1992 | Normal | Dry Year 4 |
| 72 | 2081 | 1993 | 1993 | Dry Year 1 | Normal |
| 73 | 2082 | 1994 | 1994 | Normal | Normal |
| 74 | 2083 | 1995 | 1995 | Normal | Normal |
| 75 | 2084 | 1996 | 1996 | Normal | Normal |
| 76 | 2085 | 1997 | 1997 | Normal | Normal |
| 77 | 2086 | 1998 | 1998 | Normal | Normal |
| 78 | 2087 | 1999 | 1999 | Normal | Normal |
| 79 | 2088 | 2000 | 2000 | Normal | Normal |
| 80 | 2089 | 2001 | 2001 | Dry Year 1 | Dry Year 1 |
| 81 | 2090 | 2002 | 2002 | Normal | Normal |
| 82 | 2091 | 2003 | 2003 | Normal | Normal |
| 83 | 2092 | 2004 | 2004 | Normal | Normal |
| 84 | 2093 | 2005 | 2005 | Dry Year 1 | Normal |
| 85 | 2094 | 2006 | 2006 | Normal | Normal |
| 86 | 2095 | 2007 | 2007 | Normal | Normal |

Ta le -

**Climate Projection #6 (Global Climate Model NCAR_PCM1.3_sresA2)**

llu ial an Saugus For ation Pu ing for t e Si ulation of 1 22-2 istorical rolog

| Model Year | Alluvium Year | Saugus Year | Year Name for Model Run | Simulated Pumping Conditions | |
|---|---|---|---|---|---|
| | | | | Alluvium | Saugus |
| 1 | 2010 | 1922 | 1922 | Normal | Normal |
| 2 | 2011 | 1923 | 1923 | Normal | Normal |
| 3 | 2012 | 1924 | 1924 | Dry Year 1 | Dry Year 1 |
| 4 | 2013 | 1925 | 1925 | Dry Year 2 | Normal |
| 5 | 2014 | 1926 | 1926 | Dry Year 3 | Normal |
| 6 | 2015 | 1927 | 1927 | Dry Year 4 | Normal |
| 7 | 2016 | 1928 | 1928 | Normal | Normal |
| 8 | 2017 | 1929 | 1929 | Normal | Dry Year 1 |
| 9 | 2018 | 1930 | 1930 | Normal | Normal |
| 10 | 2019 | 1931 | 1931 | Dry Year 1 | Dry Year 1 |
| 11 | 2020 | 1932 | 1932 | Dry Year 2 | Dry Year 2 |
| 12 | 2021 | 1933 | 1933 | Normal | Dry Year 3 |
| 13 | 2022 | 1934 | 1934 | Normal | Dry Year 4 |
| 14 | 2023 | 1935 | 1935 | Normal | Normal |
| 15 | 2024 | 1936 | 1936 | Normal | Normal |
| 16 | 2025 | 1937 | 1937 | Dry Year 1 | Normal |
| 17 | 2026 | 1938 | 1938 | Dry Year 2 | Normal |
| 18 | 2027 | 1939 | 1939 | Dry Year 3 | Normal |
| 19 | 2028 | 1940 | 1940 | Dry Year 4 | Normal |
| 20 | 2029 | 1941 | 1941 | Dry Year 5 | Normal |
| 21 | 2030 | 1942 | 1942 | Dry Year 6 | Normal |
| 22 | 2031 | 1943 | 1943 | Dry Year 7 | Normal |
| 23 | 2032 | 1944 | 1944 | Dry Year 8 | Normal |
| 24 | 2033 | 1945 | 1945 | Dry Year 9 | Normal |
| 25 | 2034 | 1946 | 1946 | Normal | Normal |
| 26 | 2035 | 1947 | 1947 | Normal | Normal |
| 27 | 2036 | 1948 | 1948 | Dry Year 1 | Normal |
| 28 | 2037 | 1949 | 1949 | Dry Year 2 | Dry Year 1 |
| 29 | 2038 | 1950 | 1950 | Normal | Normal |
| 30 | 2039 | 1951 | 1951 | Normal | Normal |
| 31 | 2040 | 1952 | 1952 | Normal | Normal |
| 32 | 2041 | 1953 | 1953 | Normal | Normal |
| 33 | 2042 | 1954 | 1954 | Normal | Normal |
| 34 | 2043 | 1955 | 1955 | Normal | Dry Year 1 |
| 35 | 2044 | 1956 | 1956 | Normal | Normal |
| 36 | 2045 | 1957 | 1957 | Normal | Normal |
| 37 | 2046 | 1958 | 1958 | Normal | Normal |
| 38 | 2047 | 1959 | 1959 | Normal | Normal |
| 39 | 2048 | 1960 | 1960 | Dry Year 1 | Dry Year 1 |
| 40 | 2049 | 1961 | 1961 | Dry Year 2 | Normal |
| 41 | 2050 | 1962 | 1962 | Dry Year 3 | Normal |
| 42 | 2051 | 1963 | 1963 | Dry Year 4 | Normal |
| 43 | 2052 | 1964 | 1964 | Normal | Normal |
| 44 | 2053 | 1965 | 1965 | Normal | Normal |
| 45 | 2054 | 1966 | 1966 | Normal | Normal |
| 46 | 2055 | 1967 | 1967 | Normal | Normal |
| 47 | 2056 | 1968 | 1968 | Normal | Normal |
| 48 | 2057 | 1969 | 1969 | Normal | Normal |
| 49 | 2058 | 1970 | 1970 | Dry Year 1 | Normal |
| 50 | 2059 | 1971 | 1971 | Normal | Normal |
| 51 | 2060 | 1972 | 1972 | Dry Year 1 | Normal |
| 52 | 2061 | 1973 | 1973 | Normal | Normal |
| 53 | 2062 | 1974 | 1974 | Dry Year 1 | Normal |
| 54 | 2063 | 1975 | 1975 | Dry Year 2 | Normal |
| 55 | 2064 | 1976 | 1976 | Normal | Normal |
| 56 | 2065 | 1977 | 1977 | Normal | Dry Year 1 |
| 57 | 2066 | 1978 | 1978 | Dry Year 1 | Normal |
| 58 | 2067 | 1979 | 1979 | Normal | Normal |
| 59 | 2068 | 1980 | 1980 | Normal | Normal |
| 60 | 2069 | 1981 | 1981 | Normal | Normal |
| 61 | 2070 | 1982 | 1982 | Dry Year 1 | Normal |
| 62 | 2071 | 1983 | 1983 | Dry Year 2 | Normal |
| 63 | 2072 | 1984 | 1984 | Dry Year 3 | Normal |
| 64 | 2073 | 1985 | 1985 | Normal | Normal |
| 65 | 2074 | 1986 | 1986 | Dry Year 1 | Normal |
| 66 | 2075 | 1987 | 1987 | Dry Year 2 | Normal |
| 67 | 2076 | 1988 | 1988 | Dry Year 3 | Dry Year 1 |
| 68 | 2077 | 1989 | 1989 | Normal | Normal |
| 69 | 2078 | 1990 | 1990 | Normal | Dry Year 2 |
| 70 | 2079 | 1991 | 1991 | Normal | Dry Year 3 |
| 71 | 2080 | 1992 | 1992 | Normal | Dry Year 4 |
| 72 | 2081 | 1993 | 1993 | Normal | Normal |
| 73 | 2082 | 1994 | 1994 | Normal | Normal |
| 74 | 2083 | 1995 | 1995 | Normal | Normal |
| 75 | 2084 | 1996 | 1996 | Normal | Normal |
| 76 | 2085 | 1997 | 1997 | Dry Year 1 | Normal |
| 77 | 2086 | 1998 | 1998 | Dry Year 2 | Normal |
| 78 | 2087 | 1999 | 1999 | Dry Year 3 | Normal |
| 79 | 2088 | 2000 | 2000 | Normal | Normal |
| 80 | 2089 | 2001 | 2001 | Normal | Dry Year 1 |
| 81 | 2090 | 2002 | 2002 | Normal | Normal |
| 82 | 2091 | 2003 | 2003 | Dry Year 1 | Normal |
| 83 | 2092 | 2004 | 2004 | Dry Year 2 | Normal |
| 84 | 2093 | 2005 | 2005 | Dry Year 3 | Normal |
| 85 | 2094 | 2006 | 2006 | Dry Year 4 | Normal |
| 86 | 2095 | 2007 | 2007 | Dry Year 5 | Normal |

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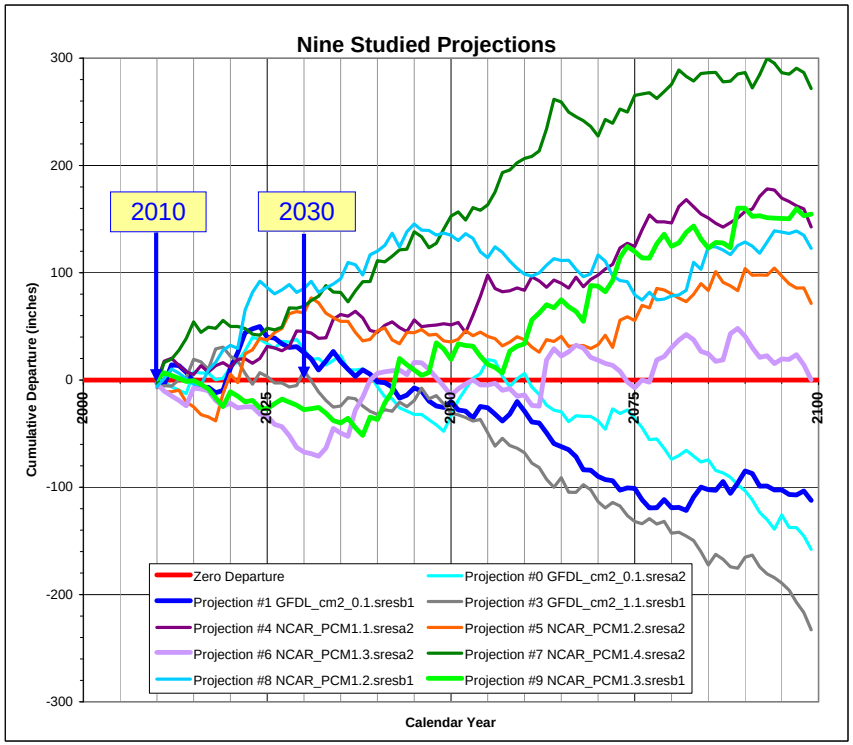
**Climate Projection #9 (Global Climate Model NCAR_PCM1.3_sresB1)**

llu ial an Saugus For ation Pu ing for t e Si ulation of 1 22-2 istorical rolog

| Model Year | Alluvium Year | Saugus Year | Year Name for Model Run | Simulated Pumping Conditions | |
|---|---|---|---|---|---|
| | | | | Alluvium | Saugus |
| 1 | 2010 | 1922 | 1922 | Normal | Normal |
| 2 | 2011 | 1923 | 1923 | Normal | Normal |
| 3 | 2012 | 1924 | 1924 | Normal | Dry Year 1 |
| 4 | 2013 | 1925 | 1925 | Normal | Normal |
| 5 | 2014 | 1926 | 1926 | Normal | Normal |
| 6 | 2015 | 1927 | 1927 | Normal | Normal |
| 7 | 2016 | 1928 | 1928 | Normal | Normal |
| 8 | 2017 | 1929 | 1929 | Normal | Dry Year 1 |
| 9 | 2018 | 1930 | 1930 | Dry Year 1 | Normal |
| 10 | 2019 | 1931 | 1931 | Dry Year 2 | Dry Year 1 |
| 11 | 2020 | 1932 | 1932 | Dry Year 3 | Dry Year 2 |
| 12 | 2021 | 1933 | 1933 | Normal | Dry Year 3 |
| 13 | 2022 | 1934 | 1934 | Normal | Dry Year 4 |
| 14 | 2023 | 1935 | 1935 | Normal | Normal |
| 15 | 2024 | 1936 | 1936 | Normal | Normal |
| 16 | 2025 | 1937 | 1937 | Dry Year 1 | Normal |
| 17 | 2026 | 1938 | 1938 | Dry Year 2 | Normal |
| 18 | 2027 | 1939 | 1939 | Normal | Normal |
| 19 | 2028 | 1940 | 1940 | Normal | Normal |
| 20 | 2029 | 1941 | 1941 | Normal | Normal |
| 21 | 2030 | 1942 | 1942 | Normal | Normal |
| 22 | 2031 | 1943 | 1943 | Dry Year 1 | Normal |
| 23 | 2032 | 1944 | 1944 | Normal | Normal |
| 24 | 2033 | 1945 | 1945 | Normal | Normal |
| 25 | 2034 | 1946 | 1946 | Dry Year 1 | Normal |
| 26 | 2035 | 1947 | 1947 | Dry Year 2 | Normal |
| 27 | 2036 | 1948 | 1948 | Dry Year 3 | Normal |
| 28 | 2037 | 1949 | 1949 | Normal | Dry Year 1 |
| 29 | 2038 | 1950 | 1950 | Dry Year 1 | Normal |
| 30 | 2039 | 1951 | 1951 | Dry Year 2 | Normal |
| 31 | 2040 | 1952 | 1952 | Normal | Normal |
| 32 | 2041 | 1953 | 1953 | Normal | Normal |
| 33 | 2042 | 1954 | 1954 | Normal | Normal |
| 34 | 2043 | 1955 | 1955 | Normal | Dry Year 1 |
| 35 | 2044 | 1956 | 1956 | Normal | Normal |
| 36 | 2045 | 1957 | 1957 | Dry Year 1 | Normal |
| 37 | 2046 | 1958 | 1958 | Dry Year 2 | Normal |
| 38 | 2047 | 1959 | 1959 | Dry Year 3 | Normal |
| 39 | 2048 | 1960 | 1960 | Normal | Dry Year 1 |
| 40 | 2049 | 1961 | 1961 | Normal | Normal |
| 41 | 2050 | 1962 | 1962 | Dry Year 1 | Normal |
| 42 | 2051 | 1963 | 1963 | Dry Year 2 | Normal |
| 43 | 2052 | 1964 | 1964 | Normal | Normal |
| 44 | 2053 | 1965 | 1965 | Normal | Normal |
| 45 | 2054 | 1966 | 1966 | Normal | Normal |
| 46 | 2055 | 1967 | 1967 | Dry Year 1 | Normal |
| 47 | 2056 | 1968 | 1968 | Dry Year 2 | Normal |
| 48 | 2057 | 1969 | 1969 | Dry Year 3 | Normal |
| 49 | 2058 | 1970 | 1970 | Dry Year 4 | Normal |
| 50 | 2059 | 1971 | 1971 | Normal | Normal |
| 51 | 2060 | 1972 | 1972 | Normal | Normal |
| 52 | 2061 | 1973 | 1973 | Normal | Normal |
| 53 | 2062 | 1974 | 1974 | Normal | Normal |
| 54 | 2063 | 1975 | 1975 | Normal | Normal |
| 55 | 2064 | 1976 | 1976 | Normal | Normal |
| 56 | 2065 | 1977 | 1977 | Normal | Dry Year 1 |
| 57 | 2066 | 1978 | 1978 | Normal | Normal |
| 58 | 2067 | 1979 | 1979 | Dry Year 1 | Normal |
| 59 | 2068 | 1980 | 1980 | Dry Year 2 | Normal |
| 60 | 2069 | 1981 | 1981 | Dry Year 3 | Normal |
| 61 | 2070 | 1982 | 1982 | Normal | Normal |
| 62 | 2071 | 1983 | 1983 | Normal | Normal |
| 63 | 2072 | 1984 | 1984 | Normal | Normal |
| 64 | 2073 | 1985 | 1985 | Normal | Normal |
| 65 | 2074 | 1986 | 1986 | Normal | Normal |
| 66 | 2075 | 1987 | 1987 | Normal | Normal |
| 67 | 2076 | 1988 | 1988 | Normal | Dry Year 1 |
| 68 | 2077 | 1989 | 1989 | Dry Year 1 | Normal |
| 69 | 2078 | 1990 | 1990 | Normal | Dry Year 2 |
| 70 | 2079 | 1991 | 1991 | Normal | Dry Year 3 |
| 71 | 2080 | 1992 | 1992 | Normal | Dry Year 4 |
| 72 | 2081 | 1993 | 1993 | Dry Year 1 | Normal |
| 73 | 2082 | 1994 | 1994 | Normal | Normal |
| 74 | 2083 | 1995 | 1995 | Normal | Normal |
| 75 | 2084 | 1996 | 1996 | Normal | Normal |
| 76 | 2085 | 1997 | 1997 | Dry Year 1 | Normal |
| 77 | 2086 | 1998 | 1998 | Dry Year 2 | Normal |
| 78 | 2087 | 1999 | 1999 | Normal | Normal |
| 79 | 2088 | 2000 | 2000 | Normal | Normal |
| 80 | 2089 | 2001 | 2001 | Normal | Dry Year 1 |
| 81 | 2090 | 2002 | 2002 | Normal | Normal |
| 82 | 2091 | 2003 | 2003 | Normal | Normal |
| 83 | 2092 | 2004 | 2004 | Dry Year 1 | Normal |
| 84 | 2093 | 2005 | 2005 | Normal | Normal |
| 85 | 2094 | 2006 | 2006 | Normal | Normal |
| 86 | 2095 | 2007 | 2007 | Normal | Normal |

**Figure 5-1: 2010-2098 Cumulative Departure from Average Annual Rainfall at Newhall-Soledad Rain Gage**



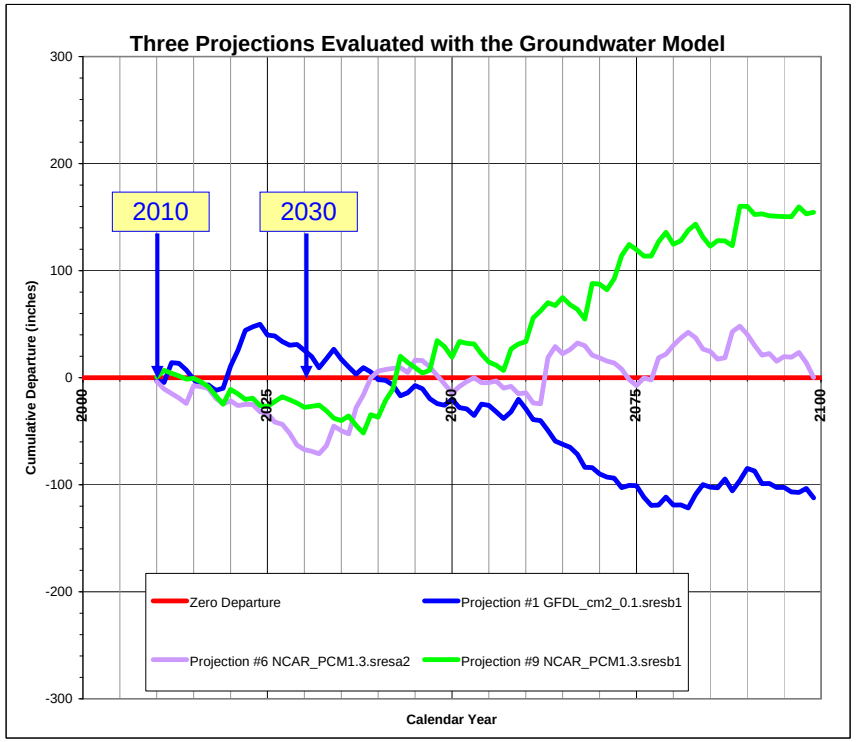



**Figure 5-2: VWC-E15 Modeled Groundwater Elevations For Various Climate Projections (Alluvial Aquifer Below Valencia WRP)**

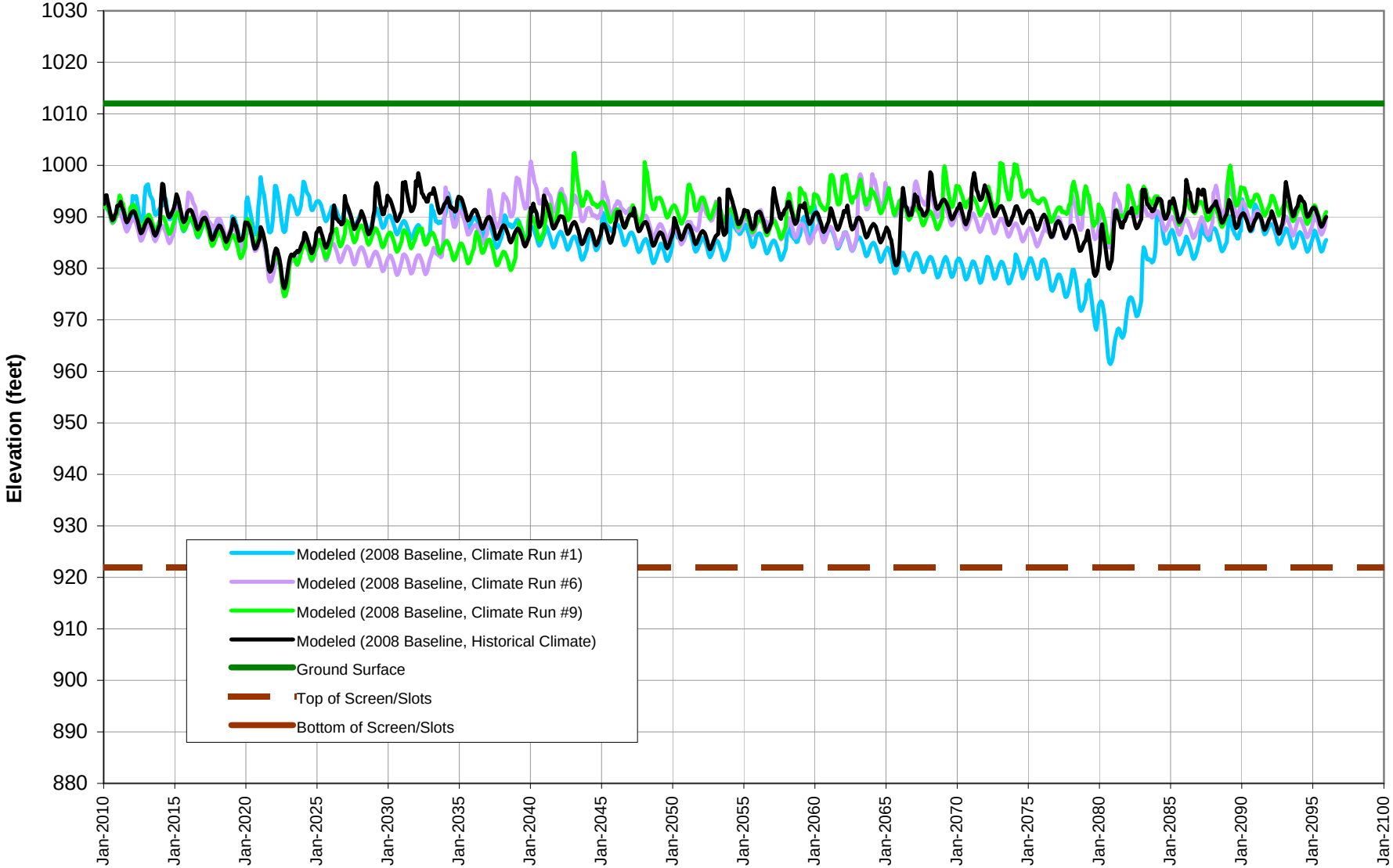


**Figure 5-3: VWC-S8 Modeled Groundwater Elevations For Various Climate Projections (Alluvial Aquifer Below Saugus WRP)**

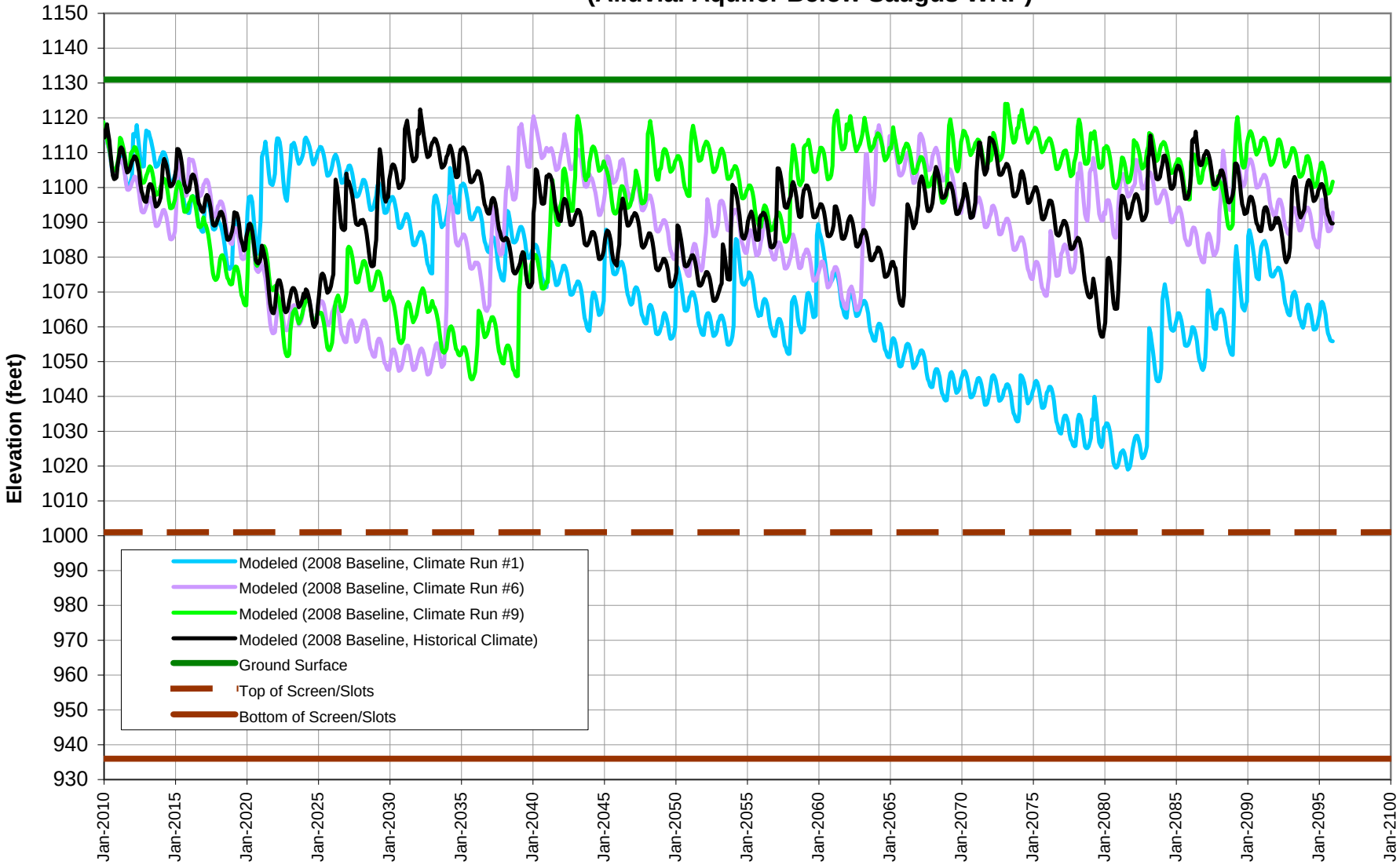


**Figure 5-4: VWC-T7 Modeled Groundwater Elevations For Various Climate Projections (Alluvial Aquifer Below Saugus WRP)**

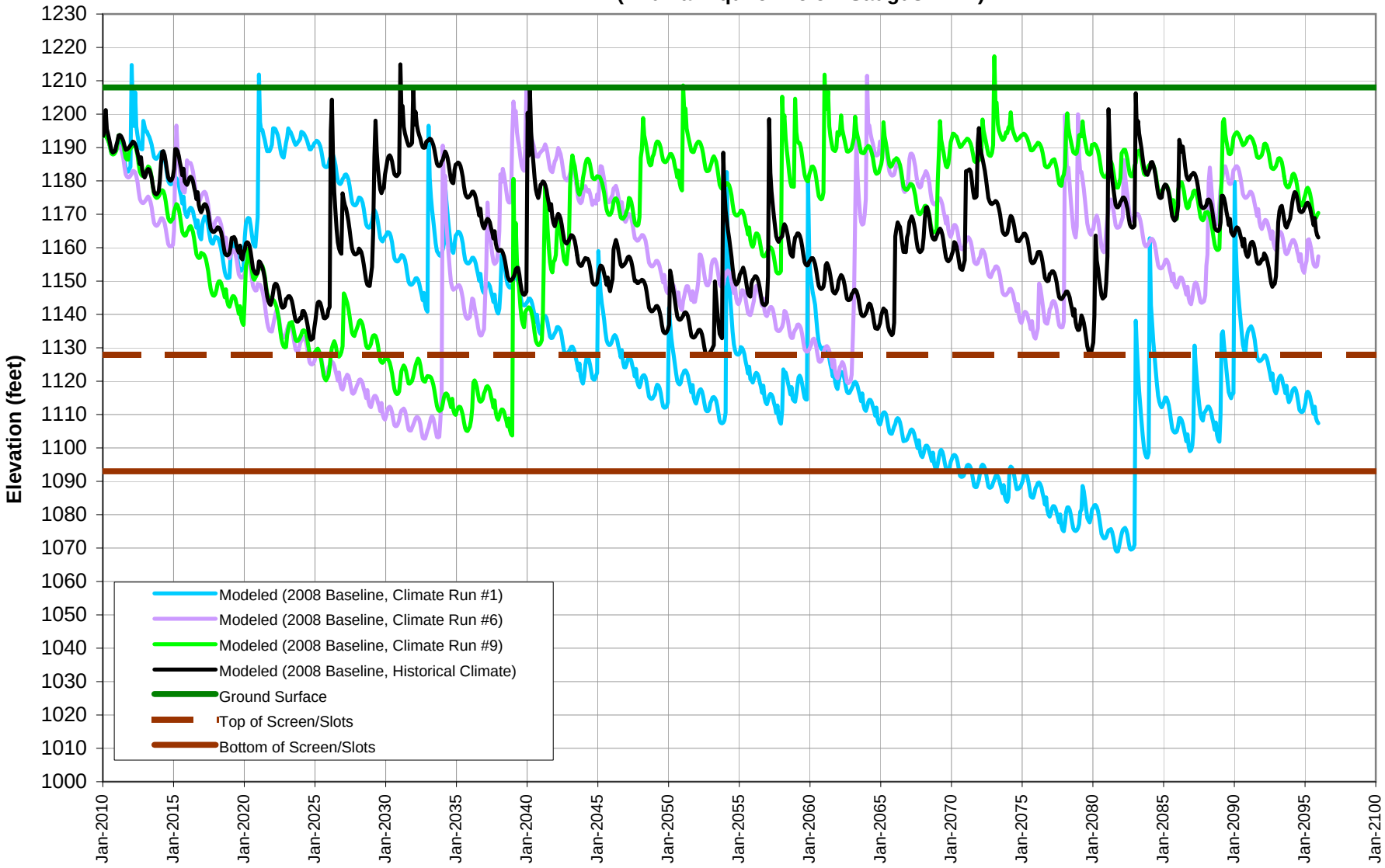


**Figure 5-5: SCWD-Sierra Modeled Groundwater Elevations for Various Climate Projections (Alluvial Aquifer along Santa Clara River, At and Above Mint Canyon)**

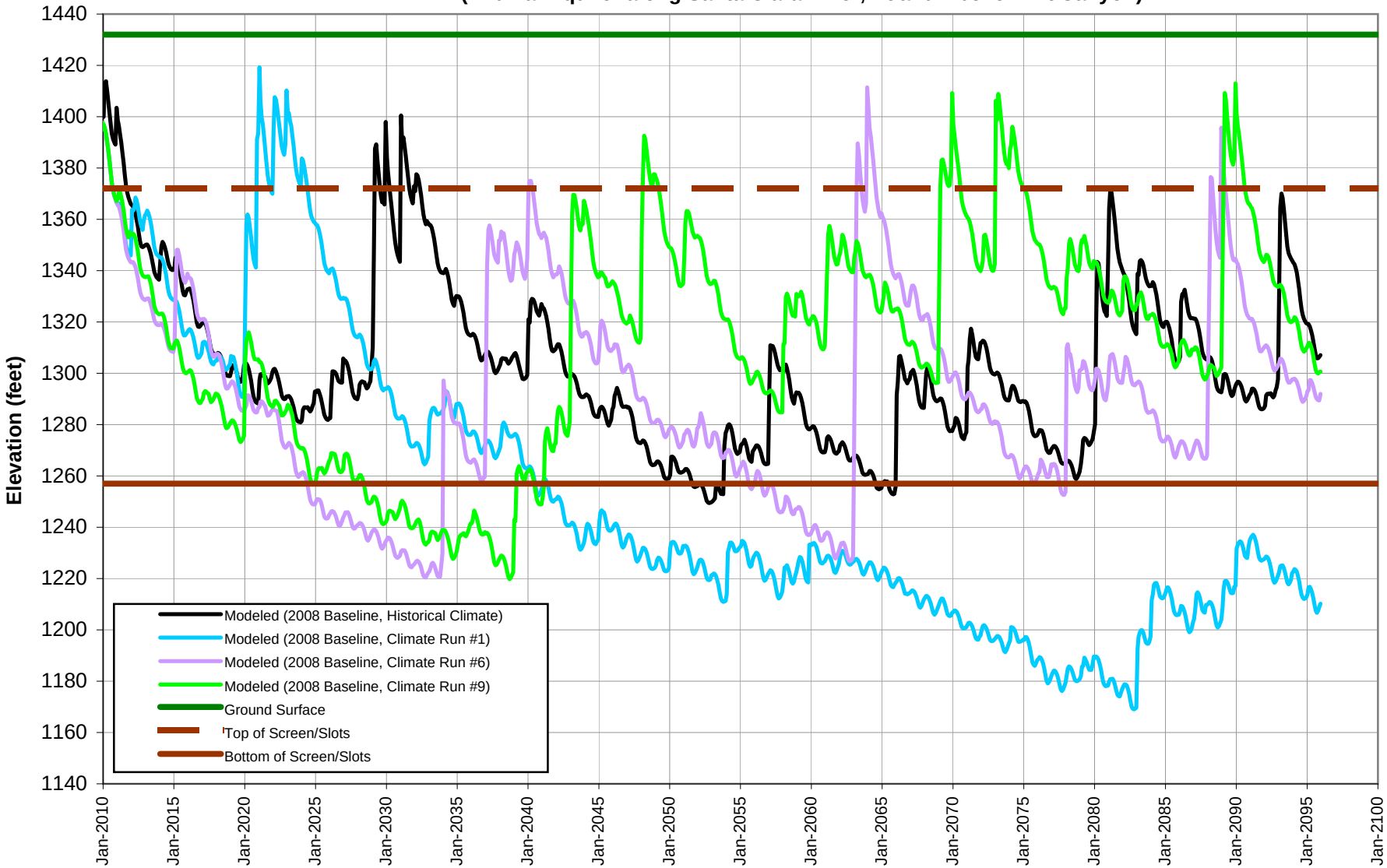


**Figure 5-6: NCWD-Pinetree1 Modeled Groundwater Elevations For Various Climate Projections (Alluvial Aquifer Along Santa Clara River, At and Above Mint Canyon)**

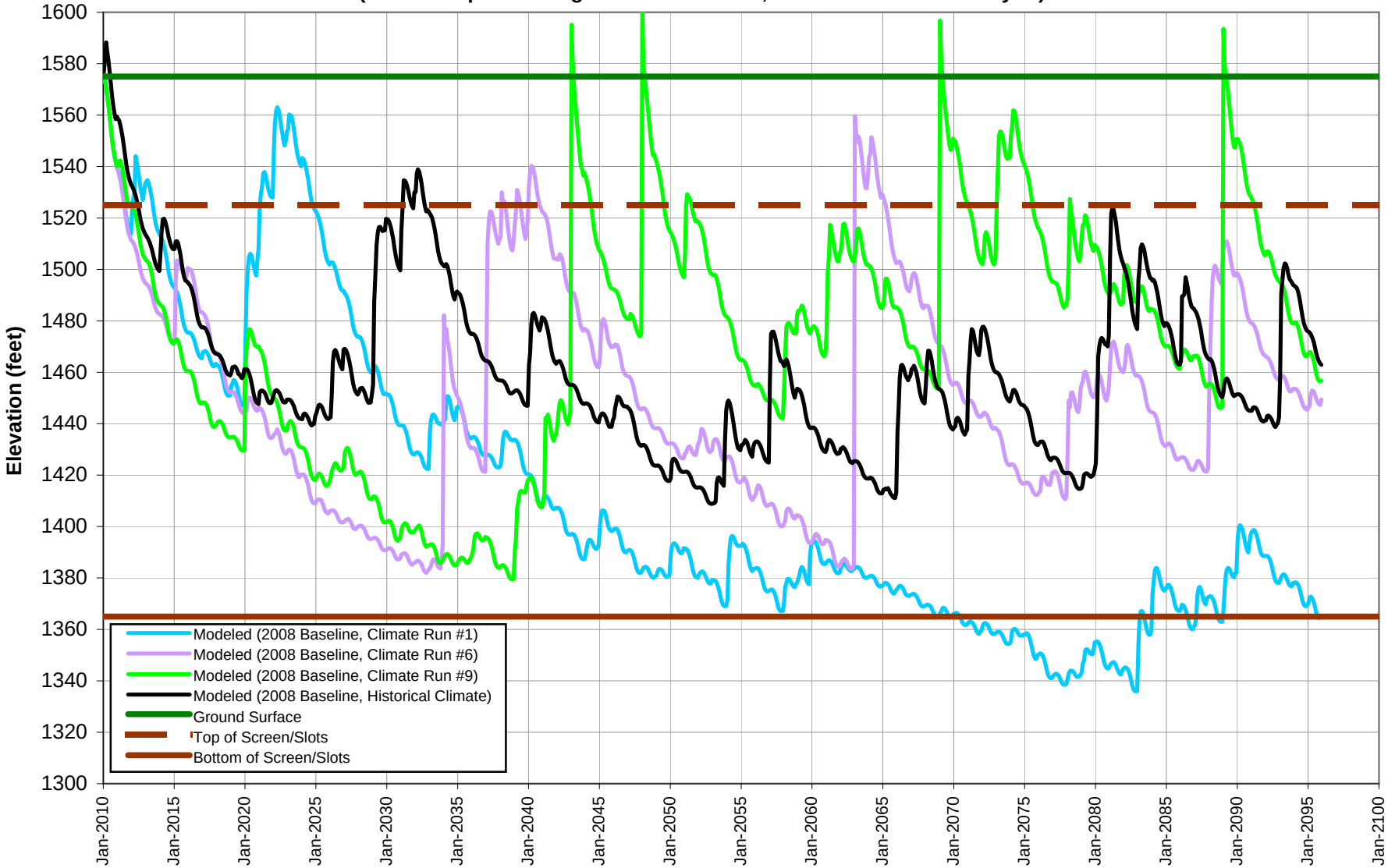


**Figure 5-7: NCWD-Castaic7 Modeled Groundwater Elevations For Various Climate Projections (Alluvial Aquifer in Castaic Valley)**

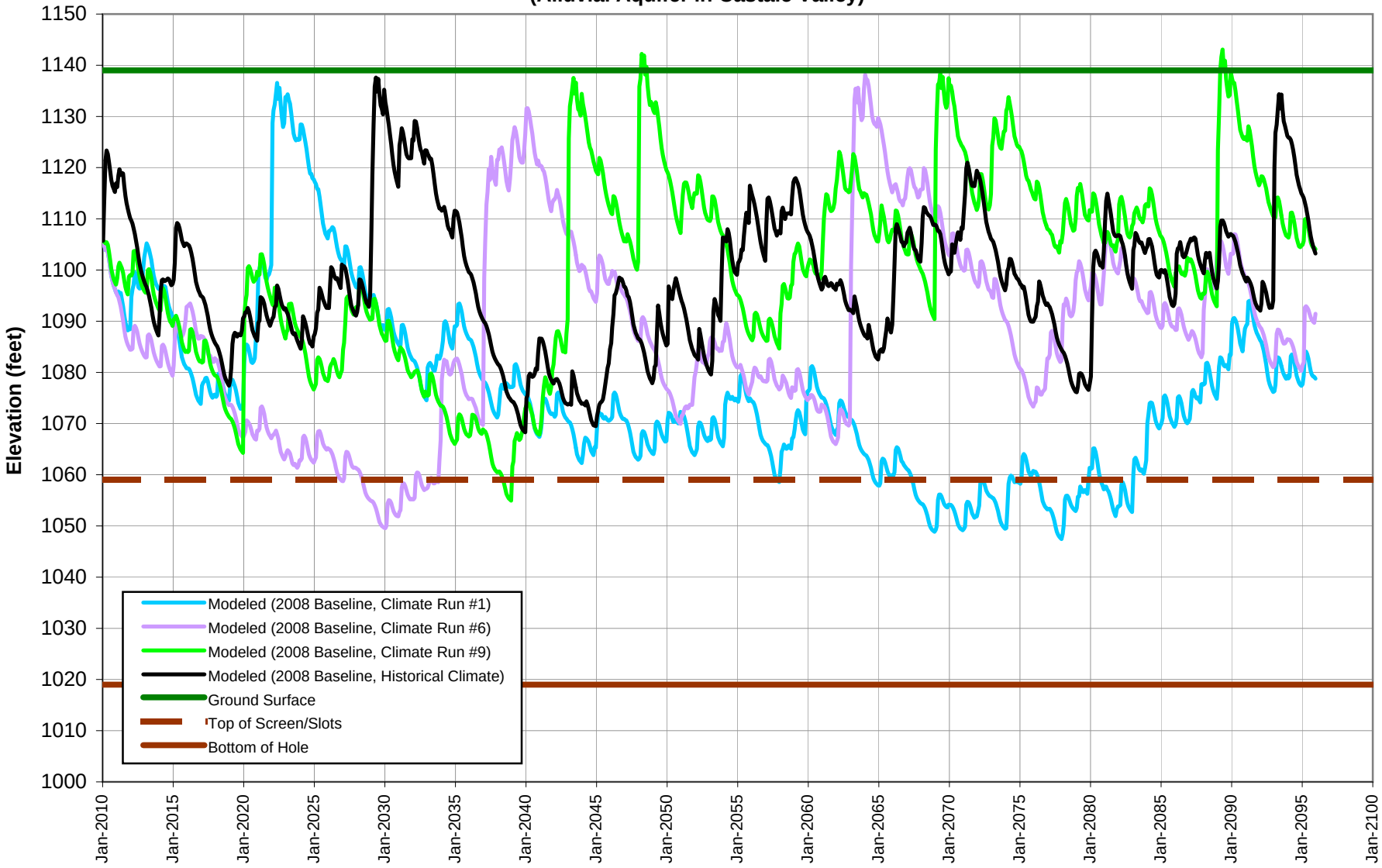


**Figure 5-8: VWC-W11 Modeled Groundwater Elevations For Various Climate Projections (Alluvial Aquifer in San Francisquito Canyon)**

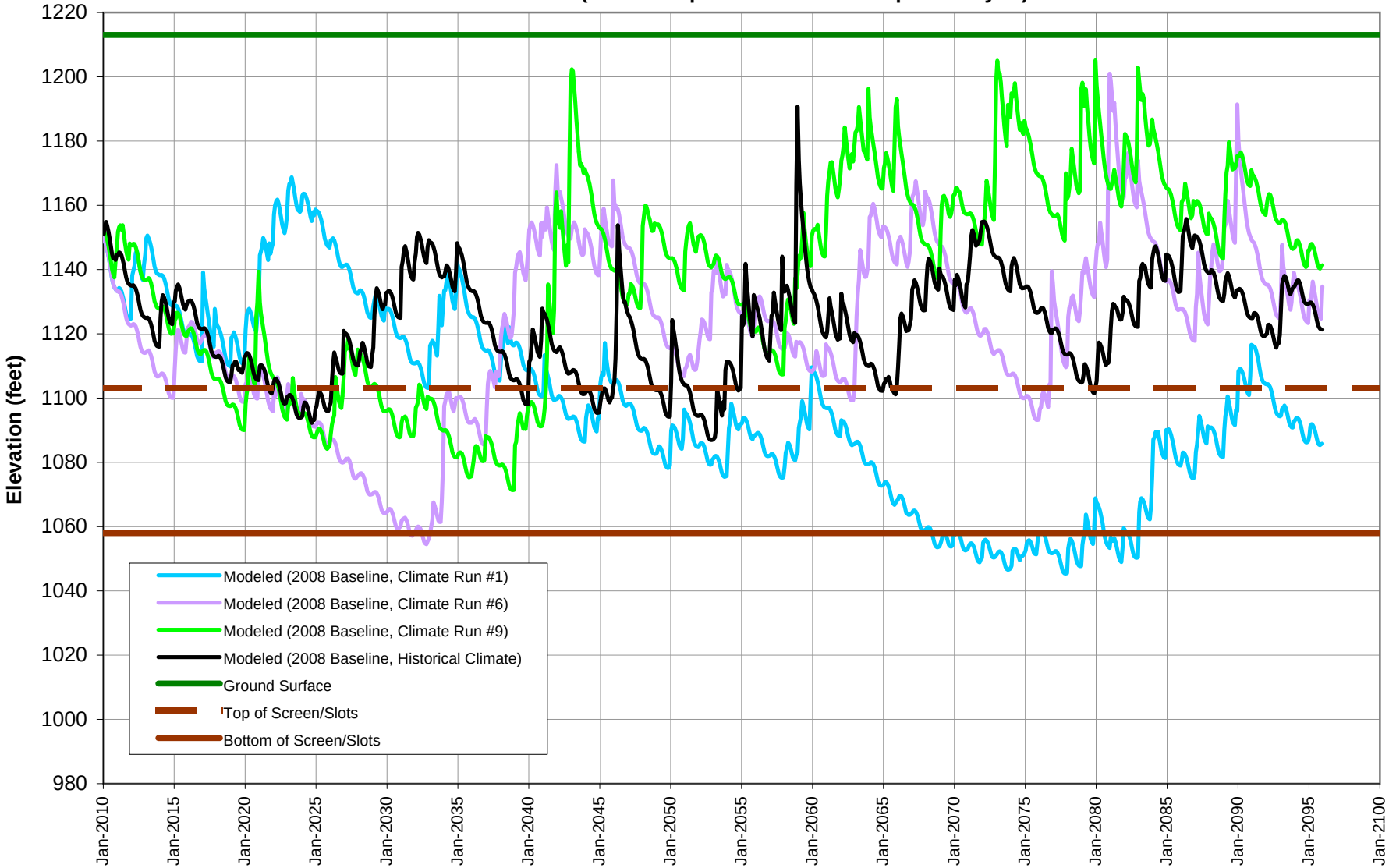


**Figure 5-9: SCWD-Clark Modeled Groundwater Elevations for Various Climate Projections (Alluvial Aquifer in Bouquet Canyon)**

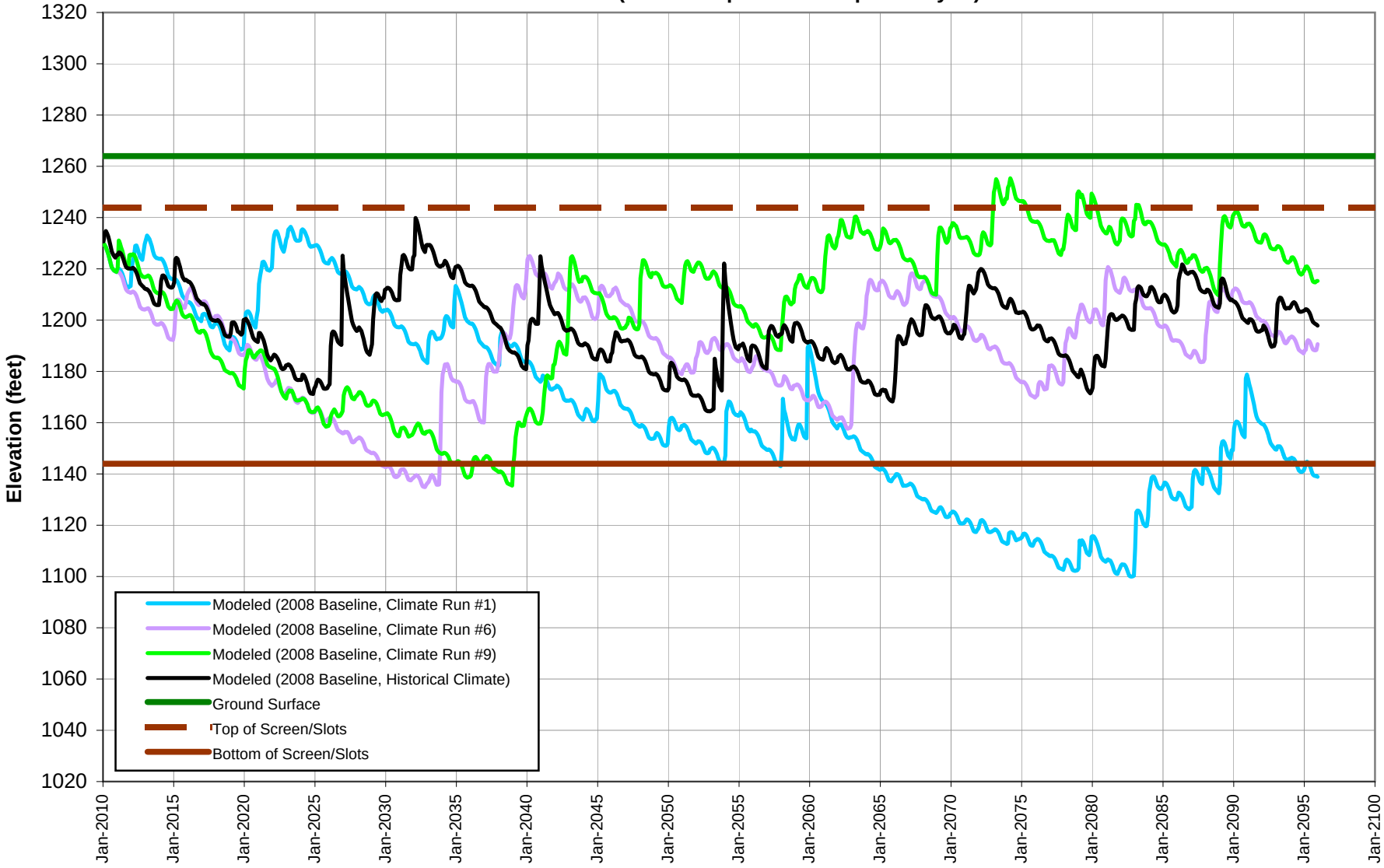
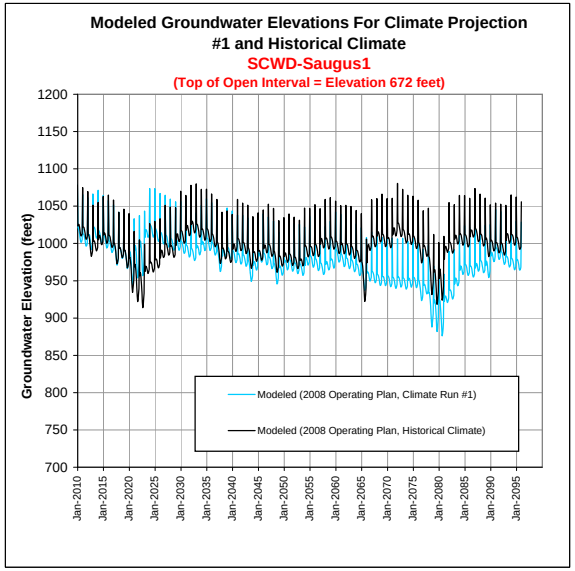
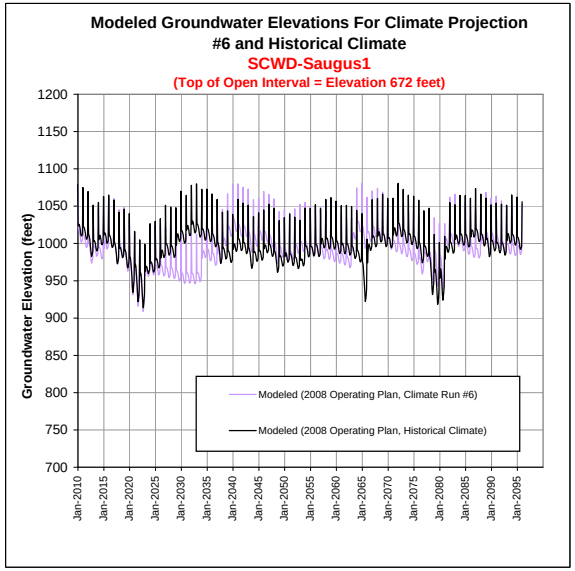


**Figure 5-10: Groundwater Elevation Trends at SCWD-Saugus1 for the 2008 Operating Plan Under Historical Climate and Climate Projections #1, #6, and #9**



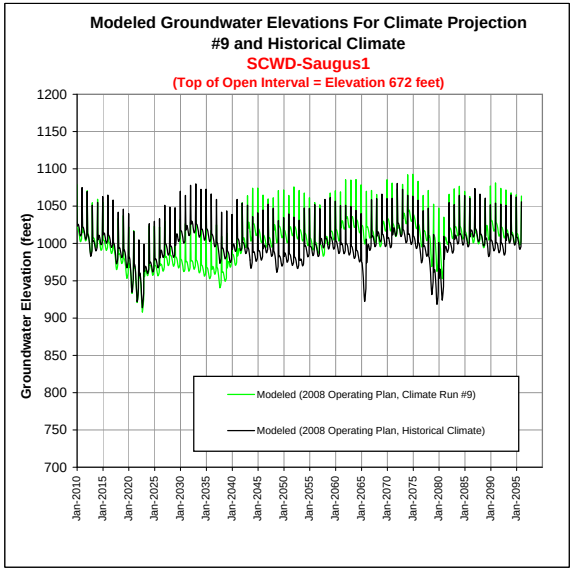
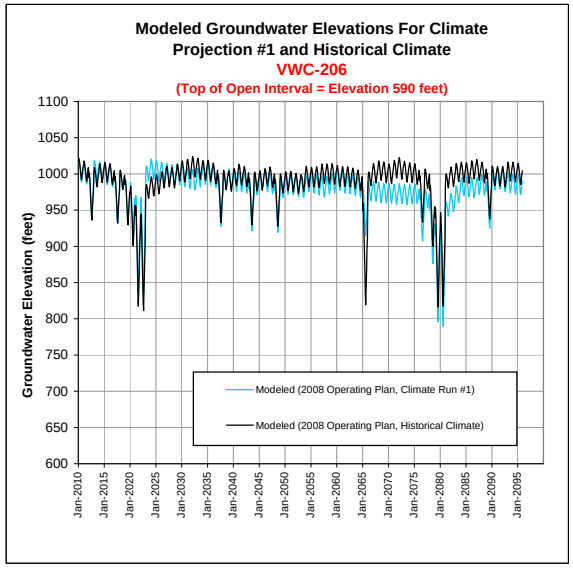
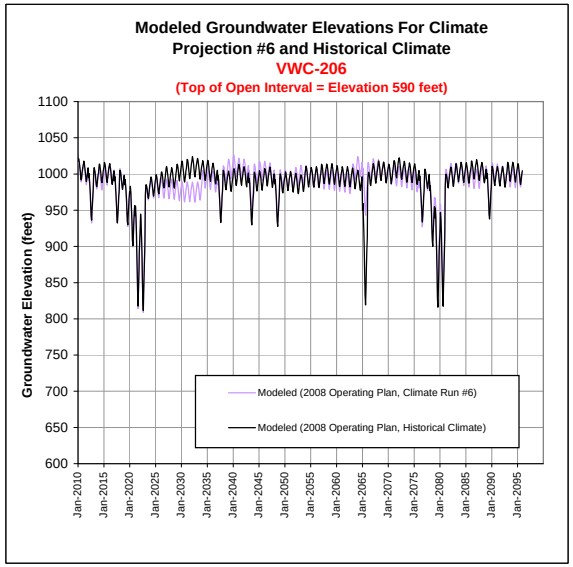



**Figure 5-11: Groundwater Elevation Trends at VWC-206 for the 2008 Operating Plan Under Historical Climate and Climate Projections #1, #6, and #9**



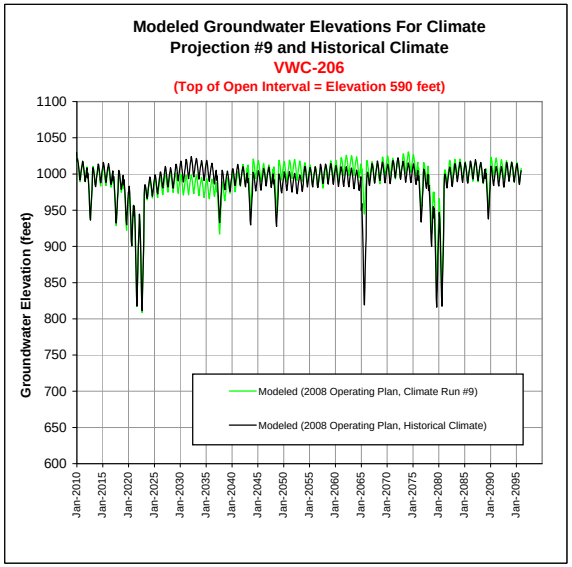
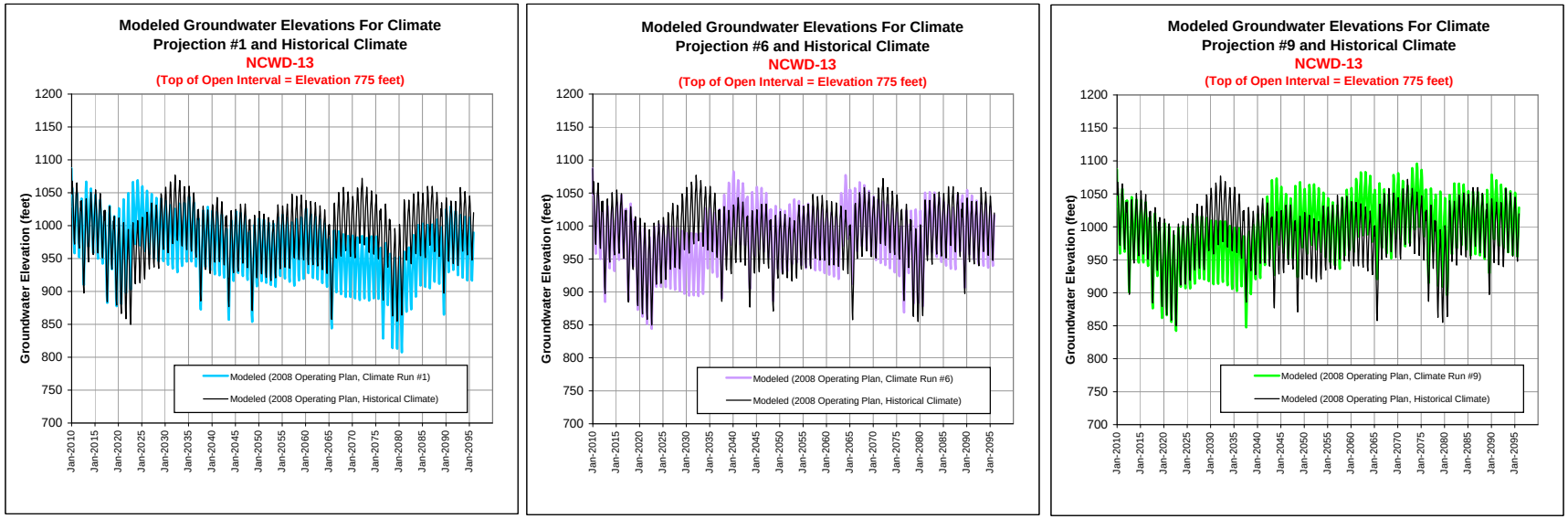



**Figure 5-12: Groundwater Elevation Trends at NCWD-13 for the 2008 Operating Plan Under Historical Climate and Climate Projections #1, #6, and #9**



# VI. Local Artificial Recharge Projects

## 6.1 Los Angeles County Flood Control District Study

The Los Angeles County Flood Control District (LACFCD) prepared an unpublished water conservation plan that proposes constructing thirteen separate artificial recharge projects in the upper Santa Clara River Watershed. The focus of the plan is to capture or impede stormwater runoff to promote percolation to groundwater, specifically to the Alluvium located along the Santa Clara River. Although the plan acknowledged that there is a lack of runoff data to accurately predict the water conservation benefits of the projects, LACFCD estimated that, on average, a given year could be expected to have three storms that would be capable of producing enough stormwater runoff to fill the estimated storage capacities of each of the thirteen proposed projects. Therefore, to estimate the total water conservation benefit, LACFCD multiplied the total storage capacity of the thirteen projects by three. The total storage capacity and water conservation benefit of the thirteen projects combined were thus estimated to be 1,816 acre feet and 5,455 acre feet per year, respectively.

The plan subdivided the thirteen projects into three separate areas of the basin (Figure 6-1):

- six projects on the south fork of the Santa Clara River
- two projects in San Francisquito Canyon
- five projects on the main Santa Clara River System

Table 6-1 lists each project by subarea along with the LACFCD estimate of project capacity and water conservation benefit. The project locations relative to the Alluvial aquifer system by subarea are described below.

## 6.2 Project Locations Relative to Aquifer System

The six projects that would be located along the south fork of the Santa Clara River, as illustrated in Figure 6-1, consist of three rubber dam projects; two projects that divert water into spreading grounds; and a project that backs up flows behind a rubber dam for diversion into adjoining spreading grounds. The total capacity and estimated water conservation benefit of these six facilities are 496 acre feet and 1,475 acre feet per year, respectively. The riverbed of the south fork of the Santa Clara River lies along the eastern margin of the alluvial valley that the river occupies. In this area, the alluvium is thin and the Saugus Formation outcrops in the hills adjoining the river valley. Projects 1 through 5 are located in areas where groundwater pumping occurs from the Saugus Formation, but no Alluvial production wells are present because of the limited saturated thickness of the alluvium throughout this area. Project no. 6 is the furthest north (or downgradient) of the south fork projects and is located south of VWC's N7 and N8 Alluvial production wells in an area where the saturated thickness of the alluvium is much greater than further upstream where the other projects are located.

The two projects (no. 7 and 8 on Figure 6-1) proposed by LACFCD in San Francisquito Canyon would consist of spreading grounds along the unnamed ephemeral stream, tributary to the Santa

Clara River. The total capacity of the spreading grounds would be about 420 acre feet with a combined estimated water conservation benefit of 1,270 acre feet per year. The locations of the two spreading grounds are along the margins of the Alluvium north of Decoro Drive and Cooper Hill Drive where the alluvium is thin.

The five projects (no. 9 through 13 on Figure 6-1) proposed by LACFCD along the Santa Clara River extend from near the Saugus wastewater treatment plant eastward to areas just east of Newhall County Water District's Pinetree wells. These projects would include one rubber dam and four spreading grounds that are located along the margins of the Alluvium near outcrops of Saugus and bedrock formations in the hills adjoining the alluvial river valley. The five projects would have combined capacity of about 900 acre feet and an estimated total annual water conservation benefit of about 2,710 acre feet per year.

## 6.3 Conceptual Project Operation and Impacts

The purpose of the planned projects would be to capture stormwater runoff using inflatable rubber dams and to divert excess runoff into spreading grounds in order to recharge groundwater in the Alluvium in the immediate vicinity of each project site. The ability and related impact of the projects to effectively increase groundwater recharge in the Alluvium rather than to simply redistribute groundwater recharge is discussed in further detail below.

- **South Fork of the Santa Clara River.** Recharge projects in the South Fork of the Santa Clara River would be located primarily along the margins of the river valley where the Alluvium where this unit is thin. These project locations (nos. 1 through 5 on Figure 6-1) may not have sufficient alluvial thickness and available storage capacity during storm events to allow excess runoff captured by these projects to recharge groundwater at each project location. As a result, the excess stormwater runoff may not readily recharge groundwater and may be rejected due to the lack of available storage capacity in the vicinity of each project. Excess runoff captured by these projects would likely recharge groundwater elsewhere in the south fork of the Santa Clara River or near its mouth. Project locations 1 through 5 are proposed to be located in areas where groundwater production wells pump groundwater from the underlying Saugus Formation, rather than from the Alluvium. Consequently, even if some additional water were introduced to storage, little if any of the benefit would be able to be pumped at those project locations (again, there are no existing Alluvial production wells in the area and there is no likelihood of new production wells being constructed, all due to the lack of sufficient thickness of the Alluvium). Project location no. 6, the northernmost project in this area may have the potential to provide additional recharge to groundwater. However, due to the low storage capacity and estimated water conservation benefit, it would be difficult to differentiate between recharge from this project as compared to recharge under existing conditions, which already maintains sustainable groundwater conditions.

- **San Francisquito Canyon.** Project locations in San Francisquito Canyon would intercept stormwater runoff that would likely continue to recharge the Alluvium further downstream of the project locations; in essence, the projects would potentially

only redistribute stormwater recharge that currently has recharged the Alluvial aquifer in areas upstream of the Valencia waste water treatment plant (again, existing recharge already supports sustainable groundwater conditions in San Francisquito Canyon and immediately downstream in the main River area).

- **Santa Clara River** The project locations in the Santa Clara River area are very spread out with the easternmost project (no. 12) having the largest estimated capacity. However, Project no. 12 is located more than a mile east of Newhall County Water Districts Pinetree wells, and any stormwater runoff captured by this project would likely result in two different outcomes. One outcome is that the project would likely recharge groundwater in an area which currently has no production wells, and the water that is recharged would likely have recharged groundwater further downstream in the absence of the project. The second outcome is that the available storage in the alluvium in the area of the project would fill rapidly during a large stormwater runoff event, thereby limiting the amount of infiltration that can occur afterwards from the stormwater runoff captured by the project's spreading grounds. Three of the other four remaining projects (no. 10, 11, and 13) will likely encounter similar obstacles to Project no. 12 because of the similar surface and groundwater conditions that are present along the Santa Clara River between the Bouquet Canyon Bridge and the Lang gage (the eastern margin of the watershed). Project no. 9 (at the Bouquet Canyon Bridge) is similar in nature to Project no. 6 described above in that any benefit derived from the project might not be discernible from the conditions that would otherwise occur naturally in the absence of this and the other projects that are proposed along the Santa Clara River.

The overarching consideration with regard to the planned artificial recharge projects is that they might capture and "artificially recharge" water that already recharges the Alluvial aquifer system where it is of sufficient thickness to be developed as a groundwater supply. As evident from empirical observations and the simulations reported herein, the system "naturally" recharges to the point of sustaining groundwater pumping and, in the westerly end of the basin, to the point that stream recharge is rejected (and groundwater discharges to the stream). The small volumes of the various planned artificial recharge projects, and the arbitrarily estimated filling of those three times per year, do not represent "new" recharge; they likely represent some potential minor relocation of existing recharge.

Even if it were desirable to purposely relocate some existing recharge to one or more of the planned (LACFCD) locations, it would be difficult (possible but challenging) to redistribute the small amount of stream recharge and to then track the corresponding small effect of intercepting that water and removing it as a source of recharge as now occurs downstream. The results of the rest of the work reported herein, most notably that dealing with achievability of the 2008 Operating Plan, clearly suggest that artificial recharge could locally benefit certain areas, notably at and above Mint Canyon. However, such benefits would more logically develop from other water sources that would supplement natural recharge rather than simply redistribute it. The model used to simulate the basin response to the operating plans, under historic and potential climate change conditions, can readily simulate the effects and benefits of artificial recharge at selected locations using supplemental water.

Table 6-1

Los Angeles County Flood Control District
Stormwater Runoff Recharge Projects

| Recharge Project | Storage Capacity (acre-feet) | Annual Water Conservation Benefit (acre-feet/year) |
|---|---|---|
| Santa Clara River South Fork | | |
| 1 | 109 | 330 |
| 2 | 75 | 220 |
| 3 | 5 | 75 |
| 4 | 112 | 330 |
| 5 | 60 | 180 |
| 6 | 115 | 340 |
| Subtotal | 496 | 1,475 |
| San Francisquito Canyon | | |
| 7 | 230 | 700 |
| 8 | 190 | 570 |
| Subtotal | 420 | 1,270 |
| Santa Clara River | | |
| 9 | 80 | 230 |
| 10 | 180 | 550 |
| 11 | 220 | 670 |
| 12 | 70 | 220 |
| 13 | 350 | 1040 |
| Subtotal | 900 | 2,710 |
| Grand Total | 1,816 | 5,455 |

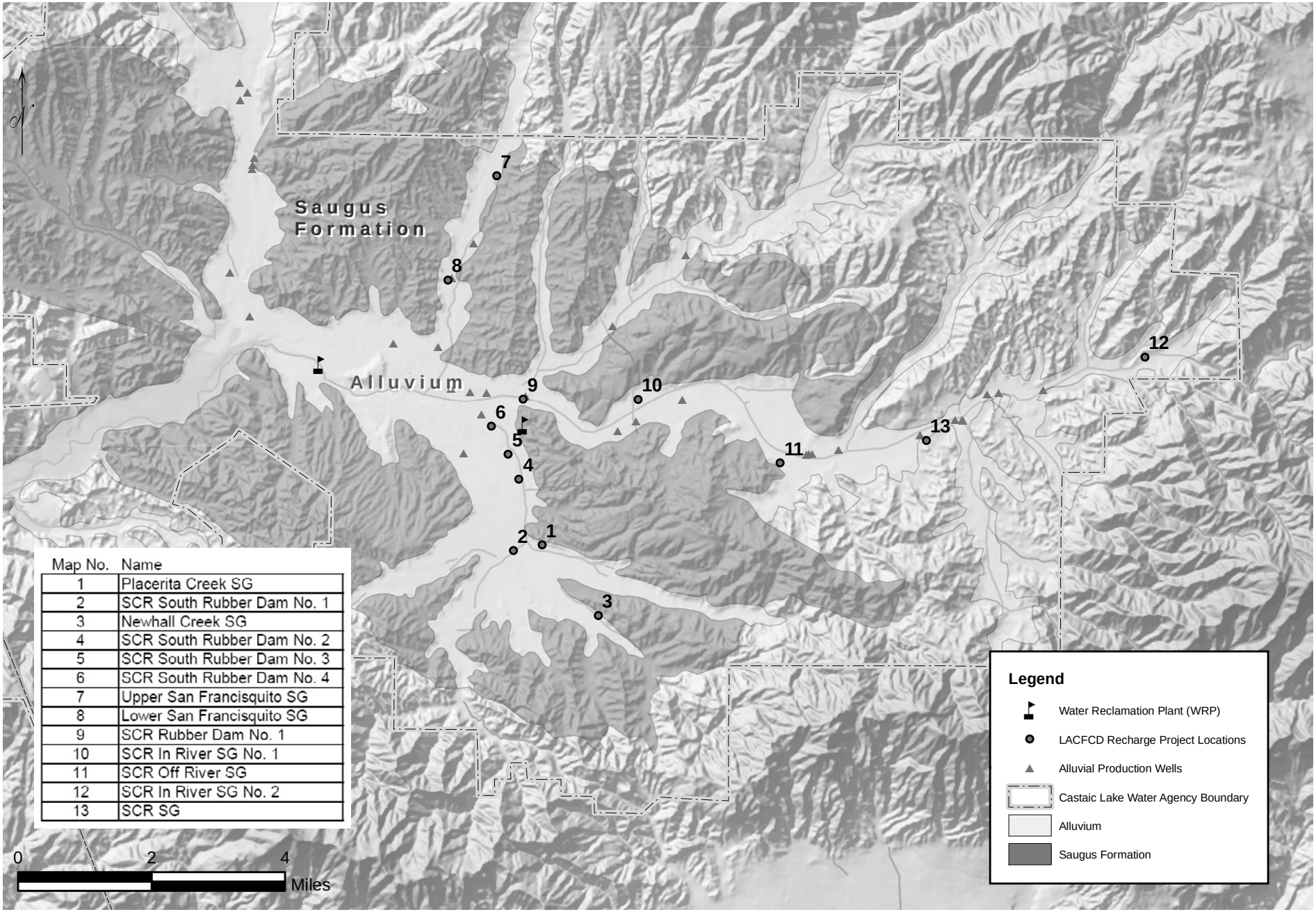



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**Figure 6-1**
**Locations of LACFCD Planned Recharge Projects**
**Upper Santa Clara River Valley Groundwater Basin, East Subbasin**

# VII. Conclusions

The primary objective of the updated analysis of groundwater basin yield in the Santa Clarita Valley was to evaluate the planned utilization of groundwater by the Purveyors, after their consideration of potential impacts on traditional supplemental water supplies from the State Water Project (SWP), and with recognition of ongoing pumping by others for agricultural and other private water supply, for sustainability of the groundwater resource and for physical ability to extract groundwater at desired rates. As has previously been utilized in this basin, consistent with groundwater management in other settings, sustainability is defined in terms of renewability (recharge) of groundwater as reflected by the following indicators:

- lack of chronic, or sustained, depletion of groundwater storage, as indicated by projected groundwater levels, over a reasonable range of wet, normal, and dry hydrologic conditions

- maintenance of surface water flows in the western portion of the basin (which are partially maintained by groundwater discharge) and surface water outflow to downstream basins over the same range of hydrologic conditions

Regarding maintenance of surface water flows, although the development and use of groundwater in a sustainable manner necessitates the inducement of recharge from surface water, sustainability in this case does not rely on inducing groundwater recharge by eliminating surface water flows. Rather, sustainability retains surface water outflows and may even increase them with the importation of supplemental water when contrasted to pre-SWP conditions. Regarding both indicators of sustainability, the range of analyzed hydrologic conditions is a long-term period that includes anticipated occurrences of the types of years and groups of year types that have historically occurred in the basin.

A second objective of the updated groundwater basin yield analysis was to investigate and describe potential impacts of expected climate change on the groundwater basin and its yield. A third objective was to consider potential augmentation of basin yield via potential artificial groundwater recharge using storm water runoff in selected areas of the basin as being planned by the Los Angeles County Flood Control District.

The primary objective was investigated by analyzing, with the numerical groundwater flow model of the basin, two groundwater operating plans: a 2008 Operating Plan to reflect currently envisioned pumping rates and distribution throughout the Valley, including fluctuations through wet/normal and dry years, to achieve a desired amount of water supply that, in combination with anticipated supplemental water supplies, can meet existing and projected water requirements in the Valley; and a Potential Operating Plan that envisions potentially increased utilization of groundwater during both wet/normal and dry years.

With regard to the respective operating plans, a first conclusion is that the 2008 Operating Plan will not cause detrimental short- or long-term effects to the groundwater and surface water resources in the Valley and is, therefore, sustainable. Consistent with actual operating experience and empirical observations of historical basin response to groundwater pumping, the

2008 Operating Plan can be expected to have local difficulty, in the Alluvium at the eastern end of the basin during locally dry periods, with achievement of all the Alluvial pumping in the 2008 Operating Plan. This condition is particularly evident if several decades of predominantly below-normal rainfall years were to occur in the future such as occurred during much of the five decades from the mid-1920s through the mid-1970s. In other words, while the basin as a whole can sustain the pumping embedded in the 2008 Operating Plan, local conditions in the Alluvium in the eastern end of the basin can be expected to repeat historical groundwater level declines during dry periods, necessitating a reduction in desired Alluvial aquifer pumping due to decreased well yield and associated actual pumping capacity. The modeling analysis conducted to date suggests that those reductions in pumping from the Alluvial aquifer can be made up by an equivalent amount of increased pumping in other parts of the basin without disrupting basin-wide sustainability or local pumping capacity in those other areas. For the Saugus Formation, the modeling analysis indicates that this aquifer can sustain the pumping from this unit that is imbedded the 2008 Operating Plan.

Simulation of the 2008 Operating Plan with Pumping Redistribution indicates that westerly redistribution of 1,600 afy of alluvial pumping from the eastern end of the basin would help, but not eliminate, the lack of achievability. The residual unachievable pumping in the east end of the basin, about 4,500 afy, could be redistributed to other areas of the basin with minimal impact on groundwater levels. In this case, total Alluvial pumping in the basin could remain near the upper end of the 2008 Operating Plan range of 30,000 to 35,000 afy. Conversely, absent any additional efforts to redistribute pumping, the total Alluvial pumping capacity during extended dry periods would likely shrink toward the lower end of the 2008 Operating Plan range, toward 30,000 afy.

Another conclusion with regard to the respective operating plans is that the Potential Operating Plan would result in lower groundwater levels, failure of the basin to fully recover (during wet hydrologic cycles) from depressed storage that occurs during dry periods, and generally declining trends in groundwater levels and storage. This conclusion is strongly suggested for the Alluvial aquifer by the modeling results, but the model also indicates that long-term lowering of groundwater levels could also occur in the Saugus Formation, with only partial water level recovery occurring in the Saugus. Thus, the Potential Operating Plan would not be sustainable over a long-term period. The simulated combination of lower and declining groundwater levels under the Potential Operating Plan also leads to a conclusion that such an operating plan could not be physically achieved in several areas within the basin.

Conclusions with regard to another of the objectives of the updated groundwater basin yield analysis include a recognition that the runoff conservation/groundwater recharge projects being planned by the Los Angeles County Flood Control District are a combination of individually small projects that are not yet fully analyzed in terms of potential new yield, are but unlikely to provide any substantial recharge that does not already occur. Additionally, these proposed projects are mostly located in areas of the basin where the alluvial aquifer is of insufficient thickness and storage (and is thus not developed for water supply) or where the alluvial aquifer already fully recharges when stream flows are naturally present.

Final conclusions related to the overall objectives of the updated groundwater basin yield analysis all relate to the potential impacts of climate change on the yield of the basin and the

related groundwater supply from the basin. While “conclusions” would probably be an inappropriate term to describe future conditions that cannot be projected with any degree of certainty, the results of simulating basin response to the 2008 Operating Plan, under a range of potential climate change result in two important observations.

- for the broad range of climate change possibilities that was analyzed, the 2008 Operating Plan would appear to be both sustainable and, with the same physical constraints to full pumping in the eastern part of the basin as have otherwise been experienced, achievable through the shorter term horizon associated with UWMP planning.

- the range of potential climate change impacts extends from a possible wet trend to a possible dry trend over the long term. The trends that range from an approximate continuation of historical average precipitation, to something wetter than that, would appear to result in continued sustainability of the 2008 Operating Plan, again with intermittent constraints on full pumping in the eastern part of the basin. The potential long-term dry trend arising out of climate change would be expected to decrease local recharge to the point that lower and declining groundwater levels would render the 2008 Operating Plan unsustainable.

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**Draft EIR – Supplemental Water Project Transfer of 41,000 Acre-Feet of State Water Project Table A Amount**
**Dated June 2004**

DRAFT

# Environmental Impact Report

California State Clearinghouse No. 1998041127

# Castaic Lake Water Agency

## Supplemental Water Project Transfer of 41,000 Acre-Feet of State Water Project Table A Amount

*Prepared for:*

**Castaic Lake Water Agency**
**27234 Bouquet Canyon Road**
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June 2004

# TABLE OF CONTENTS

EXECUTIVE SUMMARY ..... ES-1

1.0 INTRODUCTION ..... 1-1

1.1 Purpose of and Intended Uses of this Environmental Impact Report ..... 1-1

1.2 Related Environmental Documentation ..... 1-2

1.2.1 Supplemental Water Project EIR ..... 1-2

1.2.2 Monterey Amendment Program EIR ..... 1-3

1.2.3 Capital Program and Water Plan, including Acquisition of Supplemental Water and of a Proposed Second Plant Site, EIR ..... 1-4

1.3 Water Agencies and Districts Involved in the Water Transfer ..... 1-5

1.3.1 Castaic Lake Water Agency ..... 1-5

1.3.2 Kern County Water Agency and the Wheeler Ridge-Maricopa Water Storage District ..... 1-7

1.3.3 Department of Water Resources ..... 1-9

1.4 Overview of SWP Facilities and Water Supply Contracts ..... 1-9

1.4.1 SWP Facilities ..... 1-9

1.4.2 SWP Water Supply Contracts ..... 1-11

1.5 Public Involvement Process ..... 1-14

1.6 EIR Organization ..... 1-14

2.0 PROJECT DESCRIPTION ..... 2-1

2.1 Project Location ..... 2-1

2.2 Project Objectives ..... 2-1

2.3 Description of the Project ..... 2-1

2.4 Permits and Other Approvals to Implement the Project ..... 2-2

3.0 ENVIRONMENTAL SETTING, PROJECT IMPACTS, AND MITIGATION MEASURES ..... 3.0-1

3.1 Aesthetic/Visual Resources ..... 3.1-1

3.1.1 Environmental Setting ..... 3.1-1

3.1.1.1 State Water Project and Associated Facilities ..... 3.1-1

3.1.1.2 Wheeler Ridge-Maricopa Water Storage District ..... 3.1-2

3.1.1.3 Castaic Lake Water Agency ..... 3.1-2

3.1.2 Potential Impacts of the Project ..... 3.1-2

3.1.2.1 Significance Criteria ..... 3.1-2

3.1.2.2 Environmental Impacts ..... 3.1-3

3.1.3 Mitigation Measures ..... 3.1-4

3.1.3.1 State Water Project and Associated Facilities ..... 3.1-4

3.1.3.2 Wheeler Ridge-Maricopa Water Storage District ..... 3.1-4

3.1.3.3 Castaic Lake Water Agency ..... 3.1-4

3.1.4 Significant Unavoidable Adverse Impacts ..... 3.1-4

3.2 Agricultural Resources ..... 3.2-1

3.2.1 Environmental Setting ..... 3.2-1

3.2.1.1 State Water Project and Associated Facilities ....3.2-1
3.2.1.2 Wheeler Ridge-Maricopa Water Storage District....3.2-1
3.2.1.3 Castaic Lake Water Agency....3.2-6
3.2.2 Potential Impacts of the Project....3.2-7
3.2.2.1 Significance Criteria....3.2-7
3.2.2.2 Environmental Impacts....3.2-8
3.2.3 Mitigation Measures....3.2-9
3.2.3.1 State Water Project and Associated Facilities ....3.2-9
3.2.3.2 Wheeler Ridge-Maricopa Water Storage District....3.2-9
3.2.3.3 Castaic Lake Water Agency....3.2-9
3.2.4 Significant Unavoidable Impacts....3.2-9
3.3 Air Quality ....3.3-1
3.3.1 Environmental Setting....3.3-3
3.3.1.1 State Water Project and Associated Facilities ....3.3-3
3.3.1.2 Wheeler Ridge-Maricopa Water Storage District....3.3-5
3.3.1.3 Castaic Lake Water Agency....3.3-6
3.3.2 Potential Impacts of the Project....3.3-7
3.3.2.1 Significance Criteria....3.3-7
3.3.2.2 Environmental Impacts....3.3-8
3.3.3 Mitigation Measures....3.3-9
3.3.3.1 State Water Project and Associated Facilities ....3.3-9
3.3.3.2 Wheeler Ridge-Maricopa Water Storage District....3.3-10
3.3.3.3 Castaic Lake Water Agency....3.3-10
3.3.4 Significant Unavoidable Impacts....3.3-10
3.4 Biological Resources ....3.4-1
3.4.1 Environmental Setting....3.4-1
3.4.1.1 State Water Project and Associated Facilities ....3.4-1
3.4.1.2 Wheeler Ridge-Maricopa Water Storage District....3.4-4
3.4.1.3 Castaic Lake Water Agency....3.4-6
3.4.2 Potential Impacts of the Project....3.4-10
3.4.2.1 Significance Criteria....3.4-10
3.4.2.2 Environmental Impacts....3.4-11
3.4.3 Mitigation Measures....3.4-12
3.4.3.1 State Water Project and Associated Facilities ....3.4-12
3.4.3.2 Wheeler Ridge-Maricopa Water Storage District....3.4-12
3.4.3.3 Castaic Lake Water Agency....3.4-12
3.4.4 Significant Unavoidable Impacts....3.4-12
3.5 Cultural Resources....3.5-1
3.5.1 Environmental Setting....3.5-1
3.5.1.1 State Water Project and Associated Facilities ....3.5-2
3.5.1.2 Wheeler Ridge-Maricopa Water Storage District....3.5-3
3.5.1.3 Castaic Lake Water Agency....3.5-3
3.5.2 Potential Impacts of the Project....3.5-4
3.5.2.1 Significance Criteria....3.5-4
3.5.2.2 Environmental Impacts....3.5-5
3.5.3 Mitigation Measures....3.5-6

3.5.3.1 State Water Project and Associated Facilities ....3.5-6
3.5.3.2 Wheeler Ridge-Maricopa Water Storage District....3.5-6
3.5.3.3 Castaic Lake Water Agency....3.5-6
3.5.4 Significant Unavoidable Impacts....3.5-6
3.6 Geology, Soils and Mineral resources....3.6-1
3.6.1 Environmental Setting....3.6-1
3.6.1.1 State Water Project and Associated Facilities ....3.6-1
3.6.1.2 Wheeler Ridge-Maricopa Water Storage District....3.6-2
3.6.1.3 Castaic Lake Water Agency....3.6-3
3.6.2 Potential Impacts of the Project....3.6-4
3.6.2.1 Significance Criteria....3.6-4
3.6.2.2 Environmental Impacts....3.6-5
3.6.3 Mitigation Measures....3.6-6
3.6.3.1 State Water Project and Associated Facilities ....3.6-6
3.6.3.2 Wheeler Ridge-Maricopa Water Storage District....3.6-6
3.6.3.3 Castaic Lake Water Agency....3.6-6
3.6.4 Significant Unavoidable Impacts....3.6-6
3.7 Hazards and Hazardous Materials....3.7-1
3.7.1 Environmental Setting....3.7-1
3.7.1.1 State Water Project and Associated Facilities ....3.7-1
3.7.1.2 Wheeler Ridge-Maricopa Water Storage District....3.7-1
3.7.1.3 Castaic Lake Water Agency....3.7-1
3.7.2 Potential Impacts of the Project....3.7-2
3.7.2.1 Significance Criteria....3.7-2
3.7.2.2 Environmental Impacts....3.7-2
3.7.3 Mitigation Measures....3.7-4
3.7.3.1 State Water Project and Associated Facilities ....3.7-4
3.7.3.2 Wheeler Ridge-Maricopa Water Storage District....3.7-4
3.7.3.3 Castaic Lake Water Agency....3.7-4
3.7.4 Significant Unavoidable Adverse Impacts....3.7-4
3.8 Land Use and Planning....3.8-1
3.8.1 Environmental Setting....3.8-1
3.8.1.1 State Water Project and Associated Facilities ....3.8-1
3.8.1.2 Wheeler Ridge-Maricopa Water Storage District....3.8-1
3.8.1.3 Castaic Lake Water Agency....3.8-2
3.8.2 Potential Impacts of the Project....3.8-3
3.8.2.1 Significance Criteria....3.8-3
3.8.2.2 Environmental Impacts....3.8-4
3.8.3 Mitigation Measures....3.8-5
3.8.3.1 State Water Project and Associated Facilities ....3.8-5
3.8.3.2 Wheeler Ridge-Maricopa Water Storage District....3.8-5
3.8.3.3 Castaic Lake Water Agency....3.8-5
3.8.4 Significant Unavoidable Impacts....3.8-5
3.9 Noise....3.9-1
3.9.1 Environmental Setting....3.9-2
3.9.1.1 State Water Project and Associated Facilities ....3.9-2

3.9.1.2 Wheeler Ridge-Maricopa Water Storage District ..... 3.9-3
3.9.1.3 Castaic Lake Water Agency ..... 3.9-3
3.9.2 Potential Impacts of the Project ..... 3.9-5
3.9.2.1 Significance Criteria ..... 3.9-5
3.9.2.2 Environmental Impacts ..... 3.9-6
3.9.3 Mitigation Measures ..... 3.9-7
3.9.3.1 State Water Project and Associated Facilities ..... 3.9-7
3.9.3.2 Wheeler Ridge-Maricopa Water Storage District ..... 3.9-7
3.9.3.3 Castaic Lake Water Agency ..... 3.9-7
3.9.4 Significant Unavoidable Impacts ..... 3.9-7
3.10 Population and Housing ..... 3.10-1
3.10.1 Environmental Setting ..... 3.10-1
3.10.1.1 State Water Project and Associated Facilities ..... 3.10-1
3.10.1.2 Wheeler Ridge-Maricopa Water Storage District ..... 3.10-1
3.10.1.3 Castaic Lake Water Agency ..... 3.10-1
3.10.2 Potential Impacts of the Project ..... 3.10-1
3.10.2.1 Significance Criteria ..... 3.10-1
3.10.2.2 Environmental Impacts ..... 3.10-2
3.10.3 Mitigation Measures ..... 3.10-3
3.10.3.1 State Water Project and Associated Facilities ..... 3.10-3
3.10.3.2 Wheeler Ridge-Maricopa Water Storage District ..... 3.10-3
3.10.3.3 Castaic Lake Water Agency ..... 3.10-3
3.10.4 Significant Unavoidable Impacts ..... 3.10-3
3.11 Public Services ..... 3.11-1
3.11.1 Environmental Setting ..... 3.11-1
3.11.1.1 State Water Project and Associated Facilities ..... 3.11-1
3.11.1.2 Wheeler Ridge-Maricopa Water Storage District ..... 3.11-1
3.11.1.3 Castaic Lake Water Agency ..... 3.11-2
3.11.2 Potential Impacts of the Project ..... 3.11-4
3.11.2.1 Significance Criteria ..... 3.11-4
3.11.3 Environmental Impacts ..... 3.11-5
3.11.4 Mitigation Measures ..... 3.11-5
3.11.5 Significant Unavoidable Impacts ..... 3.11-6
3.12 Recreation ..... 3.12-1
3.12.1 Environmental Setting ..... 3.12-1
3.12.1.1 State Water Project and Associated Facilities ..... 3.12-1
3.12.1.2 Wheeler Ridge-Maricopa Water Storage District ..... 3.12-2
3.12.1.3 Castaic Lake Water Agency ..... 3.12-2
3.12.2 Potential Impacts of the Project ..... 3.12-2
3.12.2.1 Significance Criteria ..... 3.12-2
3.12.2.2 Environmental Impacts ..... 3.12-3
3.12.3 Mitigation Measures ..... 3.12-4
3.12.3.1 State Water Project and Associated Facilities ..... 3.12-4
3.12.3.2 Wheeler Ridge-Maricopa Water Storage District ..... 3.12-4
3.12.3.3 Castaic Lake Water Agency ..... 3.12-4
3.12.4 Significant Unavoidable Impacts ..... 3.12-4

3.13 Transportation and Circulation....3.13-1
3.13.1 Environmental Setting....3.13-1
3.13.1.1 State Water Project and Associated Facilities....3.13-1
3.13.1.2 Wheeler Ridge-Maricopa Water Storage District....3.13-1
3.13.1.3 Castaic Lake Water Agency....3.13-1
3.13.2 Potential Impacts of the Project....3.13-2
3.13.2.1 Significance Criteria....3.13-2
3.13.2.2 Environmental Impacts....3.13-2
3.13.3 Mitigation Measures....3.13-3
3.13.3.1 State Water Project and Associated Facilities....3.13-3
3.13.3.2 Wheeler Ridge-Maricopa Water Storage District....3.13-4
3.13.3.3 Castaic Lake Water Agency....3.13-4
3.13.4 Significant Unavoidable Impacts....3.13-4
3.14 Utilities/Service Systems....3.14-1
3.14.1 Environmental Setting....3.14-1
3.14.1.1 State Water Project and Associated Facilities....3.14-1
3.14.1.2 Wheeler Ridge-Maricopa Water Storage District....3.14-2
3.14.1.3 Castaic Lake Water Agency....3.14-3
3.14.2 Potential Impacts of the Project....3.14-5
3.14.2.1 Significance Criteria....3.14-5
3.14.2.2 Environmental Impacts....3.14-6
3.14.3 Mitigation Measures....3.14-8
3.14.3.1 State Water Project and Associated Facilities....3.14-8
3.14.3.2 Wheeler Ridge-Maricopa Water Storage District....3.14-8
3.14.3.3 Castaic Lake Water Agency....3.14-8
3.14.4 Significant Unavoidable Impacts....3.14-8
3.15 Water Resources....3.15-1
3.15.1 Environmental Setting....3.15-1
3.15.1.1 State Water Project....3.15-1
3.15.1.2 Wheeler Ridge-Maricopa Water Storage District....3.15-10
3.15.1.3 Castaic Lake Water Agency....3.15-15
3.15.2 Impacts of the Project....3.15-28
3.15.2.1 Significance Criteria....3.15-28
3.15.2.2 Environmental Impacts....3.15-29
3.15.3 Mitigation Measures....3.15-51
3.15.3.1 State Water Project and Associated Facilities....3.15-51
3.15.3.2 Wheeler Ridge-Maricopa Water Storage District....3.15-51
3.15.3.3 Castaic Lake Water Agency....3.15-51
3.15.4 Significant Unavoidable Impacts....3.15-52
4.0 GROWTH-INDUCING EFFECTS AND GROWTH-RELATED IMPACTS....4-1
4.1 Growth-Inducing Effects....4-1
4.2 Growth-Related Impacts....4-2
4.2.1 Aesthetic/Visual Resources....4-3
4.2.2 Agricultural Resources....4-3
4.2.3 Air Quality....4-8
4.2.4 Biological Resources....4-9

4.2.5 Cultural Resources ..... 4-9
4.2.6 Geology, Soils, and Minerals ..... 4-10
4.2.7 Hazards and Hazardous Materials ..... 4-11
4.2.8 Land Use and Planning ..... 4-12
4.2.9 Noise ..... 4-12
4.2.10 Population and Housing ..... 4-13
4.2.11 Public Services ..... 4-13
4.2.12 Recreation ..... 4-14
4.2.13 Transportation and Circulation ..... 4-15
4.2.14 Utilities/Service Systems ..... 4-16
4.2.15 Water Resources ..... 4-17

5.0 CONSISTENCY WITH ADOPTED PLANS AND POLICIES ..... 5-1

5.1 Southern California Association of Government's (SCAG) Regional Comprehensive Plan and Guide (RCPG) and Regional Transportation Plan (RTP) ..... 5-1
5.1.1 Regional Comprehensive Plan and Guide ..... 5-1
5.1.2 Regional Transportation Plan ..... 5-6
5.1.3 Consistency with Growth Projections ..... 5-7

5.2 County of Los Angeles General Plan ..... 5-7
5.2.1 Consistency with Policies ..... 5-7
5.2.2 Consistency with Growth Projections ..... 5-9

5.3 Santa Clarita Valley Area Plan of the County of Los Angeles General Plan ..... 5-9
5.3.1 Consistency with Policies ..... 5-10
5.3.2 Consistency with Growth Projections ..... 5-11

5.4 Ventura County General Plan ..... 5-11
5.4.1 Area Plan for the Piru Area ..... 5-11
5.4.2 Ventura County Save Open-Space and Agricultural Resources (SOAR) Initiative ..... 5-12

5.5 City of Santa Clarita General Plan ..... 5-12

5.6 CLWA Urban Water Management Plan 2000 ..... 5-14

5.7 CLWA Groundwater Management Plan, Santa Clara River Valley Groundwater Basin, East Subbasin, Los Angeles County, 2003 ..... 5-14

5.8 Kern County General Plan ..... 5-15

6.0 CUMULATIVE IMPACTS ..... 6-1

6.1 CEQA Requirements ..... 6-1

6.2 Cumulative Impact Analysis Methodology ..... 6-1

6.3 Analysis of Cumulative Impacts ..... 6-1
6.3.1 Other Projects Affecting the SWP and Associated Facilities ..... 6-2
6.3.1.1 CALFED Bay Delta Program (CALFED) ..... 6-2
6.3.1.2 Environmental Water Account Project (EWA) ..... 6-4
6.3.1.3 State Water Resources Control Board Decision 1641 – Bay/Delta Water Quality Control Plan (Decision 1641) ..... 6-6
6.3.1.4 Central Valley Improvement Act Project (CVPIA) ..... 6-8

6.3.1.5 Monterey Amendment ..... 6-9
6.3.1.6 Sacramento Valley Water Management Agreement (SVWMA) ..... 6-11
6.3.1.7 San Luis Reservoir Low Point Improvement Project ..... 6-12
6.3.1.8 South Delta Improvement Project (SDIP) ..... 6-14
6.3.1.9 North Delta Improvement Project (NDIP) ..... 6-16
6.3.1.10 16,000 AF Proposed Transfer of SWP Table A Amount From Kern County Water Agency, including Possible Annexations to CLWA ..... 6-16
6.3.2 Projects Affecting the WRMWSD ..... 6-17
6.3.2.1 Pastoria Power Plant ..... 6-18
6.3.2.2 Laval Farms Water Management and Exchange and WRMWSD Pump-Back ..... 6-19
6.3.2.3 Tejon Industrial Complex East Specific Plan ..... 6-20
6.3.2.4 Tejon Industrial Complex West Specific Plan ..... 6-21
6.3.2.5 Kern County Valley Floor Habitat Conservation Plan ..... 6-21
6.3.2.6 Monterey Amendment ..... 6-22
6.3.2.7 Proposed Projects in or Adjacent to the WRMWSD not Producing Cumulative Impacts ..... 6-23
6.3.3 Projects Affecting the CLWA Service Area ..... 6-23
6.3.3.1 Other CLWA Projects ..... 6-24
6.3.3.2 Projects Listed in the County of Los Angeles Development Monitoring System (DMS) ..... 6-33
6.3.3.3 Reasonably Foreseeable Land Development Projects Not Listed in the DMS ..... 6-34
6.3.3.4 Monterey Amendment ..... 6-37
6.4 Cumulative impacts by Resource ..... 6-38
6.4.1 Cumulative Impacts in the WRMWSD Service Area by Resource ..... 6-41
6.4.2 Cumulative Impacts in the CLWA Service Area by Resource ..... 6-41
7.0 ALTERNATIVES TO THE PROJECT ..... 7-1
7.1 Alternatives Evaluation Process ..... 7-1
7.2 Alternatives Considered but Not Carried Forward ..... 7-1
7.2.1 Alternative Imported Water Sources ..... 7-1
7.2.2 Increased Conservation/Recycling ..... 7-2
7.2.3 Transporting Desalinated Seawater from Ventura County to CLWA ..... 7-3
7.2.4 Upgrading the CLWA Water Treatment Plants ..... 7-3
7.3 Alternatives Carried Forward for Detailed Analysis ..... 7-3
7.3.1 Alternative 1, No Project Alternative ..... 7-3
7.3.2 Alternative 2, Increased Extractions from the Saugus Formation (Increased Groundwater Extractions) ..... 7-10
7.3.3 Alternative 3, Exchange Desalinated Water for SWP Water (Desalination/Exchange) ..... 7-16
7.3.4 Alternative 4, Transfer of a Smaller Table A Amount (Smaller Table A Amount) ..... 7-20

7.3.5 Alternative 5, Transfer of a Larger Table A Amount (Larger Table A Amount) ..... 7-22
7.4 Environmentally Superior Alternative ..... 7-24
8.0 REFERENCES ..... 8-1
9.0 PERSONS AND AGENCIES CONTACTED ..... 9-1
10.0 LIST OF ACRONYMS AND GLOSSARY OF TERMS ..... 10-1
11.0 LIST OF PREPARERS ..... 11-1

## APPENDICES

A Notice of Preparation and Comments Received
B Biological Resources
C Agricultural Resources – NEA Study
D Technical Data for Hydrologic Analysis

## LIST OF FIGURES

1.2-1 Regional Setting Including Kern County Water Agency, Wheeler Ridge-Maricopa Water Storage District, and Castaic Lake Water Agency ..... 1-6
1.3-1 Primary SWP Facilities ..... 1-10
3.3-1 Boundaries of the San Joaquin Valley Unified Air Pollution Control District, the South Coast Air Quality Management District and Adjacent Districts. ..... 3.3-4
3.15-1 SWP Storage in San Luis Reservoir, 1990 to 2001 ..... 3.15-3
3.15-2 SWP Storage in San Luis Reservoir, 1990 to 2001 Average End-of-Month Storage ..... 3.15-3
3.15-3 Castaic Lake Storage, 1990 to 2001 ..... 3.15-5
3.15-4 Castaic Lake Storage, 1990 to 2001 Average End-of-Month Storage ..... 3.15-5
3.15-5 Water Supply Analysis Overview ..... 3.15-30
3.15-6 Average Monthly SWP San Luis Reservoir Storage With and Without the Project, under With Monterey Amendment SWP Allocations ..... 3.15-41

# LIST OF TABLES


ES-1 Summary of the Project's Environmental Impacts and Mitigation Measures ..... ES-13

3.0-1 Key Differences between the 1998 and Current Environmental Setting .....3.0-2

3.0-2 Population and Housing that Could Be Supported by the Project within the CLWA Service Area .....3.0-7

3.2-1 Definitions for Important Farmland Categories .....3.2-2

3.2-2 Cropping Patterns within the WRMWSD Service Area from 1990 to 2001 .....3.2-4

3.2-3 Important Farmland and Other Lands in WRMWSD, 1998 and 2000 .....3.2-5

3.2-4 Lands Under Williamson Act Contracts in Kern County, 1998 and 2001 .....3.2-6

3.2-5 Important Farmland and Other Lands in the CLWA Service Area, 1998 and 2000.....3.2-7

3.3-1 California and National Ambient Air Quality Standards .....3.3-2

3.5-1 Castaic Lake Cultural Resources.....3.5-3

3.8-1 CLWA Service Area 1998 Land Use .....3.8-3

3.9-1 Typical Sound Levels Measured in the Environment and Industry .....3.9-2

3.9-2 County of Los Angeles Exterior Noise Standards for Stationary and Point Noise Sources.....3.9-4

3.9-3 Mobile Construction Equipment Noise Limits .....3.9-5

3.11-1 School Districts in the CLWA Service Area.....3.11-3

3.11-2 Santa Clarita Valley Libraries .....3.11-4

3.15-1 Annual SWP Water Deliveries from Castaic Lake by Contractor, 1990 to 2000.....3.15-6

3.15-2 SWP Annual A Deliveries, 1990 to 2003.....3.15-7

3.15-3 SWP Surplus and Other Water Types .....3.15-8

3.15-4 SWP Water Quality Summary based on Monthly Data for the Banks Pumping Plant, Check 29, and Castaic Lake, 1990 to 2001.....3.15-9

3.15-5 Summary of Annual SWP and Other Water Available to WRMWSD and Delivered within the District, 1990 to 2001.....3.15-13

3.15-6 1998 Water Supplies for the CLWA Service Area.....3.15-16

3.15-7 Existing Water Supplies for the CLWA Service Area .....3.15-17

3.15-8 Summary of Annual SWP and Local Groundwater Use within the CLWA Service Area, 1990 to 2002 .....3.15-21

3.15-9 CLWA's Projected Total Water Demand in Average Hydrologic Years.....3.15-22

3.15-10 CLWA Drinking Water Quality Summary .....3.15-23

3.15-11 Regulatory Timeline for Chloride.....3.15-24

3.15-12 Water Quality Summary for the Santa Clara River .....3.15-26

3.15-13 Summary of Without Monterey Amendment, With Article 18(b) Implemented and With Monterey Amendment Allocation Conditions .....3.15-34

3.15-14 Summary of Impacts to the SWP and Associated Facilities ..... 3.15-38
3.15-15 WRMWSD's SWP A Supply at Existing SWP Demand Conditions, under all SWP Allocation Scenarios ..... 3.15-44
3.15-16 WRMWSD's SWP A Supply at 2020 SWP Demand Conditions, Under all SWP Allocation Scenarios ..... 3.15-46
3.15-17 CLWA's Total SWP A Supply at Existing SWP Demand Conditions, under all SWP Allocation Scenarios ..... 3.15-49
3.15-18 CLWA's Total SWP A Supply at 2020 SWP Demand Conditions, under all SWP Allocation Scenarios ..... 3.15-50
4.2-1 Summary of Mitigation Measures from Plans and Policies ..... 4-4
5-1 Building Intensity/Population Density Standards — Piru Area Plan ..... 5-12
6.3-1 1998 DMS for the Santa Clarita Valley Planning Area (Housing Units) ..... 6-33
6.3-2 2002 DMS for the Santa Clarita Valley Planning Area (Housing Units) ..... 6-34
6.3-3 Permanent A Transfers Completed Under the Monterey Amendment Provisions (Article 53) ..... 6-39
7.4-1 Comparison of Direct and Indirect Environmental Impacts of Alternatives with Project Impacts ..... 7-25

# PREFACE

This Environmental Impact Report (EIR) evaluates the potential environmental impacts of the transfer of an existing 41,000 acre-feet (AF) of State Water Project (SWP) Table A Amount[1] from a SWP contractor (the Kern County Water Agency [KCWA]) and its member unit in Kern County (the Wheeler Ridge-Maricopa Water Storage District [WRMWSD]), to the Castaic Lake Water Agency (CLWA), another SWP contractor located in Los Angeles and Ventura counties. This EIR also evaluates the use of SWP facilities from northern California to Los Angeles County for the delivery of SWP water to the CLWA service area, and use of this water within the CLWA service area. These actions are referred to as "the Project" in subsequent sections of this EIR.

The Project is intended to meet water demands of existing users and a portion of future water demand from anticipated growth within the CLWA service area. CLWA is not a land use agency and has no control over where and when growth will occur within its service area. To the extent that land use decision-makers utilize or rely on this EIR to predict future CLWA water supplies, they are cautioned that although CLWA will implement all feasible measures to firm up its water supplies (and CLWA's retail purveyors may implement conjunctive use programs using SWP and groundwater supplies to increase the reliability of deliveries to their customers), past water deliveries are not a guarantee of future delivery rates. Rather than repeat this advice to decision-makers in each section of the EIR, the reader is requested to keep this advice in mind when reading the information about the availability and reliability of water supplies wherever such information appears. Information regarding water supplies is presented throughout this document as it relates to the CLWA service area (section 1.3.1), the Project description (section 2.3), the environmental setting (section 3.0), and growth-inducing effects and growth-related impacts (Chapter 4). To facilitate your reading of this EIR, it is suggested that the reader refer to section 10.0, "List of Acronyms and Glossary of Terms." The acronyms used in this EIR are defined the first time they are used in the text.

The transfer of SWP Table A Amount that is the subject of the present EIR was contractually completed in 1999, and imported water supply associated with the transfer became available for use by CLWA starting in January 2000 (refer to the discussion under Related Environmental Documentation for additional detail).

CLWA is the lead agency for preparation of the EIR and thus will evaluate, and if appropriate, certify this EIR, make CEQA findings, and approve the Project. CLWA has the principal responsibility for carrying out and implementing the Project because 1) a substantial portion of

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1 "Table A" is a term used in SWP Water Supply Contracts. The "Table A Amount" is the annual maximum amount of water to which an SWP Contractor has a contract right to request delivery, and is specified in Table A of each Contractor's Water Supply Contract. (Prior to the Settlement Agreement arising out of a legal challenge to the Monterey Amendment to the State Water Project contracts, the Table A Amount was referred to as "entitlement.") The amount of water actually available for delivery in any year may be an amount less than the Contractor's Table A Amount due to a number of factors, including hydrologic conditions. The parallel term used in the member unit contract between KCWA and WRMWSD is "Contract Entitlement" (sometimes referred to as "Table 1 Entitlement"). For the sake of brevity, in this EIR the term "Table A Amount" refers to the Table A Amount in the SWP Water Supply Contracts, or "Annual Entitlement" prior to the Monterey Amendment; where the term is used in connection with WRMWSD, it refers to the Table 1 Entitlement under its member unit contract with KCWA.

the Project occurs within CLWA's jurisdiction and substantially affects CLWA; 2) CLWA has been the lead proponent of the Project and has assumed the primary task of effectuating the SWP water supply contract amendment; 3) CLWA has the expertise to implement the Project; and 4) the Project, although requiring the use of SWP facilities, would involve transfers only between three agencies (CLWA, KCWA, and WRMWSD) within a limited geographic area and does not implicate the entire statewide water rights or supply framework.

The California Department of Water Resources (DWR), KCWA, and WRMWSD are considered to be responsible agencies. Responsible agencies are public agencies other than the lead agency that have responsibility for carrying out or approving a project (CEQA Guidelines section 15381).

# EXECUTIVE SUMMARY

## PROJECT DESCRIPTION

### Project Location

The Project would use existing SWP facilities located between the southern Delta facilities and Castaic Lake; these facilities include the SWP's southern Delta facilities (Clifton Court Forebay, the Banks Pumping Plant, and Bethany Reservoir); the San Luis Reservoir facilities (San Luis Reservoir, O'Neil Forebay, and the Gianelli Pumping-Generating Plant); and the California Aqueduct from the southern Delta to Castaic Lake, including pumping plants, a power plant, and storage facilities along the Aqueduct (Buena Vista, Teerink, Chrisman, Edmonston, and Oso pumping plants, Warne power plant, and Quail, Pyramid and Castaic lakes). These facilities are located in Alameda, Contra Costa, Fresno, Kern, Kings, Los Angeles, Merced, San Joaquin, and Stanislaus counties. The Project also could affect environmental resources located in the CLWA and WRMWSD service areas. The CLWA service area is located in northern Los Angeles and eastern Ventura counties. The WRMWSD is located in the southern extent of the San Joaquin Valley in Kern County.

### Project Objectives

The portion of the CLWA service area that is located within the unincorporated and incorporated portions of Los Angeles County is experiencing substantial growth in population and urbanization. This trend is expected to continue based on development that already has been approved by the County of Los Angeles and the City of Santa Clarita and development that is projected in local adopted plans. (Considerably less growth is occurring in or is anticipated to occur in the portion of the service area that is in Ventura County since this area is designated for agricultural or open space uses in the general plan, and the Ventura County Save Open-Space and Agricultural Resources [SOAR] Initiative requires a vote of the people for most changes to the general plan policies and land use designations regarding open space, agricultural, and rural lands.) Pursuant to the provisions of its SWP Water Supply Contract, CLWA has over time acquired a right to delivery of SWP water at an amount necessary to reasonably supply the Agency's increasing demand. The Project is an action by CLWA to maintain the water supply needed to meet water demands of existing users and a portion of future water demand from anticipated growth within the CLWA service area.

Specific Project objectives are as follows:

- Augment CLWA's SWP Table A Amount to meet water demands of existing users and some future anticipated growth.
- Provide a means of delivery for the augmented water supplies.

### Description of the Project

The Project is the transfer of an existing 41,000 AF of SWP Table A Amount from KCWA and its member unit in Kern County, WRMWSD, to CLWA. The Project also includes the use of SWP

facilities from northern California to Los Angeles County for the delivery of SWP water to the CLWA service area, and use of this water within the CLWA service area. The Project water is transported from certain points of origin in the SWP system to the CLWA intake south of Castaic Lake via existing SWP facilities. The points of origin and delivery are identified in the 41,000 AF Transfer Agreement and the Point of Delivery Agreement. These and other documents referenced in this EIR are available for public inspection at the CLWA offices at 27234 Bouquet Canyon Road, Santa Clarita, CA 91350, (661) 297-1600.

The Project currently is being implemented by an amendment to the SWP water supply contracts of CLWA and KCWA executed in 1999. The Project is to authorize CLWA to use water delivered from the 41,000 AF of SWP Table A Amount for water demands of existing users and a portion of future water demand from anticipated growth within the CLWA service area. As described in detail in section 3.15 and Appendix D, the annual allocations of SWP water made by DWR are based on that year's hydrologic conditions, the amount of water in storage in the SWP system, and Contractors' requests for SWP supplies. Thus, the actual amount of water available for delivery to CLWA as a result of the 41,000 AF transfer would vary from year to year. (Section 3-0 outlines the assumptions used in the environmental impact analysis regarding the amount of water that would be delivered for use by CLWA.) Water would be requested by CLWA as needed to meet the demands of its service area, and as discussed in section 1.3.1, the transfer of Table A Amount would be one of a number of projects implemented by CLWA (e.g., infrastructure improvements, groundwater banking programs, increased recycling and conservation, and expanded use of local groundwater sources) to increase water reliability. Those projects that are considered reasonably foreseeable and for which sufficient information is available are included in the cumulative impacts analysis contained in section 6.3.3.1 of this EIR.

The Project does not include the construction of any additional SWP facilities or new facilities in the CLWA, KCWA, or WRMWSD service areas.

### Permits and Other Approvals to Implement the Project

The amendment to the SWP water supply contract was approved by CLWA and DWR in 1999. Associated amendments to water supply and delivery contracts have been approved by KCWA and WRMWSD. WRMWSD is the KCWA member unit providing this Table A Amount. No permits or other approvals would be required other than the certification of this EIR.

## RELATED ENVIRONMENTAL DOCUMENTATION

### Supplemental Water Project EIR

The transfer of 41,000 AF of SWP Table A Amount between CLWA, KCWA, and WRMWSD (41,000 AF Transfer Agreement) and the Point of Delivery Agreement between DWR, KCWA, and CLWA were evaluated previously in the Supplemental Water Project Final EIR (CLWA 1999).

The Second Appellate Court, Fourth Division and the Superior Court of Los Angeles ordered that this EIR be decertified in January 2002 (*Friends of the Santa Clara River v. Castaic Lake Water Agency* (2002) 95 Cal. App. 3d 1373 [*Friends*]) because it tiered from the Monterey Agreement Program EIR, which was itself decertified as a result of an appellate court decision issued while

*Friends* was on appeal. "All other contentions" concerning the legal adequacy of the Supplemental Water Project EIR were found to be "without merit." The Court of Appeal specifically ordered the Trial Court to "issue a writ of mandate vacating the certification of the EIR," and to "retain jurisdiction until [CLWA] certifies an EIR complying with CEQA," and "consider such orders it deems appropriate under section 21168.9 [of the Public Resources Code]." The CLWA Board of Directors decertified CLWA's Supplemental Water Project Final EIR on November 27, 2002.

In September 2002, the Trial Court was requested to prohibit CLWA from using the 41,000 AF in any manner. Trial Court refused to enjoin the performance of the 41,000 AF Transfer Agreement, maintained its jurisdiction over the matter, and authorized CLWA to utilize "any of the 41,000 AFY [acre-feet per year]," albeit, with certain limitations:

> Respondent [CLWA] will not be prohibited from using the water to which it is entitled, but petitioner may renew its application for such prohibition based upon evidence of the actual use of such additional water for purposes it considers improper.

The above Order was issued without prejudice to a renewed request by the Petitioner for an injunction on all portions of CLWA's project pending completion of the EIR[1]. The present EIR is being prepared in accordance with the decisions of the Second Appellate Court, Fourth Division and the Superior Court of Los Angeles (Superior Court Case No. BS05694).

KCWA, WRMWSD, CLWA, and DWR previously approved the various contract amendments on the basis of the 1999 Supplemental Water Project Final EIR and other environmental analyses and documentation.

**Monterey Amendment Program EIR**

During the 1990s, disagreements arose between DWR, Agricultural Contractors, and municipal and industrial (M&I) Contractors about how available SWP supplies should be allocated. The SWP Contractors and DWR agreed to negotiate a settlement of their differences and develop a new approach to managing SWP resources through a major overhaul of the Water Supply Contracts. After a series of exhaustive negotiating sessions, an agreement was reached in December 1994 in Monterey, California on a set of principles, known as the "Monterey Agreement." The Monterey Agreement principles were implemented through an amendment to the Water Supply Contracts between DWR and the SWP Contractors, which became known as the "Monterey Amendment." The term "Monterey Amendment" is used in subsequent sections of this EIR. The Monterey Amendment was approved in 1995 and went into effect in August 1996.

A Program EIR analyzing the environmental impacts of the Monterey Amendment (Monterey Agreement EIR) was prepared and certified by the Central Coast Water Authority (CCWA) in 1995. In late 1995, a lawsuit was filed by the Planning and Conservation League (PCL), Plumas County Water Conservation and Flood Control District (Plumas County), and Citizens Planning

1 Petitioners appealed the Remand Order issued by the Superior Court in this case. The Court of Appeal affirmed the Trial Court's order (refusing the request for an injunction) on December 1, 2003.

Association of Santa Barbara County (CPA) (collectively referred to as the "plaintiffs") challenging the EIR. The plaintiffs argued that the environmental impact analysis prepared was inadequate because CCWA was not a proper lead agency and the EIR analysis did not reflect the inability of the SWP to deliver full Contract amounts to Contractors, even though they held contractual "entitlements" to those supplies. In 2000, the California State Court of Appeal (Third District) found that a new EIR must be prepared. That litigation is referred to as the PCL Litigation in this EIR. [2]

Discussions to mediate a settlement began in 2001 and were finalized in May 2003.[3] All parties to the litigation have signed the Settlement Agreement. The Settlement Agreement calls for DWR to prepare a new EIR pursuant to CEQA (a Notice of Preparation [NOP] was issued by DWR on January 24, 2003),[4] while the Monterey Amendment's provisions remain in operation. Pursuant to the Settlement Agreement, the parties are now administering the preparation of a new EIR, which is expected to be completed in approximately two years. The new EIR will evaluate the potential environmental impacts of changes to SWP operations incorporated in the Monterey Amendment and the Settlement Agreement. The Settlement Agreement also calls for DWR to produce a biennial SWP Delivery Reliability Report. The SWP Delivery Reliability Report - 2002 was issued in May 2003 (DWR 2003b). The Settlement Agreement did not change the substance of the Monterey Amendment, but addressed the process by which the new Monterey Amendment EIR will be prepared.

It should be noted at this point that the Settlement Agreement concerning the PCL Litigation creates a specific exclusion for this Project from any prohibitions against transfers of State Water Project Table A Amounts by the Settlement Agreement. The exclusion states:

> With respect to Section III(c)(4)(b) regarding the Kern-Castaic Transfer, the Parties recognize that such water transfer is subject to pending litigation in the Los Angeles County Superior Court following remand from the Second District Court of Appeal (See Friends of the Santa Clara River v. Castaic Lake Water Agency 95 Cal.App.4th 1373, 116 Cal.Rptr.2d 54 (2002); review denied, April 17, 2002). The Parties agree that jurisdiction with respect to that litigation should remain in that court and that nothing in this Settlement Agreement is intended to predispose the remedies or other actions that may occur in that pending litigation.

The order on remand from the appellate court in the Friend case specifically ordered the Trial Court "to retain jurisdiction until [CLWA] certifies an EIR complying with CEQA" and "consider such orders it deems appropriate under section 21168.9 [of the Public Resources Code]." This EIR thus remains under the jurisdiction of the Superior Court until the EIR is certified by CLWA.

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2 *Planning and Conservation League, et al. v. Department of Water Resources* (2000) 83 Cal. App. 4th 892.

3 In May 2003, the settlement agreement among the plaintiffs, DWR, and the SWP Contractors (referred to herein as the "Settlement Agreement") was executed and approved by the State Attorney General's office. On May 20, 2003 the Settlement Agreement was approved by the Sacramento Superior Court.

4 The NOP is entitled Notice of Preparation of Environmental Impact Report for the Monterey Amendment to the State Water Project Contracts (Including Kern Water Bank Transfer) and Other Contract Amendments and Associated Actions as part of a Proposed Settlement Agreement in Planning and Conservation League v. Department of Water Resources.

**Capital Program and Water Plan, including Acquisition of Supplemental Water and of a Proposed Second Plant Site, EIR**

In 1988, CLWA completed the Capital Program and Water Plan, including Acquisition of Supplemental Water and of a Proposed Second Plant Site, Final EIR (Capital Program EIR) (CLWA 1988), which evaluated the potential environmental impacts of the proposed Capital Improvements Program, including the acquisition of supplemental water, and the construction of a new treatment plant and facilities improvements. The Capital Program EIR evaluated a proposal for CLWA to obtain additional SWP Table A Amount of up to 37,800 AF to supplement the 1988 SWP Table A Amount of 41,500 AF. This EIR assumed that deliveries from the new SWP Table A Amount would become 100 percent reliable before 2010. It also identified a total water demand of 120,000 AFY to support a population of 270,000 persons in the year 2010. The implementation of reasonable conservation measures and recycling was projected to reduce net demand to 106,300 AFY, an approximately 11 percent reduction. The Project evaluated in the present EIR was programmatically evaluated in the Capital Program EIR (CLWA 1988).

## ENVIRONMENTAL SETTING

CEQA Guidelines section 15125 directs that an EIR must include a description of the physical environmental conditions in the vicinity of the Project as they exist at the time the NOP is published. This environmental setting will normally constitute the baseline physical conditions by which the lead agency determines whether an impact is significant. This Project was previously analyzed in the 1999 Supplemental Water Project Final EIR (CLWA 1999); the 41,000 AF Transfer Agreements were duly executed, and the Project was implemented. Solely relying on the description of physical conditions that existed at the time that the NOP for the present EIR was published (January 2003) would fail to capture any changes to the pre-Project conditions that may have resulted from the ongoing implementation of the 41,000 AF Transfer Agreement. Thus, this EIR's description of the Project's environmental setting includes information from the general timeframe when the January 2003 NOP was issued (referred to as current or present conditions), as well as information describing the environmental setting as it existed when the NOP for the 1999 Supplemental Water Project Final EIR was published (April 1998).

## SUMMARY OF SIGNIFICANT IMPACTS AND MITIGATION MEASURES

Table ES-1 summarizes the direct and indirect impacts of the Project, mitigation measures for significant impacts, and the residual impacts that would occur after the implementation of mitigation measures. No significant direct impacts would occur in any of the three geographic areas evaluated. Very minor, less than significant impacts to aesthetic/visual resources, cultural resources, and geology and soils would occur at San Luis Reservoir due to the slight seasonal change in the timing of water delivered from the reservoir. Imperceptible or very minor, less than significant impacts to water quality in the Delta could result in some years due to a minor change in the timing of Delta diversions. However, these changes would fall well within the range of historical and future anticipated SWP diversions from the Delta. Other changes associated with the SWP are less than significant impacts from increased electrical power demand and air emissions from the generation of electrical power to move water from WRMWSD to the CLWA service area.

The only impact to WRMWSD is a less than significant impact to groundwater quality from the minor reduction of SWP Table A supply that has been replaced by other water management actions. Under some extreme conditions this could result in increased reliance on other water sources and groundwater. Increased use of other water and groundwater would result in higher TDS water used and recharged to local groundwater.

The additional water supply provided by the Project would remove an obstacle to growth, and significant, indirect, growth-related impacts to all environmental resources could result from Project implementation. Compliance with the adopted plans and policies of local jurisdictions would reduce all of these impacts to less than significant, with the possible exception of five resources: aesthetics, air quality, biological resources, transportation/traffic, and utilities/service systems (solid waste disposal). Specific mechanisms for implementing these policies would be determined in the course of project-specific environmental review, as required under CEQA.

## CUMULATIVE IMPACTS

No significant cumulative impacts resulting from the Project were identified for the SWP and associated facilities or the WRMWSD. Significant cumulative Project impacts in the CLWA service area would be as described under indirect impacts, and the same mitigation measures would apply. Impacts to aesthetics, air quality, biological resources, transportation/traffic, and utilities/service systems (solid waste disposal) could be unavoidable.

## ALTERNATIVES TO THE PROJECT

Five alternatives were carried forward for detailed analysis.

### Alternative 1, No Project Alternative

Under the No Project Alternative, CLWA would not acquire the additional Table A Amount or acquire the associated contractual rights for delivery of water associated with the transfer. The demand for high quality surface water is expected to increase throughout all of southern California as a result of continued growth, and local planning agency documents project continuing growth in the CLWA service area. The contract right to the Table A Amount that is the subject of the Project could be acquired and transferred to other portions of urbanized California. The amount, timing, and location of such a transfer are highly speculative, however, and this scenario is not considered further. Two hypothetical scenarios have been carried forward for detailed analysis that are intended to define a reasonable range of possible actions that could occur under this alternative. Actions relating to future land development are not under the control of CLWA, however, and could vary depending upon the actions of agencies with land use planning and permitting authority.

***Scenario 1 – Moratorium on New Development, Existing Users Subject to Delivery Cutbacks (Moratorium Scenario)***

In the absence of the Project, under this scenario, a moratorium on new development would be implemented. This assumes that the local retail water purveyors[5] within the CLWA service area decide that there is insufficient water to issue "will serve" letters to supply development and that local land use agencies respond by imposing a moratorium on new development in the CLWA service area.

Under this scenario, development that had already been approved or recorded but not yet built in the Santa Clarita Valley would not be built, nor would pending (unapproved) development. (Approved projects are subdivisions that have been granted an approved tentative tract map that is not yet recorded or has expired; recorded projects are subdivisions that have recorded a final tract map but are not yet built.) The 1998 DMS included 15,973 housing units (8,588 approved, 2,292 recorded, and 5,093 pending). The 2002 DMS included 33,113 housing units (13,586 approved, 9,915 recorded, and 9,612 pending). Assuming 3.1 persons per household, this amount of development would result in a population of approximately 49,510 persons, using the 1998 DMS, and 102,640 persons, using the 2002 DMS. In comparison, the Project could support approximately 35,600 housing units given an average year water supply, which would house approximately 106,700 persons. Thus, the amount of development and associated population that could be allowed under this scenario would be less than could occur under the Project.

Some additional groundwater production wells might be required to serve existing demand that would have been met by the 41,000 AF transfer. Treatment at the wellhead likely would be needed, depending upon local groundwater characteristics. New underground distribution pipelines also may be required. Electric pumps would be used as needed.

***Scenario 2 – Build-Out of Recorded and Approved Projects in DMS (Build-Out Scenario)***

Under the Build-Out Scenario, approved and recorded projects listed in the DMS for the Santa Clarita Valley would be developed, notwithstanding the potential shortfall in reliable water supply. Based on the DMS from both 1998 and 2002, the number of housing units in approved and recorded DMS projects considered under this scenario (10,880 and 23,500 units, respectively) is less than the number of housing units that could be supported by the Project given an average year water supply of 34,400 AF (35,600 units). The population associated with the development identified in the 1998 DMS would be about 33,730 persons; the population associated with the 2002 DMS development would be about 72,850 persons. In comparison, the population that could be served by the Project would be about 106,700 persons. Thus, the amount of development and associated population that could be allowed under this scenario would be less than could occur under the Project.

Under this scenario, existing demand currently met by the 41,000 AF transfer and the increased water demand from new development would rely on existing water supplies (principally local groundwater resources) that are currently not used for urban purposes. Treatment at the

5 The CLWA Act refers to "retail water distributors," although the term "retail water purveyors" also is commonly used. For purposes of this report, the terms are synonymous.

wellhead likely would be needed, depending upon local groundwater characteristics. New underground distribution pipelines also may be required. Electric pumps would be used as needed.

**Alternative 2, Increased Extractions from the Saugus Formation (Increased Groundwater Extractions)**

Under this alternative, in lieu of the Project, up to 41,000 AFY would be extracted from the Saugus Formation and delivered to users in the CLWA service area. The extraction would be accomplished by increased use of existing wells and by the installation of 15 additional wells, pumps, and wellhead treatment facilities. Existing or new distribution facilities such as pipelines and pumping stations would be used to transport this water to existing and planned treated water distribution facilities. Pumps and treatment facilities would use electrical power. Wherever possible, distribution facilities would be placed in public rights-of-way, including streets, utility, and railroad corridors. Disturbed areas would be restored to their former appearance once construction was completed. It is estimated that approximately 40 acres would be disturbed by the new facilities, which would be constructed and operated either by CLWA, individual purveyors, or other parties. A detailed geohydrologic investigation would be necessary prior to drilling on a site-by-site basis.

Until contaminant remediation is completed, existing, localized perchlorate contamination in a small part of the Saugus Formation would limit potential well locations. Field studies and groundwater modeling activities are in progress to evaluate how best to hydraulically contain the portion of the aquifer system where production wells have been shut down, while simultaneously preventing perchlorate movement to currently unimpacted areas. The field studies have included the installation and sampling of monitoring wells at multiple depths and locations on and around the Whittaker-Bermite site, the most likely source of perchlorate; water level monitoring in these wells; aquifer testing of two unimpacted water supply wells; and groundwater velocity testing in alluvial monitoring wells located between the site and the Santa Clara River. These studies have helped the water purveyors and the Whittaker Corporation further refine the current understanding of groundwater flow patterns in specific areas on and near the site (such as along the Holser Fault). This information has been incorporated into a regional groundwater flow model that has been developed by the purveyors and whose calibration and construction was recently reviewed and approved by the California Department of Toxic Substances Control (DTSC). The model is being used to identify a pumping scheme that would meet the objectives of restoring the lost water supply from the impacted wells (with wellhead treatment) while simultaneously containing perchlorate and hydraulically limiting its movement downgradient to unimpacted wells and other portions of the aquifer system where new water supply wells might be constructed. The modeling analysis accounts not only for the pumping of impacted wells, but also (a) the 2000 Urban Water Management Plan's (UWMP) pumping plan for unimpacted wells throughout the Santa Clarita Valley and (b) the significant year-to-year variation in local hydrology (especially groundwater recharge) that occurs in the Valley (CH2MHill 2004). The modeling simulations will be used to guide selection of a final pumping plan for the impacted Alluvial Aquifer well and the impacted Saugus Formation wells. The selection of a final pumping plan will be made jointly by the purveyors and the Whittaker Corporation, with regulatory oversight and permitting performed by the California Department of Health Services (CA DHS) with technical support from the DTSC.

There are numerous wells in the Saugus Formation, other than the wells that were voluntarily shut down due to perchlorate contamination. Additionally, other Saugus wells are planned for construction, including those included in CLWA's Capital Improvements Program. If operated continuously during the year, the wells not subject to perchlorate contamination have the capability to produce approximately 21,000 AFY (personal communication, L. Takaichi 2004). However, a more realistic production capability is 15,000 AFY due to periodic shutdown for maintenance, monitoring, or storage limitations (personal communication, L. Takaichi 2004). The current groundwater production capability from the Saugus Formation is estimated to be 5,000 AFY during normal years but could reach 15,000 AFY during dry periods or other periods of need (personal communication, L. Takaichi 2004). These capabilities will increase as additional production wells in the Saugus Formation are completed and a response action to perchlorate contamination is implemented.

**Alternative 3, Exchange Desalinated Water for SWP Water (Desalination/Exchange)**

This alternative comprises two primary components in lieu of the Project: (1) CLWA would contribute a portion of the funds needed by another agency to develop a seawater desalination facility along the southern California coast; and (2) up to 41,000 AFY of desalinated water produced by this facility would be exchanged with CLWA for SWP water. A likely partner in such an arrangement would be The Metropolitan Water District of Southern California (Metropolitan). If both parties agreed, CLWA would enter into a contract with Metropolitan indicating that a portion of Metropolitan's annual SWP Table A Amount would be delivered to Castaic Lake for use by CLWA in exchange for CLWA's contribution to a desalination facility to be constructed by Metropolitan. CLWA would treat and distribute this SWP water in existing CLWA facilities, and Metropolitan would use water from the desalination facility in lieu of the SWP water exchanged with CLWA.

Assuming a 50 percent recovery rate, a plant capacity of approximately 73 mgd would be required to produce 41,000 AFY. Depending on the extent of ancillary facilities included at the site, a site of at least 2 acres could be required. In addition to the desalting plant, the coastal facility would likely include new electrical power conveyance and control equipment, ocean water intake and brine disposal structures, and a treated water pumping plant. Total site area could be up to 5 acres. Depending on site location, additional pipelines and related pumping facilities may be required to convey the desalinated water a short distance to the existing Metropolitan distribution facilities.

**Alternative 4, Transfer of a Smaller Table A Amount (Smaller Table A Amount)**

Under this alternative, CLWA would acquire a smaller amount of SWP Table A Amount than under the Project. A transfer of approximately 20,000 AF of SWP Table A Amount was analyzed since it is the approximate mid-point between the amount that would be transferred under the Project and the No Project Alternative. Existing facilities would be used, as described for the Project.

Since the demand for high quality surface water is expected to increase in southern California as a result of anticipated growth, the remaining SWP Table A Amount (21,000 AF) could be acquired and transferred to other (unidentified) portions of urbanized southern California. The Table A Amount not acquired by CLWA would likely be acquired by other agencies with

growing urban water demands. However, the timing, amount, and location of the transfer(s) as well as the associated impacts are speculative and are not evaluated under this alternative.

**Alternative 5, Transfer of a Larger Table A Amount (Larger Table A Amount)**

Under this alternative, CLWA would acquire a larger SWP Table A Amount than under the Project. Such an alternative would require the use of a larger proportion of the SWP facilities and capacities than described for the Project, and would attempt to reduce or avoid the effects of reductions in SWP supplies (during periods of drought) on local groundwater resources. In order to provide an analysis of impacts of a transfer greater than the Project (transfer of 41,000 AF of Table A Amount), a transfer of approximately 60,000 AF of SWP Table A Amount was established for this alternative. This Table A Amount is potentially available from other KCWA member units who have expressed interest in reducing their Table A Amount and have completed CEQA analysis of the sale of this contract right (e.g., Belridge Water Storage District, Berrenda Mesa Water District, and Lost Hills Water District [BWSD 1998; BMWD 1996]). Existing facilities would be used, as described for the Project.

**Environmentally Superior Alternative**

Scenarios 1 and 2 of Alternative 1, the No Project Alternative, would reduce or avoid the significant indirect (growth-related) impacts of the Project, but each would result in greater direct impacts since new groundwater wells, treatment facilities, and associated pipelines would be required. Additionally, each of these scenarios could result in significant unavoidable impacts to groundwater supply and groundwater quality. This alternative would not augment CLWA's water supply and therefore would not meet the Project objectives. Since the direct impacts of the No Project Alternative would be substantially greater than the Project and since it would not meet Project objectives, this alternative is not considered environmentally superior.

Alternative 2, the Increased Groundwater Extractions Alternative, would result in the same indirect impacts as the Project and thus would not reduce or avoid the Project's significant growth-related impacts. It would result in greater direct impacts to many environmental resources because new groundwater wells, treatment facilities, and pipelines would have to be constructed. It also would result in a significant, unavoidable impact to groundwater supply, whereas the Project would result in a beneficial impact to groundwater supply through recharge. This alternative would not augment CLWA's water supply and therefore would not meet the Project objectives. Because the direct impacts of the Increased Groundwater Extractions Alternative would be substantially greater than the Project and since it would not meet Project objectives, this alternative is not considered environmentally superior.

Alternative 3, the Desalination/Exchange Alternative, would result in the same indirect impacts as the Project and thus would not reduce or avoid the Project's significant growth-related impacts. It would result in greater direct impacts to many environmental resources from the construction and operation of a new desalination plant and pipeline. This alternative would augment CLWA's water supply since desalinated water would be exchanged with another water agency's SWP Table A Amount, which would be conveyed to existing CLWA facilities, and therefore would meet the Project objectives. Because the direct impacts of the Desalination/Exchange Alternative would be substantially greater than the Project, however, this alternative is not considered environmentally superior.

Alternative 4, the Smaller Table A Amount Alternative, would reduce the potentially significant indirect impacts of the Project and would result in similar or lessened direct impacts, as well. This alternative would not meet one of the two Project objectives, however, which is to "Augment CLWA's SWP Table A Amount to meet water demands of existing users and a portion of future water demand from anticipated growth within the CLWA service area." Thus, while this alternative would result in lessened direct and indirect impacts, it does not meet an important basic Project objective[6] and is not considered the environmentally superior alternative.

Alternative 5, the Larger Table A Amount Alternative, would increase the significant indirect impacts of the Project and would result in similar or greater direct impacts, as well. It would meet the Project objectives but would result in greater environmental impacts than the Project and is not considered environmentally superior.

The Project is identified as the environmentally superior alternative that meets Project objectives.

## AREAS OF KNOWN CONTROVERSY

The previous EIR on the Project was decertified because it tiered from the Monterey Agreement Program EIR, which was itself decertified as a result of an appellate court decision. The present EIR does not tier from this or any other EIR, and examines environmental impacts that would occur with and without the change in water allocation criteria implemented as part of the Monterey Amendment. Although the Monterey Amendment continues in operation under the Settlement Agreement, this EIR evaluates a reasonable worst-case scenario of SWP operations without the Monterey Amendment.

The potential for growth inducement as a result of the increased water supply to the CLWA service area is an area of known controversy.

The availability of local water supplies has been the subject of some controversy in the Santa Clarita Valley over the last few years. The water suppliers' consulting engineers recently calculated the availability of local groundwater at 50,000 AFY (Slade 2002) based on updated studies prepared using reasonable, accepted engineering and scientific practices (perchlorate remediation measures and recycled water use were considered in these studies). Some Santa Clarita Valley residents have questioned the conclusions of these studies and claim that only about 32,000 AFY of water is available based on conclusions in an earlier report published in 1986 (Slade 1986). They also claim that water from the Saugus Formation should not be calculated as available on a long-term basis until the perchlorate contamination in a small part of this formation is fully contained or remediated. CLWA, CLWA Santa Clarita Water Division, Newhall County Water District, and Valencia Water Company have received $8 million as reimbursement for litigation costs and studies to determine the cleanup plan for the perchlorate. CLWA and the retail purveyors are presently identifying the method of cleanup and the costs of cleanup to be paid by the insurance companies of Whitaker Bermite and related parties. It is anticipated the cleanup should be in place by 2006.

6 Under CEQA Guidelines 15126.6, an EIR must describe a range of reasonable alternatives that would feasibly attain most of the basic objectives of the proposed project but would avoid or substantially lessen significant impacts of the project.

## UNRESOLVED ISSUES

No unresolved environmental issues have been identified.

**Table ES-1. Summary of the Project's Environmental Impacts and Mitigation Measures**
(Page 1 of 8)

| *Environmental Resource* | *Location* | *Direct Impacts* | *Indirect Impacts* | *Mitigation Measures* | *Residual Impacts* |
|---|---|---|---|---|---|
| Aesthetic/ Visual Resources | SWP | **Less than significant.** Slight decrease in water stored in San Luis Reservoir from December through June. | **No impact.** | DIRECT: None required.<br>INDIRECT: None required. | DIRECT: Less than significant.<br>INDIRECT: None. |
| | WRMWSD | **No impact.** | **No impact.** | DIRECT: None required.<br>INDIRECT: None required. | DIRECT: None.<br>INDIRECT: None. |
| | CLWA | **No impact.** | **Significant.** Potential changes to the visual characteristics and resources from development of open space and further urbanization of hillside and natural areas. Potential increase in the amount of night lighting and unwanted glare in presently undeveloped areas. (Growth-related impact) | DIRECT: None required.<br>INDIRECT: Reduced by local governments implementing the policies of the County of Los Angeles, County of Ventura, and City of Santa Clarita general and area plans. | DIRECT: None.<br>INDIRECT: Significant unavoidable adverse impacts. |
| Agricultural Resources | SWP | **No impact.** | **No impact.** | DIRECT: None required.<br>INDIRECT: None required. | DIRECT: None.<br>INDIRECT: None. |
| | WRMWSD | **No impact.** | **No impact.** | DIRECT: None required.<br>INDIRECT: None required. | DIRECT: None.<br>INDIRECT: None. |
| | CLWA | **No impact.** | **Significant.** Potential conversion of agriculture lands to non-agricultural uses or for changes in agricultural zoning by local jurisdictions in order to allow a higher density or intensity of development. (Growth-related impact) | DIRECT: None required.<br>INDIRECT: Reduced by local governments implementing the policies of the County of Los Angeles, County of Ventura, and the Piru general and area plan. | DIRECT: None.<br>INDIRECT: Less than significant. |
| Air Quality | SWP | **Less than significant.** Increased air emissions from the generation of additional electrical power to move water from WRMWSD to CLWA. | **No impact.** | DIRECT: None required.<br>INDIRECT: None required. | DIRECT: Less than significant.<br>INDIRECT: None. |

**Table ES-1. Summary of the Project's Environmental Impacts and Mitigation Measures**
(Page 2 of 8)

| *Environmental Resource* | *Location* | *Direct Impacts* | *Indirect Impacts* | *Mitigation Measures* | *Residual Impacts* |
|---|---|---|---|---|---|
| Air Quality (continued) | WRMWSD | **No impact.** | **No impact.** | DIRECT: None required.<br>INDIRECT: None required. | DIRECT: None.<br>INDIRECT: None. |
| | CLWA | **No impact.** | **Significant.** Potential increase in air pollutant emissions from transportation and development. (Growth-related impact) | DIRECT: None required.<br>INDIRECT: Reduced by local governments implementing the policies of the County of Los Angeles, County of Ventura, and City of Santa Clarita general and area plans. Additionally, reduced by compliance with SCAQMD plans. | DIRECT: None.<br>INDIRECT: Significant unavoidable adverse impact. |
| Biological Resources | SWP | **No impact.** | **No impact.** | DIRECT: None required.<br>INDIRECT: None required. | DIRECT: None.<br>INDIRECT: None. |
| | WRMWSD | **No impact.** | **No impact.** | DIRECT: None required.<br>INDIRECT: None required. | DIRECT: None.<br>INDIRECT: None. |
| | CLWA | **No impact.** | **Significant.** Conversion and degradation of habitat; reduction/local extinction of local native plant and wildlife populations; including sensitive species; introduction of invasive non-native species; disruption of established wildlife corridors and native wildlife nursery sites; impacts on sensitive fish and amphibian populations due to wastewater discharge and polluted runoff; conflicts with local policies and ordinances protecting biological resources. (Growth-related impact) | DIRECT: None required.<br>INDIRECt: Reduced by local governments implementing the policies of the County of Los Angeles, County of Ventura, and City of Santa Clarita general and area plans. State and federal regulatory agencies permit conditions may reduce significant impacts. | DIRECT: None.<br>INDIRECT: Significant unavoidable impact. |

**Table ES-1. Summary of the Project's Environmental Impacts and Mitigation Measures**
(Page 3 of 8)

| *Environmental Resource* | *Location* | *Direct Impacts* | *Indirect Impacts* | *Mitigation Measures* | *Residual Impacts* |
|---|---|---|---|---|---|
| Cultural Resources | SWP | **Less than significant**. Potential exposure of submerged cultural resources in San Luis Reservoir from December through June. | **No impact.** | DIRECT None required.<br>INDIRECT: None required. | DIRECT: Less than significant.<br>INDIRECT: None. |
| | WRMWSD | **No impact.** | **No impact.** | DIRECT: None required.<br>INDIRECT: None required. | DIRECT: None.<br>INDIRECT: None. |
| | CLWA | **No impact.** | **Significant.** Potential disturbance of human remains, archaeological, historical, and paleontological resources by excavation and grading activities associated with future development. (Growth-related impact) | DIRECT: None required.<br>INDIRECT: Mitigated by local governments implementing the policies of the County of Los Angeles, County of Ventura, and City of Santa Clarita general and area plans. | DIRECT: None.<br>INDIRECT: Less than significant. |
| Geology and Soils | SWP | **Less than significant.** Slight increase in soil exposed to wind and water erosion at San Luis Reservoir from December through June. | **No impact.** | DIRECT: None required.<br>INDIRECT: None required. | DIRECT: Less than significant.<br>INDIRECT: None. |
| | WRMWSD | **No impact.** | **No impact.** | DIRECT: None required.<br>INDIRECT: None required. | DIRECT: None.<br>INDIRECT: None. |
| | CLWA | **No impact.** | **Significant.** Potential from: geologic hazards, including fault rupture, seismically induced ground failure, and seiches, as well as causing permanent changes in topography, loss of topsoil, and removal of unique geologic features. (Growth-related impact) | DIRECT: None required.<br>INDIRECT: Mitigated by local governments implementing the policies of the County of Los Angeles, County of Ventura, and City of Santa Clarita general and area plans. | DIRECT: None.<br>INDIRECT: Less than significant. |
| Hazards and Hazardous Materials | SWP | **No impact.** | **No impact.** | DIRECT: None required.<br>INDIRECT: None required. | DIRECT: None.<br>INDIRECT: None. |
| | WRMWSD | **No impact.** | **No impact.** | DIRECT: None required.<br>INDIRECT: None required. | DIRECT: None.<br>INDIRECT: None. |

**Table ES-1. Summary of the Project's Environmental Impacts and Mitigation Measures**
(Page 4 of 8)

| *Environmental Resource* | *Location* | *Direct Impacts* | *Indirect Impacts* | *Mitigation Measures* | *Residual Impacts* |
|---|---|---|---|---|---|
| Hazards and Hazardous Materials (continued) | CLWA | **Less than significant**. Incremental increase in use of hazardous materials to treat transferred water. | **Significant.** Previously contaminated sites may require the removal or remediation of soils before development. Potential increase in transport, use, and disposal of hazardous materials, along with increased risks of hazardous substance releases. Potential impairment of emergency response plans or emergency evacuation plans. Increased public exposure to wildland fires. (Growth-related impact) | DIRECT: None required.<br>INDIRECT: Mitigated by local governments implementing the policies of the County of Los Angeles, County of Ventura, and City of Santa Clarita general and area plans. | DIRECT: Less than significant.<br>INDIRECT: Less than significant. |
| Land Use and Planning | SWP | **No impact.** | **No impact.** | DIRECT: None required.<br>INDIRECT: None required. | DIRECT: None.<br>INDIRECT: None. |
| | WRMWSD | **No impact.** | **No impact.** | DIRECT: None required.<br>INDIRECT: None required. | DIRECT: None.<br>INDIRECT: None. |
| | CLWA | **No impact.** | **Significant.** Potential to division of a community or conflict with adopted land use plans. (Growth-related impact) | DIRECT: None required.<br>INDIRECT: Mitigated by local governments implementing the policies of the County of Los Angeles, County of Ventura, and City of Santa Clarita general and area plans. | DIRECT: None.<br>INDIRECT: Less than significant. |
| Noise | SWP | **No impact.** | **No impact.** | DIRECT: None required.<br>INDIRECT: None required. | DIRECT: None.<br>INDIRECT: None. |
| | WRMWSD | **No impact.** | **No impact.** | DIRECT: None required.<br>INDIRECT: None required. | DIRECT: None.<br>INDIRECT: None. |
| | CLWA | **No impact.** | **Significant.** Potential short-term increases from construction and grading activities, increase in traffic-related emissions and changes in land uses. (Growth-related impact) | DIRECT: None required.<br>INDIRECT: Mitigated by local governments implementing the policies of the County of Los Angeles, County of Ventura, and City of Santa Clarita general and area plans. | DIRECT: None.<br>INDIRECT: Less than significant. |

**Table ES-1. Summary of the Project's Environmental Impacts and Mitigation Measures**
(Page 5 of 8)

| *Environmental Resource* | *Location* | *Direct Impacts* | *Indirect Impacts* | *Mitigation Measures* | *Residual Impacts* |
|---|---|---|---|---|---|
| Population and Housing | SWP | **No impact.** | **No impact.** | DIRECT: None required.<br>INDIRECT: None required. | DIRECT: None.<br>INDIRECT: None. |
| | WRMWSD | **No impact.** | **No impact.** | DIRECT: None required.<br>INDIRECT: None required. | DIRECT: None.<br>INDIRECT: Less than significant. |
| | CLWA | **No impact.** | **Significant.** Potential increase in population and housing. (Growth-related impact) | DIRECT: None required.<br>INDIRECT: Mitigated by local governments implementing the policies of the County of Los Angeles, County of Ventura, and City of Santa Clarita general and area plans. | DIRECT: None.<br>INDIRECT: Less than significant. |
| Public Services | SWP | **No impact.** | **No impact.** | DIRECT: None required.<br>INDIRECT: None required. | DIRECT: None.<br>INDIRECT: None. |
| | WRMWSD | **No impact.** | **No impact.** | DIRECT: None required.<br>INDIRECT: None required. | DIRECT: None.<br>INDIRECT: None. |
| | CLWA | **No impact.** | **Significant.** Potential increase in demand for public facilities and services. (police, fire, schools, and library services). (Growth-related impact) | DIRECT: None required.<br>INDIRECT: Mitigated by local governments implementing the policies of the County of Los Angeles, County of Ventura, and City of Santa Clarita general and area plans. | DIRECT: None.<br>INDIRECT: Less than significant. |
| Recreation | SWP | **No impact.** | **No impact.** | DIRECT: None required.<br>INDIRECT: None required. | DIRECT: None.<br>INDIRECT: None. |
| | WRMWSD | **No impact.** | **No impact.** | DIRECT: None required.<br>INDIRECT: None required. | DIRECT: None.<br>INDIRECT: None. |

**Table ES-1. Summary of the Project's Environmental Impacts and Mitigation Measures**
(Page 6 of 8)

| *Environmental Resource* | *Location* | *Direct Impacts* | *Indirect Impacts* | *Mitigation Measures* | *Residual Impacts* |
|---|---|---|---|---|---|
| Recreation (continued) | CLWA | **No impact.** | **Significant.** Potential increase in demand for recreational resources. (Growth-related impact) | DIRECT: None required.<br>INDIRECT: Mitigated by local governments implementing the policies of the County of Los Angeles, County of Ventura, and City of Santa Clarita general and area plans. | DIRECT: None.<br>INDIRECT: Less than significant. |
| Transporta-tion/Traffic | SWP | **No impact.** | **No impact.** | DIRECT: None required.<br>INDIRECT: None required. | DIRECT: None.<br>INDIRECT: None. |
| | WRMWSD | **No impact.** | **No impact.** | DIRECT: None required.<br>INDIRECT: None required. | DIRECT: None.<br>INDIRECT: None. |
| | CLWA | **No impact.** | **Significant.** Potential increase in traffic and the need for new or altered roads, highways, and transportation systems in the Santa Clarita Valley. (Growth-related impact) | DIRECT: None required.<br>INDIRECT: Mitigated by local governments implementing the policies of the County of Los Angeles, County of Ventura, and City of Santa Clarita general and area plans. | DIRECT: None.<br>INDIRECT: Significant unavoidable adverse impacts from increased vehicle trips due to growth in the Santa Clarita Valley. |
| Utilities and Service Systems | SWP | **Less than significant.** Additional electricity required to convey water to CLWA. | **No impact.** | DIRECT: None required.<br>INDIRECT: None required. | DIRECT: Less than significant.<br>INDIRECT: None. |
| | WRMWSD | **No impact.** | **No impact.** | DIRECT: None required.<br>INDIRECT: None required. | DIRECT: None.<br>INDIRECT: None. |

**Table ES-1. Summary of the Project's Environmental Impacts and Mitigation Measures**
(Page 7 of 8)

| *Environmental Resource* | *Location* | *Direct Impacts* | *Indirect Impacts* | *Mitigation Measures* | *Residual Impacts* |
|---|---|---|---|---|---|
| Utilities and Service Systems (continued) | CLWA | **Less than significant**. Additional demand for water treatment and electrical power to treat and distribute the transferred water within the CLWA service area. | **Less than significant**. Potential increase wastewater generation and demand for wastewater treatment; potential need for new storm water drainage facilities or the expansion of existing facilities. (Growth-related impact)<br>**Significant.** Potential increased demand for solid waste disposal services; potential increased need for potable water treatment facilities. (Growth-related impact) | DIRECT: None required.<br>INDIRECT: Mitigated by local governments implementing the policies of the County of Los Angeles, County of Ventura, and City of Santa Clarita general and area plans. Impacts to solid waste disposal may not be avoidable unless additional landfill capacity is approved and constructed. | DIRECT: None.<br>INDIRECT: Significant unavoidable adverse impact related to increased demand for solid waste disposal services. |
| Water Resources | SWP | **Less than significant.** Imperceptible or minor change in water quality in the Delta due to minor changes in timing of Delta diversions in some years. However, these changes would fall well within the range of historical and future anticipated SWP diversions from the Delta. | **No impact.** | DIRECT: None required.<br>INDIRECT: None required. | DIRECT: None.<br>INDIRECT: None. |

**Table ES-1. Summary of the Project's Environmental Impacts and Mitigation Measures**
(Page 8 of 8)

| *Environmental Resource* | *Location* | *Direct Impacts* | *Indirect Impacts* | *Mitigation Measures* | *Residual Impacts* |
|---|---|---|---|---|---|
| Water Resources (continued) | WRMWSD | **Less than significant.** Minor reduction of SWP Table A supply that has been replaced by other water management actions. Under some extreme conditions this could result in increased reliance on other water sources and groundwater. Increased use of other water and groundwater would result in higher TDS water used and recharged to local groundwater. | **No impact.** | DIRECT: None required.<br>INDIRECT: None required. | DIRECT: None.<br>INDIRECT: None. |
| | CLWA | **Beneficial impact.** Increased imported water supply to meet anticipated demands. Increased SWP supply would replace water that could have otherwise been pumped from groundwater. | **Significant.** Potential increased demand on local groundwater resources during periods of reduced SWP deliveries could result in substantial short-term stressing of groundwater supplies. Potential alteration of surface flows, reduction of aquifer recharge and increased amount and rate of stormwater runoff. Increased flooding and peak flow rates could result in substantial erosion or siltation on- or off-site. (Growth-related impact) | DIRECT: None required.<br>INDIRECT: Mitigated by local governments implementing the policies of the County of Los Angeles, County of Ventura, and City of Santa Clarita general and area plans. | DIRECT: None.<br>INDIRECT: Less than significant. |

# 1.0 INTRODUCTION

## 1.1 PURPOSE OF AND INTENDED USES OF THIS ENVIRONMENTAL IMPACT REPORT

This Environmental Impact Report (EIR) evaluates the potential environmental impacts of the transfer of an existing 41,000 acre-feet (AF) of State Water Project (SWP) Table A Amount[1] from a SWP contractor (the Kern County Water Agency [KCWA]) and its member unit in Kern County (the Wheeler Ridge-Maricopa Water Storage District [WRMWSD]), to the Castaic Lake Water Agency (CLWA), another SWP contractor located in Los Angeles and Ventura counties. This EIR also evaluates the use of SWP facilities from northern California to Los Angeles County for the delivery of SWP water to the CLWA service area, and use of this water within the CLWA service area. These actions are referred to as "the Project" in subsequent sections of this EIR.

The Project is intended to meet water demands of existing users and a portion of future water demand from anticipated growth within the CLWA service area. CLWA is not a land use agency and has no control over where and when growth will occur within its service area. To the extent that land use decision-makers utilize or rely on this EIR to predict future CLWA water supplies, they are cautioned that although CLWA will implement all feasible measures to firm up its water supplies (and CLWA's retail purveyors may implement conjunctive use programs using SWP and groundwater supplies to increase the reliability of deliveries to their customers), past water deliveries are not a guarantee of future delivery rates. Rather than repeat this advice to decision-makers in each section of the EIR, the reader is requested to keep this advice in mind when reading the information about the availability and reliability of water supplies wherever such information appears. Information regarding water supplies is presented throughout this document as it relates to the CLWA service area (section 1.3.1), the Project description (section 2.3), the environmental setting (section 3.0), and growth-inducing effects and growth-related impacts (Chapter 4). To facilitate your reading of this EIR, it is suggested that the reader refer to section 10.0, "List of Acronyms and Glossary of Terms." The acronyms used in this EIR are defined the first time they are used in the text. The California Environmental Quality Act (CEQA) requires preparation of an EIR when an agency action is believed to have a potential for significant impacts to the environment. An EIR is "a public document used by the governmental agency to analyze the significant environmental effects of a proposed project, to identify alternatives, and to disclose possible ways to reduce or avoid the possible environmental damage" (Title 14, California Code of Regulations [CCR], section 15002). An EIR serves as an informational document for decision-makers and the general public alike. This is a Project EIR addressing actions that were anticipated and programmatically

1 "Table A" is a term used in SWP Water Supply Contracts. The "Table A Amount" is the annual maximum amount of water to which an SWP Contractor has a contract right to request delivery, and is specified in Table A of each Contractor's Water Supply Contract. (Prior to the Settlement Agreement arising out of a legal challenge to the Monterey Amendment to the State Water Project contracts, the Table A Amount was referred to as "entitlement.") The amount of water actually available for delivery in any year may be an amount less than the Contractor's Table A Amount due to a number of factors, including hydrologic conditions. The parallel term used in the member unit contract between KCWA and WRMWSD is "Contract Entitlement" (sometimes referred to as "Table 1 Entitlement"). For the sake of brevity, in this EIR the term "Table A Amount" refers to the Table A Amount in the SWP Water Supply Contracts, or "Annual Entitlement" prior to the Monterey Amendment; where the term is used in connection with WRMWSD, it refers to the Table 1 Entitlement under its member unit contract with KCWA.

evaluated in the certified Capital Program and Water Plan, including Acquisition of Supplemental Water and of a Proposed Second Plant Site Final EIR (Capital Program EIR) (CLWA 1988), described below in section 1.2.4.

CLWA is the lead agency for preparation of the EIR and thus will evaluate, and if appropriate, certify this EIR, make CEQA findings, and approve the Project. CLWA has the principal responsibility for carrying out and implementing the Project because 1) a substantial portion of the Project occurs within CLWA's jurisdiction and substantially affects CLWA; 2) CLWA has been the lead proponent of the Project and has assumed the primary task of effectuating the SWP water supply contract amendment; 3) CLWA has the expertise to implement the Project; and 4) the Project, although requiring the use of SWP facilities, would involve transfers only between three agencies (CLWA, KCWA, and WRMWSD) within a limited geographic area and does not implicate the entire statewide water rights or supply framework. All documents referenced in this EIR are available for public inspection at the CLWA offices at 27234 Bouquet Canyon Road, Santa Clarita, CA 91350, (661) 297-1600.

The California Department of Water Resources (DWR), KCWA, and WRMWSD are considered to be responsible agencies. Responsible agencies are public agencies other than the lead agency that have responsibility for carrying out or approving a project (CEQA Guidelines section 15381).

## 1.2 RELATED ENVIRONMENTAL DOCUMENTATION

### 1.2.1 Supplemental Water Project EIR

The transfer of 41,000 AF of SWP Table A Amount from KCWA and its member unit, WRMWSD, to CLWA (41,000 AF Transfer Agreement) and the Point of Delivery Agreement between DWR, KCWA, and CLWA were evaluated previously in the Supplemental Water Project Final EIR (CLWA 1999). The transfer of SWP Table A Amount that is the subject of the present EIR was contractually completed in 1999, and imported water supply associated with the transfer became available for use by CLWA starting in January 2000.

The Second Appellate Court, Fourth Division and the Superior Court of Los Angeles ordered that this EIR be decertified in January 2002 (*Friends of the Santa Clara River v. Castaic Lake Water Agency* (2002) 95 Cal. App. 3d 1373 [*Friends*]) because it tiered from the Monterey Agreement Program EIR, which was itself decertified as a result of an appellate court decision issued while *Friends* was on appeal (refer to section 1.2.3 for a discussion of the Monterey Agreement EIR). "All other contentions" concerning the legal adequacy of the Supplemental Water Project EIR were found to be "without merit." The Court of Appeal specifically ordered the Trial Court to "issue a writ of mandate vacating the certification of the EIR," and to "retain jurisdiction until [CLWA] certifies an EIR complying with CEQA," and "consider such orders it deems appropriate under section 21168.9 [of the Public Resources Code]." The CLWA Board of Directors decertified CLWA's Supplemental Water Project Final EIR on November 27, 2002.

In September 2002, the Trial Court was requested to prohibit CLWA from using the 41,000 AF in any manner. Trial Court refused to enjoin the performance of the 41,000 AF Transfer Agreement, maintained its jurisdiction over the matter, and authorized CLWA to utilize "any of the 41,000 AFY [acre-feet per year]," albeit, with certain limitations:

> Respondent [CLWA] will not be prohibited from using the water to which it is entitled, but petitioner may renew its application for such prohibition based upon evidence of the actual use of such additional water for purposes it considers improper.

The above Order was issued without prejudice to a renewed request by the Petitioner for an injunction on all of portions of CLWA's project pending completion of the EIR[2]. The present EIR is being prepared in accordance with the decisions of the Second Appellate Court, Fourth Division and the Superior Court of Los Angeles (Superior Court Case No. BS05694).

KCWA, WRMWSD, CLWA, and DWR previously approved the various contract amendments on the basis of the 1999 Supplemental Water Project Final EIR and other environmental analyses and documentation.

### 1.2.2 Monterey Amendment Program EIR

During the 1990s, disagreements arose between DWR, Agricultural Contractors, and municipal and industrial (M&I) Contractors about how available SWP supplies should be allocated. The SWP Contractors and DWR agreed to negotiate a settlement of their differences and develop a new approach to managing SWP resources through a major overhaul of the Water Supply Contracts. After a series of exhaustive negotiating sessions, an agreement was reached in December 1994 in Monterey, California on a set of principles, known as the "Monterey Agreement." The Monterey Agreement principles were implemented through an amendment to the Water Supply Contracts between DWR and the SWP Contractors, which became known as the "Monterey Amendment." The term "Monterey Amendment" is used in subsequent sections of this EIR. The Monterey Amendment was approved in 1995 and went into effect in August 1996. A summary of the provisions of the Monterey Amendment is provided in section 1.4.2.

A Program EIR analyzing the environmental impacts of the Monterey Amendment (Monterey Agreement EIR) was prepared and certified by the Central Coast Water Authority (CCWA) in 1995. In late 1995, a lawsuit was filed by the Planning and Conservation League (PCL), Plumas County Water Conservation and Flood Control District (Plumas County), and Citizens Planning Association of Santa Barbara County (CPA) (collectively referred to as the "plaintiffs") challenging the EIR. The plaintiffs argued that the environmental impact analysis prepared was inadequate because CCWA was not a proper lead agency and the EIR analysis did not reflect the inability of the SWP to deliver full Contract amounts to Contractors, even though they held contractual "entitlements" to those supplies. In 2000, the California State Court of Appeal (Third District) found that a new EIR must be prepared. That litigation is referred to as the PCL Litigation in this EIR.[3]

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2 Petitioners appealed the Remand Order issued by the Superior Court in this case. The Court of Appeal affirmed the trial court's order (refusing the request for an injunction) on December 1, 2003.

3 *Planning and Conservation League, et al. v. Department of Water Resources* (2000) 83 Cal. App. 4th 892.

Discussions to mediate a settlement began in 2001 and were finalized in May 2003.[4] All parties to the litigation have signed the Settlement Agreement. The Settlement Agreement calls for DWR to prepare a new EIR pursuant to CEQA (a Notice of Preparation [NOP] was issued by DWR on January 24, 2003),[5] while the Monterey Amendment's provisions remain in operation. Pursuant to the Settlement Agreement, the parties are now administering the preparation of a new EIR, which is expected to be completed in approximately two years. The new EIR will evaluate the potential environmental impacts of changes to SWP operations incorporated in the Monterey Amendment and the Settlement Agreement. The Settlement Agreement also calls for DWR to produce a biennial SWP Delivery Reliability Report. The SWP Delivery Reliability Report - 2002 was issued in May 2003 (DWR 2003b) (see section 1.3.2). The Settlement Agreement did not change the substance of the Monterey Amendment, but addressed the process by which the new Monterey Amendment EIR will be prepared.

It should be noted at this point that the Settlement Agreement concerning the PCL Litigation creates a specific exclusion for this Project from any prohibitions against transfers of State Water Project Table A Amounts by the Settlement Agreement. The exclusion states:

> With respect to Section III(C)(4)(b) regarding the Kern-Castaic Transfer, the Parties recognize that such water transfer is subject to pending litigation in the Los Angeles County Superior Court following remand from the Second District Court of Appeal (*See Friends of the Santa Clara River v. Castaic Lake Water Agency 95 Cal.App.4th 1373, 116 Cal.Rptr.2d 54 (2002); review denied, April 17, 2002*). The Parties agree that jurisdiction with respect to that litigation should remain in that court and that nothing in this Settlement Agreement is intended to predispose the remedies or other actions that may occur in that pending litigation.

The order on remand from the appellate court in the Friend case specifically ordered the Trial Court "to retain jurisdiction until [CLWA] certifies an EIR complying with CEQA" and "consider such orders it deems appropriate under section 21168.9 [of the Public Resources Code]." This EIR thus remains under the jurisdiction of the Superior Court until the EIR is certified by CLWA.

### 1.2.3 Capital Program and Water Plan, including Acquisition of Supplemental Water and of a Proposed Second Plant Site, EIR

In 1988, CLWA completed the Capital Program and Water Plan, including Acquisition of Supplemental Water and of a Proposed Second Plant Site, Final EIR (Capital Program EIR) (CLWA 1988), which evaluated the potential environmental impacts of the proposed Capital Improvements Program, including the acquisition of supplemental water, and the construction of a new treatment plant and facilities improvements. The Capital Program EIR evaluated a proposal for CLWA to obtain additional SWP Table A Amount of up to 37,800 AF to supplement the 1988 SWP Table A Amount of 41,500 AF. This EIR assumed that deliveries

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4 In May 2003, the settlement agreement among the plaintiffs, DWR, and the SWP Contractors (referred to herein as the "Settlement Agreement") was executed and approved by the State Attorney General's office. On May 20, 2003 the Settlement Agreement was approved by the Sacramento Superior Court.

5 The NOP is entitled Notice of Preparation of Environmental Impact Report for the Monterey Amendment to the State Water Project Contracts (Including Kern Water Bank Transfer) and Other Contract Amendments and Associated Actions as part of a Proposed Settlement Agreement in Planning and Conservation League v. Department of Water Resources.

from the new SWP Table A Amount would become 100 percent reliable before 2010. It also identified a total water demand of 120,000 AFY to support a population of 270,000 persons in the year 2010. The implementation of reasonable conservation measures and recycling was projected to reduce net demand to 106,300 AFY, an approximately 11 percent reduction. The Project evaluated in the present EIR was programmatically evaluated in the Capital Program EIR (CLWA 1988).

## 1.3 WATER AGENCIES AND DISTRICTS INVOLVED IN THE WATER TRANSFER

### 1.3.1 Castaic Lake Water Agency

The CLWA service area comprises approximately 195 square miles (124,800 acres) in Los Angeles and Ventura counties, as shown on Figure 1.2-1. CLWA serves the incorporated and unincorporated areas in, or adjacent to, the Santa Clarita Valley. Most of this area, including the incorporated cities, is within the geographic boundaries of Los Angeles County, but it also extends into a small portion of eastern Ventura County. The service area includes largely urban areas, such as the City of Santa Clarita, other smaller communities, and rural areas. The West Branch of the California Aqueduct terminates at Castaic Lake, in the northern portion of the service area.

CLWA, a water wholesaler, was created by the California Legislature in 1962 through passage of the "Castaic Lake Water Agency Law." At the time, its principal purpose was contracting with the State of California, through DWR, to acquire and distribute SWP water to its four local retail water purveyors: CLWA's Santa Clarita Water Division, Los Angeles County Waterworks District No. 36, Newhall County Water District, and Valencia Water Company. Subsequent legislation broadened CLWA's purpose, which now includes, but is not limited to, the following:

- acquire water from the state;
- distribute such water wholesale through a transmission system to be acquired or constructed by CLWA;
- reclaim (recycle) water;
- sell water at retail within certain boundaries; and
- exercise other related powers.

Adequate planning for, and the procurement of, a reliable water supply is a fundamental function of the CLWA. CLWA obtains its water supply for wholesale purposes principally from the SWP and has a Water Supply Contract with DWR for 95,200 AF of SWP Table A Amount. The transfer of 41,000 AF of this 95,200 AF to CLWA is, however, the subject of this EIR. Therefore, for the purposes of evaluating the environmental impacts of the Project, CLWA is assumed to have 54,200 AF of SWP Table A Amount. This represents the pre-Project baseline situation.

CLWA has evaluated the long-term water needs (water demand) within its service area based on applicable county and city plans and has compared these needs against existing and potential water supplies. CLWA prepared the Capital Improvements Program in 1988, and in

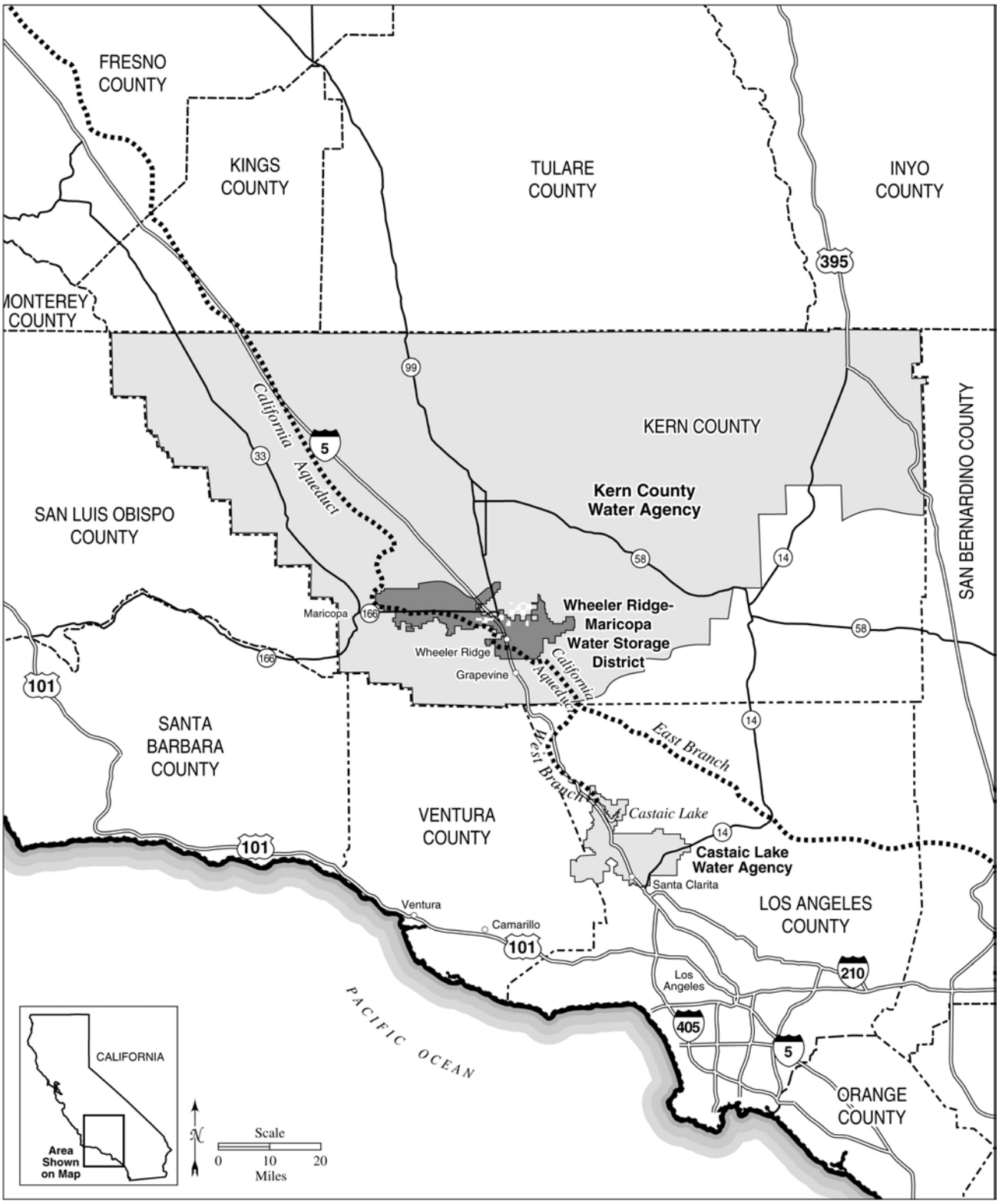


**Figure 1.2-1. Regional Setting Including Kern County Water Agency, Wheeler Ridge-Maricopa Water Storage District, and Castaic Lake Water Agency**

2000 published the 2000 Urban Water Management Plan (UWMP) to address water supply and demand issues. (The UWMP was challenged in the Superior Court of Kern County and a judgment was entered in July 2003 upholding the UWMP in all respects. The petitioners in that case have appealed the judgment. The UWMP is and remains a valid document as of the time of the preparation of this EIR. The UWMP is scheduled for update in 2005.) The Capital Improvements Program and UWMP address reclamation (recycling) options, supplemental supply, and physical improvements. Based on projected demands (and despite potential savings from conservation programs, reclamation of existing water supplies for irrigation, and expanded use of local groundwater sources), supplemental water sources appear to be needed. Water banking also appears to be needed to improve overall reliability of the water supply, particularly during periods of drought.

The availability of local water supplies has been the subject of some controversy in the Santa Clarita Valley over the last few years. The water suppliers' consulting engineers recently calculated the availability of local groundwater at 50,000 AFY (Slade 2002) based on updated studies prepared using reasonable, accepted engineering and scientific practices (perchlorate remediation measures and recycled water use were considered in these studies). Some Santa Clarita Valley residents have questioned the conclusions of these studies and claim that only about 32,000 AFY of water is available based on conclusions in an earlier report published in 1986 (Slade 1986). They also claim that water from the Saugus Formation should not be calculated as available on a long-term basis until the perchlorate contamination in a small part of this formation is fully contained or remediated. CLWA, CLWA Santa Clarita Water Division, Newhall County Water District, and Valencia Water Company have received $8 million as reimbursement for litigation costs and studies to determine the cleanup plan for the perchlorate. CLWA and the retail purveyors are presently identifying the method of cleanup and the costs of cleanup to be paid by the insurance companies of Whitaker Bermite and related parties. It is anticipated the cleanup should be in place by 2006.

Planning for an adequate water supply to meet demands requires consideration of the reliability of SWP supplies, because history and statistical analysis indicate that the full contracted Table A Amount will not be available for delivery to the SWP Contractors in some years. While CLWA's contract with DWR sets the specific maximum of CLWA's SWP Table A Amount, the amount of SWP water actually available for delivery to CLWA and the other SWP Contractor agencies varies from year to year depending on hydrology, the amount of water in storage, the operational constraints and requirements imposed by regulatory agencies to meet environmental water needs, the amount of water requested by other SWP Contractors, climatic conditions, and other factors. The amount of Table A Amount water delivered to CLWA, and all other SWP Contractors is based on the requests for delivery and the amount of water available.

### 1.3.2 Kern County Water Agency and the Wheeler Ridge-Maricopa Water Storage District

KCWA, a water wholesaler, was created by the California Legislature in 1961 to secure and supply adequate water to its local member units in Kern County. KCWA includes most of Kern County, an area of approximately 8,160 square miles or 5.22 million acres (refer to Figure 1.2-1). KCWA's Water Supply Contract was 1,087,730 AF of SWP Table A Amount in 1998, but was reduced to 1,000,949 AF in 2003 because KCWA had completed several Table A transfers with

other SWP Contractors consistent with the terms of the Monterey Amendment since early 1999, including the 41,000 AF transferred to CLWA that is the subject of this EIR. Therefore, for the purposes of evaluating the environmental impacts of the Project, KCWA is assumed to have 1,087,730 AF of SWP Table A Amount, its SWP Table A Amount in 1998 (DWR 2001a).

WRMWSD, a retail water purveyor, was formed in 1959 by an election of landowners as provided by Division 14 of the California Water Code. The district contains approximately 228 square miles (146,000 acres) and is located in the southern end of the San Joaquin Valley in Kern County as shown in Figure 1.2-1. The district mostly occupies the valley floor and smooth sloping foothill lands at the southern apex of the San Joaquin Valley between the Coast Mountain Range to the west and the Tehachapi Mountain Range to the east. Lands within the district are used predominantly for agricultural purposes, although small areas of industrial development and the unincorporated community of Lakeview are within the district, along with the town site of Wheeler Ridge. The California Aqueduct traverses the district for approximately 34 miles, and the Teerink, Chrisman, and Edmonston pumping plants are all in, or within one mile of, the district.

WRMWSD obtains SWP water through a contract with KCWA. WRMWSD's contract is currently for 197,088 AF of SWP Table A Amount through KCWA; however, in 1998, prior to the implementation of the Project, WRMWSD's contract was for 238,088 AF of SWP Table A Amount. Therefore, for the purposes of evaluating the environmental impacts of the Project, WRMWSD is assumed to have 238,088 AF of Table A Amount. This represents the pre-Project baseline situation.

WRMWSD obtains its water supplies from the SWP, other surface water sources, and groundwater sources, and delivers water to agricultural and industrial users within the district. WRMWSD also participates in a variety of other water management activities, including groundwater banking programs outside of the district and other in-lieu and direct groundwater recharge programs[6] within the district. WRMWSD's distribution system consists of a series of pipelines, pumping plants, canals and related facilities that deliver surface water from 16 separate turnouts on the California Aqueduct to approximately 72,000 acres of lands with long term water service contracts.

Some of the landowners within the district have executed long-term contracts with WRMWSD for the delivery of surface water, including SWP water, by the WRMWSD distribution system. These lands are collectively referred to as "contract lands," and rely mainly on surface water to meet water demands. Approximately 49 percent of the lands in the WRMWSD hold contracts for surface water. Lands in WRMWSD that do not hold long-term contracts for surface water, or "non-contract lands," rely mainly on groundwater supplies to meet water demands. Surface water, including SWP water when available, can be delivered to certain non-contract lands within WRMWSD (generally those that historically have held contracts) via the existing WRMWSD distribution system.

6 In-lieu groundwater recharge is the process of recharging groundwater supplies by substituting surface water for groundwater that would otherwise be extracted and used. Direct groundwater recharge is the process of recharging groundwater supplies by the percolation of surface water supplies into the groundwater basin, most commonly done through the use of groundwater recharge ponds.

### 1.3.3 Department of Water Resources

DWR operates the SWP and is responsible for overall water planning for the state of California. This agency has long-term water supply contracts for water service from the SWP with 29 local agencies for about 4.2 million acre-feet (MAF) annually. DWR's State Water Project Analysis Office is responsible for negotiating and administering water contracts and acts as a contractor liaison with long-term SWP Contactors for water deliveries and special projects.

## 1.4 OVERVIEW OF SWP FACILITIES AND WATER SUPPLY CONTRACTS

This section is intended to provide the reader with an overview of the SWP facilities and Water Supply Contracts (Water Supply Contracts or Contracts) related to the Project to facilitate review of the project description and environmental impact analyses. A more detailed description is included in Appendix D.

### 1.4.1 SWP Facilities

The SWP is a large water supply, storage, and distribution system authorized by an act of the California State Legislature in 1959. In 1960, California voters approved a $1.75 billion bond issue to begin building SWP facilities. Today, the SWP includes 28 storage facilities, reservoirs and lakes; 20 pumping plants; six pumping-generating plants and hydroelectric power plants; and about 660 miles of aqueducts and pipelines. These facilities are further described in section 3.15, Water Resources. Figure 1.3-1 provides an overview of SWP facilities.

The primary water source for the SWP is the drainage of the Feather River, a tributary of the Sacramento River. Runoff released from Oroville Dam in Butte County flows down natural channels to the Sacramento-San Joaquin River Delta (Delta), where some of the water is pumped through the North Bay Aqueduct to Napa and Solano counties. In the southern Delta, water is pumped from the Clifton Court Forebay by the Harvey O. Banks Delta Pumping Plant (Banks Pumping Plant) into the 444-mile-long, Governor Edmund G. Brown California Aqueduct (California Aqueduct).

The California Aqueduct conveys water to the primarily agricultural users in the San Joaquin Valley and the primarily urban regions of the San Francisco Bay Area, the Central Coast, and southern California. From the California Aqueduct, water is diverted into the South Bay Aqueduct for delivery to Contractors in Alameda and Santa Clara counties. Further downstream, water is delivered directly from the California Aqueduct to Contractors in the central and southern San Joaquin Valley, including WRMWSD and the other member units of the KCWA. Near Kettleman City, water is diverted into the SWP Coastal Branch Aqueduct, which carries water to San Luis Obispo and Santa Barbara counties and the northwestern portion of KCWA. The water is transported along the west side of the San Joaquin Valley through a series of four pumping plants before reaching the Edmonston Pumping Plant. This plant lifts the SWP water 1,926 feet over the Tehachapi Mountain Range. Water intended for use in southern California is conveyed through the West Branch to Castaic Lake and through the East Branch to Lake Perris, which are referred to as terminal reservoirs for the SWP.

The original plan for the SWP included constructing additional water storage facilities as Contractor demands increased, however, essentially no new construction of additional SWP storage facilities has occurred since the initial SWP facilities were completed. Although future

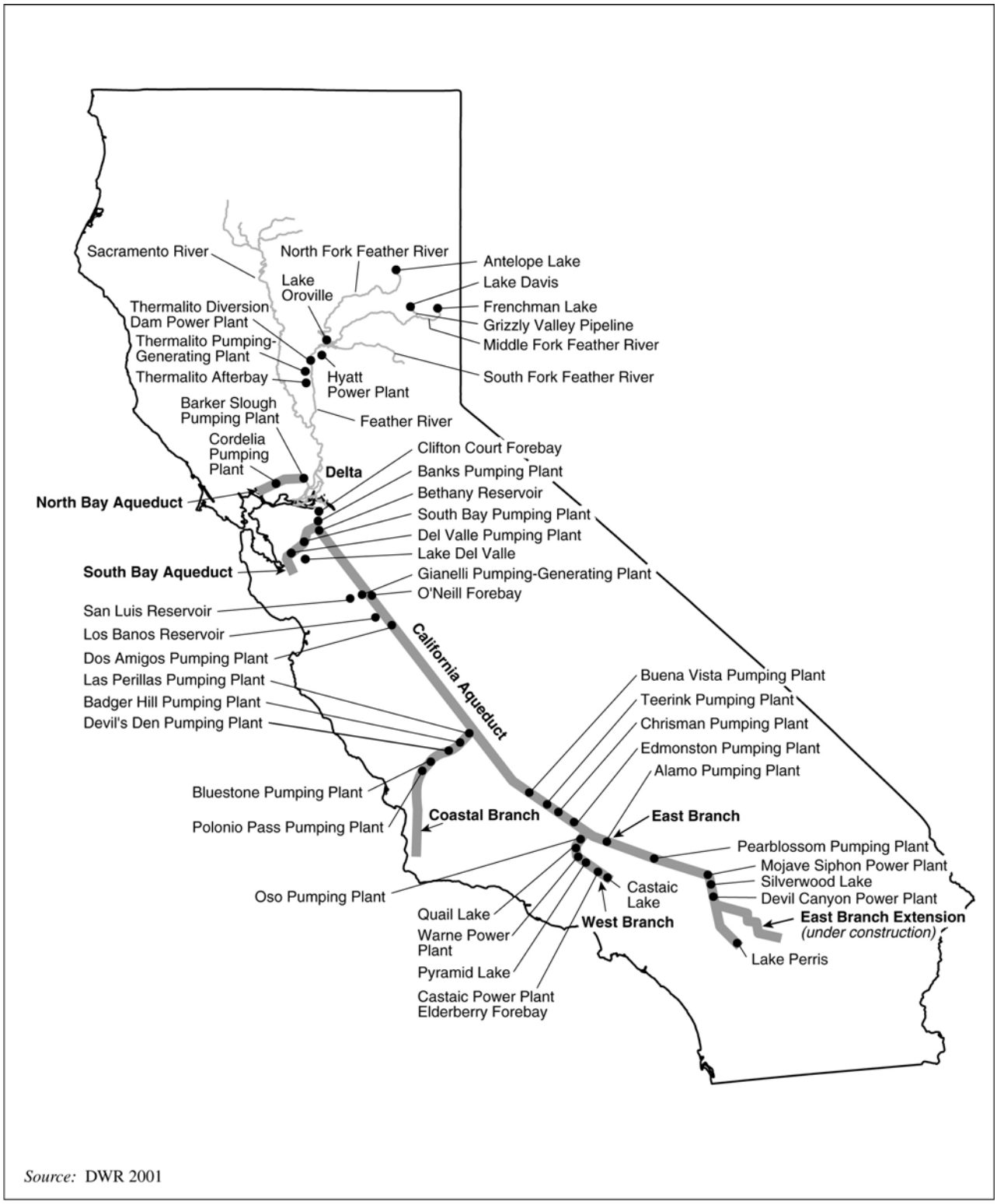


**Figure 1.3-1. Primary SWP Facilities**

construction or other actions can improve the quantity and reliability of SWP supplies (e.g., the CALFED Bay-Delta Program, the Napa Accord, and the South Delta Improvement Program), these actions entail their own environmental reviews, potential litigation delays, and multi-year construction period, therefore, it is likely to take many years before any additional storage and/or conveyance facilities that improve SWP reliability are operational. The reliability of SWP supplies will not likely improve in the foreseeable future.

### 1.4.2 SWP Water Supply Contracts

*Overview*

In 1960, DWR began executing individual Water Supply Contracts with public agencies throughout the State of California for financing and constructing SWP facilities designed to deliver water to each public agency. ("SWP Contractors" or "Contractors" collectively refer to the public agencies that hold SWP Water Supply Contracts with DWR.) Each Water Supply Contract identifies a Table A Amount, the annual maximum amount of water to which an SWP Contractor has a contract right. The Table A Amount is specified as either "agricultural" or "municipal and industrial" (M&I). Of CLWA's 54,200 AF of Table A Amount, 41,500 AF is designated as an M&I Table A Amount and 12,700 AF is an agricultural Table A Amount. WRMWSD's entire Table A Amount is an agricultural Table A Amount.

Each Contractor annually submits a request to DWR for water delivery in the following year, in any amount up to the Contractor's Table A Amount. The Water Supply Contracts provide that in a year when DWR is unable to deliver total Contractor requests, deliveries to all Contractors will be reduced so that total deliveries equal total available supply for that year. While SWP Contractors currently (2003) hold Table A Amounts totaling approximately 4.173 MAF, the amount of water actually requested by Contractors is less than that due to a number of M&I Contractors whose demands have not yet increased to their full Table A Amount. Even at these lower current demands, however, the SWP cannot meet all water delivery requests in some years due to operational and environmental constraints. Given existing SWP facilities, operational conditions, and Contractor demands, the SWP can deliver an annual average of approximately 2.96 MAF (DWR 2003b). As Contractor demands increase, the SWP is currently projected to be able to deliver an average of about 3.1 MAF (DWR 2003b).

Under the original Water Supply Contracts, the Agricultural Contractors agreed in years of shortage (i.e., when SWP supplies were insufficient to meet Contractors' requests) to first accept a certain amount of reduction in deliveries (the "initial agricultural reduction" before any remaining reduction was shared proportionately between the Agricultural and M&I Contractors. In exchange, the Agricultural Contractors received, among other favorable terms, a priority for "surplus" SWP supplies when available (i.e., SWP supplies that could be delivered in excess of Table A requests, generally available in wetter hydrologic years and/or in the early years of the SWP when demands were still low). Under the original plan for the SWP, which involved the construction of additional water storage facilities as Contractor demands increased, shortages in SWP supplies were anticipated to occur relatively infrequently and in small enough magnitudes that only Agricultural Contractors were expected to incur shortages. In the early 1990s, however, a multi-year drought coupled with increased SWP operational constraints and environmental water requirements due to the listing of several fish species as endangered or threatened, resulted in several years when SWP supplies fell below Contractors'

requests for deliveries. The initial agricultural provision in the Water Supply Contracts resulted in Agricultural Contractors receiving only half their requested supply in 1990 and no water in 1991, while the M&I Contractors received all of their requested supply in 1990 and 30 percent of their requests in 1991. Because Contractors pay their proportionate share of fixed project costs regardless of how much water is delivered, plus variable costs based on the amount of water delivered, Agricultural Contractors underwent severe delivery reductions but received little financial relief from their fixed project cost obligations. This situation led to increasing disagreements between DWR, the Agricultural Contractors, and the M&I Contractors about how available supplies should be allocated.

***The Monterey Amendment***

In 1994-1995, the SWP Contractors and the DWR agreed to negotiate a settlement of their differences and develop a new approach to managing SWP resources through a major overhaul of the Water Supply Contracts, known as the Monterey Amendment. The provisions of the Monterey Amendment are summarized below. Additional detail regarding the relationship between the Monterey Amendment and the Project is included in section 3.15.2.2 and Appendix D.

*Allocation of SWP Water Supplies*

- New method for allocation of all water supplies in proportion to each Contractor's contract amount (Table A Amounts).
- Elimination of the initial supply reduction to Agricultural Contractors in years of shortage (modification of Article 18(a) of the Water Supply Contracts).
- Replacement of certain categories of water with a single category of Article 21 water[7] allocated on the basis of Table A amounts and delivered at the same power rate as Table A Amounts.
- Elimination of the permanent shortage provision (Article 18(b) of the Water Supply Contracts).

*Transfer of Table A Amounts and Land*

- The permanent retirement of 45,000 AF of Table A Amount by Agricultural Contractors.
- Make 130,000 acre-feet of agricultural Table A Amounts available for permanent sale to M&I Contractors.[8]
- Transfer of the Kern Fan Element property to local control.

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7 Water that DWR makes available when water and capacity are available in excess of SWP storage needs and Table A supplies. This water is only available for limited time periods, generally only in the winter or early spring when Contractors' demands are low, and only under specific conditions that do not occur on an annual basis. This type of water is identified in Article 21 of the Water Supply Contracts. It is the same as, but replaced, unscheduled surplus water as part of the Monterey Amendment. Additionally, Article 21 water was defined under the Monterey Amendment as "interruptible water," but it is more commonly referred to as "Article 21 water." For purposes of the present EIR, the term "Article 21 water" is being used; however, both terms are presented in the water resources glossary in Chapter 3.15.

8 The 41,000 AF transfer associated with the Project represents a portion of the 130,000 AF transfer that the Agricultural Contractors agreed to make available for permanent transfer in the Monterey Amendment.

*Water Management Provisions*

- Enable voluntary water marketing, groundwater banking, and more effective use of existing SWP facilities.
- Explicitly provide for groundwater or surface storage of SWP water outside Contractor's service area for later use within its service area.
- Expand Contractor rights to store water in San Luis Reservoir when storage space is available.
- Specify Contractor rights to flexible storage in terminal reservoir facilities.
- Clarify terms for transport of non-SWP water in SWP facilities for Contractors.
- Create a Turnback Pool for the annual sale to interested Contractors of SWP supplies allocated to other Contractors but unneeded by them.

*Financial Restructuring*

- Use SWP funds to establish an SWP operating reserve.
- Establish a program of water rate management which, when SWP cash flow permits, provides for a credit in charges to M&I Contractors, as well as Agricultural Contractor trust funds for rate management.

***The Monterey Amendment Litigation***

In 1996, a lawsuit regarding the role of the DWR as the CEQA lead agency, among other issues, was filed (*Planning and Conservation League, et. al. vs. Department of Water Resources and Central Coast Water Authority*). Following Superior and Appellate Court decisions ordering the Monterey Agreement EIR to be decertified, mediation discussions were conducted. In July 2002, the discussions resulted in a statement of principles for the settlement of the litigation. In May 2003, the settlement agreement among the plaintiffs, DWR, and the SWP Contractors (referred to herein as the "Settlement Agreement") was executed and approved by the State Attorney General's office and by the Sacramento Superior Court. While complex, the key components applicable to this EIR are presented below:

- Continue operation under Monterey Amendment provisions.
- Establish a watershed forum for Plumas County to pursue watershed restoration and provide for amending Plumas County's Water Supply Contract regarding shortages.
- Amend and clarify SWP Water Supply Contracts to substitute in certain instances "Table A Amount" for "entitlement."
- Implement new procedures for disclosure of SWP delivery capabilities.
- Issue guidelines on permanent Table A Amount transfers.
- Establish procedures for public participation in certain Water Supply Contracts amendment negotiations.
- Provided certain funding to the plaintiffs for multiple purposes, including watershed restoration.

## 1.5 PUBLIC INVOLVEMENT PROCESS

The original decision to prepare an EIR for the Project was made following the completion of an Initial Study, which was filed with the California State Clearinghouse and distributed to interested parties on April 21, 1998. Comments on the April 1998 NOP and Initial Study were received from State agencies, regional and local governmental agencies, regional authorities, and non-governmental organizations. The comments received on the April 1998 NOP and Initial Study were considered by CLWA and helped refine the scope of the 1999 Supplemental Water Project EIR.

Subsequent to the court ordered decertification of the 1999 Supplemental Water Project EIR, a second NOP and Initial Study were distributed to the California State Clearinghouse and other potentially interested parties on January 22, 2003. Comments on the January 2003 NOP were received from State agencies, regional and local governmental agencies, regional authorities, and non-governmental organizations. The comments received on the January 2003 NOP were considered by CLWA and helped refine the scope of analysis of the present EIR. A copy of the January 2003 NOP and Initial Study and comment letters received are provided in Appendix A.

## 1.6 EIR ORGANIZATION

The Project is described in Chapter 2 of this EIR; the affected environment, environmental impacts of the Project, and mitigation measures for potentially significant impacts are described in Chapter 3 for each resource considered; growth inducement and growth-related impacts and mitigation measures are discussed in Chapter 4; consistency with adopted plans and policies is addressed in Chapter 5; cumulative impacts of the Project in combination with other projects are addressed in Chapter 6; Project alternatives, including alternatives eliminated from consideration, the No Project Alternative, and the Environmentally Superior Alternative, are considered in Chapter 7. The remaining sections include references; persons, agencies, and organizations consulted; acronyms and a glossary of technical terms; and a list of preparers. Appendix A contains the January 2003 NOP and letters received in response to the NOP. Appendix B contains Biological Resources data on sensitive species. Appendix C contains a study conducted by Northwest Economic Associates (NEA) study to determine the potential effects of the Project on agricultural operations in the WRMWSD (NEA 2003). Appendix D contains the Water Resources Technical Appendix, including a description of the operations modeling studies used and analyses performed in support of this EIR, a summary of the results of these analyses, and related information.

# 2.0 PROJECT DESCRIPTION

## 2.1 PROJECT LOCATION

The Project would use existing SWP facilities located between the southern Delta facilities and Castaic Lake; these facilities include the SWP's southern Delta facilities (Clifton Court Forebay, the Banks Pumping Plant, and Bethany Reservoir); the San Luis Reservoir facilities (San Luis Reservoir, O'Neil Forebay, and the Gianelli Pumping-Generating Plant); and the California Aqueduct from the southern Delta to Castaic Lake, including pumping plants, a power plant, and storage facilities along the Aqueduct (Buena Vista, Teerink, Chrisman, Edmonston, and Oso pumping plants, Warne power plant, and Quail, Pyramid and Castaic lakes). These facilities are located in Alameda, Contra Costa, Fresno, Kern, Kings, Los Angeles, Merced, San Joaquin, and Stanislaus counties. Figure 1.3-1 shows the location of the primary SWP facilities. The Project also could affect environmental resources located in the CLWA and WRMWSD service areas. The CLWA service area is located in northern Los Angeles and eastern Ventura counties. The WRMWSD is located in the southern extent of the San Joaquin Valley in Kern County. The locations of CLWA and WRMWSD are shown on Figure 1.2-1.

## 2.2 PROJECT OBJECTIVES

The portion of the CLWA service area that is located within the unincorporated and incorporated portions of Los Angeles County is experiencing substantial growth in population and urbanization. This trend is expected to continue based on development that already has been approved by the County of Los Angeles and the City of Santa Clarita and development that is projected in local adopted plans. Pursuant to the provisions of its SWP Water Supply Contract, CLWA has over time acquired a right to delivery of SWP water at an amount necessary to reasonably supply the Agency's increasing demand. The Project is an action by CLWA to maintain the water supply needed to meet water demands of existing users and a portion of future water demand from anticipated growth within the CLWA service area.

Specific Project objectives are as follows:

- Augment CLWA's SWP Table A Amount to meet water demands of existing users and a portion of future water demand from anticipated growth within the CLWA service area.
- Provide a means of delivery for the augmented water supplies.

## 2.3 DESCRIPTION OF THE PROJECT

The Project is the transfer of an existing 41,000 AF of SWP Table A Amount from KCWA and its member unit in Kern County, WRMWSD, to CLWA. The Project also includes the use of SWP facilities from northern California to Los Angeles County for the delivery of SWP water to the CLWA service area, and the use of his water within the CLWA service area. The Project water is transported from certain points of origin in the SWP system to the CLWA intake south of Castaic Lake via existing SWP facilities. The points of origin and delivery are identified in the 41,000 AF Transfer Agreement and the Point of Delivery Agreement (see section 1.2.1).

The Project currently is being implemented by an amendment to the SWP water supply contracts of CLWA and KCWA. The Project is to authorize CLWA to use water delivered from the 41,000 AF of SWP Table A Amount for water demands of existing users and a portion of future water demand from anticipated growth within the CLWA service area. As described in detail in section 3.15 and Appendix D, the annual allocations of SWP water made by DWR are based on that year's hydrologic conditions, the amount of water in storage in the SWP system, and Contractors' requests for SWP supplies. Thus, the actual amount of water available for delivery to CLWA as a result of the 41,000 AF transfer would vary from year to year. (Section 3-0 outlines the assumptions used in the environmental impact analysis regarding the amount of water that would be delivered for use by CLWA.) Water would be requested by CLWA as needed to meet the demands of its service area, and as discussed in section 1.3.1, the transfer of Table A Amount would be one of a number of projects implemented by CLWA (e.g., infrastructure improvements, groundwater banking programs, increased recycling and conservation, and expanded use of local groundwater sources) to increase water reliability. Those projects that are considered reasonably foreseeable and for which sufficient information is available are included in the cumulative impacts analysis contained in section 6.3.3.1 of this EIR.

The Project does not include the construction of any additional SWP facilities or new facilities in the CLWA, KCWA, or WRMWSD service areas.

## 2.4 PERMITS AND OTHER APPROVALS TO IMPLEMENT THE PROJECT

The amendment to the SWP water supply contract has been approved by CLWA and DWR. Associated amendments to water supply and delivery contracts have been approved by KCWA and WRMWSD. WRMWSD is the KCWA member unit providing this Table A Amount. No permits or other approvals would be required other than the certification of this EIR.

# 3.0 ENVIRONMENTAL SETTING, PROJECT IMPACTS, AND MITIGATION MEASURES

This chapter describes the environmental resources that could be affected by the Project, potential direct and indirect impacts to these resources, and mitigation measures that would minimize these impacts. (Growth-related indirect impacts are addressed in detail in Chapter 4, Growth-Inducing Effects and Growth-Related Impacts.) Direct impacts are those that are caused by and immediately related to the Project. Indirect impacts are not immediately related to the Project, but are reasonably foreseeable changes in the environment caused by the direct impacts (CEQA Guidelines section 15358). The facilities and geographic areas evaluated are the SWP (including the Delta, California Aqueduct, San Luis Reservoir, Castaic Lake, and associated pumping facilities); the WRMWSD, and the CLWA service area.

This section provides an overview of the general approach used to define the environmental setting for each resource and methods used to identify fundamental Project impacts that affect multiple resources. It also summarizes the physical changes that would result from the Project.

## ENVIRONMENTAL SETTING

CEQA Guidelines section 15125 directs that an EIR must include a description of the physical environmental conditions in the vicinity of the Project as they exist at the time the NOP is published. This environmental setting will normally constitute the baseline physical conditions by which the lead agency determines whether an impact is significant. This Project was previously analyzed in the 1999 Supplemental Water Project Final EIR (CLWA 1999); the 41,000 AF Transfer Agreements were thereafter duly executed, and the Project was implemented. Solely relying on the description of physical conditions that existed at the time that the NOP for the present EIR was published (January 2003) would fail to capture any changes to the original conditions that may have resulted from the ongoing implementation of the 41,000 AF Transfer Agreement. Thus, this EIR's description of the Project's environmental setting includes information from the general timeframe when the January 2003 NOP was issued (referred to as current or present conditions), as well as information describing the environmental setting as it existed when the NOP for the 1999 Supplemental Water Project Final EIR was published (April 1998).

Table 3.0-1 describes the key substantive changes in the environmental setting, if any, that occurred between 1998 and the present for each environmental resource analyzed in this EIR. The description of the environmental setting approximates as closely as reasonable the conditions that were present when the NOPs for both EIRs were published. In some cases, however, information is not available for these exact timeframes, so the best available data was used. The 2000 Census, for example, is the most accurate source of information regarding current population and housing in the Project areas, and 2000 data are the most current available for Important Farmland. In other cases, particularly when there was a notable change that occurred after the 2003 NOP was issued (e.g., the adoption of new air quality management plans affecting the WRMWSD and CLWA service area), this more current information was included.

**Table 3.0-1. Key Differences between the 1998 and Current Environmental Setting**

| *Resource* | *SWP* | *WRMWSD* | *CLWA* |
|---|---|---|---|
| Aesthetic Resources | No substantial difference, although increased land development (urban and agricultural) has occurred both in the San Joaquin Valley and in the area west of Castaic Lake. | Generally the same, although a minor amount of development has occurred along Interstate 5. | Development has continued to change the aesthetic character of the Santa Clarita Valley from a more rural to more urban landscape. |
| Agricultural Resources | No difference. | Non-Irrigated Farmland decreased by approximately 59 percent; Urban and Built-up Land decreased by approximately 13 percent; both Prime Farmland and Other Land decreased by less than 1 percent. The acreage of other farmland categories increased: Farmland of Statewide Importance (+7 percent), Unique Farmland (+less than 1 percent), Irrigated Farmland (+7 percent), and Grazing Land (+13 percent). | 1,731 acres were converted from agricultural use to urban use. |
| Air Quality | Same as described for WRMWSD and CLWA. | In 2001, the EPA reclassified the SJVAB O3 nonattainment designation from serious to severe. The total fugitive dust emissions within the SJVAB decreased substantially between 1995 and 2002, but the relative contributions of these sources to the total PM10 levels in the region did not change substantially. The 2003 PM10 Plan was adopted in 2003 and contains a Draft Concept Conservation Management Practice Program (CMP Program) for the San Joaquin Valley to regulate fugitive dust emissions from on-field activities. | The federal and state standards for CO within the SCAB were met as of the end of 2002, and the SCAQMD will request reclassification as attainment for CO in the next few years. The 2003 AQMP was adopted, which (1) updates the demonstration of attainment with the national standards for O3 and PM10; (2) replaces the 1997 attainment demonstration for the national CO standard and provides a basis for a future maintenance plan for this pollutant; and (3) updates the maintenance plan for the national NO2 standard that the SCAB has attained since 1992. |

**Table 3.0-1. Key Differences between the 1998 and Current Environmental Setting (continued)**

| *Resource* | *SWP* | *WRMWSD* | *CLWA* |
|---|---|---|---|
| Biological Resources | No substantial difference. | The Buena Vista Lake shrew's federal status has increased from species of concern to federally endangered. HCP development has begun for ranch lands within the San Joaquin Valley. | Growth has resulted in the conversion of habitat to urban uses. The San Fernando Valley spineflower was added to the state endangered list in 2001, and the Arroyo toad status was increased from federally threatened to federally endangered. Los Angeles County is updating SEA designations. |
| Cultural Resources | No substantial difference. | No substantial difference. | No substantial difference. |
| Geology, Soils, and Minerals | No substantial difference. | No substantial difference. | No substantial difference. |
| Hazards and Hazardous Materials | No substantial difference. | No substantial difference. | Since 1998, continued growth and development in the area have increased the amount of hazardous materials/wastes that are produced and transported around the region. |
| Land Use and Planning | No substantial difference. | Slight decrease in the amount of farmed area in the district and slight increase in the amount of fallowed land. Overall, no substantial change in land uses. | Continued urban development in the service area has resulted in the conversion of rural and open spaces to urban areas. |
| Noise | No substantial difference. | No substantial difference. | Ambient noise levels likely have increased in some portions of the service area since development has increased between 1998 and the present. |
| Population and Housing | No substantial difference. | Minor population and housing increase (total increase of approximately 370 people from 1990 to 2000; 129 more housing units). | Population and housing increase (total increase of approximately 40,450 people in the City of Santa Clarita from 1990 to 2000; 12,313 more housing units). |
| Public Services | No substantial difference. | No substantial difference, although a minor population increase occurred, thus increasing the demand for services. | Demand likely increased since the population increased between 1998 and the present. In the Santa Clarita Valley, five elementary schools and two high schools have been built since 1998. In addition, the overall amount of library space per square foot increased approximately 20 percent. |
| Recreation | No substantial difference. | No substantial difference. | No substantial difference, although demand for recreational resources has increased since population has increased. |

**Table 3.0-1. Key Differences between the 1998 and Current Environmental Setting (continued)**

| *Resource* | *SWP* | *WRMWSD* | *CLWA* |
|---|---|---|---|
| Transportation and Traffic | No substantial difference. | No substantial difference; the minor population increase in a rural area would cause minor changes to transportation and traffic. | In general, traffic volumes increased between 1998 and the present since the population increased during this period. |
| Utilities and Service Systems | An approximate doubling of SWP water delivered to CLWA from 1998 to 2002 resulted in an approximate doubling of electricity use from 1998 to 2002. | No substantial difference, although a minor population increase occurred, thus increasing the demand for services. | Demand likely increased since the population increased between 1998 and the present. Chiquita Canyon Landfill expansion was approved (23.0 million ton expansion). In 1998, the facility had a remaining capacity of approximately 1 million tons. Plans are being developed to expand the Sunshine Landfill's capacity to 90 million tons. The Valencia Water Reclamation Plant is undergoing expansion and will increase from 12.6 mgd to 21.6 mgd in 2004. |
| Water Resources | Total Table A deliveries fluctuated, ranging from a low of 1,546,740 AF in 2001 to a high of 3,714,230 AF in 2003.<br><br>SWP Table A Amounts were transferred among SWP Contractors, including MWD to Coachella Valley Water Authority – 35,000 AF; Belridge Water Storage District to Zone 7 – 2,219 AF; and Tulare Lake Basin Water Storage District to Zone 7 – 400 AF.<br><br>The PCL litigation challenging the Monterey Amendment was settled and essentially leaves these amendments in place (see sections 1.2.2 and 1.4.2 for a more complete description). | Water supplies generally the same, although WRMWSD has increased participation in other, more cost effective, water management options. In 1998, such water management activities could have supplied WRMWSD with an additional 59,500 AFY, and 106,000 AFY in 2002. WRMWSD's contract with KCWA from SWP water was 197,088 AF in 2002. WRMWSD's contract with KCWA was 238,088 AF of "firm supply" in 1998. | Water supply sources generally the same, although CLWA's SWP Table A Amount was increased by 41,000 AF due to the Project.<br><br>In 1998, CLWA's average year SWP supply was estimated to be 46,500 AF based on available DWR model analysis. CLWA's average year SWP supply now is estimated to be 68,300 AF based on new DWR model results and Project implementation.<br><br>In 1998, the total water demand in 2010 was projected to be approximately 106,300 AF. Future demand now is expected to be approximately 82,400 AF in 2010 and 102,500 AF by 2020. |

**Table 3.0-1. Key Differences between the 1998 and Current Environmental Setting (continued)**

| *Resource* | *SWP* | *WRMWSD* | *CLWA* |
|---|---|---|---|
| Water Resources (continued) | | | Based on deliveries, municipal water demands in the CLWA service area were approximately 48,870 AF in 1998 and approximately 68,230 AF in 2002.<br><br>In 2002, the LARWQCB developed a tentative resolution for the chloride TMDL and a nutrient TMDL is being developed for the Santa Clara River. Additional reaches of the Santa Clara River were listed as impaired for chloride, nutrient, and coliform.<br><br>Perchlorate was discovered in one additional Alluvial groundwater well in the eastern part of the basin. The CA DHS lowered the Action Level for perchlorate in drinking water from 18 ppb to 4ppb. The EPA revised MCLs for total trihalomethanes and arsenic. |

## KEY METHODOLOGICAL APPROACHES

Project impacts to all resources are driven by the amount of water transferred from WRMWSD to the CLWA service area and the timing of this delivery. This section provides an overview of the methods used to model the SWP water supply that would be available under different hydrologic conditions, defines two alternative SWP water allocation scenarios used in the impact analysis, and describes how indirect population and housing impacts were defined. More detailed information regarding the hydrologic modeling and SWP water allocation scenarios is included in section 3.15, Water Resources, and Appendix D.

### Hydrologic Modeling

The amount of SWP water available for delivery is evaluated using computer simulations that predict SWP operations under various hydrologic conditions, facility constraints, and configurations.

#### *1998 Environmental Setting*

For the 1998 environmental setting, the amount of SWP water supply that would have been available for use by CLWA given the 41,000 AF Transfer was assessed using results from DWR's planning model, DWRSIM, because this is the modeling tool that was available during 1998. The two model studies used in this analysis simulated SWP and CVP operations and were conducted by DWR in 1998 for the CALFED Bay-Delta Program EIS/EIR (CALFED 2000). The models show the capability of the SWP to meet the assumed SWP demand given a range of hydrologic conditions and given an assumed set of physical facilities and operating constraints.

The two DWRSIM studies both assume the use of SWP facilities and operating constraints that were present in 1998. One study uses 1998 estimates of existing Contractor demands and upstream land and water use, and the other uses 2020 projections for both Contractor demands and upstream land and water use.

*Current Environmental Setting*

Since 1998, the modeling tool DWR uses to simulate operations has evolved (first to CALSIM I, and more recently to CALSIM II). However, while the modeling tool itself has changed, the criteria used in the models to simulate SWP operations have not changed significantly. DWR has completed a recent assessment of SWP reliability in its SWP Delivery Reliability Report (2003b), based on CALSIM II, but the results of these new studies are comparable to the results of the older DWRSIM studies (see Appendix D for a comparison of these model study results). Results from the CALSIM II studies from DWR's SWP Delivery Reliability Report were used for determining estimates of SWP water supplies for the current environmental setting since this is the modeling tool that is currently in use. CALSIM II is based on estimated 2001 SWP demand, which is higher than the 1998 demand due to increased M&I Contractor demands.

*Environmental Impact Analysis*

The environmental impact analysis was conducted using DWRSIM because at the time the analysis was begun in early 2002, CALSIM I was undergoing revision and a decision was made to use the established DWRSIM model. Once CALSIM II was finalized, results from this model were compared with those of DWRSIM (refer to section 3.15 and Appendix D). The estimates of SWP supplies associated with the 41,000 AF of Table A Amount based on CALSIM II are somewhat lower than the amounts under the DWRSIM studies for the comparable allocation scenario, particularly under "existing" conditions. These differences were considered and found not to result in changes to the environmental impact determinations in this EIR. Direct impacts would remain less than significant regardless of the modeling tool used, and indirect impacts from growth-related development would remain significant. No new environmental impacts would occur.

**SWP Water Supply Allocation Scenarios**

This EIR considers the impacts of the Project both with and without the change in water allocation criteria implemented as part of the Monterey Amendment. Under the original SWP Water Supply Contract terms, before the Monterey Amendment was executed, Contractors could, with the consent of DWR, permanently transfer Table A Amount (then called "entitlement") to other Contractors. The Project therefore could be authorized under Article 41 of CLWA's original Water Supply Contract with DWR or under terms added to CLWA's contract as part of the Monterey Amendment (Article 53). Both contract terms allow for the transfer of Table A Amount between SWP Contractors. Under the Monterey Amendment, Agricultural Contractors committed, on a willing buyer-willing seller basis, to make available 130,000 AF of Table A Amount for permanent transfer to M&I Contractors. The transfer of Table A Amount that is the subject of this EIR was implemented under this permanent transfer provision of the Monterey Amendment, although the transfer could also be implemented under

Article 41 of CLWA's original Water Supply Contract. Additional detail regarding the Monterey Amendment scenarios is provided in section 3.15.

**Population and Housing Impacts, Allocation of Project Water to Existing and Future Users**

Population and housing would be affected only in the CLWA service area. Based on urban water consumption of approximately 61,000 AF in the service area in 2000 (SCVWP 2001) (the first year in which the 41,000 AF of Table A Amount became available for use by CLWA) and a service area population of approximately 190,000 persons (based on U.S. Census 2000 data), it was determined that 1 AF serves approximately 3.1 persons annually (190,000 persons/61,000 AF per year = 3.1 persons per AF per year). This planning factor represents the water needed for both residential and non-residential urban uses associated with this population.

As shown in Table 3.0-2, the Project would be able to serve a population of between 28,000 and 106,700 persons. The number would vary depending upon hydrologic conditions, and the assumptions used by local government decision-makers when approving new development projects. Assuming an average year supply, the Project could provide an additional 34,400 AF of SWP water to the CLWA service area. (This level of population demand could not be accommodated, however, without additional projects or programs to "firm up" the year to year reliability of the water supply, for example, groundwater banking programs). With a single dry year supply of approximately 9,200 AF, the Project could serve approximately 28,500 persons. Assuming a multiple dry year period water supply, the Project would provide approximately 18,100 AF and could serve approximately 56,200 persons. Using the assumptions outlined above, it is expected that the Project could serve between about 9,000 and 36,000 additional housing units (using the 3.1 persons per housing unit factor included in the Los Angeles County General Plan). (See section 3.15 for a discussion of the water supply analysis.)

**Table 3.0-2. Population and Housing that Could Be Supported by the Project within the CLWA Service Area[1]**

| *SWP Demand Conditions* | *Water Supply (AF)* | *Persons[2]* | *Housing Units[3]* |
|---|---|---|---|
| Average Year | 34,400 | 106,700 | 35,600 |
| Single Dry Year | 9,200 | 28,500 | 9,500 |
| Multiple Dry Year | 18,100 | 56,200 | 18,700 |

*Note:* Numbers rounded to nearest 100.
1. Based on DWRSIM results as identified in section 3.15. Assumes existing (1998) SWP demand conditions and that DWR continues to allocate available SWP supplies based on the With Monterey Amendment allocation methodology (refer to section 3.15).
2. Persons based on urban water consumption of approximately 61,000 AF in the CLWA service area in 2000 and a population of approximately 190,000 persons, whereby 1 AF serves approximately 3.1 persons annually.
3. Based on a 3.0 persons per housing unit factor.

The amount of existing versus new population that could be served by the transfer of the 41,000 AF of Table A Amount is dependent upon the availability of SWP water, which can vary from year to year. During 2000, the first year that Project water would have been available, water from the Project was not required to serve the demand because 90 percent of CLWA's 54,200 AF of SWP allocation was available. The SWP demand during that year was 32,579 AF (SCVWP

2003), which is well under the 48,780 AF that would have been available in that year had the transfer not occurred (i.e., 54,200 AF of Table A Amount x 90 percent allocation for that year). During 2002, however, Project water would have been required to meet the existing demand, which was 41,768 AF (SCVWP 2003). In that year, the SWP allocation was 70 percent; thus, only 37,940 AF of SWP would have been available to meet the demand, or 3,828 AF less than the supply that would have been available without the Project. If the SWP allocation had been lower in either of these years, more Project water would have been required to meet the existing demand.

For subsequent analyses in this EIR, an average year supply is assumed because it represents the most typical conditions and also is a worst-case scenario in terms of the indirect impacts resulting from population growth. Thus, for purposes of this analysis, it is assumed that the Project could serve 106,700 new persons and 35,600 new housing units.

## SUMMARY OF OPERATIONAL AND PHYSICAL CHANGES RESULTING FROM THE PROJECT

The Project would use existing SWP facilities for transfer, storage, and delivery of the 41,000 AF Table A Amount to CLWA instead of WRMWSD. This change in point of delivery would allow water associated with the 41,000 AF Table A Amount to be transported further along the California Aqueduct than if the water were delivered to WRMWSD. Water would continue to be diverted for export in the facilities in the Delta under existing water quality and operational criteria. All or a portion of the water would be temporarily stored in San Luis Reservoir, consistent with DWR's current operation of the reservoir. Conveyance to CLWA would require pumping the water through the SWP's Teerink, Chrisman, Edmonston, and Oso pumping plants (transport to WRMWSD also requires pumping a portion of the water through the Teerink and Chrisman pumping plants). Delivered water associated with the transferred Table A Amount would flow through both Quail and Pyramid lakes (both lie along the California Aqueduct between the WRMWSD and CLWA turnouts). Consistent with current and historic operations, the delivered water would be diverted from Castaic Lake by CLWA during the same general timeframe as the water is delivered to the lake by DWR. The Project would comply with and not materially change the existing operating criteria[1] of the SWP and associated facilities.

The Project would not require the construction of any new facilities. WRMWSD would use its existing water distribution system to implement the Project and new construction or improvements to these facilities would not be needed. WRMWSD would implement the Project in accordance with its existing operational procedures. Based on capacity assumptions discussed in section 4.2.14 Utilities/Service Systems, CLWA has capacity in its local water facilities to transport and treat the water delivered as a result of the Project, in accordance with existing operational procedures and water quality requirements. This EIR addresses changes in local treatment and transport facilities that would result from the combined impacts of the

1 The operating criteria of the SWP are the rules and regulations under which DWR operates SWP facilities. Operating criteria include, although are not limited to, the SWP Water Supply Contracts, environmental regulations and operating criteria for diversions from the Delta, operations of Oroville and San Luis reservoirs, and criteria for terminal reservoirs such as Castaic Lake.

Project and other reasonably foreseeable projects in the Santa Clarita Valley in Chapter 6.0, Cumulative Impacts.

**State Water Project and Associated Facilities**

The Project's changes to the SWP and associated facilities would result from (1) the change in timing of the delivery of water associated with the 41,000 AF of Table A Amount, and (2) the change in the amount of water transported to the CLWA turnout. Under the Project, the 41,000 AF Table A Amount would be used for urban rather than agricultural purposes. While the same total amount of water associated with the 41,000 AF of Table A would be available to CLWA as would have been available to WRMWSD, the difference between agriculture and urban patterns of use during the year would result in a net reduction in water deliveries in May through September, and a net increase in deliveries during the remaining months of the year (October through April). In addition, since the CLWA turnout is located downstream of the WRMWSD turnouts, the Project would require the transport of water this additional distance through the California Aqueduct.

***The Delta***

Since the Project would be implemented in accordance with the existing operating criteria for the SWP, including the operating criteria that govern water withdrawals from the Delta (e.g., in 1998, Water Right Order 95-6 and currently, the State Water Resources Control Board [SWRCB] Water Right Decision 1641 [Decision 1641]), the total amount of SWP water that could be diverted from the Delta would not change as a result of the Project. Because the Project would not change the total amount of SWP supply available for delivery to Contractors, there would be no change in the total amount of water diverted from the Delta. A change in the timing of deliveries for urban rather than agricultural purposes would result in changes in storage at San Luis Reservoir. These storage changes at San Luis Reservoir could result in some years in a change in the timing of the filling of the reservoir, which in turn could result in minor changes in the timing of Delta diversions. However, these changes would fall well within the range of historical and future anticipated SWP diversions from the Delta. Because of the small magnitude of the change in the timing of deliveries, any change in timing of Delta diversions that did occur would be minor and likely not detectable.

***California Aqueduct***

Implementation of the Project and the delivery of water associated with the transfer could result in some years in minor changes in the timing of the diversion of water from the Delta. However, these changes would fall well within the range of historical and future anticipated SWP diversions from the Delta. If these minor timing changes in Delta diversions occurred, there would be corresponding minor changes in the timing of water transported within the Aqueduct from the Delta to San Luis Reservoir. The Project also would result in a minor change in the timing of water transported in the Aqueduct between San Luis Reservoir and the WRMWSD turnouts due to the change in use of the water (urban rather than agricultural use) and the associated shift in the timing of delivery. Within these reaches of the Aqueduct, a slight increase in the amount of water transported would occur from October to April, and a slight decrease in the amount of water transported would occur during the remainder of the year.

CLWA has entered an agreement with The Metropolitan Water District of Southern California (MWD) to accommodate the use of capacity in the California Aqueduct by CLWA when the capacity of MWD is not needed for its purposes.

The Project would increase CLWA's Table A Amount and would increase the amount of water transported in the Aqueduct from the WRMWSD turnouts to the CLWA turnout. This increase in the amount of water transported within these reaches of the Aqueduct would be relatively minor, but would slightly increase the flow (velocity) in the California Aqueduct and may result in a minor change in the water level within the non-pipeline portions of the Aqueduct. The Project would require additional electricity to pump the water through SWP facilities, the cost of which would be paid by CLWA per the terms of CLWA's Water Supply Contract.

***San Luis Reservoir***

Water diverted from the Delta that is not immediately delivered to Contractors is stored in San Luis Reservoir. San Luis Reservoir is generally filled during the high runoff months of the winter and early spring, and the stored water is then used to meet Contractor demands during the higher demand months in the summer and fall to supplement the more limited diversions from the Delta during that period. The Project would result in a slight increase in the amount of water stored at San Luis Reservoir from July through November, and a slight decrease in the amount of water stored during the remainder of the year (December through June) due to the net change in the timing of deliveries during the year resulting from the 41,000 AF transfer. These changes would be minor and would remain well within the historic range of reservoir operations.

***Castaic Lake and Other SWP Reservoirs***

The Project would result in additional water being transported through the West Branch through Quail Lake and Pyramid Lake to CLWA's turnout at Castaic Lake, but would not result in a material change in the overall volume of water stored in these three lakes. In general, DWR operates these reservoirs to regulate water deliveries, to help meet summer peak deliveries, and to provide an emergency water supply in case of a major supply system outage. From 1990 to 2000, SWP deliveries to CLWA from Castaic Lake have averaged approximately 6 percent of the total SWP water delivered from the lake. DWR's operation of these lakes (Quail, Pyramid, and Castaic) generally would not change with the Project, although the Project would result in additional water transported through these lakes in about the same months the water is delivered to CLWA.

**Wheeler Ridge-Maricopa Water Storage District**

The Project would reduce WRMWSD's total Table A Amount by 41,000 AF, reducing the total amount of SWP water that WRMWSD could obtain in any one year. In addition, since Article 21[2] water is allocated based in part on a Contractor's Table A Amount, the Project could reduce the amount of Article 21 water WRMWSD could obtain when Contractors' requests for Article

2 Water that DWR makes available when water and capacity are available in excess of SWP storage needs and Table A supplies. This water is only available for limited time periods, generally only in the winter or early spring when Contractors' demands are low, and only under specific conditions that do not occur on an annual basis.

21 water are greater than the amount available. The 41,000 AF, a portion of WRMWSD's original Table A Amount, became unnecessary to WRMWSD as a result of other more economical water supplies becoming available to WRMWSD (e.g., diversification of water sources; see section 3.2 and Appendix C).

Water users within the WRMWSD have substantial flexibility in managing agricultural land uses, and therefore, water demand, from year to year. A variety of factors, including the cost and availability of different water sources, anticipated crop market value, anticipated or existing crop subsidies, and other factors (such as labor cost, regulation of the use of certain chemicals, etc.) are considered in the decision whether and when to plant certain crops. WRMWSD participates in water management actions, including direct and in-lieu groundwater recharge within the district (e.g., district owned and operated wells and the delivery of surface water to non-contract lands) and groundwater banking outside of the district (e.g., Kern Water Bank and the Pioneer and Berrenda Mesa projects). These water management activities are intended to supply WRMWSD (or for in-lieu groundwater recharge, landowners within the district) with additional water when SWP supplies are insufficient to meet demands, such as during dry periods.

**Castaic Lake Water Agency**

The Project would increase CLWA's Table A Amount by 41,000 AF. This would allow CLWA to order and receive delivery of up to an additional 41,000 AF of Table A water. This additional Table A Amount would meet water demands of existing users and a portion of future water demand from anticipated growth within the CLWA service area. In addition, since Article 21[2] water is allocated based, in part, on a Contractor's Table A Amount, the Project could increase the amount of Article 21 water CLWA could obtain when Contractors' requests for Article 21 water are greater than the amount available. Estimated population and housing units that could be served by the Project are described above.

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# 3.1 AESTHETIC/VISUAL RESOURCES

Visual resources consist of the natural and manmade features that give a particular environment its aesthetic qualities. These features may be natural appearing or modified by human activities. Visual resources also have a social setting, which includes public values, goals, awareness, and concern regarding visual quality. The areas considered to have the greatest visual sensitivity are typically along scenic highways and wilderness or other natural areas. The primary areas of concern generally are associated with changes to prominent topographic features, changes in the character of an area with high visual sensitivity, removal of vegetation, or blockage of public views of a visually sensitive landscape.

## 3.1.1 Environmental Setting

### *3.1.1.1 State Water Project and Associated Facilities*

*California Aqueduct*

No substantial changes in baseline conditions have occurred between the 1998 NOP and the 2003 NOP. In some areas, the 444-mile California Aqueduct is an open, concrete-lined canal that is flush with the ground surface. In others, particularly where it crosses mountains, water is transported in enclosed pipes. Water conveyed in the California Aqueduct passes through a series of pumping plants and storage reservoirs, as shown on Figure 1.3-1.

From the southern Delta facilities to the Tehachapi Mountain Range, the California Aqueduct passes through undeveloped lands and agricultural operations that contribute to the rural character of the San Joaquin Valley. The foothill areas and associated Coast Mountain Range to the west and Sierra Nevada Mountain Range to the east provide a dramatic backdrop for the valley. These foothill and mountain ranges areas can be viewed throughout the valley due to the relatively flat plains and vast open space. Between the Tehachapi Mountain Range and the SWP terminal reservoir at Castaic Lake, the area is characterized by varied topography and numerous canyons and waterways.

*San Luis Reservoir*

San Luis Reservoir is located within the foothills of the Coast Mountain Range, near Los Banos. Lands surrounding the reservoir complex are generally undeveloped, and the overall character of the area is rural. The primary development in the area is associated with the San Luis Reservoir State Recreation Area, which surrounds the reservoir, and contains two developed and two primitive campgrounds, five boat ramps, and an extensive day-use area at the O'Neill Forebay. The reservoir and surrounding recreation area are visually sensitive.

*Castaic Lake*

Castaic Lake is located in the northern portion of the Santa Clarita valley at the confluence of Elizabeth and Castaic canyons. Urban development has primarily taken place south and east of the lake but has also occurred west of the lake during the last 10 years. The remainder of the surrounding area is generally undeveloped. The backdrop of prominent hills in the western portion of the lake contributes to the scenic qualities of the area. The 8,000-acre Castaic Lake

Recreation State Area is developed with two boat launch ramps, picnic facilities, 60 developed campsites, and a day-use area. The lake and surrounding recreation area are visually sensitive.

#### *3.1.1.2 Wheeler Ridge-Maricopa Water Storage District*

No substantial changes in baseline conditions have occurred between the 1998 NOP and the 2003 NOP. Kern County designates most of the county as having a visual rating of Class II, meaning that the area is "excellent visual space" (Kern County 1994). The foothills provide a dramatic backdrop for the area and can be clearly viewed throughout the county due to the flat plains and vast open space. The undeveloped lands and agricultural operations contribute to the rural character typical of the San Joaquin Valley. Although the net farmed area slowly declined from 1998 to 2001, there have been no significant changes in agricultural land use from 1998 to 2003 (personal communication, B. Taube 2003).

#### *3.1.1.3 Castaic Lake Water Agency*

The mountainous ridgelines of the Angeles National Forest and the Los Padres National Forest provide a visual backdrop for much of Santa Clarita Valley. Much of the area has been developed, primarily with residential and commercial uses. Open spaces still exist, particularly in the mountains. The Santa Clara River traverses the valley and is another important visual element, although it is an ephemeral stream in the CLWA service area. Other areas providing local visual identity include Bouquet Canyon, Castaic Creek, San Francisquito Canyon, Newhall Creek, Placerita Canyon, Sand Canyon, and the South Fork of the Santa Clara River. Freeways and roadways such as Interstate 5, State Route 14, and State Route 126 provide view corridors through the Santa Clarita Valley and into western Ventura County. Considerable development has occurred in the Santa Clarita Valley since 1998, which has affected the aesthetic character of the CLWA service area by furthering the transition from a more rural to an urban landscape.

### 3.1.2 Potential Impacts of the Project

#### *3.1.2.1 Significance Criteria*

The criteria used to determine the significance of impacts to visual resources are based on Appendix G of the State CEQA Guidelines. The Project would have a significant environmental impact if it would:

- have a substantial adverse effect on a scenic vista;
- substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway;
- substantially degrade the existing visual character or quality of the site and its surroundings; or
- create a new source of substantial light or glare that would adversely affect day or nighttime views in the area.

### *3.1.2.2 Environmental Impacts*

#### *3.1.2.2.1 State Water Project and Associated Facilities*

DIRECT IMPACTS

Implementation of the Project would not require new construction or the modification of existing SWP facilities, nor would it change the operating criteria of these facilities. The proposed transfer would result in a slight increase in the amount of water transported in the California Aqueduct to Castaic Lake, but this would not affect aesthetic resources. As described in section 3.0, minor seasonal changes in the volume of water stored in San Luis Reservoir would result from Project implementation. The average volume of water stored would decrease slightly from December through June, but the change would be minor and the resulting elevations would fall within the range of fluctuations present under both current and historic operations. This impact would be less than significant because it would not adversely affect scenic vistas, damage scenic resources, or substantially degrade the existing visual character or quality of the Project area. The amount of water stored in Castaic Lake would not change as a result of the Project; thus, no impacts would occur. No new sources of light or glare would be developed under the Project.

INDIRECT IMPACTS

No indirect impacts would occur.

#### *3.1.2.2.2 Wheeler Ridge-Maricopa Water Storage District*

DIRECT IMPACTS

Transferring 41,000 AF of Table A Amount to CLWA would not require new construction or the modification of existing WRMWSD water distribution facilities, nor would it change the current operation of these facilities. Since no construction or operational changes would occur, implementation of the Project would not adversely affect scenic vistas, damage scenic resources, substantially degrade the existing visual character or quality of the project area, or create a new source of substantial light or glare.

INDIRECT IMPACTS

No indirect impacts would occur.

#### *3.1.2.2.3 Castaic Lake Water Agency*

DIRECT IMPACTS

Implementation of the Project would not require the construction of new CLWA facilities or modification of existing CLWA facilities. Transferring an additional 41,000 AF of Table A Amount through existing facilities for use within the service area would not affect aesthetic resources. Thus, implementation of the Project would not impact scenic vistas, damage scenic resources, substantially degrade the existing visual character or quality of the Project area, or create a new source of substantial light or glare.

INDIRECT IMPACTS

Potential aesthetic impacts from growth that could occur as an indirect impact of the Project are addressed in Chapter 4, Growth-Inducing Effects and Growth-Related Impacts.

### 3.1.3 Mitigation Measures

#### *3.1.3.1 State Water Project and Associated Facilities*

No direct or indirect significant impacts to aesthetic resources were identified; therefore, no mitigation measures are required.

#### *3.1.3.2 Wheeler Ridge-Maricopa Water Storage District*

No direct or indirect significant impacts to aesthetic resources were identified; therefore, no mitigation measures are required.

#### *3.1.3.3 Castaic Lake Water Agency*

No direct significant impacts to aesthetic resources were identified; therefore, no mitigation measures are required. Mitigation measures for indirect impacts are addressed in Chapter 4, Growth-Inducing Effects and Growth-Related Impacts.

### 3.1.4 Significant Unavoidable Adverse Impacts

No significant unavoidable adverse impacts would occur in relationship to the SWP and associated facilities or within the WRMWSD, nor would any such direct impacts occur within the CLWA service area. Indirect impacts in this service area, including significant unavoidable adverse impacts, are addressed in Chapter 4, Growth Inducement and Growth-Related Impacts.

# 3.2 AGRICULTURAL RESOURCES

The State of California has the largest food and agriculture economy in the nation, and agricultural lands in the state are among the most productive (California Agricultural Statistics Service 2003). The state has led the nation in agricultural production for more than 50 years (California Agricultural Statistics Service 2003). Because of increasing land values and the state's expanding population, the State of California has initiated a variety of programs, such as the Farmland Mapping and Monitoring Program (FMMP) and the California Land Conservation Act of 1965, to preserve agricultural lands and prevent or reduce conversion of these lands to non-agricultural uses.

The State of California Department of Conservation (Department of Conservation) FMMP categorizes and maps Important Farmlands, including those defined as Prime, Unique, and Statewide Importance. Counties may, at their discretion, establish criteria for the designation of Farmland of Local Importance. These terms are defined in Table 3.2-1. Farmland Mapping and Monitoring data are available biennially; the most recent data available are from calendar year 2000.

The California Land Conservation Act of 1965, commonly referred to as the Williamson Act, established the state's primary program for the retention of private land in agriculture and open space use. The Williamson Act is a voluntary, locally administered program that offers reduced property taxes on lands that have enforceable restrictions on their use via contracts between individual land owners and local governments.

Cities and counties in California are responsible for regulating land uses in their jurisdictions in part through establishing zoning districts that specify allowable uses. For purposes of this analysis, it is assumed that land in agricultural use is zoned for this purpose.

## 3.2.1 Environmental Setting

### *3.2.1.1 State Water Project and Associated Facilities*

SWP facilities are not located on land used for agricultural purposes, although they are generally located in areas containing or adjacent to large amounts of agricultural lands.

### *3.2.1.2 Wheeler Ridge-Maricopa Water Storage District*

NEA conducted a study to determine the potential effects of the Project on agricultural operations in the WRMWSD (NEA 2003). This section and section 3.2.2.2.2 are based, in part, on the NEA study, with additional references noted. The NEA study is provided as Appendix C.

*Cropping Patterns and Agricultural Operations*

This section provides a general description of the cropping patterns and agricultural operations in the WRMWSD. Although this information is not directly related to the CEQA significance criteria, the overall understanding of agricultural operations and cropping patterns provides a basis for understanding agricultural land use trends within the district.

**Table 3.2-1. Definitions for Important Farmland Categories**

| *Farmland Category* | *Definition* |
|---|---|
| Prime Farmland | Land that has the best combination of physical and chemical characteristics for the production of crops. It has the soil quality, growing season, and moisture supply needed to produce sustained high yields of crops when treated and managed, including water management, according to current farming methods. Prime Farmland must have been used for the production of irrigated crops at some time during the two update cycles prior to the mapping date. |
| Farmland of Statewide Importance | This land is similar to Prime Farmland but with minor shortcomings, such as greater slopes or less ability to hold and store moisture. Farmland of Statewide Importance must have been used for the production of irrigated crops at some time during the two update cycles prior to the mapping date. |
| Unique Farmland | This is land of lesser quality soils used for the production of specific high economic value crops at some time during the two update cycles prior to the mapping date. It has the special combination of soil quality, location, growing season, and moisture supply needed to produce sustained high quality or high yields of a specific crop when treated and managed according to current farming methods. Unique farmland is usually irrigated, but may include nonirrigated orchards or vineyards as found in some climatic zones in California. Examples of crops on Unique Farmland include oranges, olives, avocados, rice, grapes, and cut flowers. This category does not include publicly owned lands for which there is an adopted policy preventing agricultural use. |
| Farmland of Local Importance | This is land of importance to the local agricultural economy and is determined by each county's Board of Supervisors and local advisory committees. Examples of this type of land could include dairies, dryland farming, aquaculture, and uncultivated areas with soils qualifying for Prime Farmland and Farmland of Statewide Importance. |
| Interim Farmland (Irrigated and Non-Irrigated Farmland) | Interim Farmland is a designation used for farmed areas lacking modern soil survey information and for which there is expressed local concern on the status of farmland. Interim Farmland is designated as either Irrigated or Non-Irrigated Farmland. Irrigated Farmlands are lands with a developed irrigation water supply that is dependable and of adequate quality and that have been used for irrigated agricultural production at some time during the four years prior to the mapping date. Non-Irrigated Farmlands are lands on which agricultural commodities are produced on a continuing or cyclical basis utilizing stored soil moisture. |
| Grazing Land | Grazing land is land on which the existing vegetation, whether grown naturally or through management, is suitable for grazing or browsing of livestock. |
| Urban and Built-up Land | This is used for residential, industrial, commercial, construction, institutional, and public administrative purposes; railroad yards; cemeteries; airports; golf courses; sanitary landfills; sewage treatment plants; water control structures; and other development purposes. |
| Other Land | Other land is that which is not included in any of the other mapping categories. The following types of land are generally included: low-density rural development; brush, timber, and other lands not suitable for livestock grazing; government lands not available for agricultural use; roads systems for freeway interchanges; vacant and nonagricultural land larger than 40 acres in size and surrounded on all sides by urban development; confined livestock facilities of 10 or more acres; strip mines and borrow and gravel pits; a variety of other rural land uses. |
| Water | Water areas with an extent of at least 40 acres. |

*Note*: None of these categories includes publicly owned lands for which there is an adopted policy preventing agricultural use.
*Source*: Department of Conservation, no date.

Most of the lands in the district are cultivated agricultural areas. The cropping patterns, net amount of farmed lands, fallowed lands, and total cultivated lands within the district from 1990 to 2001 are provided in Table 3.2-2. The net acres cultivated with certain crops, such as deciduous fruits and pomegranates remained relatively constant during this period, while the net acres cultivated with other crops, such as vineyards, deciduous nuts, and citrus have increased gradually. The number of acres cultivated with annual crops, such as cotton, sugar beets, grains, green feeds, and mixed produce varied considerably over the time period. Overall, within the district there has been an increase in the cultivated acres of permanent crops (such as tree crops, vineyards, etc.) and a general decrease in annual crops (such as cotton, grains, green feeds, etc.).

The amount of fallowed land in the district peaked in 1991 during drought conditions, with over 51,500 acres fallowed. Due to the severe drought throughout the State and the then-existing SWP contract provisions (Without Monterey Amendment), WRMWSD did not receive SWP water in 1991. At that time, the district was not participating in other water management actions, but was able to deliver over 55,000 AF of surface water from purchases and exchanges. The WRMWSD (like all contractors) was not relieved from paying the fixed costs on its SWP Table A Amount in 1991, even though WRMWSD and other agricultural contractors received no water. This proved to be a substantial financial hardship for the district and those who farmed the contract lands. In 1991 and subsequent years, some farmers within the contract lands were not able to recover financially from the 1991 drought and sold their lands, were foreclosed on, or cancelled part or all of their surface water contract with WRMWSD.

Due in part to the 1991 drought, WRMWSD began to participate in other more economical water management actions that could supply the district with water in addition to SWP supplies. By 2001, these consisted of groundwater wells developed by WRMWSD in 1992 and additional wells acquired by WRMWSD after this time; participation in the Kern Water Bank beginning in 1995; the Pioneer Project initiated in 1997; and the Berrenda Mesa Project initiated in 1999. In 2001, these other water management actions could supply WRMWSD with over 88,000 AF, not including additional water that may be available from exchanges and purchases similar to those that occurred in 1991.

From 1991 to 1998, the amount of fallowed land in the district decreased by over 34,000 acres, and from 1998 to 2001, the amount of fallowed land increased by over 11,000 acres (an overall net change of approximately 22,000 acres). This increase in fallowing since 1998 appears to be related to crop markets and prices (NEA 2003). Fallowing is a regular part of the cropping patterns in WRMWSD, with an average of about 27,830 acres fallowed annually from 1990 to 2001. Farmers fallow land for both agronomic reasons (e.g., fallowing as part of crop rotations and for pest and disease control) and for economic reasons (e.g., market conditions, or prices for the crops typically grown on the land to be fallowed, and the cost and availability of various production inputs, including water). Agricultural water users have substantial flexibility in managing their lands, and therefore water use, from year to year. A variety of factors, including the cost and availability of different water sources, the anticipated crop market value, anticipated or existing crop subsidies, and other factors (such as labor cost, regulation of the use of certain chemicals, etc.) are considered in the determination to plant certain crops by farmers.

**Table 3.2-2. Cropping Patterns within the WRMWSD Service Area from 1990 to 2001**
(all values in net acres)

| *Crop Group* | *1990* | *1991* | *1992* | *1993* | *1994* | *1995* | *1996* | *1997* | *1998* | *1999* | *2000* | *2001* | *Average* | *Max* | *Min* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Cotton | 38,071 | 16,192 | 24,621 | 31,063 | 33,369 | 36,795 | 34,702 | 32,369 | 24,953 | 20,781 | 22,109 | 16,204 | 27,602 | 38,071 | 16,192 |
| Sugar Beets | 723 | 746 | 825 | 689 | 370 | 409 | 151 | 0 | 181 | 0 | 0 | 0 | 341 | 825 | 0 |
| Grains[1] | 2,692 | 3,450 | 9,859 | 8,162 | 3,739 | 9,530 | 11,804 | 8,203 | 15,586 | 12,260 | 9,496 | 9,308 | 8,674 | 15,586 | 2,692 |
| Green Feeds | 1,836 | 1,146 | 1,206 | 1,442 | 1,514 | 2,002 | 1,737 | 2,923 | 2,938 | 3,340 | 2,933 | 2,924 | 2,162 | 3,340 | 1,146 |
| Mixed Produce[2] | 19,504 | 17,471 | 17,035 | 15,775 | 17,450 | 17,406 | 18,735 | 20,332 | 18,398 | 21,737 | 19,239 | 15,487 | 18,214 | 21,737 | 15,487 |
| Vineyard | 10,719 | 9,883 | 9,633 | 9,708 | 9,778 | 10,774 | 12,547 | 14,222 | 15,315 | 15,745 | 17,387 | 17,701 | 12,784 | 17,701 | 9,633 |
| Deciduous Nuts | 6,865 | 6,900 | 6,900 | 7,022 | 7,399 | 7,255 | 7,640 | 7,624 | 8,198 | 8,381 | 8,509 | 8,369 | 7,589 | 8,509 | 6,865 |
| Deciduous Fruits | 2,074 | 2,102 | 2,013 | 2,008 | 2,060 | 2,066 | 2,154 | 2,205 | 2,104 | 1,989 | 2,058 | 1,928 | 2,063 | 2,205 | 1,928 |
| Citrus | 6,212 | 6,231 | 6,675 | 6,932 | 7,241 | 7,471 | 7,870 | 8,482 | 9,011 | 9,737 | 11,123 | 12,030 | 8,251 | 12,030 | 6,212 |
| Jojoba | 646 | 82 | 199 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 77 | 646 | 0 |
| Pomegranates | 243 | 243 | 351 | 351 | 351 | 351 | 351 | 351 | 338 | 377 | 377 | 377 | 338 | 377 | 243 |
| Eucalyptus | 10 | 10 | 14 | 14 | 6 | 6 | 19 | 19 | 19 | 19 | 19 | 19 | 15 | 19 | 6 |
| **Total Cropped** | **89,595** | **64,456** | **79,331** | **83,166** | **83,277** | **94,065** | **97,710** | **96,730** | **97,041** | **94,366** | **93,249** | **84,348** | **88,111** | **97,710** | **64,456** |
| - Double Cropped | 5,314 | 4,085 | 3,525 | 4,510 | 4,233 | 4,663 | 5,092 | 5,441 | 2,542 | 3,155 | 2,622 | 1,541 | 3,894 | 5,441 | 1,541 |
| **= Net Farmed** | **84,281** | **60,371** | **75,806** | **78,656** | **79,044** | **89,402** | **92,618** | **91,289** | **94,499** | **91,211** | **90,628** | **82,807** | **84,218** | **94,499** | **60,371** |
| + Fallow Lands | 27,588 | 51,620 | 36,031 | 33,189 | 32,980 | 22,523 | 19,584 | 20,949 | 17,649 | 20,855 | 21,660 | 29,291 | 27,827 | 51,620 | 17,649 |
| **= Total Cultivated Acres** | **111,869** | **111,991** | **111,837** | **111,845** | **112,024** | **111,925** | **112,202** | **112,238** | **112,148** | **112,066** | **112,288** | **112,098** | **112,044** | **112,288** | **111,837** |
| + Miscellaneous Lands[3] | 6,840 | 6,847 | 6,839 | 6,843 | 6,849 | 6,841 | 6,859 | 6,860 | 6,856 | 6,850 | 6,864 | 6,853 | 6,850 | 6,864 | 6,839 |
| + Deferred Lands | 1,659 | 1,659 | 1,659 | 1,659 | 1,659 | 1,659 | 1,659 | 0 | 0 | 0 | 0 | 0 | 968 | 1,659 | 0 |
| + Other Lands[4] | 668 | 738 | 880 | 968 | 919 | 1,073 | 1,098 | 1,129 | 1,183 | 1,270 | 1,361 | 1,257 | 1,045 | 1,361 | 668 |
| + Native Vegetation | 25,626 | 25,428 | 25,405 | 25,305 | 25,169 | 25,122 | 24,802 | 26,393 | 26,434 | 26,434 | 26,434 | 26,739 | 25,774 | 26,739 | 24,802 |
| **Total District** | **146,662** | **146,662** | **146,620** | **146,620** | **146,620** | **146,620** | **146,620** | **146,620** | **146,621** | **146,620** | **146,947** | **146,947** | **146,682** | **146,947** | **146,620** |

*Source:* Wheeler Ridge-Maricopa Water Storage District
1. Includes irrigated and dry farmed.
2. Includes melons.
3. Consist of developed by non-farmed areas within cultivated lands such as farm roads, farmsteads, and reservoirs.
4. Other lands consists of airstrips, cotton gins, tank farms, utility years, etc.

The net farmed area within the district declined sharply in 1991, although it recovered to the 1990 level by 1995. During the period between 1990 and 2001, the net farmed area peaked in 1998, and slowly declined from 1998 to 2001. Overall, the total cultivated acres, miscellaneous lands (non-farmed areas within cultivated lands such as farm roads, farmsteads, and reservoirs), other lands (non-cultivated lands), and native vegetation areas within the district have remained relatively constant throughout this time period, indicating that substantial land use changes have not occurred within the district.

*Important Farmland Trends*

The amount of Important Farmland and other lands in WRMWSD in 1998 and 2000 is shown in Table 3.2-3 (more recent data is not available). From 1998 to 2000, the amount of Non-Irrigated Farmland, Urban and Built-up Land, Prime Farmland, and Other Land decreased by approximately 59 percent and 13 percent, respectively for Non-Irrigated Farmland and Urban and Built-Up Land, and less than 1 percent for both Prime Farmland and Other Land. Over the same time period, the amount of Farmland of Statewide Importance, Unique Farmland, Irrigated Farmland, and Grazing Land increased, approximately 7 percent, less than 1 percent, 7 percent, and 13 percent, respectively. These changes in mapping categories from 1998 to 2000 (both increases and decreases) represent 1 percent or less of the total district lands.

**Table 3.2-3. Important Farmland and Other Lands in WRMWSD, 1998 and 2000**
**(negative numbers in parenthesis)**

| *Category* | *1998 (acres)* | *2000 (acres)* | *Difference 1998 to 2000 (acres)* |
|---|---|---|---|
| Prime Farmland | 6,992 | 6,978 | (14) |
| Farmland of Statewide Importance | 510 | 552 | 42 |
| Unique Farmland | 1,867 | 1,883 | 16 |
| Irrigated Farmland | 99,957 | 100,048 | 91 |
| Non-Irrigated Farmland | 1,854 | 244 | (1,610) |
| Grazing Land | 26,562 | 28,162 | 1,600 |
| Urban and Built-up Land | 527 | 484 | (43) |
| Other Land | 11,683 | 11,601 | (82) |
| **Total*** | **149,952** | **149,952** | **--** |

*Source*: California Division of Land Resource Protection, Farmland Mapping and Monitoring Program, 2002.
* The total is slightly greater than the current area of the WRMWSD due to mapping accuracies.

In 2000, Prime, Unique, and Farmland of Statewide Importance represented approximately 6.3 percent of the total district area, and Irrigated Farmlands represented approximately 66.7 percent of the total district area.

*Williamson Act Trends*

The amount of land enrolled in Williamson Act contracts in Kern County in 1998 and 2001 is provided in Table 3.2-4, the most recent data available. The State of California has electronic geo-referenced data for lands enrolled in Williamson Act contracts for some counties, although not Kern County (personal communication, J. Nordstrom 2003). Because data are not readily available for use in determining the amount of land within WRMWSD enrolled in Williamson Act contracts, data for Kern County are used. Although precise sub-county trends cannot be extrapolated from county-wide data, the available data on changes in the amount of Important Farmland suggests that changes are from one type of agriculture to another (farming to grazing) as opposed to changes from agriculture to non-agriculture use. This supports the likelihood of similar trends in Williamson Act enrollments in WRMWSD as occurred in Kern County. From 1998 to 2001, the amount of land enrolled in Williamson Act contracts in Kern County increased by about 36,119 acres, or by approximately 2.1 percent.

**Table 3.2-4. Lands Under Williamson Act Contracts in Kern County, 1998 and 2001**

| Year | Land Enrolled (acres) |
|---|---|
| 1998 | 1,683,744 |
| 2001 | 1,719,863 |
| *Source*: California Department of Conservation, 2003. | |

*Agricultural Zoning Trends*

A review of zoning designations for the parcels that were the source of water for the transfer of the 41,000 AF of Table A Amount to CLWA showed that all were zoned for agricultural use and that no zoning changes occurred between 1998 and the present.

### *3.2.1.3 Castaic Lake Water Agency*

Agricultural and grazing areas within the CLWA service area are located primarily in the western portion of the service area along the State Route 126 corridor and adjacent hills in both Los Angeles and Ventura counties. Over 90 percent of the CLWA service area has been inventoried and mapped by the State's FMMP. The amount of Important Farmland and other lands in the CLWA service area in both 1998 and 2000 is shown in Table 3.2-5. As noted, the amount of Urban and Built-up land increased by 1,731 acres during this period, while the amount of agricultural land decreased (a decrease of 1,034 acres of Important Farmland and Grazing Land combined).

Most of the CLWA service area is located in Los Angeles County, which does not participate in the Williamson Act program. Ventura County does participate in this program and had approximately 122,875 acres of Williamson Act contracts lands in 1998 and 123,781 in 2001 (California Department of Conservation 2002 and 2003).

**Table 3.2-5. Important Farmland and Other Lands in the CLWA Service Area, 1998 and 2000**
**(negative numbers in parenthesis)**

| *Category* | *1998 (acres)* | *2000 (acres)* | *Difference (acres)* |
|---|---|---|---|
| Prime Farmland | 2,765 | 2,444 | (321) |
| Farmland of Statewide Importance | 825 | 767 | (58) |
| Unique Farmland | 410 | 404 | (6) |
| Farmland of Local Importance | 645 | 619 | (26) |
| Grazing Land | 50,836 | 50,213 | (623) |
| Urban and Built-up Land | 22,569 | 24,300 | 1,731 |
| Other Land | 34,444 | 33,747 | (697) |
| Water Area | 2,175 | 2,175 | 0 |
| **Total** | **114,669** | **114,669** | **--** |

*Source*: California Division of Land Resource Protection, Farmland Mapping and Monitoring Program, 2002.

In 1998, Ventura County passed the Save Open-Space and Agricultural Resources (SOAR) Initiative in order to "ensure that Agricultural, Open Space and Rural lands are not prematurely or unnecessarily converted to other more intensive development uses." The initiative requires a popular vote for changes to the County's General Plan policies and land use designations regarding open space, agricultural, and rural lands in unincorporated areas, with certain exceptions. Lands within the Piru community, for instance, may be re-designated by the Board of Supervisors without a public vote, due to its urban nature.

## 3.2.2 Potential Impacts of the Project

### *3.2.2.1 Significance Criteria*

The criteria listed below are based on Appendix G of the State CEQA Guidelines. The Project would have a significant impact on agriculture if it would:

- convert a substantial portion of the available Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Important Farmland), as shown on the maps prepared pursuant to the FMMP of the California Resources Agency, to non-agricultural use;
- conflict with existing zoning for agricultural use or a Williamson Act contract; or
- involve other changes in the existing environment, which, due to their location or nature, could individually or cumulatively result in substantial loss of Important Farmland to nonagricultural use or a loss of agricultural productivity.

### *3.2.2.2 Environmental Impacts*

#### *3.2.2.2.1 State Water Project and Associated Facilities*

DIRECT IMPACTS

The Project would use existing SWP facilities, which are not located on agricultural lands. Since these facilities would be operated in accordance with existing operating criteria, using existing facilities to transfer water associated with the Project would not affect adjacent agricultural resources. Use of the SWP facilities would not convert Important Farmland to non-agricultural use, conflict with existing zoning for agricultural use or a Williamson Act contract, or involve other changes that could result in the conversion of Farmland to non-agricultural use.

INDIRECT IMPACTS

No indirect impacts to agricultural resources would occur.

#### *3.2.2.2.2 Wheeler Ridge-Maricopa Water Storage District*

DIRECT IMPACTS

Under the Project, up to 41,000 AF of SWP Table A Amount that could have been delivered to WRMWSD on an annual basis could be delivered to CLWA instead. This action would not require the construction of new water distribution facilities or modification of existing facilities. The 41,000 AF Transfer Project is excess to the WRMWSD needs and does not involve water that would have otherwise been used by WRMWSD. Thus, no direct losses of Important Farmland or conflicts with existing zoning or Williamson Act contracts from construction would occur.

INDIRECT IMPACTS

No indirect impacts to agricultural resources in WRMWSD would occur. As described in section 3.15, if the Project were implemented, in years of average or greater than average SWP deliveries, water associated with the 41,000 AF Table A Amount would be in excess of WRMWSD's demands. In these years, the Project would not result in changes to agricultural practices (e.g., cropping patterns or land fallowing) within the district since sufficient surface water would be available to meet demands without the use of the 41,000 AF Table A Amount.

As described above, WRMWSD has implemented other water management actions, including a variety of groundwater banking projects (e.g., participation in the Pioneer and Berrenda Mesa projects, participation in the Kern Water Bank, and other groundwater banking projects), which have diversified its water sources and resulted in lower water costs (when total costs are considered). Overall, this diversification of water sources has allowed and will continue to allow WRMWSD to provide surface water within the district when SWP deliveries alone are not sufficient to meet demands. This diversification also has resulted in lower overall water costs (when total costs are considered), in years when SWP deliveries are lower than average (refer to section 3.15). In years of less than average SWP deliveries, therefore, the Project would not result in changes to agricultural practices (e.g., cropping patterns or additional land fallowing)

within the district since sufficient, low-cost water would be available to meet demands without the use of the 41,000 AF Table A Amount.

Since no changes to agricultural practices would result from Project implementation, it would not result in the conversion of Important Farmland to non-agricultural use, conflict with existing zoning for agricultural use or a Williamson Act contract, or involve other changes that could result in the conversion of Farmland to non-agricultural use.

*3.2.2.2.3 Castaic Lake Water Agency*

DIRECT IMPACTS

Implementation of the Project would not require the construction of new CLWA facilities or modification of existing CLWA facilities. Conveying additional water through existing facilities for use within the service area would not directly affect agricultural resources and therefore would not result in the conversion of Important Farmland to non-agricultural use, conflict with existing zoning for agricultural use or a Williamson Act contract, or involve other changes that could result in conversion of Farmland, to non-agricultural use.

INDIRECT IMPACTS

Potential impacts to Important Farmlands in the CLWA service area from new development that would occur as an indirect impact of the Project are addressed in Chapter 4, Growth-Inducing Effects and Growth-Related Impacts.

### 3.2.3 Mitigation Measures

#### *3.2.3.1 State Water Project and Associated Facilities*

No significant direct or indirect impacts to agricultural resources would occur; therefore, no mitigation measures are required.

#### *3.2.3.2 Wheeler Ridge-Maricopa Water Storage District*

No significant direct or indirect impacts to agricultural resources would occur; therefore, no mitigation measures are required.

#### *3.2.3.3 Castaic Lake Water Agency*

No significant direct impacts to agricultural resources would occur; therefore, no mitigation measures are required. Mitigation measures for indirect impacts are addressed in Chapter 4, Growth-Inducing Effects and Growth-Related Impacts.

### 3.2.4 Significant Unavoidable Impacts

No significant direct or indirect unavoidable impacts on agricultural resources would result from the Project.

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## 3.3 AIR QUALITY

Air quality at a given location can be described by the concentration of various pollutants in the atmosphere. Units of concentration are generally expressed in parts per million (ppm) or micrograms per cubic meter ($\mu g/m^3$). The significance of a pollutant concentration is determined by comparing the concentration to an appropriate federal and/or state ambient air quality standard. The standards represent the allowable atmospheric concentrations at which the public health and welfare are protected and include a reasonable margin of safety to protect the more sensitive individuals in the population. National standards, established by the EPA, are termed the National Ambient Air Quality Standards (NAAQS). The NAAQS represent maximum acceptable concentrations that may not be exceeded more than once per year, except the annual standards, which may never be exceeded. The state standards, established by the California Air Resources Board (ARB), are termed the California Ambient Air Quality Standards (CAAQS). The CAAQS represent maximum acceptable pollutant concentrations that are not to be equaled or exceeded. The NAAQS and CAAQS are presented in Table 3.3-1.

Air quality regulations were first promulgated with the federal Clean Air Act of 1969 (CAA). This act established the NAAQS and delegated the enforcement of air pollution control regulations to the states. In California, the ARB is responsible for enforcing air pollution regulations. The ARB has in turn delegated the responsibility of regulating stationary emission sources to local air agencies. In areas that exceed the NAAQS, the CAA requires preparation of a State Implementation Plan (SIP), detailing how the state will attain the standards within mandated time frames. The CAA identifies emission reduction goals and compliance dates based upon the severity of the ambient air quality standard violation within a region.

The California Clean Air Act of 1988, as amended in 1992 (CCAA), outlines a program to attain the CAAQS for ozone ($O_3$), nitrogen dioxide ($NO_2$), sulfur dioxide ($SO_2$), and carbon monoxide (CO) by the earliest practical date. Since the CAAQS are more stringent than the NAAQS, emissions reductions beyond what would be required to show attainment of the NAAQS are required.

Identifying the Region of Influence (ROI) for air quality requires knowledge of the types of pollutants being emitted, emission rates of pollutant sources, the source proximity to other pollutant sources, and meteorological conditions. The ROI for inert pollutants (pollutants other than $O_3$ and its precursors) is generally limited to a few miles downwind from a source. Thus, the ROI for emissions of inert pollutants from Project construction sources, for example, would occur in proximity to construction sites and along road systems used by on-road construction traffic. The ROI for $O_3$ can extend much farther downwind than for inert pollutants. Ozone is a secondary pollutant formed in the atmosphere by photochemical reactions of previously emitted pollutants, or precursors. Ozone precursors are mainly the reactive organic gases portion of volatile organic compounds and nitrogen oxides. In the presence of solar radiation, the maximum effect of reactive organic gases and nitrogen oxide emissions on $O_3$ levels usually occurs several hours after they are emitted and many miles from the source. Therefore, the ROI for $O_3$ generally extends much farther downwind than for inert pollutants.

**Table 3.3-1. California and National Ambient Air Quality Standards**

| *Pollutant* | *Averaging Time* | *California Standards* [a,c] | *----National Standards* [b]*----* | |
|---|---|---|---|---|
| | | | *Primary* [c,d] | *Secondary* [c,e] |
| Ozone ($O_3$) | 1-hour | 0.09 ppm (180 µg/m$^3$) | 0.12 ppm (235 µg/m$^3$) | Same as primary |
| | 8-hour | --- | 0.08 ppm (157 µg/m$^3$) | Same as primary |
| Carbon monoxide (CO) | 8-hour | 9.0 ppm (10 mg/m$^3$) | 9 ppm (10 mg/m$^3$) | --- |
| | 1-hour | 20 ppm (23 mg/m$^3$) | 35 ppm (40 mg/m$^3$) | --- |
| Nitrogen dioxide ($NO_2$) | Annual | --- | 0.053 ppm (100 µg/m$^3$) | Same as primary |
| | 1-hour | 0.25 ppm (470 µg/m$^3$) | --- | --- |
| Sulfur dioxide ($SO_2$) | Annual | --- | 0.03 ppm (80 µg/m$^3$) | --- |
| | 24-hour | 0.04 ppm (105 µg/m$^3$) | 0.14 ppm (365 µg/m$^3$) | --- |
| | 3-hour | --- | --- | 0.5 ppm (1,300 µg/m$^3$) |
| | 1-hour | 0.25 ppm (655 µg/m$^3$) | --- | --- |
| Respirable Particulate Matter ($PM_{10}$) | Annual | 20 µg/m$^3$ [f] | 50 µg/m$^3$ [g] | Same as primary |
| | 24-hour | 50 µg/m$^3$ | 150 µg/m$^3$ | Same as primary |
| Fine Particulate Matter ($PM_{2.5}$) | Annual | 12 µg/m$^3$ [h] | 15 µg/m$^3$ [i] | Same as primary |
| | 24-hour | --- | 65 µg/m$^3$ [j] | Same as primary |
| Lead | 30-day | 1.5 µg/m$^3$ | --- | --- |
| | Quarterly | --- | 1.5 µg/m$^3$ | Same as primary |
| Hydrogen sulfide | 1-hour | 0.03 ppm (42 µg/m$^3$) | --- | --- |
| Sulfates | 24-hour | 25 µg/m$^3$ | --- | --- |
| Visibility reducing particles [k] | 8-hour (10 AM to 6 PM PST) | In sufficient amount to produce an extinction coefficient of 0.23 per kilometer due to particles when the relative humidity is less than 70%. | --- | --- |

*Source:* (APCD 2002; ARB 2002)

*Notes*:

a. California standards for $O_3$, CO, $SO_2$ (1 hour), $NO_2$, $PM_{10}$, $PM_{2.5}$, and visibility reducing particles, are values that are not to be exceeded. The standards for $SO_2$ (24-hour), sulfates, lead, hydrogen sulfide, and vinyl chloride standards are not to be equaled or exceeded.

b. National standards, other than O3 and those based on annual averages, are not to be exceeded more than once a year. The O3 standard is attained when the expected number of days per calendar year with maximum hourly average concentrations above the standard is equal to or less than one.

c. Concentration expressed first in units in which it was promulgated. Equivalent units given in parenthesis are based on a reference temperature of 25°C and a reference pressure of 760 mm of mercury (1,013.2 millibars). All measurements of air quality are to be corrected to a reference temperature of 25°C and a reference pressure of 760 mm of mercury; ppm in this table refers to ppm by volume, or micromoles of pollutant per mole of gas.

d. National Primary Standards: The levels of air quality necessary, with an adequate margin of safety to protect the public health.

e. National Secondary Standards: The levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant.

f. Measured as an arithmetic mean. New standard promulgated by ARB on June 20, 2002.

g. Measured as an arithmetic mean.

h. New standard promulgated by ARB on June 20, 2002.

i. Three-year average.

j. Three-year average of 95th percentile measurements.

k. This standard is intended to limit the frequency and severity of visibility impairment due to regional haze and is equivalent to a 10-mile nominal visual range when relative humidity is less than 70 percent.

The EPA designates all areas of the United States as having air quality better than (attainment) or worse than (nonattainment) the NAAQS. The criteria for nonattainment designation varies by pollutant; for example, an area is in nonattainment for $O_3$ if its NAAQS has been exceeded more than three discontinuous times in three years, and an area is in nonattainment for any other pollutant if its NAAQS generally has been exceeded more than once per year. The ARB also designates areas of the state as either in attainment or nonattainment of the CAAQS. An area is in nonattainment if the CAAQS has been exceeded more than once in three years.

The pollutants of primary concern considered in this analysis include reactive organic compounds (ROC), $O_3$, CO, $NO_2$, and particulate matter less than 10 microns in diameter ($PM_{10}$).

### 3.3.1 Environmental Setting

The Project region occurs predominately within the San Joaquin Valley Air Basin (SJVAB) and South Coast Air Basin (SCAB)[1]. As shown on Figure 3.3-1, the Project region occurs within the jurisdictions of the San Joaquin Valley Unified Air Pollution Control District (SJVUAPCD) and the South Coast Air Quality Management District (SCAQMD). The SJUVAPCD jurisdiction includes the portion of Kern County west of a north-south line roughly 10 miles west of the town of Tehachapi, and all or a portion of Tulare, Kings, Fresno, Madera, Merced, Stanislaus, and San Joaquin counties. The SCAB consists of the non-desert portions of Los Angeles, Riverside, and San Bernardino counties and all of Orange County.

#### *3.3.1.1 State Water Project and Associated Facilities*

*Climate*

Within the San Joaquin Valley, the climate is similar to that described in section 3.3.1.2 below for KCWA and WRMWSD. Within northern Los Angeles County and the Castaic Lake area, the climate is similar to that described in section 3.3.1.3 below for CLWA.

*Baseline Air Quality*

The California Aqueduct and associated facilities of concern predominately occur within the SJVAB and SCAB. Baseline air quality within these regions is described below in sections 3.3.1.2 and 3.3.1.3, respectively.

*Local Regulations*

SJVUAPCD regulations are described in section 3.3.1.2 below. SCAQMD regulations are described in section 3.3.1.3 below.

1 Although some SWP facilities lie outside of the SJVAB and SCAB, implementation of the Project would not affect the operation of these facilities or air quality within these areas. Also, the eastern portions of Kern County lie within the Mojave Desert Air Basin under the jurisdiction of the Kern County Air Pollution Control District. Implementation of the Project would not result in changes that would affect air quality within the Mojave Desert Air Basin.

*Source:* DWR 2001

**Figure 3.3-1. Boundaries of the San Joaquin Valley Unified Air Pollution Control District, and the South Coast Air Quality Management District and Adjacent Districts**

#### 3.3.1.2 *Wheeler Ridge-Maricopa Water Storage District*

*Climate*

The climate within the southern San Joaquin valley is classified as Mediterranean, and is characterized by dry, hot summers and mild, semi-arid winters. Average daily maximum temperatures within the WRMWSD range from 85 to over 100 degrees Fahrenheit (°F) in the summer and 50 to 60°F in the winter. The area is classified as a hot desert, where precipitation is less than half the potential evaporation. The rainy season typically occurs between November and April and produces as little as 5 inches of precipitation per year in the northwest portion of the district and about 18 inches per year in the mountainous regions to the east. Winds prevail from the northwest due to a semi-permanent high-pressure cell located off the Pacific Coast. During the colder months of the year, winds prevail from the south and southeast due to the presence of polar storms and topographical effects. Average wind speed is about 6 miles per hour, but extreme wind speeds can reach 60 to 80 miles per hour.

*Baseline Air Quality*

The district is located in the southernmost region of the SJVAB, which includes the western half of Kern County. Mountain ranges encompass the district on its western, southern, and eastern sides. This topography, combined with the prevailing wind patterns, inhibits dispersion and leads to an accumulation of pollutants in the region. Prevailing northwest winds also transport pollutants from the northern reaches of the SJVAB to the region and increase air pollutant concentrations in the area.

The Kern County portion of the SJVAB is presently in nonattainment of the NAAQS and CAAQS for $PM_{10}$ and $O_3$. In November 2001, the EPA reclassified the SJVAB $O_3$ nonattainment designation from serious to severe. The SJVAB is currently in serious nonattainment for $PM_{10}$ (SJVUAPCD 2002).

The main sources of $PM_{10}$ within the SJVAB include wood and agricultural waste burning and fugitive dust. Fugitive dust is a major source of $PM_{10}$ and results from (1) the operation of vehicles on paved and unpaved roads, (2) various agricultural operations, such as tilling, harvesting, and planting, and (3) windblown dust from disturbed ground areas. Geologic dust generated from dry, erodible soils is the primary component of $PM_{10}$ exceedances during the fall. In 1995, road dust, farming operations, fugitive windblown dust, and waste disposal and burning produced about 85 percent (approximately 39, 24, 12, and 5 percent, respectively) of the $PM_{10}$ in the SJVAB (ARB 1997). While the total emissions within the SJVAB decreased substantially between 1995 and 2002, the relative contributions of these sources to the total $PM_{10}$ levels in the region did not change substantially during this period (SJVUAPCD 2002).

Concentrations of photochemical smog, or $O_3$, are highest during the warmer months of the year and coincide with the season of maximum insolation. Inert pollutant concentrations (pollutants other than $O_3$) tend to be the greatest during the winter months and are a product of light wind conditions and surface-based temperature inversions that are common during that time of year. These conditions tend to inhibit the dispersion of pollutants. The main sources of

$O_3$ precursor emissions (ROC and $NO_x$) within the SJVAB include gasoline-powered on-road vehicles, solvent usage, and farm operations (SJVUAPCD 2002).

*Local Regulations*

The SJUVAPCD is responsible for regulating stationary sources of emissions within the SJVAB and has developed rules and air quality attainment plans designed to reduce emissions to a level that will bring the region into attainment of the $O_3$ and $PM_{10}$ ambient air quality standards. The SJVUAPCD originally adopted its 1991 Air Quality Attainment Plan and 1994 Ozone Attainment Demonstration Plan to bring the region into attainment of the state and national $O_3$ standards, respectively (SJVUAPCD 1994). The SJVUAPCD has subsequently amended these plans to show progress towards attaining the $O_3$ standards. Due to the inability of the region to attain the national $O_3$, the SJVUAPCD proposes to request the EPA to reclassify the SJVAB $O_3$ nonattainment designation from severe to extreme to allow for additional time to attain this standard (SJVUAPCD 2003a). As part of this proposal, the SJVUAPCD would adopt an Extreme Ozone Attainment Demonstration Plan by May 2004 and then submit this plan to the EPA for their approval.

The SJVUAPCD originally adopted its 1991 Moderate Area $PM_{10}$ Plan (Moderate Plan) and the 1994 Serious Area $PM_{10}$ Plan (Serious Plan) to bring the region into attainment of the national $PM_{10}$ standard. The latest version of the $PM_{10}$ attainment plan is the 2003 $PM_{10}$ Plan (SJVUAPCD 2003b). Through this attainment planning process, the SJVUAPCD has developed Regulation VIII to reduce ambient concentrations of $PM_{10}$ from fugitive dust (SJVUAPCD 2004). The 2003 $PM_{10}$ Plan also contains a Draft Concept Conservation Management Practice Program (CMP Program) for the San Joaquin Valley to regulate fugitive dust emissions from on-field activities (tilling, harvesting, land preparation, fallowing, etc.). These on-field activities are currently not regulated by the SJVUAPCD. The CMP Program would apply to a number of "source categories" including windblown dust from on-field activities. Under the CMP Program, at the beginning of a year, farmers would be required to select a minimum of one control measure relating to windblown dust for the coming year. The specific measures are not identified in the Draft CMP Program; however, the practices to reduce fugitive dust emissions would fall into several broad categories including: practices that reduce or eliminate the need to disturb the soil; practices that protect the soil from wind erosion; equipment modifications to physically produce less $PM_{10}$; applying water or dust suppressants in off-field high traffic areas; reducing speeds or access on unpaved roads; and actions that reduce pesticide application.

#### *3.3.1.3 Castaic Lake Water Agency*

*Climate*

The climate in the CLWA service area is classified as Mediterranean, characterized by dry, hot summers and mild, semi-arid winters. Summer temperatures can reach as high as 110°F; winters are cooler, and winter temperatures can dip as low as 20°F. Average rainfall is about 18 inches per year in the flat areas and about 27 inches in the mountains. The region is subject to wide variations in annual precipitation.

*Baseline Air Quality*

The CLWA service area is located in the Santa Clarita Valley, which is in the northwestern portion of the SCAB. With regard to the NAAQS, the area of SCAB that encompasses the Project area is presently in "extreme" nonattainment for $O_3$ and "serious" nonattainment for CO and $PM_{10}$. With regard to the CAAQS, the SCAB is presently in "extreme" nonattainment for $O_3$, "severe" nonattainment for CO, and nonattainment for $PM_{10}$. These conditions were present in 1998; the key difference between 1998 and the present is that the federal and state standards for CO within the basin were met as of the end of 2002, and the SCAQMD will request reclassification as attainment for CO in the next few years (SCAQMD 2003).

*Local Regulations*

The SCAQMD is responsible for regulating emission sources within the SCAB. The SCAQMD has developed the 2003 Air Quality Management Plan (2003 AQMP) to bring the region into attainment of the state and national ambient air quality standards. Through this attainment planning process, the SCAQMD develops rules to regulate stationary sources of air pollution in the SCAB. The 2003 AQMP (1) updates the demonstration of attainment with the national standards for $O_3$ and $PM_{10}$ (the 1999 Revised $O_3$ Plan and 1997 AQMP, respectively), (2) replaces the 1997 attainment demonstration for the national CO standard and provides a basis for a future maintenance plan for this pollutant, and (3) updates the maintenance plan for the national $NO_2$ standard that the SCAB has attained since 1992 (SCAQMD 2003).

## 3.3.2 Potential Impacts of the Project

### *3.3.2.1 Significance Criteria*

The criteria used to define the significance of an air quality impact are based on the Appendix G of the State CEQA Guidelines. An impact would be significant if air pollutant emissions would:

- conflict with or obstruct implementation of an applicable air quality plan;
- violate any air quality standard or contribute substantially to an existing or projected ambient air quality violation;
- result in a cumulatively considerable net increase of any criteria pollutant for which the project region is in nonattainment under an applicable federal or state ambient air quality standard (including releasing emissions that exceed quantitative thresholds for ozone precursors);
- expose sensitive receptors to substantial pollutant concentrations; or
- create objectionable odors affecting a substantial number of people.

### *3.3.2.2 Environmental Impacts*

#### *3.3.2.2.1 State Water Project and Associated Facilities*

DIRECT IMPACTS

Implementation of the Project would not require new construction or the modification of existing SWP facilities; nor would it change the operating criteria of these facilities or materially change their operation. The transfer would increase the amount of water transported in the California Aqueduct between the WRMWSD and CLWA turnouts. As discussed in section 3.14, Utilities and Service Systems, this action would increase the use of electrical power to operate water pumps and would change the timing of power usage.

Electrical power used by the SWP is obtained from SWP hydroelectric generating plants, the Reid Gardner Power Plant in Nevada, and other power producers in the Western U.S. (DWR 2002). These existing sources would provide the electrical power demands of the Project and therefore they would preclude the need to develop new power sources. The annual amount of electricity needed by the Project for pumping at the four SWP pumping plants located within or between WRMWSD and the CLWA service area (Teerink, Chrisman, Edmonston, and Oso) is estimated to be 140,000 MWh (see Utilities and Service Systems section 3.14.2.2). The air quality impacts associated with the generation of this power would depend upon the specific electrical generation source. For example, air emissions due to power generation could range from almost zero to some finite amount, depending upon whether the generation source was hydroelectric or fossil fuel-fired. Any existing fossil fuel-fired power plant that provides electricity for the Project would have to comply with all ambient air quality standards and applicable air permit conditions, such as emission offsets. Therefore, air quality impacts due to the generation of electrical power for the Project would be less than significant.

The SWP pumping plants are powered by electricity and their operation creates minimal air emissions. Therefore, implementation of the Project would have a less than significant impact to air quality as a result of increased pumping at these plants.

As described in section 3.0, minor seasonal changes in the average volume of water stored in San Luis Reservoir would result from Project implementation. The average volume of stored water would decrease slightly from December through June and would slightly increase the rest of the year. The amount of water stored in the reservoir already fluctuates, and the changes resulting from the Project would fall within the range of fluctuations present under both current and historic operations. Therefore, the Project would not produce fugitive dust emissions from exposed shorelines that differ from historic levels, and impacts would be less than significant. The volume of water stored at Castaic Lake would not change as a result of the Project, and air quality would not be affected.

No odors would be generated as a result of Project actions.

In summary, the Project would not (1) conflict with or obstruct implementation of an applicable air quality plan; (2) violate any air quality standard or contribute substantially to an existing or projected ambient air quality violation; (3) result in a cumulatively considerable net increase of any criteria pollutant for which the Project region is in nonattainment under an applicable

federal or state ambient air quality standard; (4) expose sensitive receptors to substantial pollutant concentrations; (5) or create objectionable odors affecting a substantial number of people. The Project would have less than significant impacts on air quality resources as a result of actions in the SWP and associated facilities.

INDIRECT IMPACTS

No indirect air quality impacts would occur.

*3.3.2.2.2 Wheeler Ridge-Maricopa Water Storage District*

DIRECT IMPACTS

Implementation of the Project would not require new construction or the modification of existing WRMWSD water distribution facilities, nor would it change the current operation of these facilities. Therefore no direct air quality impacts would occur.

INDIRECT IMPACTS

As noted in section 3.2, the Project would not change agricultural practices (e.g., cropping patterns or land fallowing) in the WRMWSD and thus and would not affect the generation of fugitive dust emissions ($PM_{10}$) or other air emissions in the district.

*3.3.2.2.3 Castaic Lake Water Agency*

DIRECT IMPACTS

Implementation of the Project would not require the construction of new CLWA facilities or the modification of existing CLWA facilities. Transferring an additional 41,000 AF of water through existing facilities for use within the service area would not directly affect air quality. The Project would not conflict with or obstruct implementation of an applicable air quality plan; violate any air quality standard or contribute substantially to an existing or projected ambient air quality violation; result in a cumulatively considerable net increase of any criteria pollutant for which the Project region is in nonattainment under an applicable federal or state ambient air quality standard; expose sensitive receptors to substantial pollutant concentrations; or create objectionable odors affecting a substantial number of people.

INDIRECT IMPACTS

Potential impacts from population growth that could occur as an indirect impact of the Project are addressed in Chapter 4, Growth-Inducing Effects and Growth-Related Impacts.

### 3.3.3 Mitigation Measures

#### *3.3.3.1 State Water Project and Associated Facilities*

No direct or indirect significant impacts to air quality would occur; therefore no mitigation measures are required.

#### *3.3.3.2 Wheeler Ridge-Maricopa Water Storage District*

No direct or indirect significant impacts to air quality would occur; therefore no mitigation measures are required.

#### *3.3.3.3 Castaic Lake Water Agency*

No direct significant impacts to air quality would occur; therefore no mitigation measures are required. Mitigation measures for indirect impacts are addressed in Chapter 4, Growth Inducement and Growth-Related Impacts.

### 3.3.4 Significant Unavoidable Impacts

No direct or indirect significant unavoidable impacts would result from the Project, with the exception of potential indirect impacts within the CLWA service area. These are addressed in Chapter 4, Growth-Inducing Effects and Growth-Related Impacts.

# 3.4 BIOLOGICAL RESOURCES

## 3.4.1 Environmental Setting

### *3.4.1.1 State Water Project and Associated Facilities*

*Vegetation and Wildlife*

CALIFORNIA AQUEDUCT AND ASSOCIATED FACILITIES

The California Aqueduct begins in the southern Delta near the city of Tracy. Historically, the Delta region was dominated by approximately 400,000 acres of tidal marshland, although extensive land reclamation for agricultural purposes in the late 1800s and early to mid 1900s have reduced the tidal marshland area to an estimated 18,000 acres in 1985 (CALFED 1999). Within the Delta region, agricultural lands now occupy approximately 72 percent of the total land area, with grassland and ruderal (disturbed), open-water, wetland, and riparian habitats occupying the majority of the remaining area (CALFED 1999). Grassland and ruderal habitats, although typically small in size, provide relatively high wildlife value within the region (CALFED 1999). Riparian scrub and woodland habitats with the Delta region typically occur on channel islands, on levees, and along unmaintained creeks, waterways and tributary channels (CALFED 1999). Seasonal fresh water and nontidal freshwater wetlands and marshes including vernal pools and flooded agricultural areas provide important habitat for migratory waterfowl, and shorebird populations (CALFED 1999). Tidal fresh water and brackish water emergent marsh habitat also provides important habitat for migratory waterfowl and shorebird population and supports a variety of special status species. Open water habitat within the Delta region consists of both deep water and shallow water areas. Deep-water areas tend to be unvegetated, while shallow water areas typically support a variety of aquatic plant species and provide resting and foraging habitat for water birds (CALFED 1999). Open water areas within the Delta region provide habitat for over 120 species of fish.

The California Aqueduct originates in the south Delta at Clifton Court Forebay (located 10 miles northwest of the city of Tracy). The forebay provides storage and regulation capability for pumping by the Banks Pumping Plant. The water pumped at Banks Pumping Plant must pass through the John E. Skinner Delta Fish Protective Facility where fish are separated from the water before the water is transported down the Aqueduct. SWP diversions at the Delta are currently governed by the State Water Resources Control Board's Water Right Decision 1641 (described in more detail in section 3.15 and Appendix D), which specifies criteria for which DWR must follow in SWP Delta operations. These criteria are intended to protect biological resources within the Delta.

South of the SWP facilities in the Delta, the California Aqueduct traverses the west side of the San Joaquin Valley to the Tehachapi Mountain Range in the southern end of the valley. The dominant land use within the San Joaquin Valley is agricultural and agricultural related uses. The Aqueduct within the San Joaquin Valley is a concrete lined canal with a few short segments of enclosed pipe. Biological resources within the Aqueduct, therefore, are limited to common fish species, mostly introduced, and a variety of invertebrate species that may occupy the water

column. Other upland species and birds may utilize the Aqueduct in some locations for drinking water or to forage for fish and invertebrates.

*California Aqueduct from Tehachapi Mountain Range to Castaic Lake.* At the southern end of the San Joaquin Valley, the open canal structure of the Aqueduct changes to enclosed pipes, which traverse the Tehachapi Mountains in a southerly direction to Pyramid Lake and eventually empty water into the Castaic Lake reservoir. No biological resources are associated with the piped portion of the Aqueduct.

SAN LUIS RESERVOIR

San Luis Reservoir was constructed as a storage reservoir for the federal CVP and the California SWP. The water arrives through the California Aqueduct and the Delta-Mendota Canal, and is pumped from the O'Neil Forebay into the main reservoir during the winter and spring. The reservoir supports a large variety of fish and wildlife species both within the water column and in the areas surrounding the reservoir.

The dominant shoreline vegetation of the reservoir is grassland, making up approximately 70 percent of the shoreline (USBR 1997). Grassland vegetation community is characterized by the dominance of annual or perennial grasses. The remaining 30 percent of the shoreline vegetation consists of montane hardwood (USBR 1997). Montane hardwood consists of a well-defined tree layer composed predominately of broadleaved hardwood tree species, poorly developed shrub layer, and sparse herb layer (USBR 1997). A variety of reptiles, birds and mammals are typically associated with grassland and montane hardwood habitats. San Luis Reservoir supports a small number of diving and dabbling ducks (USBR 1997).

Approximately 55 percent of the shoreline vegetation of the O'Neil Forebay is grassland (USBR 1997). The forebay supports more than 200,000 wintering waterbirds, including American coot (*Fulica americana*) (dominant species), northern pintail (*Anas acuta*), ruddy duck (*Oxyura jamaicensis*), and American widgeon (*Anas americana*) (USBR 1997). O'Neil Forebay is one of the three most important wintering areas in California for the Barrow's goldeneye (*Bucephala islandica*) (USBR 1997).

The San Luis Reservoir complex is important recreational fishery area. Fish typically caught at the San Luis Reservoir complex include striped bass (*Morone saxatilis*), largemouth bass (*Micropterus salmoides*), catfish (*Ictalurus* sp.), bluegill (*Lepomis machrochirus*) and crappie (*Pomoxis* sp.) (DWR 2001c).

CASTAIC LAKE

Castaic Lake is a terminal water storage facility for the SWP located in the northern portion of the Santa Clarita valley at the confluence of Castaic Creek and Elizabeth Lake Canyon Creek. Adjacent to the lake, vegetation consists of dry upland scrub and chaparral communities on the steep slopes above the water. The steep banks along almost the entire parameter of the lake and fluctuating water levels prevent the establishment of shoreline vegetation, and therefore, there is minimal shoreline and aquatic vegetation associated with the lake. Scattered willows (*Salix* sp.) and mulefat (*Baccharis salicifolia*) exist in areas with more gradually sloped banks. The

banks of Castaic Lagoon, located immediately below Castaic Dam, are less steep than the banks of the lake and water levels in the lagoon are kept relatively constant.

Native wildlife associated with, and adjacent to, Castaic Lake includes both terrestrial and aquatic species. The arid hills surrounding the lake support species adapted to the hot, dry conditions, such as the western fence lizard (*Sceloporus occidentalis*), side-blotched lizard (*Uta stansburiana*), San Diego horned lizard (*Phrynosoma coronatum blainvillei*), western rattlesnake (*Crotalus viridis*), gopher snake (*Pituophis melanoleucus*), black-tailed jackrabbit (*Lepus californicus*), deer mouse (*Peromyscus maniculatus*), mule deer (*Odocoileus hemionus*), coyote (*Canis latrans*), and bobcat (*Lynx rufus*). Species more directly associated with the lake include osprey (*Pandion haliaetus*), bald eagle (*Haliaeetus leucocephalus*), which both occasionally winter at the lake, and a variety of species of waterfowl and fish.

Castaic Lake is an important recreational fishing lake, and is known for its trophy-sized largemouth bass. Other fish species include striped bass, bluegill, crappie, channel catfish (*Ictalurus punctatus*), white catfish (*Ictalurus catus*), and threadfin shad (*Dorosoma petenense*). Hatchery raised rainbow trout (*Oncorhynchus mykiss* sp.) are also stocked annually.

*Special Status Species*

Numerous adopted Habitat Conservation Plans (HCPs) and Natural Community Conservation Plans (NCCPs) exist within the Delta region, the San Joaquin Valley and other areas traversed by, or containing SWP facilities. Sensitive plant communities and special status plant and animal species in the Delta region, San Joaquin Valley and associated with the California Aqueduct are described in detail in the CALFED Bay-Delta Program Environmental Impact Statement (EIS)/EIR (CALFED 1999), and the Central Valley Project Improvement Act Draft Programmatic EIS (USBR 1997). These documents are available from the CALFED Bay-Delta Authority, 650 Capitol Mall, 5th Floor, Sacramento, California 95814, and the U.S. Bureau of Reclamation, 2800 Cottage Way, Sacramento California 95825-1898.

CALIFORNIA AQUEDUCT AND ASSOCIATED FACILITIES

The Delta region supports many sensitive plant communities as well as dozens of special status plant and animal species. The San Joaquin Valley also supports a large number of special status plant and wildlife species with the largest number occurring in grassland and valley foothill woodland habitats (CALFED 1999). No vegetation persists within the Aqueduct, limiting habitat to the water column. Some sensitive species occurring in the vicinity of the Aqueduct, such as the pallid bat (*Antrozous pallidus*), may occasionally utilize the Aqueduct to forage for insects or other small prey inhabiting the water in the Aqueduct.

SAN LUIS RESERVOIR

According to the California Natural Diversity Database (CNDDB), sensitive species known to occur in the San Luis Reservoir area include, although may not be limited to the following, blunt-nosed leopard lizard (*Gambelia silus*), California tiger salamander (*Ambystoma californiense*), burrowing owl (*Athene cunicularia*), California horned lark (*Eremophila alphestris actia*), Swainson's hawk (*Buteo swainsoni*), tricolored blackbird (*Agelaius tricolor*), and San Joaquin kit fox (*Vulpes macrotis mutica*) (CNDDB 2002).

CASTAIC LAKE

Sensitive plant species known to occur in the Castaic Lake area include, although may not be limited to: Nevin's barberry *(Berberis nevinii)*, and San Gabriel bedstraw *(Galium grande)* (California Department of Parks and Recreation 1985; CNDDB 2002). Both Nevin's barberry and San Gabriel bedstraw occur in chaparral or cismontane woodland habitat areas, and may occur in appropriate upland habitat areas around Castaic Lake. One additional sensitive plant species, the San Fernando Valley spineflower, has historically been in the area (CNDDB 2002). Sensitive wildlife species known to occur in the Castaic Lake area include, although may not be limited to the following: California condor *(Gymnogyps californianus)*, bald eagle, osprey, golden eagle *(Aquila chrysaetos)*, least bell's vireo (*Vireo bellii pusillus*), arroyo toad (*Bufo californicus*), California red-legged frog (*Rana aurora draytonii*), San Diego horned lizard, coastal western whiptail *(Cnemidophorus tigris multiscutatus)*, San Diego black-tailed jackrabbit *(Lepus californicus bennettii)*, San Diego desert woodrat *(Neotoma lepida intermedia)*, Southern California rufous-crowned sparrow *(Aimophila ruficeps ruficeps)*, and Bell's sage sparrow *(Amphispiza belli belli)* (CCWA 1995, PCR 2000, CNDDB 2002).

### *3.4.1.2 Wheeler Ridge-Maricopa Water Storage District*

*Vegetation and Wildlife*

Most of the lands in the district are cultivated agricultural areas. The predominant habitat on lands not cultivated is annual grassland characterized by introduced annual grasses and a combination of native and non-native forbs (Lower Sonoran grassland [Moe and Twisselmann 1995], California prairie [Williams 1998], or non-native grassland [Holland 1986]). Formerly cultivated lands typically support an annual grassland community dominated by introduced grasses such as red brome (*Bromus madritensis rubens*), common foxtail (*Hordeum glaucum*), and wild oats (*Avena fatua*). Within the district, there are also fairly extensive areas of chenopod scrub vegetation (Holland 1986) dominated by shrubby members of the family Chenopodiaceae, typically saltbushes (*Atriplex* spp.). Riparian, wetland, and open water habitats are limited to short stretches along intermittent or ephemeral stream channels, agricultural ponds and drainage ditches, and along the California Aqueduct.

Higher elevation foothill areas within the district were historically characterized by Blue Oak Woodland habitat. Blue Oak Woodland is characteristically an open woodland dominated by blue oak (*Quercus douglasii*) with a grassy or shrubby understory. It is found, for example, on the slopes of the middle elevations of the mountains at the southern end of the San Joaquin Valley. Blue oak is often accompanied by gray pine (*Pinus sabiniana*).

The alkali sink community in Kern County was formerly relatively extensive, surrounding lakes in undrained valley bottom habitats where salts accumulated from evaporating water. This community is also associated with sag ponds along major fault zones (1967, reprinted in Moe and Twisselmann 1995). Alkali-tolerant species are often perennial, markedly halophytic, and highly specialized members of the family Chenopodiaceae, such as glasswort pickleweed (*Salicornia subterminalis*), iodine bush (*Allenrolfea occidentalis*), and sea-blite (*Suaeda moquinii*). Much of the land supporting this community has been converted to productive farmland.

The native wildlife composition of the district and the San Joaquin Valley has been affected by the extensive conversion of native habitats to cropland and the fragmentation of the remaining habitat. Upland wildlife species have been replaced over large areas by a small subset of native and introduced wildlife species that are more ubiquitous and frequent row crops, vineyards, or orchard agricultural operations. Typical mammalian species of the area include the California ground squirrel (*Spermophilus beecheyi)*, Botta's pocket gopher (*Thomomys bottae*), deer mouse, big brown bat (*Eptesicus fuscus*), coyote, opossum (*Didelphis virginiana*), raccoon (*Procyon lotor*), introduced red fox (*Vulpes vulpes*), and striped skunk (*Mephitis mephitis*). Typical birds include the American crow (*Corvus brachyrhynchos*), house sparrow (*Passer domesticus*), house finch (*Carpodacus mexicanus*), killdeer (*Charadrius vociferus*), lark sparrow (*Chondestes grammacus*), mourning dove (*Zenaida macroura*), common raven (*Corvus corax*), red-winged blackbird (*Agelaius phoeniceus*), and the American robin (*Turdus migratorius*). Birds of prey occur in a large variety and number in the area due to the abundant rodent populations that thrive in fallow fields and grazing lands. Common birds of prey in the area include the golden eagle, red-tailed hawk (*Buteo jamaicensis*), American kestrel (*Falco sparverius*), prairie falcon (*Falco mexicanus*), and turkey vulture (*Cathartes aura*), great horned owl (*Bubo virginianus*), and barn owl (*Tyto alba*). Native waterfowl and herons, such as the American avocet (*Recurvirostra americana*), snowy plover (*Charadrius alexandrinus*), mallard duck (*Anas platyrhynchos*), northern pintail duck (*Anas acuta*), gadwall duck (*Anas strepera*), common teal duck (*Anas crecca*), redhead duck (*Aythya americana*), northern shoveler duck (*Anas clypeata*), eared grebes (*Podiceps nigricollis*), great blue heron (*Ardea herodias*), and the snowy egret (*Egretta thula*) are concentrated in natural water bodies with aquatic and wetland habitat as well as many man made features where these habitat types have developed.

Species that were once widespread and characteristic of native Central Valley habitats such as the San Joaquin kit fox (*Vulpes macrotis mutica*), San Joaquin pocket mouse (*Perognathus inornatus*), and burrowing owl (*Athene cunicularia*) are now rare in the area due to the extensive conversion of native valley habitat to other uses. These species are discussed below under the subheading of sensitive species.

Plants and animals of the southern San Joaquin Valley were described in recent field investigations conducted for the San Emidio New Town Specific Plan (Kern County 1992a, b), Pacific Pipeline Project (Aspen Environmental Group 1996), and Metropolitan Bakersfield Habitat Conservation Plan (City of Bakersfield 1994). Additional relevant data are assembled in the San Joaquin Valley Endangered Species Recovery Program (Williams 1998; USFWS 1997) and Kern County Draft Valley Floor Habitat Conservation Plan (Kern County 2001). General discussions of the vegetation of the region are provided in Twisselmann (1967, reprinted in Moe and Twisselmann 1995).

*Sensitive Species and Habitats*

Sensitive plants include state and federally listed, proposed, and candidate species, and species listed in the California Native Plant Society's (CNPS) Inventory of Rare and Endangered Plants (CNPS 2001). This evaluation includes plants that were identified in previous site inventories (Mitchell 1991, Aspen Environmental Group 1996). Sensitive plants known or likely to occur within the district and greater San Joaquin Valley floor are provided in Appendix B.

Sensitive wildlife species include state and federally listed, proposed and candidate species, and state and federal species of concern. The sensitive wildlife species potentially occurring or known to occur within the district and greater San Joaquin Valley floor are provided in Appendix B. Since 1998, the federal status of the Buena Vista Lake shrew (*Sorex ornatus relictus)* has changed from federal species of concern to federally listed as endangered (CNDDB 2002).

There are no significant stands of designated sensitive plant communities within the district. Undeveloped grassland and saltbush scrub habitats south of Highway 166 support noteworthy stands of the endangered Bakersfield cactus (*Opuntia basilaris* var. *treleasei*) and so would be considered sensitive with regard to future land use decisions.

An HCP has been adopted for the Metropolitan Bakersfield Area. Kern County is in the process of developing the Kern County Valley Floor Habitat Conservation Plan (KCVFHCP) for additional portions of the county. A draft of the KCVFHCP was released in April 2001 for public review, and the United States Fish and Wildlife Service (USFWS) released a Notice of Intent to prepare an EIS for the KCVFHCP in October 2002 (USFWS 2002). In addition, the Tejon Ranch Valley Floor HCP (TRVFHCP) is being developed for Tejon Ranch lands within the San Joaquin Valley, some of which are within the district.

#### *3.4.1.3 Castaic Lake Water Agency*

*Vegetation and Wildlife*

For the most part, the CLWA service area coincides with the Santa Clarita planning area (City of Santa Clarita 1991) and encompasses the Santa Clara River Valley, the east extension of the Santa Susana Mountains, the westernmost reaches of the San Gabriel Mountains, and the southern slopes of the Sierra Pelona. The principal natural features of the Santa Clarita Valley include the Santa Clara River (which is a dry riverbed most of the year, although portions contain riparian habitat patches), Castaic Valley, San Francisquito Canyon, Bouquet Canyon, Placerita Canyon, and Hasley Canyon. The Santa Clara River flows west intermittently from the San Gabriel Mountains to the Santa Susana Mountains and on through Ventura County to the ocean. This complex topography provides a natural setting that supports a diverse assemblage of biotic communities (City of Santa Clarita 1991).

Much of the existing development is concentrated along the Santa Clara River and Interstate 5. Although substantial portions of the Santa Clarita planning area have been developed, a large portion of the lands within the CLWA service area remains undeveloped. These undeveloped lands still support ecologically important vegetation and wildlife habitats. Major vegetation/habitat types include oak woodlands (distinct stands of valley oak, coast live oak, and interior live oak can be distinguished), chaparral, Southern California walnut woodlands, coastal and/or Riversidean (Venturan) sage scrub, non-native grassland, riparian scrub (characterized by mulefat and/or shrubby willows), and riparian woodlands (characterized by large willows and cottonwoods [*Populus fremontii*], including densely forested areas). Although large amounts of riparian habitat are not present in the CLWA service area, this habitat is important where it does occur. Inventories of plants and wildlife associated with these habitats are described in Aspen Environmental Group (1996) and County of Los Angeles (1996). The current vegetation and habitat setting is generally the same as in 1998; however, continued

growth and development in the area have resulted in some conversion of habitat to urban land uses.

In addition to the above habitats, there is open water habitat provided by Castaic Lake, Castaic Lagoon, and limited areas along the Santa Clara River. Except during and immediately after rainfall and runoff events, open water in the Santa Clara River west of Interstate 5 is principally a result of permitted discharges from the regional water reclamation facilities. Castaic Lake supports recreational fishing for bass, trout, catfish and bluegill, along with swimming, boating, and other recreation. The Santa Clara River is a regionally significant habitat area for native fishes and other wildlife.

*Sensitive Species and Habitats*

Within the CLWA service area, no regional HCPs or NCCPS have been adopted. However, some unincorporated portions of the service area are subject to Los Angeles County Significant Ecological Area (SEA) zoning overlays, which indicate the presence of sensitive resources and require county environmental review. These areas are discussed at greater length below.

Sensitive plants and animals potentially occurring or known to occur within the CLWA service area are listed in Appendix D. These compilations are based largely on the EIRs for the Pacific Pipeline Project (Aspen Environmental Group 1996) and the Newhall Ranch Specific Plan (County of Los Angeles 1996), and the Los Angeles County SEA Update Study (PCR 2000), all of which provide information on the regional and local occurrence of sensitive species in the area. These documents are available from the County of Los Angeles, Department of Regional Planning, 320 West Temple Street, Los Angeles, California 90012. Sensitive species information was also gleaned from the CNDDB (CNDDB 2002).

Los Angeles County has designated five locations in and around the Santa Clarita Valley as SEAs. The SEAs include the Santa Clara River, the Santa Susana Mountains, San Francisquito Canyon, Lyon Canyon, and Valley Oaks Savannah and are described below (City of Santa Clarita 1991). The SEAs are originally described in England and Nelson (1976).

1. **Santa Clara River.** This is the largest SEA in the Santa Clarita Valley, extending through the City of Santa Clarita and along the entire Santa Clara River watershed. It supports a variety of natural habitats including freshwater marsh, coastal sage scrub, oak woodland, and riparian woodlands. A great portion of the river channel, through the Santa Clarita planning area, is ephemeral and remains dry for most of the year. In scattered areas, however, the water table under the streambed is high, and lush riparian vegetation provides refuge for birds and wildlife. This assemblage of vegetation described as a broad wash association in the SEA descriptions is unlike that found in steeper mountain canyons. It is the only major river drainage from the San Gabriel Mountains that remains unchannelized for most of its length. This area was designated as an SEA primarily because of the threat of loss of suitable habitat for the unarmored threespine stickleback (*Gasterosteus aculeatus williamsoni*), a federally and state-listed endangered species. This species formerly occurred in the Los Angeles, San Gabriel, and Santa Ana rivers but is now restricted to San Francisquito Canyon, three areas in the Santa Clara River, and San Antonio Creek on Vandenberg Air Force Base. The

stickleback requires clean, free-flowing perennial streams and ponds surrounded by natural vegetation. The adjacent floodplain of the Santa Clara River is included in this SEA in order to preserve this habitat. The natural vegetation along the intermittent portion of the stream slows heavy runoff during rainy seasons and thus decreases destruction and siltation of stickleback habitats downstream.

2. **Santa Susana Mountains SEA**. The westernmost portion of the Santa Clarita planning area encompasses a portion of this SEA that covers 12,000 acres. These mountains are one of several relatively small ridges (dominated by Oat Mountain at elevation 3,840 feet) that form the eastern end of the transverse ranges and blend eastward into the larger San Gabriel and San Bernardino Mountains. The Santa Monica Mountains are also part of this system. Vegetation within this SEA consists of coastal sage scrub on the south-facing sunlit slopes and dense chaparral on the north facing slopes. Riparian and oak woodland vegetation is found along stream drainages and within canyons, along with bigcone spruce (*Pseudotsuga macrocarpa*), bigleaf maple (*Acer macrophyllum*), and California walnut (*Juglans californica*). The oak woodland habitat is extremely diverse containing six species of oaks. The interior portions of the Santa Susana Mountains are largely undisturbed by the urbanization that has occurred both to the south (San Fernando Valley) and to the north (Santa Clarita). These wilderness areas are important for maintaining gene flow and wildlife movement between the Santa Monica and the San Gabriel mountains, which are now largely isolated from one another by urban development.

3. **San Francisquito Canyon SEA**. San Francisquito Canyon SEA contains an intermittent stream that drains the hillsides north of the planning area in the Angeles National Forest. Riparian vegetation is located in the canyon bottom along the stream channel, while grasslands and chaparral are found on the walls. This SEA was designated because it supports populations of the unarmored threespine stickleback. The San Francisquito Canyon SEA is currently maintained to prevent downstream siltation of the Santa Clara River and provide constant water flows to preserve designated critical habitat for the unarmored threespine stickleback. The San Francisquito floodplain is included in the SEA in order to preserve downstream stickleback habitats.

4. **Lyon Canyon SEA**. The Lyon Canyon SEA is located in the southwest portion of the Santa Clarita planning area, west of Interstate-5, and covers approximately 150 acres. This SEA is a relatively narrow canyon that contains both an oak woodland community and a substantial chamisal chaparral community. The oak woodland, found in the southern portion of the SEA contains both the coast live oak (*Quercus agrifolia*) and the valley oak. The northern region of the SEA contains the chaparral community consisting of species such as sugarbush (*Rhus ovata*), ceanothus (*Ceanothus* sp.), black sage (*Salvia mellifera*), mulefat, and chamise (*Adenostoma fasiculatum*), the latter of which is the dominant shrub.

5. **Valley Oaks Savannah SEA**. The Valley Oaks Savannah SEA covers approximately 400 acres and is located west and east of Interstate-5, south of the Valencia Boulevard interchange. This area contains one of the last remaining stands of valley oak in the Santa Clarita Valley, and it represents the southernmost limit of large, contiguous Valley

Oak Savannah in California. Although the stand is quite extensive, little regeneration is occurring, possibly due to grazing or other disturbances. The vegetative land cover consists mainly of weed-dominated grasslands. Scattered coast live oaks occur throughout the area as well. Recent development, however, has significantly altered this SEA.

The County of Los Angeles is currently reviewing the SEA program as part of the General Plan Update. Recommendations from the county's consulting biologist include revised boundaries that would group smaller SEAs into larger connected SEAs (PCR 2000). Although the proposed boundaries cover a considerably larger area, they generally contain the same resources that persist in the exiting SEAs. A revised general plan and SEA program are not expected to be adopted until mid to late 2004.

Other sensitive biological resources located within the CLWA service area include riparian habitats, oak woodlands, walnut woodlands, and potential nesting and foraging habitat for sensitive and endangered species.

Riparian habitats, especially along the Santa Clara River, provide nesting and foraging habitat for many sensitive bird species including the federally and state listed endangered least Bell's vireo and the federally listed endangered southwestern willow flycatcher (*Empidonax traillii extimus*). Scrub habitat in the foothills supports some of the most northerly occurrences of the federally listed threatened California gnatcatcher (*Polioptila californica californica*). Riparian habitats along the Santa Clara River, Soledad Canyon, and/or San Francisquito Canyon support population of the federally and state listed endangered unarmored threespine stickleback, federally listed endangered Santa Ana sucker (*Catostomus santaanae*), federally listed endangered arroyo toad, and the federally listed threatened California red-legged frog. Vernal pool habitat in the vicinity of Cruzan Mesa have historically supported the federally listed threatened vernal pool fairy shrimp (*Branchinecta lynchii*), federally listed endangered Riverside fairy shrimp (*Streptocephalus woottoni*), federally listed threatened spreading navarretia (*Navarretia fossalis*), and the federally and state listed endangered California Orcutt grass (*Orcuttia californica*) and thread-leaved brodiaea (*Brodiaea filifolia*). Two additional listed plant species, federally and state listed endangered Nevin's barberry and slender-horned spineflower (*Dodecahema leptoceras*), have been documented in the region (City of Santa Clarita 1991; PCR 2000). Since 1998, the San Fernando Valley spineflower was added to the state endangered list (CNDDB 2002). Additionally, the Arroyo toad was moved from the federal list of threatened species to the list of endangered species. With the above exceptions, the current environmental setting is generally the same as it was in 1998; however, continued growth and development in the area may have resulted in some impacts to the abundance of sensitive species with the conversion of land to urban uses.

Other important habitats and biological resource areas within the Santa Clarita planning area are listed below (from City of Santa Clarita 1991):

- Land within the Angeles and Los Padres National Forests, including Elsmere Canyon, and wildlife corridors between the Santa Susana Mountains and the San Gabriel Mountains.

- Canyon areas, including Whitney Canyon, Elsmere Canyon, Wiley Canyon, East Canyon, Towsley Canyon, Rice Canyon, San Francisquito Canyon, and other canyons that provide important habitat (water, food and shelter) and biological resources, and add to the viewshed of the Santa Clarita Valley.
- Open water habitat provided by Castaic Lake, Castaic Lagoon, and isolated locations along the Santa Clara River.
- Habitat for federally listed endangered, threatened, or rare plant and wildlife species found in chaparral and coastal sage scrub vegetation.
- State listed endangered plant and wildlife species found in chaparral and coastal sage scrub habitat.
- Oak trees that are protected by ordinances within the City of Santa Clarita and elsewhere in Los Angeles County.

## 3.4.2 Potential Impacts of the Project

### *3.4.2.1 Significance Criteria*

The criteria used to determine the significance of impacts to biological resources are based on Appendix G of the State CEQA Guidelines. The Project would result in a significant impact if it would:

- have a substantial adverse impact, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the CDFG or USFWS;
- have a substantial adverse impact on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, and regulations or by the CDFG or USFWS;
- adversely impact federally protected wetlands (including marsh, vernal pool, coastal, etc.) either individually or in combination with the known or probable impacts of other activities through direct removal, filling, hydrological interruption, or other means;
- interfere substantially with the movement of any resident or migratory fish or wildlife species or with the established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites;
- conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance; or
- conflict with the provisions of an adopted HCP, NCCP, or other approved, local, regional, or state habitat conservation plan.

For the purpose of this analysis, "sensitive" habitats or species are those that are demonstrably rare, threatened, or endangered; are protected by statute or regulation; or have recognized commercial, recreational, or scientific importance.

### 3.4.2.2 Environmental Impacts

#### 3.4.2.2.1 State Water Project and Associated Facilities

DIRECT IMPACTS

Implementation of the Project would not require new construction or the modification of existing SWP facilities. The annual amount of SWP diversions from the Delta would be unchanged, and runoff would continue to be captured when available and stored in SWP and local facilities. Runoff would be used to meet SWP demand based on current SWP operating criteria and management practices. As described in section 3.0, the timing of SWP diversions at the Delta could change slightly, although this change would be minor and within the current operating criteria. The slight change in the timing of diversions would not result in an impact to biological resources.

The Project would result in a slight increase in the amount of water transported in the California Aqueduct from southern Kern County to Castaic Lake. This change would not adversely impact fish or other wildlife that use the Aqueduct. As described in section 3.0, minor seasonal changes in the average volume of water stored in San Luis Reservoir would result from Project implementation. The average volume of stored water would decrease slightly from December through June and would slightly increase the rest of the year. The amount of water stored in the reservoir already fluctuates, and the changes resulting from the Project would fall within the range of fluctuations present under both current and historic operations. Impacts to biological resources at San Luis Reservoir would be less than significant. The volume of water stored at Castaic Lake would not change as a result of the Project, and biological resources would not be impacted.

Since the only changes to the operation of SWP facilities are minor and since no construction would occur, the Project would not adversely impact candidate, sensitive, or special status species, riparian habitat or other sensitive natural communities, federally protected wetlands; interfere with the movement of any fish or wildlife species or impede the use of native wildlife nursery sites; conflict with any local policies or ordinances protecting biological resources, or conflict with the provisions of an adopted HCP, NCCP, or other approved, local, regional, or state HCP. In summary, there would be no direct impact to biological resources for the California Aqueduct, associated facilities, or adjacent lands.

INDIRECT IMPACTS

No indirect impacts to biological resources would occur.

#### 3.4.2.2.2 Wheeler Ridge-Maricopa Water Storage District

DIRECT IMPACTS

The Project would not result in changes in the amount of land actively used for agriculture or other uses. Since the Project would not require new construction, no direct loss of habitat or impacts to sensitive species would occur from construction activities. Overall, the Project would not adversely impact candidate, sensitive, or special status species, riparian habitat or

other sensitive natural communities, federally protected wetlands; interfere with the movement of any fish or wildlife species or impede the use of native wildlife nursery sites; conflict with any local policies or ordinances protecting biological resources, or conflict with the provisions of an adopted HCP, NCCP, or other approved, local, regional, or state HCP.

INDIRECT IMPACTS

No indirect impacts to biological resources would occur.

*3.4.2.2.3 Castaic Lake Water Agency*

DIRECT IMPACTS

Since implementation of the Project would not require the construction of new CLWA facilities or modification of existing CLWA facilities, no direct impact to biological resources would occur.

INDIRECT IMPACTS

Potential environmental impacts from growth that could occur as an indirect impact of the Project are addressed in Chapter 4, Growth-Inducing Effects and Growth-Related Impacts.

### 3.4.3 Mitigation Measures

#### *3.4.3.1 State Water Project and Associated Facilities*

No direct or indirect significant impacts to biological resources were identified, therefore no mitigation measures are required.

#### *3.4.3.2 Wheeler Ridge-Maricopa Water Storage District*

No direct or indirect significant impacts to biological resources were identified, therefore no mitigation measures are required.

#### *3.4.3.3 Castaic Lake Water Agency*

No direct significant impacts to biological resources were identified, therefore no mitigation measures are required. Indirect impacts are addressed in Chapter 4, Growth Inducement and Growth-Related Impacts.

### 3.4.4 Significant Unavoidable Impacts

No direct or indirect significant unavoidable impacts would result from the Project, with the exception of potential indirect impacts within the CLWA service area. These are addressed in Chapter 4, Growth-Inducing Effects and Growth-Related Impacts.

# 3.5 CULTURAL RESOURCES

## 3.5.1 Environmental Setting

Cultural resources include prehistoric and historic archaeological sites, districts, and objects; standing historic structures, buildings, districts, and objects; and locations of important historic events, or sites of traditional/cultural importance.

These "historical resources" are defined in State CEQA Guidelines section 15064.5 as the following:

1. A resource listed in, or determined to be eligible by the State Historical Resources Commission for listing in the California Register of Historical Resources (Pub. Res. Code section 5024.1, Title 14 CCR, section 4850 et seq.).
2. A resource included in a local register of historical resources, as defined in section 5020.1(k) of the Public Resources Code or identified as significant in a historical resource survey meeting the requirements of section 5024.1(g) of the Public Resources Code, shall be presumed to be historically or culturally significant. Public agencies must treat any such resource as significant unless the preponderance of evidence demonstrates that it is not historically or culturally significant.
3. Any object, building, structure, site, area, place, record, or manuscript that a lead agency determines to be historically significant or significant in the architectural, engineering, scientific, economic, agricultural, educational, social, political, military, or cultural annals of California may be considered to be a historical resource, provided the lead agency's determination is supported by substantial evidence in light of the whole record. Generally, a resource shall be considered by the lead agency to be "historically significant" if the resource meets the criteria for listing on the California Register of Historical Resources (Pub. Res. Code section 5024.1, Title 14 CCR, section 4852), including the following:
    a. is associated with events that have made a significant contribution to the broad patterns of California's history and cultural heritage;
    b. is associated with the lives of persons important in our past;
    c. embodies the distinctive characteristics of a type, period, region, or method of construction, or represents the work of an important creative individual, or possesses high artistic values; or
    d. has yielded, or may be likely to yield, information important in prehistory or history.

Paleontologic resources are the recognizable remains of once-living, non-human organisms. Identified as fossils, these resources represent a record of the history of life on the planet dating as far back as approximately four billion years ago. Paleontologic resources can include shells, bones, leaves, trails, and other fossilized floral or faunal materials.

#### 3.5.1.1 State Water Project and Associated Facilities

No substantial changes in baseline conditions have occurred between the 1998 NOP and the 2003 NOP.

*California Aqueduct*

The California Aqueduct is a 444-mile-long concrete-lined canal running between the Delta and Lake Perris. The oldest sections were built in the early 1960s, and the most recent sections were built in the early 1990s. The California Aqueduct, along with the regional feeder aqueducts, passes through Alameda, Contra Costa, San Joaquin, Stanislaus, Merced, Fresno, Kings, Kern, Santa Barbara, San Luis Obispo, Los Angeles, and San Bernardino counties. Its corridor includes the areas traditionally inhabited by the Miwok, Northern Valley Yokuts, Southern Valley Yokuts, Chumash, Tataviam, Gabrielino, Serrano, Cahuilla, and other neighboring tribes.

*San Luis Reservoir*

San Luis Reservoir is a storage reservoir for the CVP and SWP that was filled for the first time in 1969. San Luis Reservoir is located on the flanks of the San Joaquin Valley, on land that was traditionally inhabited by the Northern Valley Yokuts at the time of first European contact. The San Joaquin River, associated channels and sloughs, formed the core of the Northern Yokuts' homeland (Wallace 1978a). The Northern Yokuts' subsistence practices centered around the San Joaquin River, fishing salmon and harvesting tule roots that grew in riverine marshes. Acorns from valley oaks also played an important role in their diet, and were made into a thick soup or gruel. The valley floor of the San Joaquin River region contains numerous Native American archaeological sites, such as stone tool manufacturing stations (i.e., lithic scatters) and acorn processing sites (e.g., bedrock mortars) (USBR 1997).

The Northern Yokut population rapidly declined as the result of disease, missionization, and, later, by the arrival of American miners and settlers during the gold rush years (Wallace 1978a). Spanish soldiers, Mexican ranchers, and early gold miners traveled through nearby Pacheco Pass, named after Don Juan Pacheco who settled there in 1840, and the pass became part of an early stage route between San Francisco and Missouri. By the late 1800s, the economy of the west side of San Joaquin Valley was firmly rooted in agricultural pursuits (USBR 1997). The San Joaquin River region contains numerous historic sites related to early mining, settlement, and agricultural (USBR 1997). There may be historic, prehistoric, or paleontologic sites either along the reservoir margins or located on submerged knolls.

*Castaic Lake*

The West Branch of the California Aqueduct terminates at Castaic Lake, in the northern portion of the CLWA service area. Local ethnographic groups and historic land uses are the same as those described for the CLWA service area in section 3.5.1.3 below.

The creation of the Castaic Dam and lake facility in 1972 inundated cultural resources located along on the margins of the lake (CCWA 1995), including seven prehistoric sites listed in Table 3.5-1. No historic resources are recorded in the area; however, no systematic survey of the lake margins was conducted prior to the construction of the dam (CCWA 1995). Therefore, there

**Table 3.5-1. Castaic Lake Cultural Resources**

| *Site* | *Description* | *Condition* |
|---|---|---|
| CA-LAN-323 | Prehistoric village site with bedrock mortars | Cultivated prior to inundation |
| CA-LAN-324 | Prehistoric village with cemetery | Bulldozed before inundation |
| CA-LAN-325 | Prehistoric rock shelter | Heavily looted |
| CA-LAN-326 | Prehistoric stone tool scatter | Crossed by highway prior to inundation |
| CA-LAN-327 | Prehistoric temporary camp | Cultivated prior to inundation |
| CA-LAN-1221 | Prehistoric sandstone rock shelter | Lake flooding, boating access, and illicit artifact collection |
| CA-LAN-1222 | Prehistoric sandstone rock shelter | Lake flooding, boating access, and illicit artifact collection |

*Note*: No historic resources have been recorded.
*Source*: CCWA 1995.

may be unrecorded historic, prehistoric, or paleontologic sites either along the lake margins or located on submerged knolls.

#### *3.5.1.2 Wheeler Ridge-Maricopa Water Storage District*

No substantial changes in baseline conditions have occurred between the 1998 NOP and the 2003 NOP. Several ethnographic groups were scattered throughout what is now Kern County, including the Southern Valley Yokuts, Kitanemuk, Castac Chumash (Heizer 1978). The Southern Valley Yokuts inhabited the southern end of the San Joaquin Valley, from the lower Kings River to the Tehachapi Mountains (Wallace 1978b). The Kitanemuck were located principally in the Tehachapi Mountains at the southern end of the San Joaquin Valley (Blackburn and Bean 1978), while the traditional territory of the Castac Chumash is located in the southwestern portion of Kern County (Grant 1978a). Cultivated areas are considered to have a low to moderate cultural resource sensitivity because historic plowing and grading associated with cultivated agriculture generally destroys or damages the integrity of any cultural sites within the cultivated area.

Although Spanish explorers entered Kern County area as early as the 1770s, major European influence began in the mid-1800s with the influx of settlers associated with Spanish land grants and gold miners drawn to the 1857 gold discovery in the Greenhorn Mountain area of eastern Kern County. As gold-fever declined, agricultural pursuits and oil exploration began to grow in Kern County, and historic resources in the county are often associated with these early industries.

#### *3.5.1.3 Castaic Lake Water Agency*

For purposes of this analysis, no substantial changes in baseline conditions have occurred between 1998 and the present. The CLWA service area is located in Ventura and Los Angeles counties, where at least four distinct ethno-linguistic groups were living at the time of first European contact. The area around Castaic Lake itself was the home of the Tataviam, a group of about 1,000 people who lived in villages along Piru Creek, Castaic Creek, and the upper

portions of the Santa Clara River drainage (King and Blackburn 1978). The lower Santa Clara River drainage was home to the Ventureño Chumash, a much larger (about 4,000 people) and more maritime oriented group (Grant 1978b). The upper portions of Piru Creek, along with much of the inland portions of Ventura County, were inhabited by the Emigdiano and Castac Chumash (Grant 1978a). Native American archaeological sites from various time periods exists within the CLWA service area, especially along the Piru and Castaic drainage systems, at the Vasquez Rocks and Escondido Canyon, and along major ridgelines (CLWA 1999).

Spanish contact with Native American groups along the coast began as early as the mid 1500s, but it was not until the late 1700s that the Spanish, and then Mexicans, established any kind of continuous presence. The discovery of gold in Placerita Canyon near Newhall during the 1840s attracted many miners to the area, and agricultural and livestock operations rose up in the Santa Clara River valley to support their need for provisions. Oil was discovered in the area in the 1870s, and settlement accelerated throughout the late 1800s with the development of regional and interregional transportation systems. Historic resources documented in the CLWA service area are usually associated with major routes of travel, watercourses, and early homesteading practices in and around Newhall (Scientific Resource Surveys 1988).

The CLWA service area contains at least three types of geologic units that have yielded fossilized material. Fossilized fish, shark teeth, and invertebrate remains have been recovered from the Castaic Formation, remains of Clarendonian land mammals have been recorded in the Saugus Formation, and marine invertebrates are often common in Quaternary terrace deposits (Scientific Resource Surveys 1988).

## 3.5.2 Potential Impacts of the Project

### *3.5.2.1 Significance Criteria*

Section 15064.5 of the CEQA Guidelines indicates a project may have a significant environmental effect if it causes "substantial adverse change" in the significance of an "historical resource" or a "unique archaeological resource" as defined or referenced in CEQA Guidelines section 15064.5[b, c]. Such changes include "physical demolition, destruction, relocation, or alteration of the resource or its immediate surroundings such that the significance of an historical resource would be materially impaired" (CEQA Guidelines section 15064.5 [b]).

An impact on cultural resources is considered significant, therefore, if it adversely affects a resource that is listed in or eligible for listing in the California Register of Historical Resources or is otherwise considered a unique or important archaeological resource under CEQA. In general, a project may have an adverse effect on a cultural resource if it would:

- cause a substantial adverse change in the significance of a historical resource as defined in State CEQA Guidelines section 15064.5;
- cause a substantial adverse change in the significance of an archaeological resource pursuant to State CEQA Guidelines section 15064.5;
- directly or indirectly destroy a unique paleontological resource or site or unique geologic feature; or
- disturb any human remains, including those interred outside of formal cemeteries.

### *3.5.2.2 Environmental Impacts*

Direct impacts to cultural resources are primarily associated with ground disturbance from construction-related activities. Changing water levels of a reservoir or lake could also impact a cultural resource by permanently submerging a resource or by repeatedly inundating and then exposing a resource (USBR 1997). Submerging a site would eliminate access to the site for future scientific study and could affect site integrity. Repeated inundations/exposures could lead to site erosion and could cause perishable artifacts to disintegrate more rapidly. Sites could also be more susceptible to looting if site erosion led to the exposure of more artifacts or fossils on the ground surface. Such actions could compromise the integrity of a cultural resource.

#### *3.5.2.2.1 State Water Project and Associated Facilities*

DIRECT IMPACTS

Implementation of the Project would not require new construction or the modification of existing SWP facilities; nor would it change the operating criteria of these facilities. The proposed transfer would result in a slight increase in the amount of water transported in the California Aqueduct from Kern County to Castaic Lake, but this would not affect cultural resources. As described in section 3.0, minor seasonal changes in the volume of water stored in San Luis Reservoir would result from Project implementation. The average volume of water stored would decrease slightly from December through June, potentially exposing more submerged cultural resources during this period, but the change would be minor and the resulting elevations would fall within the range of fluctuations present under both current and historic operations. The impact would be less than significant. The amount of water stored in Castaic Lake would not change as a result of the Project; thus, no impacts to cultural resources would occur.

Since no construction or substantive operational changes would occur, the Project would not cause a substantial adverse change in the significance of historical or archaeological resources, directly or indirectly destroy a unique paleontological resource or site or unique geologic feature, or disturb any human remains.

INDIRECT IMPACTS

No indirect impacts to cultural resources would occur.

#### *3.5.2.2.2 Wheeler Ridge-Maricopa Water Storage District*

DIRECT IMPACTS

Implementation of the Project would not require new construction or the modification of existing WRMWSD facilities, nor would it change the current operation of these facilities. Since no construction or substantive operational changes would occur, the Project would not cause a substantial adverse change in the significance of historical or archaeological resources, directly or indirectly destroy a unique paleontological resource or site or unique geologic feature, or disturb any human remains.

INDIRECT IMPACTS

No indirect impacts to cultural resources would occur.

*3.5.2.2.3 Castaic Lake Water Agency*

DIRECT IMPACTS

Implementation of the Project would not require the construction of new CLWA facilities or modification of existing facilities. Since no construction or operational changes would occur, the Project would not cause a substantial adverse change in the significance of historical or archaeological resources, directly or indirectly destroy a unique paleontological resource or site or unique geologic feature, or disturb any human remains.

INDIRECT IMPACTS

Potential environmental impacts from growth that could occur as an indirect impact of the Project are addressed in Chapter 4, Growth-Inducing Effects and Growth-Related Impacts.

## 3.5.3 Mitigation Measures

### *3.5.3.1 State Water Project and Associated Facilities*

No direct or indirect significant impacts to cultural resources would occur; therefore, no mitigation measures are required.

### *3.5.3.2 Wheeler Ridge-Maricopa Water Storage District*

No direct or indirect significant impacts to cultural resources would occur; therefore, no mitigation measures are required.

### *3.5.3.3 Castaic Lake Water Agency*

No direct significant impacts to cultural resources would occur; therefore, no mitigation measures are required. Mitigation measures for significant indirect impacts are addressed in Chapter 4, Growth-Inducing Effects and Growth-Related Impacts.

## 3.5.4 Significant Unavoidable Impacts

No direct or indirect significant unavoidable impacts would result from the Project.

# 3.6 GEOLOGY, SOILS AND MINERAL RESOURCES

## 3.6.1 Environmental Setting

### *3.6.1.1 State Water Project and Associated Facilities*

No substantial changes in baseline conditions have occurred between the 1998 NOP and the 2003 NOP. The portion of the SWP and associated facilities that would potentially be affected by implementation of the Project extends from the South Delta region near the confluence of the San Joaquin and Sacramento rivers to the terminus of the West Branch at Castaic Lake. In order from north to south, the SWP facilities traverse the relatively flat terrain of the western San Joaquin Valley, the Tehachapi Mountain Range, and the Santa Clarita Valley. The environmental setting of the southern San Joaquin and Santa Clarita valleys are described in detail in sections 3.6.1.2 and 3.6.1.3, respectively. This section describes the topography, soils, and geology of the north and central San Joaquin Valley and the Tehachapi Mountain Range.

*Topography and Stratigraphy.* The California Aqueduct conveys water along the western side of the San Joaquin Valley from the Delta down to Kern County. The alignment follows the land contours in the San Joaquin Valley where possible to minimize energy costs from pumping the water. The SWP facilities through the northern and central portion of the San Joaquin Valley traverse the contact between the Coast Range and Central Valley geologic provinces.

The landform types along the San Joaquin Valley alignment are basin rim/basin floor and terrace (CALFED 1999). Basin lands consist of poorly drained soils, and saline and alkali soils in the valley trough and on the basin rims (CALFED 1999). Soils at a moderate depth to bedrock (20-40 inches) occur in the northern part of the San Joaquin Valley where the annual rainfall is intermediate to moderately high (CALFED 1999). Soils less than 20 inches deep occur in the medium- to low-rainfall zone at lower elevations in the southern San Joaquin Valley (CALFED 1999). Soil salinity problems occur primarily in the western and southwestern portions of the San Joaquin Valley, in areas derived from the marine sediments of the Coast Ranges containing salts and trace elements such as arsenic, boron, molybdenum, and selenium (CALFED 1999).

From the southern San Joaquin Valley, water is pumped through a series of tunnels, pipelines, and canals through the Tehachapi Mountain. The highest peaks in the Techachapi Mountains are over 7,000 feet above mean sea level. The Techachapi Mountains consist of a basement complex of crystalline rocks (Hagan 2001).

*Minerals.* Numerous oil wells, groundwater wells and gravel mining operations are scattered throughout the regions traversed by or containing SWP facilities. Any mineral resources directly associated with SWP facilities would be under the jurisdiction of DWR or its designee.

*Seismicity.* Numerous earthquake fault systems lie within or traverse the San Joaquin River Region. The Coast Ranges and the western boundary of the San Joaquin Valley joins the Great Valley thrust fault system, which has a maximum credible earthquake (MCE) of 6.7 (CALFED 1999). To the west of the valley is the Diablo Range, which is mainly subject to seismicity from northwest-trending faults associated with the San Andreas Fault system (CALFED 1999). The

mapped active[1] faults of this system that are most likely to affect the upper watersheds west of the San Joaquin Valley are the Ortigalita Fault, and the Greenville-Marsh Creek Fault, which have MCEs of 7.0 and 7.25 respectively (Mualchin 1996).

#### *3.6.1.2 Wheeler Ridge-Maricopa Water Storage District*

No substantial changes in baseline conditions have occurred between the 1998 NOP and the 2003 NOP.

*Topography and Stratigraphy*. The district is located in southern Kern County, and extends southward onto Wheeler Ridge. Elevations range from 295 to 1,800 feet above mean sea level. The district is located within the Great Valley and Sierra Nevada batholith geologic provinces. This portion of the batholith is composed predominantly of Mesozoic-age granitic rock and overlying Miocene sediments. The San Andreas and Garlock fault systems are located south of the district, and the district and straddles the White Wolf fault. Sand and clay loams characterize the soils present in the district. Complexes composed of several soil combinations are also present. Many of these soils contain saline-sodic properties. Areas of major riverwashes also exist in the district.

Due to the relatively gentle slopes found in the district, erosion is generally related to agricultural practices, although most landowners within the district implement voluntary erosion control measures. Generally, the district does not contain extensive areas of expansive soils. Due to the gentle slopes found in the district and the deep groundwater levels, only a small portion of the district is subject to liquefaction, lateral spreading and landslides. Historically, groundwater overdraft has occurred in areas of the district (BE 1995); therefore, portions of the district may be subject to subsidence. Throughout the district, however, groundwater levels have either stabilized or have risen since the importation of SWP water (BE 1995), reducing the risk of subsidence.

*Minerals*. Portions of the district are, or have historically been, used for oil and gas exploration and production. In addition, active sand and gravel mining areas exist within the district.

*Seismicity*. Numerous earthquake faults have been identified in the vicinity of the district. The Pleito, Springs, and White Wolf faults traverse the district. The Pleito fault is capable of producing an MCE of 7.3 (Mark 1977), but no substantial historic earthquakes have been attributed to the Pleito fault. The Springs fault is estimated as being capable of producing an MCE of 6.75 (Greensfelder 1974). The White Wolf fault is estimated as being capable of producing an MCE of 7.75 (Greensfelder 1974). The White Wolf fault was the origin of the 1952 Arvin-Tehachapi earthquake, which had a magnitude of 7.7 on the Richter Scale. Other nearby active faults capable of producing earthquakes in WRMWSD include the Garlock and San Andreas faults, located approximately 8.5 miles south/southeast and 12 miles south/southwest, respectively. The Garlock fault is capable of producing an MCE of 7.75 and the San Andreas is capable of producing an MCE of 8.25 (Greensfelder 1974).

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1 An active fault is defined as a fault that has shown displacement in the last 11,000 years (Holocene) and a potentially active fault is defined as showing evidence of displacement during the last 1.6 million years (Quaternary) (CDMG 1992).

#### *3.6.1.3 Castaic Lake Water Agency*

No substantial changes in baseline conditions have occurred between the 1998 NOP and the 2003 NOP.

*Topography and Stratigraphy.* The CLWA service area encompasses the relatively flat-lying Santa Clarita Valley and portions of the surrounding hills and mountains. The geology of the CLWA service area consists of a relatively thick sequence of Plio-Pleistocene Saugus Formation, locally overlain by more recent alluvial deposits. The Saugus Formation consists primarily of semi-consolidated conglomerate and sandstone materials, which reach a maximum thickness of approximately 7,000 feet (Slade 1988). Alluvial deposits consist of a maximum of 200 feet of unconsolidated gravel, sand, silt, and clay, which occur as relatively narrow strips underlying and adjacent to major stream channels (Slade 1988).

Soils within and adjacent to the CLWA service area typically consist of sandy silts and silty sands. The soil erosion potential is very high in many of the steep, mountainous regions of the CLWA service area. Although generally not prevalent, clay-rich soils within CLWA may be subject to expansion. Liquefaction is most likely to occur in areas of the CLWA service area that are saturated at very shallow depths, such as adjacent to the Santa Clara River (City of Santa Clarita 1991, CLWA 1988). Lateral spreading would most likely occur within CLWA along the banks of the Santa Clara River or its tributaries. Historically, groundwater overdraft has not occurred within the Alluvial and Saugus Formation aquifers of the Santa Clarita Valley, and regional ground subsidence has not occurred (CLWA 2001). Due to the rugged, high relief of the foothill and mountainous areas surrounding the Santa Clarita Valley, landslides and unstable slopes are present in many portions of the CLWA service area (City of Santa Clarita 1991).

*Minerals*. Portions of the CLWA service area historically have been used for oil and gas exploration and production. Oil fields in the area include the Newhall-Potrero, Placerita, Castaic Junction, Castaic Hills, Bouquet Canyon, Wayside Canyon, Tapia, and Honor Rancho fields (California Department of Conservation, Division of Oil, Gas and Geothermal Resources [DOGGR] 1998, 1999).

Much of the CLWA service area is classified as potential sand and gravel mineral resource areas. Most of the floodplain of the Santa Clara River drainage system is classified by the California Department of Mines and Geology (CDMG) as Zone MRZ-2, which is an area where adequate information indicates that significant mineral deposits are present or where it is judged that a high likelihood for their presence exists. This zone along the Santa Clara River also includes the major tributaries Castaic and Newhall creeks. The remainder of the tributaries, which contain substantial alluvial deposits, are classified as Zone MRZ-3, which are those areas containing mineral deposits, the significance of which cannot be evaluated from available data. The larger of these remaining tributary alluvial deposits that may be future sources of aggregate include San Francisquito, Bouquet, Mint, Upper Soledad, Oak Spring, Sand, Pico, and Hasley Canyons (CDMG 1987).

Tertiary sedimentary rocks in the CLWA service area are also considered alternative sources of aggregate. The Saugus Formation is classified as Zone MRZ-3. Although in many areas the

Saugus Formation contains an abundance of clayey silt, clayey sandstone, and sandy mudstone, many areas consist of relatively clean sandstone and conglomerate, which are suitable sources of aggregate (CDMG 1987).

*Seismicity.* Two faults, including the active San Gabriel fault, and the potentially active Holser fault, traverse the CLWA service area. The active San Andreas fault is located approximately 18 miles northeast of the central portion of the Santa Clarita Valley. The San Fernando and Sierra Madre faults are also located in the vicinity of the CLWA service area. The San Gabriel fault is capable of producing an MCE of 7.5 (Mark 1977). The Holser fault is estimated as being capable of producing an MCE of 7.25 (Slemmons 1977). The San Andreas fault is estimated as being capable of producing an MCE of 8.25 (Greensfelder 1974). The San Fernando and Sierra Madre faults are capable of producing an MCE of 6.7 (Slemmons 1977) and 7.5 (Greensfelder 1974) respectfully. Areas of potential liquefaction have been identified adjacent to the Santa Clara River. Soils in the area typically consist of sandy silts and silty sands.

## 3.6.2 Potential Impacts of the Project

### *3.6.2.1 Significance Criteria*

The criteria listed below are based on Appendix G of the State CEQA Guidelines. The Project would have a significant impact on geology, soils, and mineral resources if it would:

- expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:
  - rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault;
  - strong seismic ground shaking;
  - seismic-related ground failure, including liquefaction;
  - landslides; or
- result in substantial soil erosion or the loss of topsoil; or
- involve construction located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse; or
- be located on expansive soil, as defined in the Uniform Building Code, creating substantial risks to life or property; or
- result in the substantial loss of availability of a known mineral resource that would be of value to the region and the residents of the state; or
- result in the substantial loss of availability of a locally important mineral resource recovery site delineated on a local general plan, specific plan, or other land use plan.

*Alquist-Priolo Earthquake Fault Zoning Act*

The Alquist-Priolo Earthquake Fault Zoning Act of 1972 requires the State Geologist to delineate zones along active faults in California so that structural development can be regulated to reduce the risk to humans and structures associated with seismic activity. The act prohibits the construction of structures intended for human occupancy within these zones (occupancy rate of more than 2,000 person-hours per year), as well as requires local agencies to regulate certain developments.

### *3.6.2.2 Environmental Impacts*

#### *3.6.2.2.1 State Water Project and Associated Facilities*

DIRECT IMPACTS

Implementation of the Project would not require new construction or the modification of existing SWP facilities; nor would it change the operating criteria of these facilities. The Project would result in a slight increase in the amount of water transported in the California Aqueduct from Kern County to Castaic Lake, but this volume would be within the range that has been transported by the aqueduct both in recent years and historically. Slightly increasing the amount of water transported in the aqueduct would not affect geology, soils, or minerals. As described in section 3.0, minor seasonal changes in the volume of water stored in San Luis Reservoir would result from Project implementation. The average volume of water stored would decrease slightly from December through June, exposing more soil to wind and water erosion during this period, but the change would be minor and the resulting elevations would fall within the range of fluctuations present under both current and historic operations. This impact would be less than significant. Changes in the timing of water storage at this facility would not affect other geologic resources or minerals. The amount of water stored in Castaic Lake would not change as a result of the Project; thus, no erosional impacts would occur. Since no construction or substantive operational changes would occur, implementation of the Project would not expose people or structures to seismic hazards or other hazards involving construction on an unstable or potentially unstable unit or expansive soils. The Project would not result in soil erosion or loss of topsoil, nor would it result in the loss of mineral resources.

INDIRECT IMPACTS

No indirect impacts to geology, soils, or mineral resources would occur.

#### *3.6.2.2.2 Wheeler Ridge-Maricopa Water Storage District*

DIRECT IMPACTS

Implementation of the Project would not require new construction or the modification of existing WRMWSD water distribution facilities, nor would it change the current operation of these facilities. Since no construction or operational changes would occur, implementation of the Project would not expose people or structures to seismic hazards or other hazards involving construction on an unstable or potentially unstable unit or expansive soils, result in substantial erosion or the loss of topsoil, nor would it result in the loss of mineral resources.

INDIRECT IMPACTS

No indirect impacts to geology, soils, or mineral resources would occur.

*3.6.2.2.3 Castaic Lake Water Agency*

DIRECT IMPACTS

Implementation of the Project would not require the construction of new CLWA facilities or modification of existing CLWA facilities. Transferring an additional 41,000 AF of water through existing facilities for use within the service area would not affect geology, soils, or minerals. Since no construction or operational changes would occur, implementation of the Project would not expose people or structures to seismic hazards or other hazards involving construction on an unstable or potentially unstable unit or expansive soils. The Project would not result in water erosion of soils or the loss of topsoil, nor would it result in the loss of mineral resources.

INDIRECT IMPACTS

Potential impacts from population growth that could occur as an indirect impact of the Project are addressed in Chapter 4, Growth-Inducing Effects and Growth-Related Impacts.

## 3.6.3 Mitigation Measures

### *3.6.3.1 State Water Project and Associated Facilities*

No direct or indirect significant impacts to geologic resources would occur; therefore, no mitigation measures are required.

### *3.6.3.2 Wheeler Ridge-Maricopa Water Storage District*

No direct or indirect significant impacts to geologic resources would occur; therefore, no mitigation measures are required.

### *3.6.3.3 Castaic Lake Water Agency*

No direct significant impacts to geologic resources would occur; therefore, no mitigation measures are required. Mitigation measures for indirect impacts are addressed in Chapter 4, Growth-Inducing Effects and Growth-Related Impacts.

## 3.6.4 Significant Unavoidable Impacts

No direct or indirect significant unavoidable impacts would result from the Project.

# 3.7 HAZARDS AND HAZARDOUS MATERIALS

A material is considered hazardous if it appears on a list of hazardous materials prepared by a federal, state, or local agency, or if it has characteristics defined as hazardous by such an agency. Chemical and physical properties cause a substance to be considered hazardous, including the properties of toxicity, ignitability, corrosivity and reactivity. These properties are defined in California Code of Regulations, Title 22, Sections 66261.20-66261.24. Common materials that are considered hazardous include fuels, motor oil, grease, various lubricants, solvents, soldering equipment and glues. A "hazardous waste" is any hazardous material that is discarded, abandoned, or recycled. The criteria that render a material hazardous also make a waste hazardous (California Health and Safety Code, Section 25117).

## 3.7.1 Environmental Setting

### *3.7.1.1 State Water Project and Associated Facilities*

No substantial changes in baseline conditions have occurred between the 1998 NOP and the 2003 NOP. Much of the area traversed by the California Aqueduct is used for agricultural purposes. Pesticides and fertilizers used for agricultural operations may accumulate in the soil and may over time contaminate surface water and groundwater supplies. Urban areas contain commercial and industrial facilities that may produce and/or use a wide variety of hazardous materials, including fuels and solvents. Fuels, chemicals, and other hazardous materials and hazardous wastes are also transported via roadways and railways in the vicinity of SWP facilities. A variety of fuels, solvents, and other hazardous materials are used as part of DWR's regular operations and maintenance of SWP facilities.

### *3.7.1.2 Wheeler Ridge-Maricopa Water Storage District*

No substantial changes in baseline conditions have occurred between the 1998 NOP and the 2003 NOP. A substantial portion of the district is used for agricultural purposes. Pesticides and fertilizers used for agricultural operations may accumulate in the soil and may over time contaminate surface water and groundwater supplies. Industrial facilities and other entities in the district may use a wide variety of hazardous materials, including fuels and solvents. Fuels, chemicals, and other hazardous materials and hazardous wastes are also transported via roadways and railways.

### *3.7.1.3 Castaic Lake Water Agency*

The CLWA service area is largely urbanized and has a variety of industries and commercial enterprises that likely use or produce hazardous materials and/or hazardous wastes. Fuels, chemicals, and other hazardous materials and hazardous wastes are also transported via roadways and railways. Numerous hazardous materials/waste sites are present in the CLWA service area. Since 1998, continued growth and development in the area have increased the amount of hazardous materials and/or hazardous wastes that are produced and transported around the region. The CLWA service area contains mountainous areas that are classified as high fire hazard areas.

## 3.7.2 Potential Impacts of the Project

### *3.7.2.1 Significance Criteria*

The criteria listed below are based on Appendix G of the State CEQA Guidelines. The Project would result in significant impacts if it would:

- create a significant hazard to the public or the environment through the routine transport, storage, use, or disposal of hazardous materials;
- create a significant hazard to the public or the environmental through reasonably foreseeable upset and accident involving the release of hazardous materials into the environment;
- emit hazardous emissions or handle hazardous or acutely hazardous materials, substances or waste within one-quarter mile of an existing or proposed school;
- be located on a site which is included in a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5, and as a result could create a significant hazard to the public or the environment;
- be located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, and result in a safety hazard for people residing or working in the project area;
- be located with the vicinity of a private airstrip, and result in a safety hazard for people residing or working in the project area;
- impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan; or
- expose people or structures to a significant risk of loss, injury, or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands.

### *3.7.2.2 Environmental Impacts*

#### *3.7.2.2.1 State Water Project and Associated Facilities*

DIRECT IMPACTS

Implementation of the Project would not require new construction or the modification of existing SWP facilities; nor would it change the operating criteria of these facilities or substantially change their operation. The Project would result in a slight increase in the amount of water transported in the California Aqueduct from Kern County to Castaic Lake, but this volume would be within the range that has been transported by the aqueduct both in recent years and historically and would not increase safety risks. Slightly increasing the amount of water transported in a portion of the SWP system would require more pumping, which would incrementally increase the use of hazardous materials associated with pumping. This impact would be less than significant since these materials already are used for operations and

maintenance in accordance with established practices and the incremental increase in their use would not result in a significant hazard to the public or the environment.

As described in section 3.0, minor seasonal changes in the volume of water temporarily stored in San Luis Reservoir would result from Project implementation. The average volume of water stored would decrease slightly from December through June, but the change would be minor and the resulting elevations would fall within the range of fluctuations present under both current and historic operations. This change in the timing of water storage would not constitute a hazard. The amount of water stored in Castaic Lake would not change as a result of the Project; thus, no impacts to hazards or hazardous materials would occur.

No elements of the Project would emit hazardous emissions within one-quarter mile of an existing or proposed school, and no actions would occur that could impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan or expose people or structures to a significant risk of loss, injury, or death involving wildland fires.

INDIRECT IMPACTS

No indirect impacts would occur.

*3.7.2.2.2 Wheeler Ridge-Maricopa Water Storage District*

DIRECT IMPACTS

The Project would not involve construction or operational changes that could require the use of hazardous materials or otherwise increase hazards in the district. The Project would not require the routine transport, storage, use, or disposal of additional hazardous materials in this district and thus could not increase the frequency or severity of the release of hazardous materials into the environment or emit hazardous emissions. No other actions would occur that could impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan or expose people or structures to a significant risk of loss, injury, or death involving wildland fires.

INDIRECT IMPACTS

No indirect impacts would occur.

*3.7.2.2.3 Castaic Lake Water Agency*

DIRECT IMPACTS

No construction would occur that potentially could emit hazardous emissions. No other actions would occur that could impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan or expose people or structures to a significant risk of loss, injury, or death involving wildland fires.

The use of up to 41,000 AF of water within the CLWA service area would result in an increased use of hazardous materials to treat water. The primary hazardous chemicals used in the treatment of water at the CLWA facilities are ferric chloride, sodium hydroxide, chlorine, and

aluminum sulfate. Any additional use of hazardous materials to treat the water would be conducted in accordance with existing policies, procedures, and regulations to prevent upset or release into the environment. Thus, impacts from the incremental increase in use of hazardous materials to treat water would be less than significant.

INDIRECT IMPACTS

Potential impacts from population growth that could occur as an indirect impact of the Project are addressed in Chapter 4, Growth-Inducing Effects and Growth-Related Impacts.

## 3.7.3 Mitigation Measures

### *3.7.3.1 State Water Project and Associated Facilities*

No direct or indirect significant impacts to hazards or hazardous materials would occur; therefore, no mitigation measures are required.

### *3.7.3.2 Wheeler Ridge-Maricopa Water Storage District*

No direct or indirect significant impacts to hazards or hazardous materials would occur; therefore, no mitigation measures are required.

### *3.7.3.3 Castaic Lake Water Agency*

No direct significant impacts to hazards or hazardous materials would occur; therefore, no mitigation measures are required. Mitigation measures for indirect impacts are addressed in Chapter 4, Growth-Inducing Effects and Growth-Related Impacts.

## 3.7.4 Significant Unavoidable Adverse Impacts

No direct or indirect significant unavoidable impacts would result from the Project.

# 3.8 LAND USE AND PLANNING

## 3.8.1 Environmental Setting

### *3.8.1.1 State Water Project and Associated Facilities*

No substantial changes in baseline conditions have occurred between the 1998 NOP and the 2003 NOP. SWP facilities such as the California Aqueduct and pumping and generation facilities are under the jurisdiction of DWR or its designee. The San Luis Reservoir State Recreation Area is under the jurisdiction of the State Department of Parks and Recreation. The Castaic Lake State Recreation Area is under the jurisdiction of the Los Angeles County Department of Parks and Recreation. Each of these agencies regulates development on lands within their jurisdiction.

### *3.8.1.2 Wheeler Ridge-Maricopa Water Storage District*

WRMWSD is located within Kern County, which has land use and planning authority in the unincorporated portions of the County, including this district. The Kern County General Plan regulates the type and intensity of land uses and specifies other development-related requirements. It consists of seven state-mandated and three optional elements and also includes rural community plans and specific plans for smaller geographic areas within the county. Kern County has adopted an HCP for the Metropolitan Bakersfield Area and is in the process of developing the KCVFHCP for additional portions of the county in order to provide a long-term program designed to conserve federally protected species, state-protected species, and/or other species of concern. In addition, the TRVFHCP is being developed for the Tejon Ranch lands within the San Joaquin Valley, some of which are within the WRMWSD. There are no adopted NCCPs within Kern County.

At the time the 1998 NOP was prepared, WRMWSD contained approximately 146,620 acres. Land uses included the following: farmed area (94,500 acres, or 64 percent); fallow lands (17,650 acres, or 12 percent); miscellaneous and other lands, defined as developed but nonfarmed areas within cultivated lands, such as farm roads, farmsteads, reservoirs, airstrips, cotton gins, tank farms, utility yards, etc. (8,040 acres, or 5 percent); and native vegetation/non-developed lands (26,430 acres, or 18 percent) (WRMWSD 2001).

In 2000, the most recent year for which information is available, the district contained approximately 146,950 acres. Land uses included the following: farmed area (90,630 acres, or 62 percent); fallow lands (21,660 acres, or 15 percent); miscellaneous lands, defined as developed but nonfarmed areas within cultivated lands, such as farm roads, farmsteads, and reservoirs (6,865 acres, or 5 percent); other lands, consisting of airstrips, cotton gins, tank farms, utility yards, etc. (1,360 acres, or 1 percent) and native vegetation/non-developed lands (26,435 acres, or 18 percent) (WRMWSD 2001). Additional detail regarding changes in agricultural land uses between 1998 and 2000 is included in section 3.2.

#### 3.8.1.3 Castaic Lake Water Agency

The CLWA service area is located primarily in the Santa Clarita Valley in northwestern Los Angeles County and also in eastern Ventura County. Plans and policies of local and regional agencies with planning authority in the CLWA service area include those adopted by the Southern California Association of Governments (SCAG), County of Los Angeles, County of Ventura (for the Piru Planning Area portion of the county), and the City of Santa Clarita. The relevant plans include SCAG's Regional Comprehensive Plan and Guide, the Santa Clarita Valley Area Plan of the County of Los Angeles General Plan, the County of Ventura General Plan, and the City of Santa Clarita General Plan. Consistency with adopted plans and policies is discussed in Chapter 5.0, Plans and Policies. Additionally, the City of Santa Clarita and Los Angeles County have initiated a joint planning effort to address future growth in the Santa Clarita Valley. Phase I of the Santa Clarita Valley Joint General Plan was completed in 2001, including securing Regional Planning Commission and City Council approval of the Guiding Principles and Vision.

CLWA makes decisions related to the wholesale and retail (within defined boundaries) provision of water and does not have the authority to approve land development within its service area. Rather, such approvals are the responsibility of the local planning agencies identified above. CLWA's role is limited to complying with laws that went into effect on January 2002 and require retail water purveyors to provide information regarding the availability of water supplies to land use planning agencies. Senate Bills 610 and 221 amended state law in an attempt to improve the link between information on water supply availability and certain land use decisions made by cities and counties. Both statutes require detailed information to be provided to city and county decision-makers prior to the approval of specified large development projects.

Land uses in the service area range from the urbanized environment of the City of Santa Clarita and other developed communities to the undeveloped environment of the eastern Santa Susana and western San Gabriel Mountains. As shown in Table 3.8-1, in 1998 when the first NOP was prepared for the Project, approximately 30,000 acres of land within the CLWA service area were improved, and approximately 88,000 acres were unimproved (CLWA 1998b). Of the 30,000 acres of improved land, almost half were classified in one of the six urban and non-urban residential categories. Another substantial portion of the service area is designated as Hillside Management. Lands with this designation are located in non-urban areas that typically exceed a 25 percent slope. Depending upon the degree of slope, maximum residential densities are specified, up to one unit per 2 acres. As shown on Table 3.2-5, the amount of Urban and Built-Up Land in the CLWA service area increased by 1,731 acres between 1998 and 2000[1], while the amount of agricultural and "other" land decreased by the same amount ("other land" refers to such land uses as low-density rural development, brush, timber, vacant and nonagricultural land larger than 40 acres in size and surrounded on all sides by urban development, and a variety of other rural land uses).

1 2000 is used instead of 2003 because 2000 was the most recent census. This census yielded the most available data.

## 3.8.2 Potential Impacts of the Project

### *3.8.2.1 Significance Criteria*

The criteria used to determine the significance of impacts to land use and planning are based on Appendix G of the State CEQA Guidelines. The Project would result in a significant impact if it would:

- physically divide an established community;
- conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project adopted for the purpose of avoiding or mitigating an environmental effect; or
- conflict with any applicable HCP or NCCP.

**Table 3.8-1. CLWA Service Area 1998 Land Use**

| *Plan Code Designation/ Land Use Category* | | IMPROVED PARCELS | | UNIMPROVED PARCELS | | *Total* |
|---|---|---|---|---|---|---|
| | | *Acres* | *Percent* | *Acres* | *Percent* | *Acres* |
| C | Commercial | 1,564 | 1.3 | 1,558 | 1.3 | 3,122 |
| HM | Hillside Management | 6,057 | 5.1 | 33,614 | 28.4 | 39,671 |
| M | Industrial | 2,349 | 2.0 | 3,246 | 2.7 | 5,595 |
| MU | Municipal | 407 | 0.3 | 72 | 0.1 | 479 |
| N1 | Non-Urban Residential (0.5 DU/Ac) | 2,812 | 2.4 | 4,810 | 4.1 | 7,622 |
| N2 | Non-Urban Residential (1.0 DU/Ac) | 706 | 0.6 | 2,314 | 2.0 | 3,020 |
| NF | National Forest | 647 | 0.5 | 8,442 | 7.1 | 9,089 |
| O | Open Space & Agriculture | 880 | 0.7 | 12,069 | 10.2 | 12,949 |
| P | Public Service Facilities | 89 | 0.1 | 2,763 | 2.3 | 2,852 |
| PF | Public Service Facilities | 0 | 0.0 | 32 | 0.0 | 32 |
| RR | Resort Recreation | 518 | 0.4 | 74 | 0.1 | 592 |
| TC | Transportation Corridor | 0 | 0.0 | 49 | 0.0 | 49 |
| U1 | Urban Residential (1.1-3.3 DU/Ac) | 8,682 | 7.3 | 8,389 | 7.1 | 17,071 |
| U2 | Urban Residential (3.4-6.6 DU/Ac) | 1,064 | 0.9 | 1,692 | 1.4 | 2,756 |
| U3 | Urban Residential (6.7-15.0 DU/Ac) | 68 | 0.1 | 405 | 0.3 | 473 |
| U4 | Urban Residential (15.1-40.0 DU/Ac) | 252 | 0.2 | 186 | 0.2 | 438 |
| VC | Floodway/Floodplain | 2,365 | 2.0 | 6,121 | 5.2 | 8,486 |
| W | Undefined | 1,596 | 1.4 | 2,305 | 2.0 | 3,901 |
| | TOTAL | 30,056 | 25.3 | 88,141 | 74.5 | 118,197 |

*Source*: CLWA 1998b.
*Note*: DU/Ac = dwelling units per acre
Percentages total slightly less than 100 due to rounding.

### *3.8.2.2 Environmental Impacts*

#### *3.8.2.2.1 State Water Project and Associated Facilities*

DIRECT IMPACTS

Implementation of the Project would not require new construction or the modification of existing SWP facilities; nor would it change the operating criteria of these facilities or substantially change their operation. Since no construction would occur, the Project would not physically divide an established community. As discussed in the other sections of Chapter 3 and in Chapter 5, the Project would not result in significant environmental effects associated with SWP facilities and thus would not conflict with an applicable land use plan, policy, or regulation of any agency with jurisdiction over the Project adopted for the purpose of avoiding or mitigating an environmental effect, nor would it conflict with any applicable HCP or NCCP.

INDIRECT IMPACTS

No indirect impacts to land use and planning would occur.

#### *3.8.2.2.2 Wheeler Ridge-Maricopa Water Storage District*

DIRECT IMPACTS

Implementation of the Project would not require new construction or the modification of existing facilities. Since no construction would occur, the Project would not physically divide an established community. As discussed in the other sections of Chapter 3 and in Chapter 5, the Project would not result in significant environmental effects in the district and thus would not conflict with an applicable land use plan, policy, or regulation of any agency with jurisdiction over the Project adopted for the purpose of avoiding or mitigating an environmental effect, nor would it conflict with any applicable HCP or NCCP.

INDIRECT IMPACTS

No indirect impacts to land use and planning would occur.

#### *3.8.2.2.3 Castaic Lake Water Agency*

DIRECT IMPACTS

Implementation of the Project would not require new construction or the modification of existing facilities. Since no construction would occur, the Project would not physically divide an established community. As discussed in the other sections of Chapter 3 and in Chapter 5, the Project would not result in significant environmental effects in the CLWA service area and thus would not conflict with an applicable land use plan, policy, or regulation of any agency with jurisdiction over the Project adopted for the purpose of avoiding or mitigating an environmental effect, nor would it conflict with any applicable HCP or NCCP.

INDIRECT IMPACTS

Potential impacts from population growth that could occur as an indirect impact of the Project are addressed in Chapter 4, Growth-Inducing Effects and Growth-Related Impacts.

## 3.8.3 Mitigation Measures

### *3.8.3.1 State Water Project and Associated Facilities*

No direct or indirect significant impacts to land use and planning would occur; therefore no mitigation measures are required.

### *3.8.3.2 Wheeler Ridge-Maricopa Water Storage District*

No direct or indirect significant impacts to land use and planning would occur; therefore no mitigation measures are required.

### *3.8.3.3 Castaic Lake Water Agency*

No direct significant impacts to land use and planning would occur; therefore no mitigation measures are required. Mitigation measures for indirect impacts are addressed in Chapter 4, Growth-Inducing Effects and Growth-Related Impacts.

## 3.8.4 Significant Unavoidable Impacts

No direct or indirect significant unavoidable impacts would result from the Project.

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## 3.9 NOISE

Sources of stationary or transient noise can be characterized as unwanted sound that could disrupt normal activities or diminish the quality of the environment. Stationary sources are generally localized, while transient or mobile sources can occur irregularly. The noise generated combines with the ambient sounds to produce the local acoustical environment. The response to noise can be quite varied depending on the noise source, the sensitivity of the receptor and the time of day in which it occurs.

Several noise measurement scales are used to describe noise in a particular location. A decibel (dB) is a unit of measurement that indicates the relative amplitude of a sound. The zero on the decibel scale is based on the lowest sound level that the healthy, unimpaired human ear can detect. Sound levels in decibels are calculated on a logarithmic basis. An increase of 10 dB represents a ten-fold increase in acoustic energy, while 20 dB is 100 times more intense, 30 dB is 1,000 times more intense, etc. Each 10 dB increase in sound level is perceived as approximately a doubling of loudness over a fairly wide range of intensities. There are several methods of characterizing sound. The most common in California is the A-weighted sound level, or dBA. This scale gives greater weight to the frequencies of sound to which the human ear is most sensitive.

Because sound levels can vary markedly over a short period of time, a method for describing either the average character of the sound or the statistical behavior of the variations must be utilized. Most commonly, environmental sounds are described in terms of an average level that has the same acoustical energy as the summation of all the time-varying events. This energy-equivalent sound/noise descriptor is called $L_{eq}$. The most common averaging period is hourly, but $L_{eq}$ can describe any series of noise events of arbitrary duration.

Since the sensitivity to noise increases during the evening and at night—because excessive noise interferes with the ability to sleep—24-hour descriptors have been developed that incorporate artificial noise penalties added to quiet-time noise events. The Community Noise Equivalent Level, CNEL, is a measure of the cumulative noise exposure in a community, with a 5 dB penalty added to evening (7:00 P.M. to 10:00 P.M.) and a 10 dB addition to nocturnal (10:00 P.M. to 7:00 A.M.) noise levels. The Day/Night Average Sound Level, $L_{dn}$, is essentially the same as CNEL, with the exception that the evening time period is dropped and all occurrences during this 3-hour period are grouped into the daytime period.

Noise-sensitive receptors include residential areas, facilities such as schools and hospitals, and certain types of recreational uses where a quiet setting is considered to be an integral part of the recreational experience.

Representative outdoor and indoor noise levels in units of dBA are shown in Table 3.9-1.

**Table 3.9-1. Typical Sound Levels Measured in the Environment and Industry**

| *At a Given Distance From Noise Source* | *dBA* | *Noise Environments* | *Subjective Impression* |
|---|---|---|---|
| | 140 | | |
| Civil Defense Siren (100') | 130 | | |
| Jet Takeoff (200') | 120 | | Pain Threshold |
| | 110 | Rock Music Concert | |
| Diesel Pile Driver (100') | 100 | | Very Loud |
| | 90 | Boiler Room | |
| Freight Cars (50') | | Printing Press Plant | |
| Pneumatic Drill (50') | 80 | | |
| Freeway (100') | | In Kitchen with Garbage Disposal Running | |
| Vacuum Cleaner (10') | 70 | | Moderately Loud |
| | | Data Processing Center | |
| | 60 | | |
| | | Department Store | |
| Light Traffic (100') | 50 | | |
| Large Transformer (200') | | | |
| | 40 | Private Business Office | Quiet |
| Soft Whisper (5') | 30 | Quiet Bedroom | |
| | 20 | Recording Studio | |
| | 10 | | Threshold of Hearing |
| | 0 | | |

*Source:* U.S. Department of Housing and Urban Development. 1985

## 3.9.1 Environmental Setting

### *3.9.1.1 State Water Project and Associated Facilities*

No substantial changes in baseline conditions have occurred between the 1998 NOP and the 2003 NOP. Noise within the rural portions of the San Joaquin Valley, where many of the SWP facilities affected by the Project are located, primarily results from agricultural activities (e.g., the operation of farming equipment and pumps) and vehicular traffic. In urban areas, noise

primarily results from vehicular traffic and activities commonly associated with residential, commercial, industrial, and recreational uses. Along the California Aqueduct, noise levels vary considerably, depending largely on its proximity to heavily traveled roadways such as Interstate 5. Pumps are the primary source of noise caused directly by operation of the SWP facilities. At San Luis Reservoir and Castaic Lake, noise results mainly from recreational activities. Noise standards are typically developed by local jurisdictions. The State of California has not adopted any quantitative noise regulations; however, the State Department of Health Services, Environmental Health Division has established noise compatibility guidelines for different land use types (California Department of Health Services [CA DHS] 1976). For example, an $L_{dn}$ or CNEL of 50 to 75 dB is considered normally acceptable at areas used for water recreation; 70 to 80 dB is normally unacceptable and above 80 dB is clearly unacceptable.

#### *3.9.1.2 Wheeler Ridge-Maricopa Water Storage District*

No substantial changes in baseline conditions have occurred between the 1998 NOP and the 2003 NOP. Noise within the WRMWSD is primarily related to agricultural activities and vehicular traffic, although noise also is generated by activities commonly associated with residential, commercial, industrial, and recreational uses.

The Noise Element of the Kern County General Plan (1989) contains standards for noise control in unincorporated portions of the county. Kern County also has adopted a noise control ordinance as a provision of its Health and Safety Code, Subsection 8.36 Noise Control; however, this ordinance has very limited provisions and primarily addresses noise from amplification. The Kern County Noise Element divides land uses into four categories according to noise sensitivity: insensitive land uses; moderately sensitive land uses; sensitive land uses; and highly sensitive land uses. Different numerical noise quality standards apply to each of the four sensitivity categories, and corrections are applied if a "noise operation" or activity would produce noise that is not smooth and continuous.

#### *3.9.1.3 Castaic Lake Water Agency*

The CLWA service area includes developed urban areas, primarily within the City of Santa Clarita and adjacent unincorporated portions of Los Angeles County, as well as lower density residential or rural/agricultural areas, including portions of eastern Ventura County. The Southern Pacific Railroad, Interstate 5, State Route 14 and Highway 126 traverse the Santa Clarita Valley and are major sources of noise. Noise also is generated by activities commonly associated with residential, commercial, industrial, and recreational uses. Ambient noise levels likely have increased in some portions of the service area since development has increased between 1998 and the present.

The Noise Element of the County of Los Angeles General Plan establishes noise-related goals and policies. In addition, the county has adopted a Noise Control Ordinance (County Code Title 12.08 Noise Control (Ord. 11778 Section 2 (Art. 1 Section 101), 1978: Ord. 11773 Section 2 (Art. 1 Section 101), 1978.) and Title 12.12 Building Construction Noise) that identifies exterior noise standards for various land use categories as identified in Table 3.9-2.

County of Los Angeles Noise Ordinance also restricts noise generated by construction activities at noise sensitive land uses. Additionally, all mobile and stationary internal-combustion

powered equipment and machinery is required to be equipped with suitable exhaust and air-intake silencers in proper working order. These regulations are summarized below in Table 3.9-3.

The Noise Element of the City of Santa Clarita's General Plan contains noise-related goals and policies, and the City's Noise Ordinance establishes noise thresholds for specific land uses. The allowable noise levels in residential areas are 65 dBA during the daytime and 55 dBA during the nighttime. In commercial and manufacturing areas, up to 80 dBA is allowed during the daytime and 70 dBA is allowed during the nighttime. Construction work is limited to the hours between 7 A.M. and 7 P.M. Monday through Friday and between 8 A.M. and 6 P.M. on Saturday. Construction is prohibited on Sundays and six holidays.

**Table 3.9-2. County of Los Angeles Exterior Noise Standards for Stationary and Point Noise Sources**

| *Noise Zone* | *Land Use* | *Time Interval* | *Exterior Noise Level dBA $L_{eq}$*[1] |
|---|---|---|---|
| I | Noise Sensitive Area[2] | Anytime | 45 |
| II | Residential | 10:00 P.M. to 7:00 A.M.<br>7:00 A.M. to 10:00 P.M. | 45<br>50 |
| III | Commercial | 10:00 P.M. to 7:00 A.M.<br>7:00 A.M. to 10:00 P.M. | 55<br>60 |
| IV | Industrial | Anytime | 70 |

*Source:* County of Los Angeles Ordinance No. 11743, Section 12.08.390.

1. ***Standard No. 1*** shall be the exterior noise level which may not be exceeded for a cumulative period of more than 30 minutes in any hour. Standard No.1 shall be the applicable noise level; or, if the ambient $L_{50}$ exceeds the foregoing level, then the ambient $L_{50}$ becomes the exterior noise level Standard No. 1.

   ***Standard No. 2*** shall be the exterior noise level which may not be exceeded for a cumulative period of more than 15 minutes in any hour. Standard No.2 shall be the applicable noise level from Standard No. 1 plus 5.0 dB(A);or, if the ambient $L_{25}$ exceeds the foregoing level, then the ambient $L_{25}$ becomes the exterior noise level Standard No.2

   ***Standard No. 3*** shall be the exterior noise level which may not be exceeded for a cumulative period of more than 5 minutes in any hour. Standard No.3 shall be the applicable noise level from Standard No. 1 plus 10.0 dB(A);or, if the ambient $L_{8.3}$ exceeds the foregoing level, then the ambient $L_{8.3}$ becomes the exterior noise level Standard No. 3.

   ***Standard No. 4*** shall be the exterior noise level which may not be exceeded for a cumulative period of more than 1 minute in any hour. Standard No.3 shall be the applicable noise level from Standard No. 1 plus 15.0 dB(A);or, if the ambient $L_{1.7}$ exceeds the foregoing level, then the ambient $L_{1.7}$ becomes the exterior noise level Standard No. 4.

   ***Standard No. 5*** shall be the exterior noise level which may not be exceeded for any period of time. Standard No. 4 shall be the applicable noise level from Standard 1 plus 20 dB(A); or, if the ambient $L_0$ exceeds the forgoing level, then the ambient $L_0$ becomes the exterior noise level for Standard No. 4.

2. Not defined in the County Noise Ordinance; to be designated by the County Health Officer.

Both the Ventura County General Plan and the Area Plan for the Piru Area contain goals and policies relating to noise. The General Plan, which also applies to the Piru Area, states that noise generators proposed to be located near any noise sensitive receptor shall incorporate noise control measures so that the outdoor noise levels at the receptor do not exceed:

- An hourly $L_{eq}$ of 55 dBA or ambient noise level plus 3 dBA, whichever is greater, during any hour from 6:00 A.M. to 7:00 P.M.
- An hourly $L_{eq}$ of 50 dBA or ambient noise level plus 3 dBA, whichever is greater, during any hour from 7:00 P.M. to 10:00 P.M.
- An hourly $L_{eq}$ of 45 dBA or ambient noise level plus 3 dBA, whichever is greater, during any hour from 10 P.M. to 6 A.M.

**Table 3.9-3. Mobile Construction Equipment Noise Limits**

| | *Mobile Construction Equipment Maximum Noise Levels ($L_{eq}$)* | | *Stationary Construction Equipment Maximum Noise Levels ($L_{eq}$)* | |
|---|---|---|---|---|
| LAND USE | DAYTIME | NIGHTTIME | DAYTIME | NIGHTTIME |
| Residential | 75 dBA | 60 dBA | 60 dBA | 50 dBA |
| Multi-family residential | 80 dBA | 65 dBA | 65 dBA | 55 dBA |
| Residential / commercial | 85 dBA | 70 dBA | 70 dBA | 60 dBA |
| *Note:* Daytime: 7 A.M. to 8 P.M., excluding Sundays and holidays; nighttime: 8 P.M. to 7 A.M. daily and all day on Sundays and holidays. | | | | |

## 3.9.2 Potential Impacts of the Project

### *3.9.2.1 Significance Criteria*

The significance criteria are based on Appendix G of the State CEQA Guidelines. The Project would result in a significant impact if it would:

- expose persons to or generate noise levels in excess of standards established in the local General Plan or Noise Ordinance, or applicable standards of other agencies;
- expose persons to or generate excessive ground-borne vibration or ground-borne noise levels;
- cause a substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project;
- cause a substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project;
- for a project located within an airport land use plan or, where such a plant has not been adopted, within two miles of a public airport or public use airport, expose people residing or working in the project area to excessive noise levels; or
- for a project within the vicinity of a private airstrip, expose people residing or working in the project area to excessive noise levels.

### *3.9.2.2 Environmental Impacts*

#### *3.9.2.2.1 State Water Project and Associated Facilities*

DIRECT IMPACTS

The Project would not involve construction or significant operational changes that could generate noise or vibration or increase current noise levels associated with the SWP and related activities. While increased pumping could result from the Project, no new pumps would be required. The existing pumps are housed in concrete structures and generally are located in rural areas; thus, increased pumping would not expose persons to or generate noise levels in excess of established standards, generate or expose persons to excessive ground-borne vibration or ground-borne noise levels, cause a substantial permanent, temporary, or periodic increase in ambient noise levels in the Project vicinity, or expose people residing or working in the Project area to excessive noise levels.

INDIRECT IMPACTS

No indirect noise impacts would occur.

#### *3.9.2.2.2 Wheeler Ridge-Maricopa Water Storage District*

DIRECT IMPACTS

The Project would not involve construction or operational changes that could generate noise or vibration or increase current noise levels in the district. The Project would not expose persons to or generate noise levels in excess of established standards, generate or expose persons to excessive ground-borne vibration or ground-borne noise levels, cause a substantial permanent, temporary, or periodic increase in ambient noise levels in the Project vicinity, or expose people residing or working in the Project area to excessive noise levels.

INDIRECT IMPACTS

No indirect noise impacts would occur.

#### *3.9.2.2.3 Castaic Lake Water Agency*

DIRECT IMPACTS

The Project would not involve construction or operational changes that could generate noise or vibration or increase current noise levels. Thus, the Project would not expose persons to or generate noise levels in excess of established standards, generate or expose persons to excessive ground-borne vibration or ground-borne noise levels, cause a substantial permanent, temporary, or periodic increase in ambient noise levels in the Project vicinity, or expose people residing or working in the Project area to excessive noise levels.

INDIRECT IMPACTS

Potential impacts from population growth that could occur as an indirect impact of the Project are addressed in Chapter 4, Growth-Inducing Effects and Growth-Related Impacts.

## 3.9.3 Mitigation Measures

### *3.9.3.1 State Water Project and Associated Facilities*

No direct or indirect significant noise impacts would occur; therefore, no mitigation measures are required.

### *3.9.3.2 Wheeler Ridge-Maricopa Water Storage District*

No direct or indirect significant noise impacts would occur; therefore, no mitigation measures are required.

### *3.9.3.3 Castaic Lake Water Agency*

No direct significant noise impacts would occur; therefore, no mitigation measures are required. Mitigation measures for indirect impacts are addressed in Chapter 4, Growth-Inducing Effects and Growth-Related Impacts.

## 3.9.4 Significant Unavoidable Impacts

No direct or indirect significant unavoidable impacts would result from the Project.

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# 3.10 POPULATION AND HOUSING

## 3.10.1 Environmental Setting

### *3.10.1.1 State Water Project and Associated Facilities*

Population and housing are not directly associated with the SWP, although the SWP is a water storage and delivery system that serves a large portion of California's population.

### *3.10.1.2 Wheeler Ridge-Maricopa Water Storage District*

Based on U.S. Census Bureau data[1], between 1990 and 2000, the population within the district increased from 2,480 to 2,854, or by approximately 15 percent. The number of households also increased during this period from 728 households in 1990 to 857 households in 2000, or by approximately 18 percent.

### *3.10.1.3 Castaic Lake Water Agency*

Based on U.S. Census Bureau data, the population in the CLWA service area in 2000 was approximately 190,000[2]. (This is the most recent data available. The next census will not be taken until 2010.) About 80 percent of the CLWA service area population resides in the City of Santa Clarita, whose population increased by about 36 percent between 1990 and 2000, from 110,642 to 151,088. Within the City of Santa Clarita, the 2000 Census reported 50,787 occupied housing units, a 12,313-unit increase since 1990. Based on 2000 Census data, about three persons occupy each housing unit. Assuming the same persons per occupied housing unit, there would be about 63,300 occupied housing units in the CLWA service area.

## 3.10.2 Potential Impacts of the Project

### *3.10.2.1 Significance Criteria*

The criteria used to determine the significance of impacts related to population and housing are based on Appendix G of the State CEQA Guidelines. The Project would result in significant impacts it if would:

- induce substantial population growth in an area either directly (e.g., by proposing new homes and businesses) or indirectly (e.g., through extension of roads or other infrastructure);
- displace substantial numbers of existing housing, necessitating the construction of replacement housing elsewhere; or

1. Using GIS, the census blocks and tracts that were fully or partially within the WRMWSD were determined. If a block was partially within the district, the percentage of the area within the district was multiplied by the block census counts. U.S. Census data is the most current information available for population and housing.
2. Using GIS, the census blocks and tracts that were fully or partially within the CLWA service area were determined. If a block was partially within the service area, the percent of the area within the service area was multiplied by the block census counts.

- displace substantial numbers of people, necessitating the construction of replacement housing elsewhere.

### *3.10.2.2 Environmental Impacts*

#### *3.10.2.2.1 State Water Project and Associated Facilities*

DIRECT IMPACTS

Implementation of the Project would not require new construction or the modification of existing SWP facilities. The use of existing SWP facilities to transport water associated with the Project would not require the creation of new homes or businesses or otherwise directly induce population growth.

INDIRECT IMPACTS

The Project would not result in changes in employment or new business opportunities associated with the SWP, nor would it extend infrastructure. No indirect impacts to population and housing would occur.

#### *3.10.2.2.2 Wheeler Ridge-Maricopa Water Storage District*

DIRECT IMPACTS

Implementation of the Project would not require new construction or the modification of existing WRMWSD water distribution facilities. The Project would not require the creation of new homes or businesses or otherwise directly induce population growth.

INDIRECT IMPACTS

The Project would not result in changes in employment or new business opportunities in WRMWSD, nor would it extend infrastructure. No indirect impacts to population and housing would occur.

#### *3.10.2.2.3 Castaic Lake Water Agency*

DIRECT IMPACTS

Implementation of the Project would not require new construction or the modification of existing CLWA facilities. The Project would not require the creation of new homes or businesses or otherwise directly induce population growth.

INDIRECT IMPACTS

The Project would remove an obstacle to population growth by providing additional SWP water within the CLWA service area. Because it would remove such an obstacle, the Project may indirectly foster economic or population growth or the construction of additional housing within the CLWA service area. Assumptions regarding the population that could be served by the Project are described in section 3.0. Given an average year water supply, it is expected that

the Project would be able to serve a population of approximately 106,700 persons and could serve about 35,600 housing units (see Chapter 4, Growth-Inducing Effects and Growth-Related Impacts). Specific potential impacts from population and housing growth that could occur as an indirect impact of the Project are addressed for each resource in Chapter 4. With the exception of aesthetics, air quality, biological resources, transportation and circulation, and utilities and service systems, all indirect, growth-related impacts would be mitigable to less than significant.

## 3.10.3 Mitigation Measures

### *3.10.3.1 State Water Project and Associated Facilities*

No direct or indirect significant impacts to population and housing would occur; therefore, no mitigation measures are required.

### *3.10.3.2 Wheeler Ridge-Maricopa Water Storage District*

No direct or indirect significant impacts to population and housing would occur; therefore, no mitigation measures are required.

### *3.10.3.3 Castaic Lake Water Agency*

No direct significant impacts to population and housing would occur; therefore, no mitigation measures are required for direct impacts. Mitigation measures for indirect impacts associated with Project-induced population and housing growth are addressed in Chapter 4, Growth-Inducing Effects and Growth-Related Impacts (section 4.2.10, Population and Housing).

## 3.10.4 Significant Unavoidable Impacts

No significant unavoidable direct impacts would result from the Project. Significant and unavoidable indirect impacts to aesthetics, air quality, biological resources, transportation and circulation, and utilities and service systems may result from Project-induced population and housing growth.

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# 3.11 PUBLIC SERVICES

Public services addressed in this section include police protection, fire protection, schools, and libraries. Parks and other recreational facilities are discussed in section 3.12, Recreation Resources.

## 3.11.1 Environmental Setting

### *3.11.1.1 State Water Project and Associated Facilities*

No substantial changes in baseline conditions have occurred between the 1998 NOP and the 2003 NOP. The SWP facilities traverse California between the Delta and southern California. Public services are provided by either by the State of California or local jurisdictions, depending on the location of individual facilities. The California Highway Patrol (CHP) has the primary authority for the major roadways accessing or adjacent to SWP facilities with support from individual county sheriff departments and local police departments. Fire protection is provided by the California Department of Forestry and by county, city, and special district fire departments. Since the SWP is a water storage and delivery system, it does not generate a demand for schools or library services.

### *3.11.1.2 Wheeler Ridge-Maricopa Water Storage District*

No substantial changes in baseline conditions have occurred between the 1998 NOP and the 2003 NOP. Population increased modestly during this period (the entire increase between 1998 and 2000 was less than 400 persons); thus, the demand for public services likely increased as well.

*Police Protection*

The CHP provides services along the major highways of Kern County. Unit response stations for the CHP are located in Bakersfield, Taft, and Lebec. The Kern County Sheriff's Department provides police protection for the unincorporated areas of the county, including the district. The Kern County Sheriff's Department also is under contract to provide police protection to several cities within the county. Currently, the Sheriff's Department has one main station and 14 sub-stations throughout the county. These are staffed by approximately 1,050 employees, of which approximately 450 are sworn peace offices (Kern County Sheriff's Department 2002).

*Fire Protection*

Fire protection in the unincorporated portions of Kern County, including the district, is provided by the Kern County Fire Department, which operates 45 full time stations and one seasonal station throughout the county (Kern County Fire Department 2001).

*Education*

Kern County has 35 elementary school districts, four high school districts, and two community college districts (Kern County Superintendent of Schools 2002). No schools are present within the district.

*Library Services*

Kern County operates one main library and 24 branch libraries throughout the county. No libraries are present within the district.

#### *3.11.1.3 Castaic Lake Water Agency*

No substantial changes in baseline conditions have occurred between the 1998 NOP and the 2003 NOP, except as noted below under Education and Library Services. Population increased during this period; thus, the demand for public services likely increased as well.

*Police Protection*

The Los Angeles County Sheriff's Department provides law enforcement services via contract to the unincorporated areas of Los Angeles County and the City of Santa Clarita. Over 140 deputy sheriffs currently staff the Santa Clarita Sheriff's Station. With a planning standard of one deputy per 1,000 residents, the current ratio is well within the planning range (Santa Clarita Valley Sheriff's Station 2002). The station includes a jail with beds for eight females and 31 males and also is equipped with a Helicopter, K-9 unit, Search and Rescue team, Mobile Command Post, and Detective Unit. The Sheriff's Department provides traffic services within the limits of the City of Santa Clarita, while the CHP provides service to the unincorporated portions of the CLWA service area.

The Ventura County Sheriff's Department is the law enforcement provider for Ventura County, including five of the county's ten incorporated cities (Thousand Oaks, Camarillo, Moorpark, Fillmore, and Ojai), plus the unincorporated areas of the county.

*Fire Protection*

The Consolidated Fire Protection District (Los Angeles County Fire Department, Battalion 6) provides fire protection services in the Santa Clarita Valley, both in the unincorporated portions of Los Angeles County and the City of Santa Clarita. Battalion 6 has a total of ten stations; eight are in the Santa Clarita Valley and two are in Gorman and Chatsworth (personal communication, L. Bagwell 2004). The eight stations located in the Santa Clarita Valley maintain nine engines, one truck, three paramedic squad cars, one water tender, and one helicopter with a paramedic team. Additional resources and staff are utilized for emergency back-up situations or as needed according to fire hazard levels throughout the year. The County Fire Department has planned for 11 more fire stations in the City of Santa Clarita by 2007 or 2008 (personal communication, L. Bagwell 2004), but the timing of these stations depends on the pace of development since developer fees fund new station construction (personal communication, D. Aguirre 2004. Angeles National Forest personnel provide wildland fire protection services to the Santa Clarita Valley and vicinity.

Fire protection services within the portion of the CLWA service area that is in Ventura County are provided by Ventura County Fire Department Station No. 28, which is located in Piru. Back-up fire protection is provided by both the Ventura County Fire Department, Los Angeles County Fire Department and in cases of wildland fire, Los Padres National Forest personnel.

*Education*

The Santa Clarita Valley has five school districts serving grades K-12. Based on conversations with school officials (as noted in Table 3.11-1), all school districts are at capacity or are experiencing overcrowding. Table 3.11-1 provides a list of school districts and enrollments within the area. No schools are located in the portion of the CLWA service area that is in Ventura County.

**Table 3.11-1. School Districts in the CLWA Service Area**

| *School District* | *1998*[1] | | | *2002*[2] | | |
|---|---|---|---|---|---|---|
| | *Number of Schools* | *Grades Served* | *Enrollment* | *Number of Schools* | *Grades Served* | *Enrollment* |
| Castaic Union School District | 2 elementary<br>1 junior high | K-8 | 2,120 | 2 elementary<br>1 middle school | K-8 | 3,398[3] |
| Newhall School District | 7 elementary | K-6 | 5,946 | 7 elementary | K-6 | 6,547 |
| Saugus Union School District | 11 elementary | K-6 | 8,300 | 14 elementary | K-6 | 10,046 |
| Sulphur Springs School District | 7 elementary | K-6 | 4,810 | 8 elementary | K-6 | 5,466 |
| William S. Hart Union High School District | 4 junior high<br>4 high school<br>1 continuation school<br>4 alternative sites | 7-12 | 13,500 | 4 junior high<br>6 high school<br>1 continuation school<br>4 alternative sites | 7-12 | 18,622 |

*Notes*:
1. Personal communications with Pam Wellcome, Castaic Union School; Dr. Herbert D. Bartelt Jr., Newhall School District; Sandy Kuhlman, Saugus School District; Carol Greenwood, Sulphur Springs School District; and Connie Ford, William S. Hart High School District, May 1998.
2. Personal communications with Kitty Belendez, Castaic Union School; Sue Malone, Newhall School District; Judy Fish, Saugus School District; Leslie Turner, Sulphur Springs School District; Rory Livingston, William S. Hart High School District, 2002.
3. A new elementary school within the district is expected to open September 2003 (Personal communication, Kitty Belendez).

*Library Services*

Three libraries operated by the County of Los Angeles Libraries Department serve the residents of the Santa Clarita Valley: the Canyon Country Library, the Newhall Library, and the Valencia Library (see Table 3.11-2). In 1998, the three libraries did not meet the planning standard of 1.7 square feet of library space per capita. The County Library currently uses a planning standard of two material items per capita and 0.389 gross square feet of space per capita. A recently completed service area analysis for the three Santa Clarita libraries (County of Los Angeles Public Library 2002), using 2000 population data, indicated that:

- The Valencia Library has an adequate materials collection and a facility space deficit of 13,737 square feet.

- The Newhall Library has an adequate materials collection and a facility space deficit of 7,776 square feet.
- The Canyon Country Library has a materials deficit of 62,229 and a facility space deficit of 15,419 square feet.

**Table 3.11-2. Santa Clarita Valley Libraries**

| *Library* | 1998[1] | | 2002[2] | |
|---|---|---|---|---|
| | *Number of Books* | *Size of Library (square feet)* | *Number of Books* | *Size of Library (square feet)* |
| Canyon Country Library | 61,537 | 5,050 | 70,389 | 12,000 |
| Newhall Library | 54,401 | 4,842 | 63,126 | 4,842 |
| Valencia Library | 185,243 | 22,966 | 198,331 | 22,966 |

*Notes*: 1. Personal communications, S. Hampton and F. Hungerford, 1998.
2. Valencia Library, 2002; Newhall Library, 2002; Canyon Country Library, 2002.

Overall, there is currently a total deficit of 36,932 square feet in the combined service areas of these libraries.

With projected population growth for the Santa Clarita Valley by the year 2010 (Los Angeles County 1980), Santa Clarita libraries would need approximately 65,000 more square feet of space. Alternative funding sources for all libraries in the project area include Mello-Roos Community Facilities Districts, developer impact fees and agreements, and property taxes.

## 3.11.2 Potential Impacts of the Project

### *3.11.2.1 Significance Criteria*

The significance criteria listed below are based on Appendix G of the State CEQA Guidelines. The Project would have a significant impact on public services if it would:

- result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities; or
- result in the need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts in order to maintain acceptable service ratios, response times, or other performance objectives for any of the public services: fire protection, police protection, schools, parks, and other public facilities.

### 3.11.3 Environmental Impacts

***State Water Project and Associated Facilities***

*Direct Impacts*

Since the Project would not require new construction or the modification of existing SWP facilities, it would not involve the provision of new or physically altered governmental facilities or result in the need for new or physically altered governmental facilities.

*Indirect Impacts*

No indirect impacts to public services would occur.

***Wheeler Ridge-Maricopa Water Storage District***

*Direct Impacts*

Transferring 41,000 AF of Table A Amount to CLWA would not require new construction or the modification of existing WRMWSD water distribution facilities, nor would it change the current operation of these facilities. Thus, the Project would not involve the provision of new or physically altered governmental facilities or result in the need for new or physically altered governmental facilities.

*Indirect Impacts*

No indirect impacts to public services would occur.

***Castaic Lake Water Agency***

*Direct Impacts*

The Project would not involve new construction, nor would it directly result in population growth. The use of existing facilities to transport an additional 41,000 AF of water would not require the provision of new or physically altered governmental facilities or result in the need for new or physically altered governmental facilities.

*Indirect Impacts*

Potential impacts to public services from population growth that could occur as an indirect impact of the Project are addressed in Chapter 4, Growth-Inducing Effects and Growth-Related Impacts.

### 3.11.4 Mitigation Measures

***State Water Project and Associated Facilities***

No direct or indirect significant impacts to public services would occur; therefore, no mitigation measures are required.

***Wheeler Ridge-Maricopa Water Storage District***

No direct or indirect significant impacts to public services would occur; therefore, no mitigation measures are required.

***Castaic Lake Water Agency***

No direct significant impacts to public services would occur; therefore, no mitigation measures are required. Mitigation measures for indirect impacts are addressed in Chapter 4, Growth-Inducing Effects and Growth-Related Impacts.

### 3.11.5 Significant Unavoidable Impacts

No direct or indirect significant unavoidable impacts would result from the Project.

# 3.12 RECREATION

Recreational resources consist of natural and manmade features or areas that are used, or could potentially be used, by the public for recreational purposes.

## 3.12.1 Environmental Setting

### *3.12.1.1 State Water Project and Associated Facilities*

No substantial changes in baseline conditions have occurred between the 1998 NOP and the 2003 NOP.

*California Aqueduct*

The California Aqueduct provides year-round recreational fishing opportunities, primarily for striped bass and catfish. The aqueduct contains eleven designated fishing areas within the San Joaquin Valley (DWR 2001c). Other recreational uses, such as boating and swimming, are not permitted.

*San Luis Reservoir*

The San Luis Reservoir complex includes the reservoir itself, the O'Neill Forebay and the Los Banos Detention Reservoir. The San Luis Reservoir is typically full in the spring and recedes throughout the summer and fall as water is used to meet the needs of both SWP and CVP contractors. San Luis Reservoir is surrounded by the San Luis Reservoir State Recreation Area, which is a popular recreation area used for boating, sailboarding, camping, picnicking, and fishing (DWR 2001b). The O'Neill Forebay receives the heaviest recreational use since it has a gentle shoreline and developed day use areas containing such amenities as lawns, beaches, and pit barbeques (DWR 2001b).

*Castaic Lake*

The Castaic Lake State Recreation Area, located at the northern end of the Santa Clarita Valley, is home to one of the largest SWP reservoirs in southern California. Castaic Lake's recreational facilities were built by DWR and the State Department of Parks and Recreation, but the 8,000-acre park is operated and maintained by the Los Angeles County Department of Parks and Recreation. The facility consists of two separate lakes—the main reservoir and the lagoon/afterbay. The main reservoir forms a V-shaped body of water with approximately 29 miles of shoreline. The east arm of the lake is open to boating, fishing and sailing, and a portion is open to water skiing and wakeboarding. The west arm is reserved for water-skiing and wakeboarding, with a special use area for all personal watercraft. Fishing in the west arm is allowed only in the coves. Ramps are provided on the east and west sides of the dam, and picnic facilities are located in both areas. The recreation area offers self-contained overnight camping on the lagoon/afterbay. Campgrounds containing 60 campsites are located on the east side and can accommodate travel trailers, campers, and RVs. Tent camping also is available on a limited basis. The campgrounds also include a picnic area and provide access to areas designated for boating, swimming (seasonal), and fishing.

#### *3.12.1.2 Wheeler Ridge-Maricopa Water Storage District*

No substantial changes in baseline conditions have occurred between the 1998 NOP and the 2003 NOP. No recreational facilities are located within WRMWSD. Parks and/or recreational services within Kern County are under the jurisdiction of the county, eight recreation and park districts, other special districts, cities, school districts, the state and federal governments, and private organizations (Kern County 1994). Kern County provides both regional park facilities and local park facilities to serve unincorporated areas of the county not served by the recreation and park districts or special districts. Three state parks (Fort Tejon State Historical Park, Tule Elk State Reserve, and Red Rock Canyon State Park), two national forests (Los Padres National Forest and Sequoia National Forest), along with approximately 10,000 acres of USFWS land and over 500,000 acres of Bureau of Land Management land are located, in total or in part, within Kern County (Kern County 1994).

#### *3.12.1.3 Castaic Lake Water Agency*

No substantial changes in baseline conditions have occurred between the 1998 NOP and the 2003 NOP, although demand for recreational resources has increased as the population increased. Recreational resources in the CLWA service area consist of state, county/regional and local parks, and designated regional and local recreational trails. The Los Angeles County Department of Parks and Recreation provides local parks and recreation facilities for northwestern Los Angeles County residents and provides regional parks for all residents of the county. The Ventura County Parks Department provides this function for eastern Ventura County portions of the CLWA service area. The City of Santa Clarita provides local parks within the city boundaries. Los Angeles County has determined that there is a county-wide shortage of local parkland, including portions of the Santa Clarita Valley.

Regional recreation areas under the control of the federal government include the Angeles National Forest, the Los Padres National Forest, and the Santa Monica Mountains National Recreation Area. The Castaic Lake Recreation Area, described above, is also located within the CLWA service area.

### 3.12.2 Potential Impacts of the Project

#### *3.12.2.1 Significance Criteria*

The criteria used to determine the significance of impacts to recreation resources are based on Appendix G of the State CEQA Guidelines. The Project would have a significant environmental impact if it would:

- increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated; or
- include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment.

#### *3.12.2.2 Environmental Impacts*

*State Water Project and Associated Facilities*

DIRECT IMPACTS

The Project would result in a slight increase in the amount of water transported in the California Aqueduct to Castaic Lake, which would not adversely impact fishing opportunities in the aqueduct. As described in section 3.0, minor seasonal changes in the average volume of water stored in San Luis Reservoir would result from Project implementation. The average volume of stored water would decrease slightly from December through June and would slightly increase the rest of the year. The amount of water stored in the reservoir already fluctuates, and the changes resulting from the Project would fall within the range of fluctuations present under both current and historic operations. Impacts to recreational resources at San Luis Reservoir would be less than significant. The volume of water stored at Castaic Lake would not change as a result of the Project, and recreational resources would not be affected. The use of existing SWP facilities to transport water to the CLWA service area would not increase the use of recreational facilities, nor does the Project include recreational facilities or require the construction or expansion of recreational facilities.

INDIRECT IMPACTS

No indirect impacts to recreational resources would occur.

*Wheeler Ridge-Maricopa Water Storage District*

DIRECT IMPACTS

The Project would not result in short-term or long-term population growth in the district (refer to section 3.10) and therefore would not increase the use of recreational facilities. The Project does not include or require the construction or expansion of recreational facilities.

INDIRECT IMPACTS

No indirect impacts to recreational resources would occur.

*Castaic Lake Water Agency*

DIRECT IMPACTS

The Project would not directly result in short-term or long-term population growth in the district (refer to section 3.10) and therefore would not directly increase the use of recreational facilities. The Project does not include or require the construction or expansion of recreational facilities.

INDIRECT IMPACTS

Potential impacts from population growth that could occur as an indirect impact of the Project are addressed in Chapter 4, Growth-Inducing Effects and Growth-Related Impacts.

### 3.12.3 Mitigation Measures

#### *3.12.3.1 State Water Project and Associated Facilities*

No direct or indirect significant impacts to recreational resources would occur; therefore no mitigation measures are required.

#### *3.12.3.2 Wheeler Ridge-Maricopa Water Storage District*

No direct or indirect significant impacts to recreational resources would occur; therefore no mitigation measures are required.

#### *3.12.3.3 Castaic Lake Water Agency*

No direct significant impacts to recreational resources would occur; therefore no mitigation measures are required. Mitigation measures for indirect impacts are addressed in Chapter 4, Growth-Inducing Effects and Growth-Related Impacts.

### 3.12.4 Significant Unavoidable Impacts

No direct or indirect significant unavoidable impacts would result from the Project.

# 3.13 TRANSPORTATION AND CIRCULATION

## 3.13.1 Environmental Setting

### *3.13.1.1 State Water Project and Associated Facilities*

No substantial changes in baseline conditions have occurred between the 1998 NOP and the 2003 NOP. The SWP and associated facilities are served by, lie adjacent to, or are traversed by, several major transportation routes, including Interstates 5 and 580, State Route 152, and Highways 33, 41, 46, 55, 119, 138, 166, and 198. Numerous general aviation airports exist within the regions traversed by the SWP and associated facilities, but none is immediately adjacent to the SWP facilities. Passenger bus and rail service are generally available in the urbanized areas traversed by the California Aqueduct.

### *3.13.1.2 Wheeler Ridge-Maricopa Water Storage District*

No substantial changes in baseline conditions have occurred between the 1998 NOP and the 2003 NOP. The minor population increase in a rural area during this period would cause minor changes to transportation and traffic.

Planning, design, construction, and operation of regional transportation systems in the Kern County area are primarily the responsibility of the California Department of Transportation (CalTrans), District 6. The WRMWSD is served by several major transportation routes, including Interstate 5 and State Highways 99 and 166. Interstate 5 and State Highway 99 trend generally north to south through the district and serve as the major north/south routes through the San Joaquin Valley. State Highway 166 trends east to west through the district. Local roadways are under the jurisdiction of Kern County. The district does not contain any commercial or general aviation airport facilities, and the nearest commercial airport is Meadows Field, located northwest of Bakersfield. The area is not served by scheduled passenger rail or bus services.

### *3.13.1.3 Castaic Lake Water Agency*

The primary agency responsible for the planning, design, construction, and operation of regional transportation systems in the Santa Clarita Valley is CalTrans District 7. Local roadways are under the jurisdiction of local cities and/or Los Angeles County. Two regional freeways serve the Santa Clarita Valley area. Interstate 5 traverses the area in a north-south direction on the west side of the City of Santa Clarita and continues south through the Los Angeles area. State Route 14 serves the eastern part of the area and beyond, connecting to the communities of Palmdale and Lancaster. State Route 126 traverses Ventura County in an east-west direction and continues to Los Angeles County intersecting with Interstate 5 near Santa Clarita.

The highway and roadway system in the Santa Clarita Valley is being modified in response to local and regional development projects, and Caltrans has developed long-range plans for state highways in this area based on projected travel demand over a 20-year period. Interstate 5, which has eight lanes from State Route 126 to State Route 14, is projected to need two additional

high occupancy vehicle (HOV) and two additional truck lanes to meet future traffic volumes (Caltrans 1991c). In general, traffic volumes increased between 1998 and the present since the population increased during this period.

The closest commercial airport to the CLWA service area is the Burbank Glendale Pasadena Airport, approximately 15 miles from Valencia. Passenger bus service is available to most of the service area, provided by Greyhound, Amtrak, and Santa Clarita Transit. Santa Clarita Transit provides transportation services connecting the communities of Castaic, Val Verde, Valencia, Saugus, Friendly Valley, Canyon Country, and Newhall and express service to downtown Los Angeles (Santa Clarita Transit 2002). In addition, three Metrolink rail stations are located within the CLWA service area.

## 3.13.2 Potential Impacts of the Project

### *3.13.2.1 Significance Criteria*

The criteria used to determine the significance of an impact related to transportation are based on the initial study checklist in Appendix G of the State CEQA Guidelines. The Project would result in a significant impact if it would:

- cause an increase in traffic that is substantial in relation to the existing traffic load and capacity of the street system (i.e., result in a substantial increase in either the number of vehicle trips, the volume to capacity ratio on roads, or congestion at intersections;
- exceed either individually or cumulatively, a level of service standard established by the county congestion management agency for designated roads or highways;
- result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks;
- substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment);
- result in inadequate emergency access;
- result in inadequate parking capacity; or
- conflict with adopted policies supporting alternative transportation (e.g., bus turnouts, bicycle racks).

### *3.13.2.2 Environmental Impacts*

*State Water Project and Associated Facilities*

DIRECT IMPACTS

The Project would not involve construction or operational changes that could generate traffic or otherwise affect traffic conditions. Similarly, the Project would not produce a change in population or employment that would produce addition demands on the transportation system. Thus, the Project would not cause an increase in traffic, result in an exceedance of an established level of service standard, change air traffic patterns, substantially increase hazards,

result in inadequate emergency access, result in inadequate parking capacity, conflict with adopted policies supporting alternative transportation.

INDIRECT IMPACTS

No indirect impacts to transportation and circulation would occur.

*Wheeler Ridge-Maricopa Water Storage District*

DIRECT IMPACTS

The Project would not involve construction or operational changes that could generate traffic or otherwise adversely affect traffic conditions. Similarly, the Project would not produce a change in population or employment that would produce addition demands on the transportation system. Thus, the Project would not cause an increase in traffic, result in an exceedance of an established level of service standard, change air traffic patterns, substantially increase hazards, result in inadequate emergency access, result in inadequate parking capacity, conflict with adopted policies supporting alternative transportation.

INDIRECT IMPACTS

No indirect impacts to transportation and circulation would occur.

*Castaic Lake Water Agency*

DIRECT IMPACTS

The Project would not involve construction or operational changes that could generate traffic or otherwise affect traffic conditions. Similarly, the Project would not directly produce a change in population or employment that would produce addition demands on the transportation system. Thus, the Project would not cause an increase in traffic, result in an exceedance of an established level of service standard, change air traffic patterns, substantially increase hazards, result in inadequate emergency access, result in inadequate parking capacity, conflict with adopted policies supporting alternative transportation.

INDIRECT IMPACTS

Potential impacts from population growth that could occur as an indirect impact of the Project are addressed in Chapter 4, Growth-Inducing Effects and Growth-Related Impacts.

## 3.13.3 Mitigation Measures

### *3.13.3.1 State Water Project and Associated Facilities*

No direct or indirect significant impacts to transportation and circulation would occur; therefore, no mitigation measures are required.

#### *3.13.3.2 Wheeler Ridge-Maricopa Water Storage District*

No direct or indirect significant impacts to transportation and circulation would occur; therefore, no mitigation measures are required.

#### *3.13.3.3 Castaic Lake Water Agency*

No direct significant impacts to transportation and circulation would occur; therefore, no mitigation measures are required. Mitigation measures for indirect impacts are addressed in Chapter 4, Growth-Inducing Effects and Growth-Related Impacts.

### 3.13.4 Significant Unavoidable Impacts

No direct or indirect significant unavoidable impacts would result from the Project, with the exception of potential indirect impacts within the CLWA service area. These are addressed in Chapter 4, Growth-Inducing Effects and Growth-Related Impacts.

# 3.14 UTILITIES/SERVICE SYSTEMS

This section addresses potential impacts to utilities and service systems, including solid waste disposal and domestic and wastewater service. In addition, since the Project would require electrical power for pumping additional water through SWP facilities from the WRMWSD turnout to the CLWA turnout and for potable water treatment prior to use in the CLWA service areas, the sections describing the SWP and associated facilities and CLWA service area also include a discussion of energy consumption.

## 3.14.1 Environmental Setting

### *3.14.1.1 State Water Project and Associated Facilities*

The SWP is a water storage and delivery system consisting of reservoirs, aqueducts, power plants, and pumping plants. Solid waste disposal services associated with SWP facilities are provided by municipalities as well as local disposal companies. Domestic water service is provided by municipalities and special districts. Wastewater service is provided by local municipalities as well as local treatment companies.

*Electrical Power*

The SWP is the single largest user of electrical power in California. The electricity needed to operate the SWP comes from a combination of SWP hydroelectric facilities, the Reid Gardner Coal-fired Generation Plant (approximately 68 percent of Unit 4 is owned by DWR), and through long-term and short-term contracts with other energy producers (DWR 2002).

In 1998, operating the 25 SWP pumping and generating plants required 3.445 billion kilowatt hours (kWh) (DWR 2001a) to deliver approximately 1.8 million AF of water overall and approximately 666,000 AF of water to southern California. During 1998, SWP facilities produced approximately 4.533 billion kWh of energy (not including the 1.382 million kWh of energy produced under DWR's share of the Reid Gardner coal-fired generation plant) (DWR 2001a). In 1998, DWR sold approximately 6.9 billion kWh to 36 utilities and 19 power marketers (DWR 2001a). DWR also purchased or exchanged 4.43 billion kWh of energy in 1998 (DWR 2001a).

In 2000, operating the 25 SWP pumping and generating plants required 9.19 billion kWh to deliver approximately 3.6 million AF overall and approximately 1.8 million AF to southern California (DWR 2002)[1]. In 2000, DWP sold approximately 2.92 billion kWh to 24 utilities and 16 power markets (DWR 2002). DWR also purchased 2.94 billion kWh of energy in 2000 (DWR 2002).

Water delivered to the WRMWSD turnouts passes though the Banks, Dos Amigos, and Buena Vista pumping plants on the California Aqueduct as it travels from the SWP south Delta facilities to the first of WRMWSD's turnouts. When water is stored in San Luis Reservoir, it also

1 These values are total water delivered and include deliveries associated with Table A, Article 21, flexible storage, and non-project water. See Table 9-1 in DWR 2002.

passes through the Gianelli Pumping-Generating Plant located adjacent to the reservoir. The SWP Teerink and Chrisman pumping plants, both located within the WRMWSD, lift water in the Aqueduct as it continues south. Water in the Aqueduct is then lifted over the Tehachapi Mountain Range by the Edmonston pumping plant, and lifted again at the Oso pumping plant. Water then flows through the Warne powerplant just north of Pyramid Lake. Water is delivered from Pyramid Lake to Castaic Lake by gravity. Some power is recovered at the Warne and Castaic powerplants (Castaic powerplant is owned and operated by the Los Angeles Department of Water and Power) when water flows down the Aqueduct from the south side of the Tehachapi Mountain Range to Castaic Lake.

Electrical energy demand varies in response to economic trends and population. As a result of these factors, peak electrical energy demand is expected to increase by approximately 10 MW per year for the foreseeable future (CEC 2002b). However, when one considers the West as a whole, more generation capacity is being built than is necessary to meet the anticipated demands of growth. Based on the evaluations of recent demand trends, population trends, fuel costs, power generation capability and construction, meteorological conditions, actions outside California, and other factors, CEC concluded that, for the foreseeable future, capacity additions will exceed the peak demand growth both within California and the Northwest, Southwest, and Rocky Mountain regions. While various factors may trigger calls for load curtailments, supply reserve margins should be adequate to meet the reasonably foreseeable demands.

#### *3.14.1.2 Wheeler Ridge-Maricopa Water Storage District*

No substantial changes in baseline conditions have occurred between the 1998 NOP and the 2003 NOP. Population increased modestly during this period (the entire increase between 1998 and 2000 was less than 400 persons); thus, the demand for utilities and service systems likely increased as well.

*Solid Waste*

Kern County Waste Management Department operates seven landfills including Bena, Boron, Mojave-Rosamond, Ridgecrest, Shafter-Wasco, Taft, and Tehachapi; and six transfer stations including Buttonwillow, Glennville, Kern Valley, Lebec, Lost Hills, and McFarland-Delano. In addition, four bin sites serve Kern County and include Caliente, Keene, Lorraine-Twin Oaks, and Randsburg.

*Wastewater*

Wastewater treatment within Kern County is provided by public entities and individual wastewater treatment facilities such as septic tanks and leach fields. All residential and commercial buildings in WRMWSD use individual wastewater treatment facilities.

*Storm Water*

The Kern County Engineering & Survey Services Department (KCESSD) provides storm water services to WRMWSD. These services includes the design, maintenance, and monitoring of pollutant discharges from Kern County's storm water management infrastructure. The Engineering & Survey Services Department is also responsible for reviewing and inspecting

street, sewer, water, drainage, and grading plans for Kern County project and development permits, collecting floodplain mapping and hydrologic data, and implementing the National Flood Insurance Program (KCESSD 2002).

#### *3.14.1.3 Castaic Lake Water Agency*

No substantial changes in baseline conditions have occurred between the 1998 NOP and the 2003 NOP, except as noted. In general, population increased during this period; thus, the demand for utilities and service systems likely increased as well.

*Solid Waste Disposal*

Waste generated in the CLWA service area is generally hauled by private contractors to public landfills in Los Angeles County. The Chiquita Canyon Landfill and the Sunshine Canyon Sanitary Landfill handle the majority of waste from the Santa Clarita Valley, although numerous other landfills in Los Angeles County also provide service. Landfill capacity available to the CLWA service area is therefore not limited to those areas in the immediate vicinity. In 1998, Chiquita Canyon Landfill had a remaining capacity of approximately 1 million tons and had an expansion permit pending for an additional 23.0 million tons. The landfill had a daily limit of 5,000 tons per day or 30,000 tons per week. Since 1998, the 23.0 million ton expansion permit for the Chiquita Canyon Landfill was approved, and it has a remaining capacity of 20.1 million tons (LACSD 2002). The landfill's allowable daily tonnage is currently 6,000 tons per day; however, the weekly allowable amount is still 30,000 tons per week (California Integrated Waste Management Board [CIWMB] 2001a).

In 1998, the capacity of the Sunshine Landfill was 17 million tons, which was expected to last for another nine years (personal communication, S. Rohas 1998). The maximum daily tonnage rate in 1998 was 6,000 tons per day or 36,000 tons per week (personal communication, J. Aidukas 1998). This facility is developing plans for expansion to a 90 million ton capacity that would be expected to last 26 years after date of approval. Expansion would include an increase in the maximum tonnage rate from 6,000 to 11,000 tons per day. As of May 2001, the daily tonnage rate increased to 6,600 tons per day, and the landfill has a remaining capacity of 16 million cubic yards (CIWMB 2001b). The Sunshine Landfill currently has an estimated closure date of January 2004 (CIWMB 2001b).

*Water Treatment*

Surface water and groundwater are treated prior to the distribution for potable use. Treatment of groundwater within the CLWA service area is generally limited to disinfection and is completed at individual wellhead facilities. Surface water (such as from imported sources) is filtered and disinfected, in compliance with applicable regulations, at either the Earl Schmidt Filtration Plant (ESFP) or Rio Vista Water Treatment Plant (RVWTP). Construction is underway at the ESFP to upgrade the treatment process to meet anticipated water quality requirements and to expand the ESFP capacity from 33.6 million gallons per day (mgd) to 56 mgd (refer to section 4.2.14 regarding Growth-Related Impacts and Chapter 6.0, Cumulative Impacts, for additional details). The ESFP was originally constructed with a capacity of 12.5 mgd in 1980 and expanded to 25 mgd in 1987. In the 1990s, the California Department of Health Services re-rated the treatment plant to a capacity of 28 mgd and then in 2001 to a capacity of 33.6 mgd.

The ESFP is located in Castaic, near Castaic Lake. The ESFP obtains its raw water supply from SWP water stored in Castaic Lake. The RVWTP was constructed in the early 1990s with a rated capacity of 30 mgd. The RVWTP is located in Santa Clarita, near Bouquet Canyon Road.

Water treatment capacity is based on peak demand. Current and anticipated operations of the existing and proposed water production and treatment facilities have a great deal of flexibility to meet peak (summer) demands and non-peak ("baseload" or winter) demands by coordinated use of imported and local groundwater resources and associated treatment facilities. Based on the operations and peaking factors used by CLWA, the combined capacity of the existing facilities is sufficient to treat approximately 35,600 AFY for potable use. If these facilities were operated at peak capacity for a full year they would have the capacity to treat approximately 71,200 AF. The routine operation of the treatment plants at full rated capacity would not follow sound engineering or operational practices. When the ESFP expansion project is completed (expected in 2005), normal treatment capacity would be increased to approximately 48,200 AFY. If expanded peak operations were maintained for a full year, the treatment capacity would be approximately 96,300 AFY.

*Wastewater*

*Santa Clarita Valley and Unincorporated Los Angeles County.* Two wastewater treatment facilities managed by the County Sanitation Districts of Los Angeles County service the Santa Clarita Valley and vicinity: the Saugus Water Reclamation Plant and the Valencia Water Reclamation Plant. These facilities are operated by the County Sanitation Districts of Los Angeles County. These facilities work jointly to treat the wastewater of the Santa Clarita Valley. Any excess flows from the Saugus facility are treated by the Valencia facility. The Saugus facility has a maximum capacity of 6.5 mgd. The treatment processes used are primary, secondary, and tertiary treatment. Both the Saugus and Valencia facilities discharge treated effluent into the Santa Clara River. The Valencia Water Reclamation Plant is also a primary, secondary, and tertiary treatment facility with a capacity of 12.6 mgd. These two districts jointly operate a regional system known as the Santa Clarita Valley Joint Sewerage System (SCVJSS) for which the 2015 Joint Sewerage System Facilities System Plan has been completed (LACSD 1998). The SCVJSS has a current combined capacity (from the Saugus and Valencia treatment plants in 2003) of 19.1 mgd and plans to expand capacity to 28.1 mgd by 2004. The System Plan identifies further expansion to the practical site capacity of 34.1 mgd by 2010, which has been extended to 2020 (personal communication, S. Highter, 2003). To date, the efforts to expand capacity to 28.1 mgd are on schedule, and completion is expected in Spring 2004. All expansions are occurring at the Valencia plant. The ultimate expansion is intended to serve a population of 321,000. Nitrification and denitrification process upgrades have been completed at both facilities (final construction is ongoing but the processes have been underway since June of 2003) and the related required effluent standards have been met since June of 2003 (personal communication, R. Kettle 2004).

*Unincorporated Ventura County.* A package plant located on the north side of Highway 126 at its intersection with Hopper Creek provides wastewater treatment service to the residents of the nearby unincorporated areas of Ventura County (personal communication, R. Pakala 1998). This package plant, managed by Ventura County Public Works, Water and Sanitation Department, uses an activated sludge process to service 220,000 gallons of wastewater per day

(Ventura County Public Works Agency 2001). All treated effluent is discharged into several percolation ponds located on the south side of Highway 126.

*Storm Water*

*Santa Clarita Valley and Unincorporated Los Angeles County*. The Los Angeles County Department of Public Works provides storm water services for the Santa Clarita Valley and unincorporated Los Angeles County. The Department of Public Works is responsible for the design, construction, operation, maintenance, and repair of roads, bridges, airports, sewers, water supply, flood control and water conservation facilities; and for the design and construction of capital projects. Additional responsibilities include regulatory and ministerial programs for the County of Los Angeles, Los Angeles County Flood Control District, other special districts, and contract cities that request services. A 24-hour Emergency Operations Center is maintained to respond to problems reported by the public and other agencies as well as major emergencies, such as floods, windstorms, snowstorms, earthquakes, etc., and to monitor various Department facilities (Los Angeles County Department of Public Works 2002).

*Unincorporated Ventura County*. The Flood Control Department of the Ventura County Public Works Agency has the operational responsibilities for the Ventura County Flood Control District, which provides storm water services to the unincorporated regions of Ventura County.

*Electrical Power*

Southern California Edison (Edison) provides electricity to the CLWA service area. Edison generates electricity from a variety of energy resources, including solar, geothermal, hydroelectric, natural gas, and nuclear. Edison also purchases electricity from independent producers and is part of the Pacific Intertie and the western power supply grid.

The Edison transmission system includes transmission lines of approximately 50 miles in length or greater with a capacity of 220,000 volts, as well as sub-transmission systems with a 66,000 volt capacity, which transmit power from the larger capacity lines to 7 existing substations serving the Santa Clarita Valley. The Elizabeth Lake Substation, located in Castaic, serves the ESFP. Edison has a proprietary 10-year plan for the Santa Clarita Valley and has earmarked additional substations and power lines to be built, as needed, depending upon growth in the area (personal communication, M. Hughes 2002). Power consumption in the CLWA service area likely increased between 1998 and the present since the population increased during this period.

## 3.14.2 Potential Impacts of the Project

### *3.14.2.1 Significance Criteria*

The significance criteria listed below are based on Appendix G of the State CEQA Guidelines. The Project would have a significant impact on utilities and service systems if it would:

- exceed wastewater treatment requirements of the applicable Regional Water Quality Control Board;

- require or result in the construction of new water, wastewater treatment, or electrical power generation facilities or expansion of existing facilities, the construction of which could cause significant environmental effects;
- require or result in the construction of new storm water drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects;
- exceed water supplies available to serve the project from existing entitlements and resources and require new or expanded entitlements;
- exceed existing wastewater treatment capacity;
- exceed existing landfill capacity; and/or
- not comply with federal, state, and local statutes and regulations related to solid waste.

### *3.14.2.2 Environmental Impacts*

#### *3.14.2.2.1 State Water Project and Associated Facilities*

DIRECT IMPACTS

Implementation of the Project would not require new construction or the modification of existing SWP conveyance facilities. SWP conveyance facilities were constructed to meet the anticipated demands of the SWP Contractors; however, these delivery demands vary from year to year and many Contractors don't request delivery of their total Table A Amounts in every year, thereby resulting in the availability of additional conveyance capacity. The use of existing SWP facilities to transport water from the WRMWSD service area to the CLWA service area would not affect wastewater treatment, require or result in the construction of new or expanded water or wastewater treatment facilities or storm water drainage facilities, require a water supply to serve the Project, or require the disposal of additional solid waste.

The Project would require additional electricity to pump the transferred water to the CLWA turnouts. About 3,450 kWh per AF are required to pump water through the Teerink, Chrisman, Edmonston, and Oso pumping plants for delivery to the CLWA turnout (DWR 2001a). Although the average amount of water transferred would vary from year to year (refer to section 3.15), assuming the full Table A Amount of 41,000 AF were delivered to CLWA, about 0.14 billion kWh would be required to pump the additional water through these pumping plants for delivery to the CLWA turnout. This is approximately 3 percent of the total energy used by the 25 SWP pumping and generating plants in 1998, and approximately 1.5 percent of the power used in 2000. The difference in these values is a result of the differing amounts of water delivered by the SWP in these two years (approximately 1.76 million AF in 1998 and approximately 3.57 million AF in 2000; DWR 2002).

SWP pumping facilities are rated to meet the anticipated demands of the SWP Contractors, and this rated capacity would not be exceeded by implementation of the Project. The amount of additional power required would be within the limits of the planned power supply, and no expansion or construction of new facilities to generate power would be required. The impact to electrical power would be less than significant.

INDIRECT IMPACTS

No indirect impacts to utilities and service systems would occur.

*3.14.2.2.2 Wheeler Ridge-Maricopa Water Storage District*

DIRECT IMPACTS

The Project would not involve new construction or other changes that would result in increased demand for utilities and service systems. Therefore, the Project would not affect wastewater treatment, require or result in the construction of new or expanded water or wastewater treatment facilities or storm water drainage facilities, require a water supply to serve the Project, require the disposal of additional solid waste, or generate additional demand for electrical power.

INDIRECT IMPACTS

No indirect impacts to utilities and service systems would occur.

*3.14.2.2.3 Castaic Lake Water Agency*

DIRECT IMPACTS

The Project would not involve new construction or other changes that directly would result in increased demand for utilities and service systems. Therefore, the Project would not directly affect wastewater treatment, require or result in the construction of new or expanded water or wastewater treatment facilities or storm water drainage facilities, require a water supply to serve the Project, require the disposal of additional solid waste, or generate additional demand for electrical power.

The Project would generate additional demand for water treatment and electrical power to treat and distribute the transferred water within the CLWA service area. The pumping plants and treatment facilities have the existing or planned capacity to accommodate the additional amount of water provided by the Project; thus, the amount of additional power and water treatment required would be within the limits of the planned supplies, and no expansion or construction of new facilities to generate power or water treatment beyond that which is already being planned would be required. The impact to electrical power and water treatment would be less than significant.

INDIRECT IMPACTS

Potential impacts to utilities and service systems from population growth that could occur as an indirect impact of the Project are addressed in Chapter 4, Growth-Inducing Effects and Growth-Related Impacts.

## 3.14.3 Mitigation Measures

### *3.14.3.1 State Water Project and Associated Facilities*

No direct or indirect significant impacts to utilities and service systems would occur; therefore, no mitigation measures are required.

### *3.14.3.2 Wheeler Ridge-Maricopa Water Storage District*

No direct or indirect significant impacts to utilities and service systems would occur; therefore, no mitigation measures are required.

### *3.14.3.3 Castaic Lake Water Agency*

No direct significant impacts to utilities and service systems would occur; therefore, no mitigation measures are required. Mitigation measures for indirect impacts are addressed in Chapter 4, Growth-Inducing Effects and Growth-Related Impacts.

## 3.14.4 Significant Unavoidable Impacts

No direct or indirect significant unavoidable impacts would result from the Project, with the exception of potential indirect impacts to solid waste disposal within the CLWA service area. These are addressed in Chapter 4, Growth-Inducing Effects and Growth-Related Impacts.

# 3.15 WATER RESOURCES

As discussed in section 3-0, this EIR's description of the Project's environmental setting includes information from the general timeframe when the January 2003 NOP was issued (referred to as current or present conditions), as well as information describing the environmental setting as it existed when the NOP for the 1999 Supplemental Water Project Final EIR was published (April 1998). Table 3.0-1 describes the key substantive changes in the environmental setting, if any, that occurred between 1998 and the present for each environmental resource analyzed in this EIR. The differences relevant to water resources are summarized below for the three geographic areas under consideration.

**State Water Project**

Total Table A deliveries fluctuated, ranging from a low of 1,546,740 AF in 2001 to a high of 3,714,230 AF in 2003. SWP Table A Amounts were transferred among SWP Contractors, including MWD to Coachella Valley Water Authority – 35,000 AF; Belridge Water Storage District to Zone 7 – 2,219 AF; and Tulare Lake Basin Water Storage District to Zone 7 – 400 AF. The PCL litigation challenging the Monterey Amendment was settled and essentially leaves these amendments in place (see sections 12.2 and 1.4.2 for a more complete description).

**Wheeler Ridge-Maricopa Water Storage District**

Water supplies are generally the same, although WRMWSD has increased participation in other, more cost effective, water management options. In 1998, such water management activities could have supplied WRMWSD with an additional 59,500 AFY, and 106,000 AFY in 2002. WRMWSD's contract with KCWA from SWP water was 197,088 AF in 2002. WRMWSD's contract with KCWA was 238,088 AF of "firm supply" in 1998.

**Castaic Lake Water Agency**

Water supply sources are generally the same, although CLWA's SWP Table A Amount was was increased by 41,000 AF due to the Project. In 1998, CLWA's average year SWP supply was estimated to be 46,500 AF based on available DWR model analysis. CLWA's average year SWP supply now is estimated to be 68,300 AF based on new DWR model results and Project implementation. In 1998, the total water demand in 2010 was projected to be approximately 106,300 AF. Future demand now is expected to be approximately 82,400 AF in 2010 and 102,500 AF by 2020.

## 3.15.1 Environmental Setting

### *3.15.1.1 State Water Project*

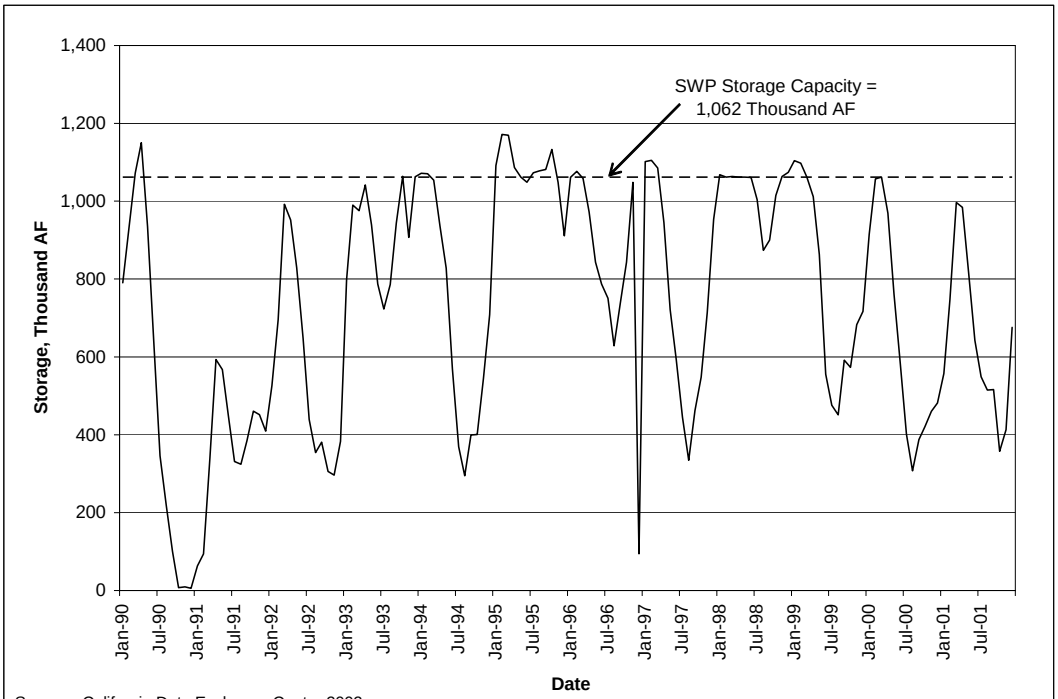
*SWP Facilities*

The SWP is a water supply, storage, and distribution system that includes 28 storage facilities, reservoirs, and lakes; 20 pumping plants; six pumping-generating plants and hydroelectric power plants; and about 660 miles of aqueducts and pipelines (DWR 2001a). Principal SWP facilities are shown on Figure 1.3-1.

The primary water source for the SWP is within the drainage of the Feather River, a tributary of the Sacramento River, where runoff is stored behind Oroville Dam. Water released from Oroville Dam flows down natural channels to the Delta. In the southern Delta, water is pumped into the 444-mile-long California Aqueduct at the Clifton Court Forebay by the Banks Pumping Plant (or by agreement with the U.S. Bureau of Reclamation [USBR], at the Central Valley Project's [CVP] Tracy Pumping Plant). SWP water exports for users south of the Banks and Tracy pumping plants are currently limited by a series of water quality and operational constraints, governed primarily by the SWRCB's Water Right Decision 1641, as amended. Decision 1641 was adopted by the SWRCB in 1999; prior to that time, SWP water exports from the Delta were limited by the SWRCB's Water Right Decision 1485 (adopted in 1978), Order Water Right (WR) 95-6 (adopted in 1995), and Order WR 98-09 (adopted in 1998).

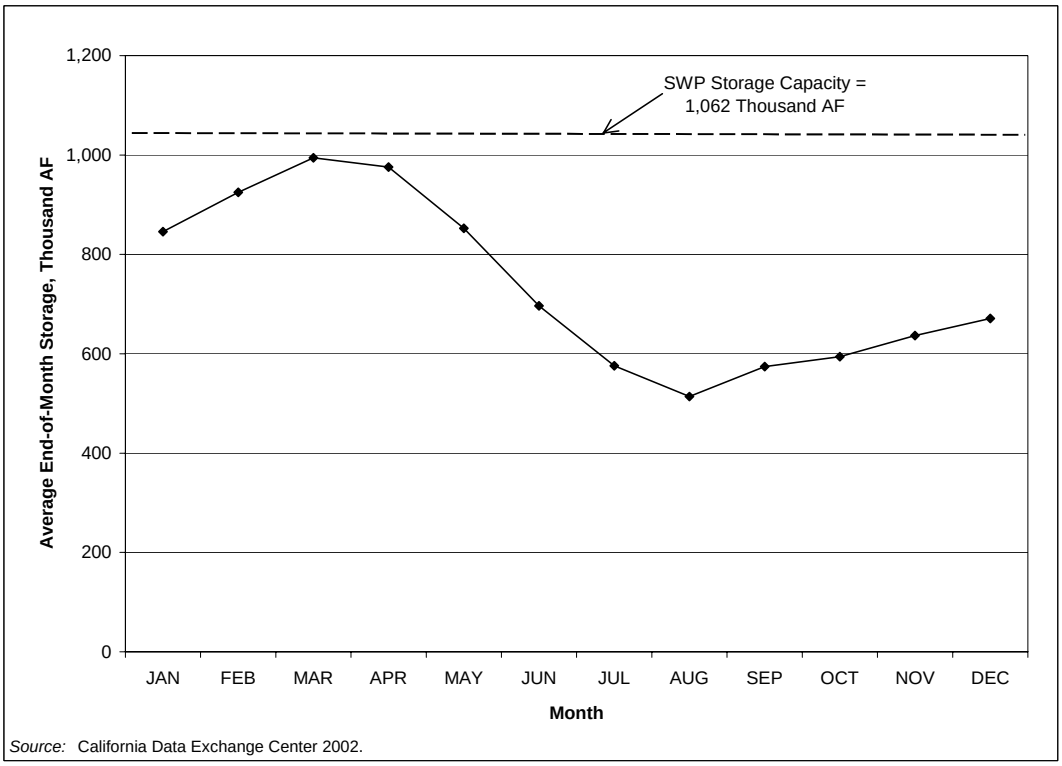
From the southern Delta facilities, water in the California Aqueduct travels along the west side of the San Joaquin Valley and is delivered directly to SWP Contractors or is stored in San Luis Reservoir, the SWP's main storage facility south of the Delta. San Luis Reservoir, located near Los Banos, is an off-stream storage reservoir with a total storage capacity of more than 2 million AF (of which approximately 1,062,000 AF are allocated to the SWP; the remainder is allocated to the CVP [DWR 2001a]).

In general, the SWP is operated to fill storage reservoirs during the high runoff months of the winter and early spring. Regulatory requirements for the Delta and associated operational constraints also affect the timing and ability to fill reservoirs south of the Delta. Under current operating conditions, including Decision 1641, SWP diversions from the Delta are substantially reduced as of April 15 of each year. As a result, the SWP is operated to store as much water as possible in San Luis Reservoir prior to April 15. The stored water is then released to meet Contractor demands during the high-demand summer and fall months to supplement the more limited pumping from the Delta during those months. Figure 3.15-1 shows the volume of SWP water stored in San Luis Reservoir for the period between 1990 and 2001. Figure 3.15-2 shows the average end-of-month SWP storage in San Luis Reservoir from 1990 to 2001. As is shown on these figures, San Luis Reservoir SWP storage levels vary considerably, both during the year and from year to year. From 1990 to 2001, SWP storage in the reservoir has ranged from approximately zero to more than 1.1 million AF.




*Source:* California Data Exchange Center 2002.
Note: SWP storage can exceed its capacity when it borrows unused capacity from the CVP.
Total San Luis Reservoir storage capacity is 2,028 thousand AF.

**Figure 3.15-1. SWP Storage in San Luis Reservoir, 1990 to 2001**




*Source:* California Data Exchange Center 2002.

**Figure 3.15-2. SWP Storage in San Luis Reservoir, 1990 to 2001 Average End-of-Month Storage**

Water is conveyed southward from San Luis Reservoir via the California Aqueduct to the primarily agricultural users in the San Joaquin Valley and the primarily urban regions of the Central Coast and southern California. Water is diverted from the Aqueduct and delivered directly to SWP Contractors, including KCWA, in the central and southern San Joaquin Valley at various locations along the Aqueduct. The Aqueduct traverses the west side of the San Joaquin Valley, and water is pumped through a series of four pumping plants (Dos Amigos, Buena Vista, Teerink, and Chrisman) before reaching the Edmonston Pumping Plant. The capacity in these reaches of the Aqueduct ranges from 10,000 cubic feet per second (cfs) at the northern end to approximately 4,400 cfs at the Edmonston Pumping Plant. The Edmonston Pumping Plant pumps water over the Tehachapi Mountain Range, and the California Aqueduct then divides into the East Branch and the West Branch. Water intended for use by CLWA is conveyed through the West Branch through Quail and Pyramid lakes and then to Castaic Lake, the terminus for the West Branch.

Quail and Pyramid lakes are located between the KCWA turnouts for deliveries to WRMWSD and the CLWA turnout on the West Branch of the California Aqueduct. Because of Quail Lake's limited storage capacity (approximately 7,800 AF) the lake is primarily used for the re-regulation of Aqueduct flows. Pyramid Lake, which has a storage capacity of approximately 171,200 AF, is used to provide an emergency water supply to the SWP Contractors that receive deliveries from the West Branch in the case of a major supply system outage, and is used in the operation of the Castaic Power Plant, located between Pyramid and Castaic lakes.

Castaic Lake has a storage capacity of approximately 323,700 AF. As shown on Figure 3.15-3, from 1990 to 2001, storage has ranged from a minimum of approximately 150,000 AF to a maximum of approximately 320,000 AF. The average end-of-month storage from 1990 to 2001 in Castaic Lake is shown on Figure 3.15-4. The reservoir is operated to provide regulatory storage to meet peak deliveries during the summer months for the three SWP Contractors that receive water from Castaic Lake (CLWA, The Metropolitan Water District of Southern California [MWD], and the Ventura County Flood Control District [VCFCD]), and to provide an emergency water supply in the case of a major supply system outage. As part of the Monterey Amendment, these three SWP Contractors have access to 160,000 AF of the storage from Castaic Lake as "flexible storage," which they may withdraw in addition to their allocated SWP supplies and which they must replace within five years of any withdrawal. Local runoff captured in Castaic Lake is managed in compliance with an agreement between DWR and the holders of prior water rights. From 1990 to 2000, SWP deliveries to CLWA from Castaic Lake averaged approximately 19,200 AF, or approximately 6 percent of the total annual SWP deliveries from the lake (see Table 3.15-1). From 1990 to 2000, the majority of the SWP water delivered from the lake (approximately 93 percent) was delivered to MWD due to its relatively larger Table A Amount and storage rights in Castaic Lake.

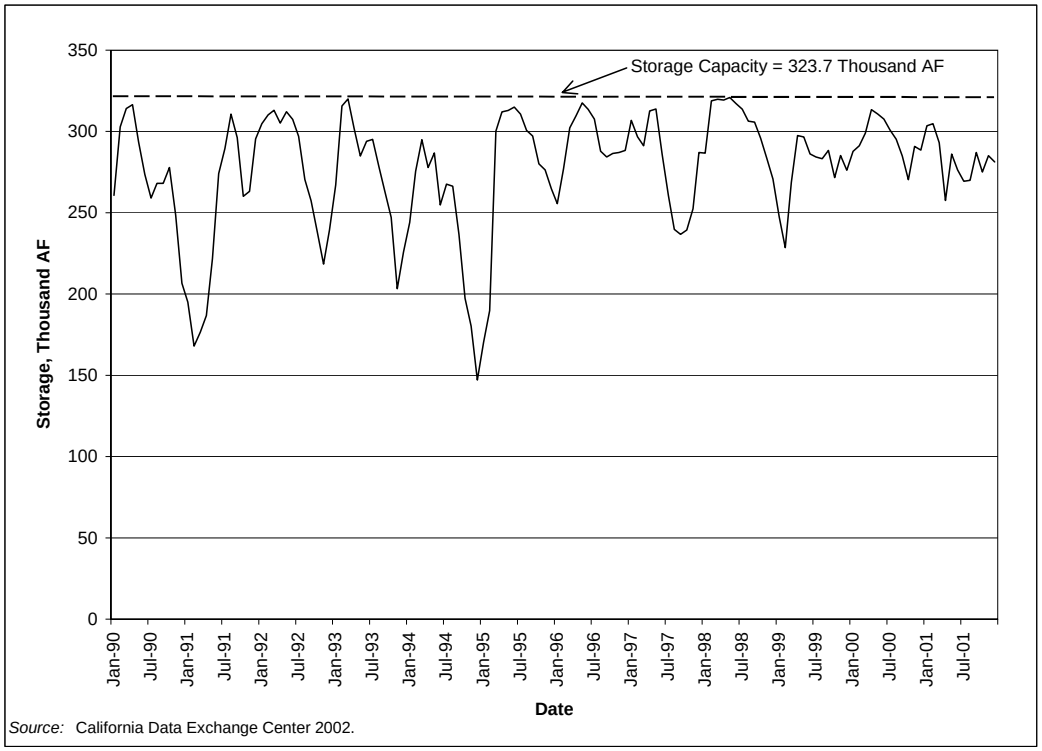



**Figure 3.15-3. Castaic Lake Storage, 1990 to 2001**

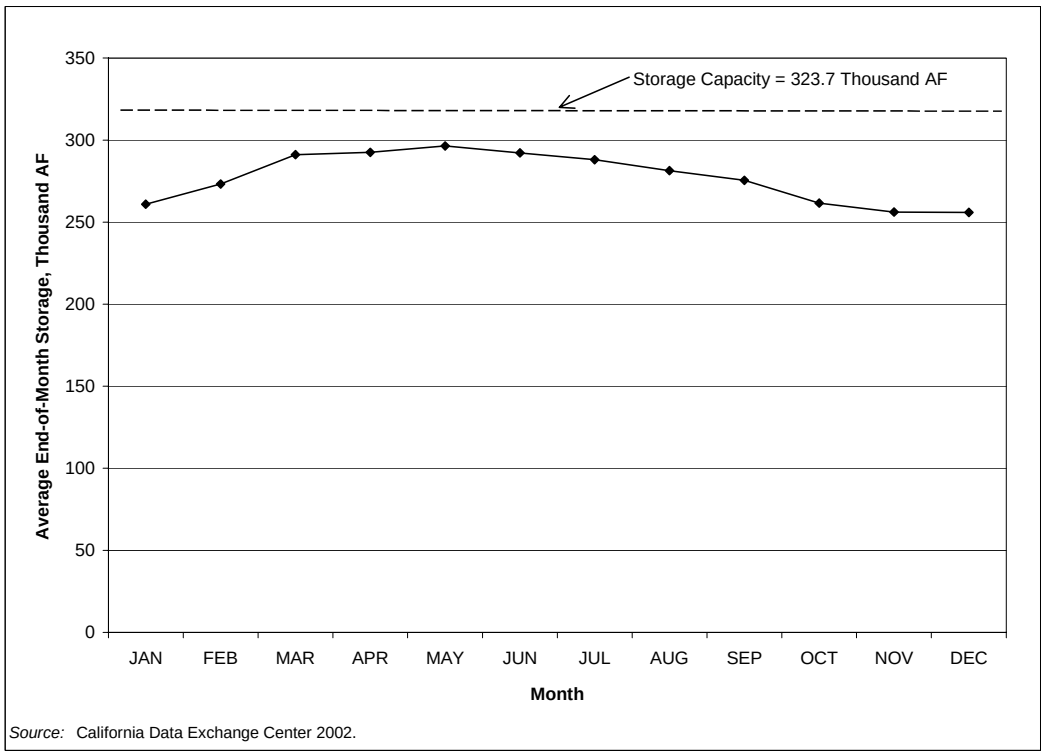



**Figure 3.15-4. Castaic Lake Storage, 1990 to 2001 Average End-of-Month Storage**

**Table 3.15-1. Annual SWP Water Deliveries from Castaic Lake by Contractor, 1990 to 2000**

| | *CLWA* | *MWD* | *VCFCD* | *Other*[1] | *Total* | *CLWA as a % of Total* |
|---|---|---|---|---|---|---|
| 1990 | 22,139 | 764,380 | 0 | 0 | 786,519 | 2.81 |
| 1991 | 3,846 | 257,835 | 0 | 1,240 | 262,921 | 1.46 |
| 1992 | 14,812 | 420,849 | 0 | 0 | 435,661 | 3.40 |
| 1993 | 13,787 | 437,470 | 0 | 0 | 451,257 | 3.06 |
| 1994 | 14,919 | 475,900 | 0 | 0 | 490,819 | 3.04 |
| 1995 | 17,747 | 139,882 | 0 | 0 | 157,629 | 11.26 |
| 1996 | 18,448 | 267,618 | 0 | 0 | 286,066 | 6.45 |
| 1997 | 22,842 | 271,379 | 1,850 | 27,130 | 323,201 | 7.07 |
| 1998 | 19,782 | 187,277 | 1,850 | 0 | 208,909 | 9.47 |
| 1999 | 28,813 | 327,001 | 1,850 | 0 | 357,664 | 8.06 |
| 2000 | 33,674 | 632,993 | 1,848 | 0 | 668,515 | 5.04 |
| Average | 19,164 | 380,235 | 673 | 2,579 | 402,651 | 5.56 |

Source: DWR 2002.
1. Includes deliveries from Castaic Lake via exchange. These deliveries were made by the Santa Barbara County Flood Control and Water Conservation District in 1991 via exchange with VCFCD, and by the Coachella Valley Water District and Desert Water Agency in 1997 via exchange with MWD.

*Water Supply and Demands*[1]

As described in section 1.4.2, in the early 1960s, DWR began entering into individual Water Supply Contracts with various urban and agricultural public water supply agencies, known as Contractors. The total planned annual delivery capability of the SWP and the sum of all Contractors' maximum Table A Amounts specified in the Water Supply Contracts were approximately 4.2 million AF. The initial SWP facilities were designed to meet Contractors' water demands in the early years of the project, with the construction of additional facilities planned as demands increased. Water deliveries to Contractors began as initial SWP facilities were completed in the late 1960s and early 1970s; essentially no additional SWP storage facilities have been constructed since that time.

As shown on Table 3.15-2, from 1990 to 2003, actual SWP annual deliveries of Table A supplies to Contractors have ranged from approximately 550,000 AF in 1991 to approximately 3.7 million AF in 2003. Many Contractors did not request delivery of their full Table A Amount during this period. Climatic conditions and other factors can significantly alter the availability of SWP water in any year. The annual allocations of water made by DWR are based on that year's hydrologic conditions, the amount of water in storage in the SWP system, and Contractors' requests for SWP supplies. Contractors' water needs vary from year to year, and many

1 Bulletin 132-01, *Management of the California State Water Project*, is the most recent published data by DWR for SWP operations, including SWP deliveries to Contractors. Because Bulletin 132-01 covers SWP activities through calendar year 2000, the baseline information presented in this EIR for SWP operations includes information through calendar year 2000.

Contractors did not request delivery of their full Table A Amount in a number of years during this 14-year period.

**Table 3.15-2. SWP Annual Table A Deliveries, 1990 to 2003**

| | *Agricultural Contract Holders* | | *M&I Contract Holders* | | *Total Table A Deliveries (AF)* |
|---|---|---|---|---|---|
| | *Table A Deliveries (AF)* | *Allocation Percentage (%)* | *Table A Deliveries (AF)* | *Allocation Percentage (%)* | |
| 1990 | 706,080 | 50 | 1,876,070 | 100 | 2,582,150 |
| 1991 | 12,440 | 0 | 536,670 | 30 | 549,110 |
| 1992 | 509,810 | 45 | 961,650 | 45 | 1,471,460 |
| 1993 | 1,250,370 | 100 | 1,064,870 | 100 | 2,315,240 |
| 1994 | 614,360 | 53 | 1,134,990 | 53 | 1,749,350 |
| 1995 | 1,165,520 | 100 | 801,570 | 100 | 1,967,090 |
| 1996 | 1,369,190 | 100 | 1,145,640 | 100 | 2,514,830 |
| 1997 | 1,067,320 | 100 | 1,258,460 | 100 | 2,325,780 |
| 1998 | 860,720 | 100 | 864,800 | 100 | 1,725,520 |
| 1999 | 1,333,590 | 100 | 1,405,300 | 100 | 2,738,890 |
| 2000 | 1,177,200 | 90 | 2,022,700 | 90 | 3,199,900 |
| 2001 | 383,840 | 39 | 1,162,900 | 39 | 1,546,740 |
| 2002 | 827,128 | 70 | 2,059,886 | 70 | 2,887,014 |
| 2003 | 1,064,267 | 90 | 2,649,966 | 90 | 3,714,230 |

*Source:* For 1990 to 2000, DWR 2002. For 2001, DWR 2004a. For 2002, DWR 2003c. For 2003, DWR 2004b.

Under conditions specified in the Water Supply Contracts, DWR can make water available to SWP Contractors above and beyond a Contractor's Table A supply. Table 3.15-3 provides an overview of the various types of SWP water supplies discussed throughout this EIR.

In 1998, DWR estimated that annual deliveries to SWP Contractors would average approximately 3.1 million AF (based on estimates of then-existing levels of Contractor demands and land and water use upstream of the Banks Pumping Plant[2], with existing facilities operated under the constraints of Order WR 95-6; DWR 1998). This estimate is generally consistent with DWR's recent SWP Delivery Reliability Report (DWR 2003b). In this report, DWR estimated that the SWP currently can be expected to deliver an average annual supply of approximately 2.96 million AF, based on a 2001 level of Contractor demand and upstream land and water use, with existing facilities operated under existing constraints (DWR 2003b).

2 Land and water use upstream of the Banks Pumping Plant affects the amount of water flowing into the Delta. In general, increases in the amount of water flowing into the Delta can increase SWP supplies, while decreases in the amount of water flowing into the Delta (due to increased water use upstream or a variety of other factors) can decrease SWP supplies.

**Table 3.15-3. SWP Surplus and Other Water Types**

| | | |
|---|---|---|
| **Surplus Water** | SWP water that can be made available to Contractors when water and capacity are available in excess of SWP storage needs and Table A supplies. See below for terminology for, and descriptions of, specific types of surplus water. Surplus water terminology changed with implementation of the Monterey Amendment. | |
| | **Without Monterey Amendment (Including With Implementation of Article 18(b))** | **With Monterey Amendment** |
| | **Scheduled surplus water -** Water that DWR determined to be available, in addition to Table A supplies, which was scheduled for delivery throughout the year (in the same manner as Table A supplies). This water was generally available only during the early years of the SWP (when Contractor demands were low). | Category deleted as part of the Monterey Amendment. Given increased Contractor demands, this water was physically no longer available. |
| | **Unscheduled surplus water -** Water that DWR made available when water and capacity were available in excess of SWP storage needs and Table A supplies. This water is only available for limited time periods, generally only in the winter or early spring when Contractors demands are low, and only under specific conditions that do not occur on an annual basis. | **Article 21 water -** Same as unscheduled surplus water. Article 21 water was defined under the Monterey Amendment as "interruptible water" but is more commonly referred to as "Article 21 water." |
| **Carryover Water** | SWP Table A water that is allocated to, and paid for by, a Contractor in one year, but is stored in SWP supply reservoirs (when storage is available) for use by that Contractor in a following year. | |
| **DWR Dry Year Purchase** | Water from DWR's Dry Year Water Purchase Program, through which water is purchased by DWR in shortage years from willing sellers in areas that have available supplies, and is then sold by DWR to Contractors willing to purchase those supplies. | |
| **Flexible Storage (Added as part of the Monterey Amendment)** | Storage available to Contractors that share in repayment of the costs of terminal reservoirs (Castaic and Perris lakes). These Contractors may withdraw water from their share of flexible storage, in addition to any other SWP supplies available to the Contractor. The Contractor must replace any water it withdraws from flexible storage within five years. Flexible storage was added to the Water Supply Contracts as part of the Monterey Amendment. CLWA may withdraw up to 4,684 AF of water from Castaic Lake as flexible storage. | |
| **Turnback Pool Water (Added as part of the Monterey Amendment)** | Water sold or purchased through the SWP Turnback Pool. The Turnback Pool is a program in which Contractors with allocated Table A supplies that are in excess of their needs in a given year may turn back that excess supply for purchase by other Contractors that need additional supplies that year. The Turnback Pool can make water available in all types of hydrologic years, although there is generally less excess water turned back in dry years. The Turnback Pool was created as part of the Monterey Amendment. | |

*Water Quality*

Water quality in the California Aqueduct is primarily a reflection of the quality of water diverted from the Delta. Wet hydrologic years have lower concentrations of total dissolved

solids (TDS[3]) and other constituents relative to drier hydrologic years due to higher Delta outflows pushing the Delta's seawater/fresh water interface further downstream. Water quality sampling data are available at various locations in the California Aqueduct from the California Data Exchange Center (CDEC) operated by DWR. Table 3.15-4 summarizes the water quality data at the Banks Pumping Plant, Check 29 on the California Aqueduct (the nearest upstream location to WRMWSD), and at Castaic Lake from 1990 to 2001.

**Table 3.15-4. SWP Water Quality Summary based on Monthly Data for the Banks Pumping Plant, Check 29, and Castaic Lake, 1990 to 2001**

| *Constituent[1]* | *MCL[1]* | *Harvey Banks Delta Pumping Plant* | | *Check 29[2]* | | *Castaic Lake[3]* | |
|---|---|---|---|---|---|---|---|
| | | AVERAGE | RANGE | AVERAGE | RANGE | AVERAGE | RANGE |
| Chloride[4] (mg/L) | 250 | 82.27 | 12 to 162 | 85.05 | 3 to 170 | 77.64 | 41 to 119 |
| Nitrate + Nitrite, (mg/L) | 10 | 3.33 | 0.13 to 13 | 2.909 | 0.1 to 8.9 | 1.18 | 0.044 to 3.1 |
| TDS[4] (mg/L) | 500 | 276.12 | 85 to 466 | 330.55 | 66 to 687 | 386.59 | 239 to 429 |
| Arsenic[5] (mg/L) | 0.010 | 0.002 | 0.001 to 0.01 | 0.002 | 0.001 to 0.017 | 0.002 | 0.002 to 0.008 |
| Selenium (mg/L) | 0.05 | 0.001 | 0.001 to 0.002 | 0.005 | 0.001 to 0.1 | 0.001 | 0.001 to 0.001 |

*Source:* Personal communication, C. Erickson 2003.

1. An MCL (Maximum Contaminant Level) is the maximum permissible level of a contaminant in drinking water that is delivered to any user of a public water system.
2. Check 29 is located near Highway 119, north of the Buena Vista Pumping Plant and south of the Coastal Aqueduct.
3. Castaic Lake data were taken from MWD's inlet pipe and the outlet tower.
4. The chloride and TDS standards are secondary standards, which are non-enforceable guidelines regulating contaminants that may cause cosmetic effects (such as skin or tooth discoloration) or aesthetic effects (such as taste, odor, or color) in drinking water. EPA recommends secondary standards but does not require compliance. States may choose to adopt them as enforceable standards, however.
5. On January 22, 2001, EPA adopted a new standard for arsenic in drinking water at 0.010 milligrams per liter (mg/L), replacing the previous standard of 0.050 mg/L. The rule became effective on February 22, 2002. Systems must comply with the new 0.010 mg/L standard is January 23, 2006 (EPA 2002).

The beneficial uses[4] designated by the Central Valley Regional Water Quality Control Board (CVRWQCB) for the California Aqueduct include municipal, agricultural, industrial, recreational (except for canoeing and rafting), and wildlife habitat uses (CVRWQCB 1998). The San Luis Reservoir has the same beneficial uses designated for the Aqueduct except that the reservoir does not have an industrial processing use. San Luis Reservoir is also designated as a

3 TDS is a measure of the total amount of minerals, organic matter, and nutrients that are dissolved in water. The dissolved solids concentration commonly is called the water's salinity and is classified as follows: fresh, 0-1,000 mg/L; slightly saline, 1,000-3,000 mg/L; moderately saline, 3,000-10,000 mg/L; very saline, 10,000-35,000 mg/L; and briny, more than 35,000 mg/L.

4 The Porter-Cologne Water Quality Control Act gave the SWRCB authority over water quality within California and established nine regional water quality control boards. The regional boards prepare water quality plans (called basin plans) for their region that identify the beneficial uses of water to be protected, establish water quality objectives (limits or levels of water constituents based on both state and federal laws), and define a program to implement water quality objectives.

warm freshwater fishery. The beneficial uses designated by the Los Angeles Regional Water Quality Control Board (LARWQCB) for Castaic and Pyramid lakes include municipal, agricultural, industrial, groundwater recharge, freshwater replenishment of surface waters to maintain quality or flow, power, recreational activities, warm and cold water fisheries, wildlife habitat and fish spawning, and rare species habitat (LARWQCB 1994).

#### *3.15.1.2 Wheeler Ridge-Maricopa Water Storage District*

*Facilities and District Areas*

WRMWSD receives SWP water through 16 separate turnouts along the California Aqueduct via KCWA's Water Supply Contract with DWR. The WRMWSD distribution system consists of a series of pipelines, pumping plants, canals, and related facilities to deliver surface water from the California Aqueduct to approximately 72,000 acres of contract lands within the district. Contract lands are those lands within the district where landowners have executed long-term contracts with WRMWSD for the delivery of surface water, including SWP water, by the WRMWSD distribution system. These contract lands rely mainly on surface water to meet water demands, although many of the landowners use groundwater to supplement supplies when adequate surface water supplies are not available. Non-contract lands, those lands that do not hold long-term contracts for surface water, rely mainly on groundwater supplies to meet water demands. Surface water, including SWP water when available, can be delivered to certain non-contract lands within the district (generally those lands that historically have held contracts) via the existing WRMWSD distribution system.

Owners of contract lands pay an annual fixed cost based on the amount of land specified in the contract and annual variable costs based on the amount of water received by a particular contract land holder. Contract holders are required to pay the annual fixed cost regardless of the amount of water delivered to their land. Because contract holders can use local groundwater to irrigate their lands, the decision by individual landowners to enter into a contract (or likewise reduce a contract amount or cancel a contract), or to order surface water from WRMWSD instead of using local groundwater is predominantly an economic decision.

WRMWSD delivers untreated surface water predominantly for agricultural uses. Water delivered by WRMWSD is not intended for municipal or potable use without additional treatment.

*Water Supply*

WRMWSD obtains its water supplies from the SWP, other surface water sources, and groundwater sources, and delivers water to agricultural and industrial users within the district. WRMWSD also participates in a variety of other water management activities, including groundwater banking programs outside of the district and other in-lieu and direct groundwater recharge programs within the district.

LOCAL SURFACE WATER

WRMWSD is located along Wheeler Ridge and east of the Tejon Hills in southern Kern County. Sandy, Bitterwater, Santiago, Pleitito, Pleito, Salt, Tecuya, Grapevine, Pastoria, Tunis, El Paso,

Liveoak, and Caparell creeks flow from the south into the district; and Tejon Creek flows from the east into the district. Most of these creeks are intermittent and do not provide substantial water for irrigation or conveyance for irrigation water. Floods occur along the creeks and in areas where sheetflow may occur during high intensity rainfall (KCWA 1998).

The water quality of most of the streams entering the district is generally suitable for irrigation. Because these streams are ephemeral, however, they cannot be used as a reliable source of irrigation water supply for large-scale irrigation (KCWA 1998).

GROUNDWATER

Deep groundwater wells in the district initially were drilled in the mid-1940s. Over the next 20 years, groundwater was the primary water supply in the southern Kern County area. As a result, the groundwater levels declined by 150 to 200 feet (Bookman-Edmonston Engineering, Inc. [BE] 1995). In the late 1960s, the annual groundwater overdraft was estimated to be about 112,000 AF (BE 1995). Use of SWP water has allowed groundwater levels to rise to levels equal to, or above, those observed prior to the availability of SWP water (BE 1995).

The San Joaquin Valley is underlain by a large aquifer system generally referred to as the San Joaquin Valley Groundwater Basin. DWR has divided the San Joaquin Valley Groundwater Basin into smaller groundwater basins based on hydrologic differences (such as water quality and rate of movement of water through the basin). The Kern County Groundwater Basin is the part of the San Joaquin Valley Groundwater Basin that underlies the district. The basin is bounded on the north by the Kern County line and the Tule Groundwater Basin, on the east and southeast by the granitic bedrock of the Sierra Nevada and Tehachapi Mountain ranges, and on the west and southwest by the marine sediments of the San Emigdio and Coast Mountain ranges (DWR 2003a). The surface area of the basin is approximately 1.945 million acres, or 3,040 square miles (DWR 2003a). Total water in storage within the basin is estimated to be 40 million AF, and the dewatered (available) aquifer storage is estimated to be 10 million AF (DWR 2003a). Recharge to the basin results from the seepage of surface water from local streams along the eastern extent of the basin and the Kern River, as well as seepage of surface water from agriculture-related land uses, which is the largest contributor to recharge (DWR 2003a).

The White Wolf Groundwater Basin, a sub-basin to the Kern County Groundwater Basin, underlies the eastern portion of the district. The White Wolf sub-basin is separated from the remainder of the Kern County Groundwater Basin to the north by the White Wolf Fault, and to the southwest by the Springs Fault. The White Wolf Fault historically has been considered a barrier to movement of groundwater from the White Wolf sub-basin to the rest of the Kern County basin (BE 1967; BE 1975). Recent studies have indicated that the White Wolf Fault may act as only a partial barrier to groundwater flow, and only when the aquifer is stressed by pumping (Hagan 2001). The surface area of the White Wolf basin is approximately 52,000 acres (BE 1975). The volume of groundwater in storage has been estimated to be 2.5 million AF (BE 1975). Recharge to the White Wolf basin results from seepage of surface water from local streams and seepage of surface water from agriculture-related land uses.

IMPORTED WATER

KCWA holds the Water Supply Contract through which WRMWSD receives SWP water. KCWA's SWP Table A Amount in 2003 was 1,000,949 AF, and was 1,087,730 AF in 1998. This reduction in Table A Amount was due to several Table A Amount transfers KCWA completed with SWP Contractors since early 1999 consistent with the terms of the Monterey Amendment, including the 41,000 AF transferred to CLWA that is the subject of this EIR. WRMWSD's contract with KCWA included 263,200 AF of SWP Table A Amount in 1971[5]. This quantity was reduced to 251,370 AF in 1988, to 238,088 AF in 1996, and to 197,088 AF in 2000, after the Project was implemented.

Table 3.15-5 summarizes SWP Table A deliveries from 1990 through 2001. From 1990 to 1999 (before the Project was implemented), the SWP deliveries by WRMWSD averaged about 137,360 AF, with a minimum of zero AF in 1991 to a maximum of about 198,100 AF in 1997.

OTHER WATER MANAGEMENT ACTIONS

WRMWSD participates in a variety of other water management actions, including groundwater banking both within and outside of the district. Through its groundwater banking program, WRMWSD stores water when available and draws on that water in dry years to reduce shortages. WRMWSD's other water management actions consist of the following: ongoing in-lieu groundwater recharge within the district through delivery of surface water, when available, to non-contract lands; groundwater wells available to WRMWSD starting in 1992 and additional wells developed or acquired by WRMWSD since 1992; participation in the Kern Water Bank beginning in 1995; participation in the Pioneer Groundwater Banking Project initiated in 1997; and participation in the Berrenda Mesa Project beginning in 1999. These water management actions provide water supplies above and beyond the additional supplies that may be obtained from purchases and exchanges. In 1998, these water management actions could have supplied WRMWSD with an additional 59,500 AF, and by 2001 the amount had increased to over 88,000 AF. In 2002, the amount available from these other water management actions was over 106,000 AF.

Table 3.15-5 summarizes deliveries of water from these other water management actions from 1990 to 2001.

TOTAL SUPPLY

Table 3.15-5 summarizes the annual amount of SWP supply and other water supplies (such as the User Input Program[6], other transfers and exchanges, and other water management actions) available to WRMWSD, and the amount of water delivered within the district from 1990 to 2001. As identified in this table, except for 1990 and 1991, both drought years, WRMWSD's

5 As discussed in Chapter 1, the term Table A Amount in connection to WRMWSD is used for brevity. The parallel term used in the KCWA—WRMWSD member unit contract is "Contract Entitlement," sometimes referred to as "Table 1 Entitlement."

6 The User Input Program allows water users within the district to deliver water into the WRMWSD distribution system. The water user is then credited with an equal amount of water, less any losses, to be delivered to the user by WRMWSD within the same calendar year.

**Table 3.15-5. Summary of Annual SWP and Other Water Supply to WRMWSD and Delivered within the District, 1990 to 2001**
(all values in AF except percentages)

| *Year* | *Water Supply* | | | | | *Water Delivered* | | | | *Table A Water Delivered as a Percent of Table A Supply* | *Total Delivered as a Percent of Total Supply* |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | *SWP Table A Amount (AF)* | *SWP Allocation Percent*[1] | *SWP Table A Water Supply* [2] *(a)* | *Other Water Supply* [3] *(b)* | *Total Supply (a + b)* | *SWP Table A Water Delivered (c)* | *Carryover Water Delivered (d)* | *Other Water Delivered* [3] *(e)* | *Total Delivered (c + d + e)* | | |
| 1990 | 251,370 | 50% | 126,535 | 60,888 | 187,423 | 126,544 | 40,884 | 20,004 | 187,432 | 100% | 100% |
| 1991 | 251,370 | 0% | 0 | 66,656 | 66,656 | 0 | 0 | 66,656 | 66,656 | N/A[4] | 100% |
| 1992 | 251,370 | 45% | 113,117 | 18,431 | 131,548 | 107,504 | 1,382 | 17,048 | 125,934 | 95% | 96% |
| 1993 | 251,370 | 100% | 251,370 | 22,774 | 274,144 | 133,600 | 10,370 | 2,555 | 146,525 | 53% | 53% |
| 1994 | 251,370 | 53% | 133,226 | 50,544 | 183,770 | 132,316 | 0 | 28,248 | 160,564 | 99% | 87% |
| 1995 | 251,370 | 100% | 251,370 | 49,614 | 300,984 | 161,024 | 0 | 1,114 | 162,138 | 64% | 54% |
| 1996 | 238,088 | 100% | 238,088 | 60,244 | 298,332 | 191,279 | 11,319 | 425 | 203,023 | 80% | 68% |
| 1997 | 238,088 | 100% | 238,088 | 59,740 | 297,828 | 198,065 | 0 | 240 | 198,305 | 83% | 67% |
| 1998 | 238,088 | 100% | 238,088 | 63,111 | 301,199 | 145,605 | 949 | 2,738 | 149,292 | 61% | 50% |
| 1999 | 238,088 | 100% | 238,088 | 66,162 | 304,250 | 177,702 | 0 | 4,868 | 182,570 | 75% | 60% |
| 2000 | 197,088 | 90% | 177,379 | 77,013 | 254,392 | 165,090 | 2,579 | 16,260 | 183,929 | 93% | 72% |
| 2001 | 197,088 | 39% | 76,864 | 114,025 | 190,889 | 73,247 | 3,441 | 61,640 | 138,508 | 96% | 73% |

1. SWP allocation (i.e., the percent of Table A Amount that each Contractor could have received based on that year's supply availability and Contractor requests), as determined by DWR for the year. Based on agricultural Table A allocations for years prior to implementation of the Monterey Amendment in 1996.
2. SWP Table A water available equals SWP Table A Amount multiplied by the SWP allocation percentage.
3. Other water includes the following: SWP surplus water (unscheduled surplus water/Article 21 water); SWP Carryover water (refer to Table 3.15-3); WRMWSD wells; Blanca Rosa Improvement District wells; User Input Program water; Kern Water Bank; Pioneer Groundwater Banking Project; Berrenda Mesa Project; and other miscellaneous water supplies such as water purchased from the Drought Water Bank, and other water transfers and purchases. Of these sources, Article 21 water, Carryover water, other miscellaneous water supplies, and to some extent User Input Program water is not available for use in future years.
4. SWP water (Table A or surplus) was not available to Agricultural Contractors in 1991; therefore, no SWP water was delivered in this year.

water supply (both SWP Table A supply and total supply) has been greater than the amount of water delivered within the district.

*Water Demand*

A variety of factors, including the cost and availability of different water sources, the anticipated crop market value, anticipated or existing crop subsidies, and other factors (such as labor cost, regulation of the use of certain chemicals, etc.) are considered by farmers in the determination to plant or fallow fields, and to plant certain crops. Therefore, water demands within the district can vary substantially from year to year depending on irrigated acreage and the types of crops grown. Refer to section 3.2, Agricultural Resources for further discussion of crop types and irrigated acres within the district. In addition, demands within the district can vary depending on local hydrologic and climatic conditions (e.g., amount and timing of rainfall and local temperatures).

WRMWSD has estimated that under favorable economic conditions, demands within the contract lands are approximately 180,000 to 190,000 AF (personal communication, W. Taube 2002). In only four years from 1990 to 1999 (prior to the Project), did WRMWSD deliver greater than 180,000 AF of SWP water, indicating that favorable economic conditions occurred approximately 40 percent of the time. Demands within the district vary from year to year depending on agricultural economic conditions and hydrologic conditions (amount and timing of local rainfall), but demands within the district are not anticipated to materially increase in the future because the suitable agricultural lands within the district are already in agricultural production, and because WRMWSD does not provide potable water.

*Water Quality*

WRMWSD is within the jurisdiction of the CVRWQCB, Region 5c. Within the district, there are no impaired water bodies or established Total Maximum Daily Load (TMDL) programs[7] (CVRWQCB 1995, SWRCB 1998). Local surface water is of generally good quality. Water quality of imported supplies is primarily dependent on the SWP water quality, which is discussed above.

Groundwater quality varies across the district, and there are portions of the district in which groundwater is not used due to poor quality. These areas are generally located in the most westerly portions of the district. Within the district, the Kern County Groundwater Basin has TDS concentrations that generally increase from east to west, with concentrations ranging from 300 to 2,600 milligrams per liter (mg/L) (BE 1995). TDS concentrations within the White Wolf

7 The federal Clean Water Act requires states to designate appropriate water uses to be protected and directs states to set water quality criteria based on these uses (United States Environmental Protection Agency [EPA] 2000a). Under section 303(d) of the Clean Water Act, states, territories, and authorized Indian tribes are required to submit lists to the EPA detailing water bodies for which existing pollution controls are insufficient to attain or maintain water quality standards. After submitting the list of "impaired waters" to the EPA, states must develop a TMDL plan to limit excess pollution. A TMDL is a number that represents the assimilative capacity of water for a particular pollutant, or the amount of a particular pollutant that the waterbody can receive without impacting its beneficial uses. TMDL plan implementation can be accomplished through revised permit requirements (for point source contaminants) and through implementation of Best Management Practices (EPA 1999).

Groundwater Basin range from 300 to 700 mg/L in the eastern two-thirds of the basin and 1,000 to 3,500 mg/L in the western one-third of the basin (BE 1995).

#### *3.15.1.3 Castaic Lake Water Agency*

CLWA is the wholesale water supplier for the Santa Clarita Valley. In addition, CLWA's Santa Clarita Water Division is one of four retail water purveyors within the Santa Clarita Valley. The other three retailers are Los Angeles County Waterworks District #36, Newhall County Water District and Valencia Water Company.

*Facilities*

CLWA receives SWP water through the terminus of the West Branch of the California Aqueduct at Castaic Lake. Surface water supplies (whether derived from local or imported water supplies) require treatment (filtration and disinfection) prior to distribution. SWP water from Castaic Lake is treated at the ESFP and RVWTP (both owned and operated by CLWA), and is distributed to the four water retailers through a system of pipelines.

The RVWTP is planned for future expansion from its current 30 mgd treatment capacity, to 60 mgd and eventually to 90 mgd as demands for treated water increase. This expansion was programmatically evaluated in CLWA's Capital Program Final EIR (CLWA 1988). In April 2003, CLWA approved an upgrade of treatment technology and a capacity expansion at the ESFP from 33.6 mgd to 56 mgd. The combined capacity of the two treatment plants currently is approximately 63.6 mgd. When the ESFP is expanded, the total treatment capacity will increase to about 86 mgd. Without the Project, CLWA's Water Supply Contract provides for a delivery maximum of 99 cfs for its 54,200 AF of Table A Amount. This delivery rate is approximately 65 mgd, or similar to the current treatment capacity, and would yield a maximum monthly delivery of approximately 6,000 AF. With the Project, CLWA's contractual delivery limit increases to 150 cfs (or approximately 98 mgd, yielding a maximum of approximately 9,000 AF per month) for the 95,200 AF of Table A Amount.

*Water Supply*

The current water supply for the Santa Clarita Valley is derived from both local and imported sources. The principal components of this supply are groundwater from the Alluvial Aquifer, groundwater from the Saugus Formation, and imported water from the SWP. A variety of future water sources (including local recycled[8] water, desalted ocean water, increased Saugus Formation production, conjunctive use of local or non-local groundwater basins, and other imported water sources) could be developed to supply future development planned for the CLWA service area.

CLWA completed an analysis of its water supply as part of the UWMP (CLWA 2000). Prior to that analysis, CLWA had determined that it could reliably depend on the SWP to deliver about half of its Table A Amount (about a 25,000 AF supply vs. 54,200 AF of Table A) in any year (CLWA 1996). The UWMP is scheduled to be updated in 2005.

8 Initial deliveries of recycled water commenced in 2003.

Table 3.15-6 summarizes water supplies available to meet demands in the CLWA service area in 1998, prior to the Project. SWP supplies identified in the table are based on results from DWR's SWP operations model, DWRSIM (discussed in section 3.15.2.2), with SWP water supplies allocated among Contractors under the Water Supply Contract provisions then in effect (i.e., based on the Monterey Amendment provisions). The table displays water supplies available under various hydrologic conditions.

**Table 3.15-6. 1998 Water Supplies for the CLWA Service Area**

(all values in AF)

| *Hydrologic Condition*[1] | SWP SUPPLIES | | EXISTING LOCAL SUPPLIES | | ***Total*** |
|---|---|---|---|---|---|
| | *Table A*[2] | *SWP Flexible Storage*[3] | *Alluvial Aquifer* | *Saugus Formation* | |
| Average Year | 46,500 | 0 | 35,000 | 11,000 | **92,500** |
| Single Dry Year | 12,100 | 4,680 | 32,500 | 15,000 | **64,280** |
| Multiple Dry Year Period | 24,000 | 1,170 | 32,500 | 15,000 | **72,670** |

1. The average year supply is the average amount of water available based on DWRSIM model results over its entire period of hydrologic record. The single dry year supply is the supply available in the single year with the lowest total SWP deliveries based on DWRSIM model results (1977). Multiple dry year period supply is the average amount of water available over the four consecutive drought years of 1988 through 1991 based on DWRSIM model results. (See section 3.15.2.2).
2. Values based on CLWA's Table A Amount in 1998 (prior to the Project) of 54,200 AF, and percentages for Table A deliveries based on DWR's DWRSIM SWP operations model (discussed in section 3.15.2.2).
3. CLWA may withdraw up to about 4,680 AF of water from Castaic Lake as "flexible storage." It is assumed that CLWA would use this supply only in drier years, with the entire amount used in the one single dry year. For the multiple dry year, it is assumed that the entire amount would be used during the four-year period, or an annual average of 1,170 AF.

Table 3.15-7 summarizes existing (2002) water supplies available to meet demands in the CLWA service area, including the Project. SWP supplies are based on the data presented in DWR's SWP Delivery Reliability Report, with SWP water supplies allocated among Contractors under the Water Supply Contract provisions currently in effect (i.e., based on the Monterey Amendment provisions). The table displays water supplies available under various hydrologic conditions. In 2002, CLWA was able to store some of its allocated SWP Table A supply on a short-term basis (10 years or less) pursuant to a groundwater banking agreement with the Semitropic Water Storage District. CLWA may withdraw up to 21,600 AF within 10 years. Similar to 2002, in February 2004, CLWA was again able to store up to 35,000 AF of its allocated 2003 SWP Table A supply on a short-term basis (10 years or less) pursuant to a groundwater banking agreement with the Semitropic Water Storage District. CLWA may withdraw up to 31,500 AF within 10 years. In addition to the supplies identified in Tables 3.15-6 and 3.15-7, CLWA may obtain additional surface supplies on a limited basis when surplus water is available within the SWP system, along with various other SWP and non-SWP purchases and exchanges.

LOCAL SURFACE WATER

The primary drainage course in the CLWA service area is the Santa Clara River. Principal tributaries to the Santa Clara River include creeks flowing from Mint, Bouquet, San Francisquito, Castaic Creek, Oak Spring, Sand, and Potrero canyons. Water flow in the stream

**Table 3.15-7. Existing Water Supplies for the CLWA Service Area**

(all values in AF)

| *Hydrologic Condition*[1] | SWP SUPPLIES | | | EXISTING LOCAL SUPPLIES | | ***Total*** |
|---|---|---|---|---|---|---|
| | *Table A*[2] | *SWP Flexible Storage*[3] | *Semitropic Storage*[4] | *Alluvial Aquifer* | *Saugus Formation* | |
| Average Year | 68,300 | 0 | 0 | 35,000 | 11,000 | **114,300** |
| Single Dry Year | 18,600 | 4,680 | 7,200 | 32,500 | 15,000 | **77,980** |
| Multiple Dry Year Period | 34,300 | 1,170 | 5,400 | 32,500 | 15,000 | **88,370** |

1. The average year supply is the average amount of water available based on DWRSIM model results over its entire period of hydrologic record. The single dry year supply is the supply available in the single year with the lowest total SWP deliveries based on DWRSIM model results (1977). Multiple dry year period supply is the average amount of water available over the four consecutive drought years of 1988 through 1991 based on DWRSIM model results. (See section 3.15.2.2).
2. Values based on current Table A Amount of 95,200 AF (which includes the Project), and percentages for Table A deliveries from DWR's SWP Delivery Reliability Report (DWR 2003b).
3. CLWA may withdraw up to about 4,680 AF of water from Castaic Lake as "flexible storage." It is assumed that CLWA would use this supply only in drier years, with the entire amount used in the one single dry year. For the multiple dry year, it is assumed that the entire amount would be used during the four-year period, or an annual average of 1,170 AF.
4. In 2002, CLWA was able to store some if its allocated SWP Table A supply on a short-term basis (10 years or less) under a groundwater banking agreement with the Semitropic Water Storage District. Under this agreement, CLWA stored 24,000 AF of SWP water, and after consideration for losses, may withdraw up to 21,600 AF within 10 years. It is assumed that CLWA could expect to withdraw up to 1/3 of this amount in the single dry year, and the entire amount would be used during the four-year dry period. It is assumed that CLWA would only use this supply in drier years.

canyons and the upper Santa Clara River is ephemeral, and diminishes rapidly after most rainfall events. Surface water resources include the Santa Clara River and Castaic Lake.

Primary flood hazard areas occur in and along natural drainage channels, such as the Santa Clara River and its tributaries, and in areas where sheetflow may occur during high intensity rainfall (CLWA 1988, CLWA 1998a). CLWA does not utilize local surface water as a water supply, although landholders within the service area may use runoff from these natural drainages as a water supply.

GROUNDWATER

The existing local water supply in the CLWA service area is groundwater extracted from the Alluvial Aquifer and from the underlying Saugus Formation. Historically, groundwater has been the primary source of water in the Santa Clarita Valley. Since 1980, local groundwater supplies have been supplemented with imported water from the SWP.

Although the Alluvial Aquifer is the smaller of the two-aquifer systems as measured by storage capacity, most water wells within the CLWA service area are drilled into this aquifer. In his original assessment of the Alluvial Aquifer, Slade (1986) estimated the practical perennial yield of the Alluvial Aquifer to be 31,600 AFY to 32,600 AFY. The total annual groundwater production from the Alluvial Aquifer over the last 10 years (urban and agricultural production) has averaged approximately 35,000 AFY, about 10 percent higher than the "practical perennial yield" without any evidence of undesirable conditions that might be an indication of aquifer

overdraft (Slade 2002). Slade (2002) suggested that the primary reason that the Alluvial Aquifer has been able to supply groundwater in volumes that are in excess of its previously estimated perennial yield is due to the increase in imports of SWP water by CLWA. For example, most of the historical period on which Slade's original work was based predated the importation of SWP water. Based on discharge records published by the LARWQCB (2002), approximately half of this additional water is returned to the Alluvial Aquifer in the form of discharge from the two wastewater reclamation plants located along the Santa Clara River. Additionally, percolation of SWP water from various municipal and industrial uses (such as landscape irrigation) also contributed to recharge of the Alluvial Aquifer.

In this recent updated report on the groundwater basin, Slade (2002) identified the operational yield of the Alluvial Aquifer to be about 30,000 to 40,000 AF in normal weather years, and 30,000 to 35,000 AF in dry years. In updating his original (1986) analysis of the yield of the Alluvium, Slade recognized that the analytical methodology employed in his original work was no longer applicable, primarily due to a combination of stable groundwater levels and storage, and the progressive changes in the hydrology of the basin as a result of the increasing importation of supplemental water (from the SWP). In his updated analysis, Slade proposed that the concept of operational yield of the basin was more applicable to current conditions in the basin since it allows fluctuations in year-to-year yield in response to fluctuating hydrologic conditions, yet protects the renewability of the groundwater by retaining longer-term pumping within the basin's perennial yield on an average basis. The normal and dry-year ranges of basin yield were based by Slade on that operational yield concept.

Recharge amounts are highly variable depending on annual precipitation, with documented annual water level recoveries of 70 feet or more during wet years that follow dry periods. Multi-year dry periods have in the past resulted in water level decreases of as much as 100 feet from the beginning to the end of the multi-year drought period, particularly in Soledad Canyon. However, groundwater levels have remained very stable over time (and near the ground surface) throughout the western part of the basin, generally west of Bouquet Canyon. This relative stability occurs because the regional discharge zone for the valley's groundwater resources is the alluvium west of Interstate 5. In this area, the Saugus Formation discharges to the alluvium, which in turn discharges to the Santa Clara River. The discharge zone is present in this area because of the east-west movement of groundwater and the bedrock materials that form the western margin of the basin aquifer systems at Blue Cut (just to the west of the Los Angeles County / Ventura County line). The shallow and stable nature of the groundwater levels in this area are further supported by a continual supply of recharge water from the treatment plant discharges described above.

From 1980 to 2002, groundwater extraction from the Alluvial Aquifer for urban uses ranged from approximately 8,700 to 27,200 AFY, while total extraction for all uses ranged between 20,300 and 43,400 AFY. Average extractions from the Alluvial Aquifer during this same period were approximately 17,500 AFY for urban uses and 30,400 AFY for all uses (SCVWP 2002). The latter remains well within all historical estimates of the yield of the Alluvial Aquifer. The use of one well in the Alluvial Aquifer has been suspended due to the detection of perchlorate. (Groundwater quality in the Alluvial Aquifer is discussed in more detail under the subheading Groundwater Quality.)

The Saugus Formation contains much greater quantities of groundwater than the Alluvial Aquifer. In his original assessment of the Saugus Formation, Slade (1988) estimated that approximately 1.41 million AF of potentially useable groundwater was present from depths of 500 to 2,500 feet in the Saugus Formation. More recent information on the thickness of the alluvium and the degree of potential drawdown interference between adjacent Saugus Formation and Alluvial Aquifer wells has supported a re-calculation of groundwater in storage in the Saugus Formation to approximately 1.65 million AF (Slade 2002).

The principal source of recharge to the Saugus Formation is precipitation on exposed outcrops and direct infiltration from the overlying alluvium. In his initial assessment of the Saugus Formation, Slade (1988) estimated the combined potential recharge to the Saugus Formation from these two sources to be from 20,000 to 22,000 AFY in wet periods, and from 11,00 to 13,000 AFY in dry periods. The Saugus Formation has supplied about 7,500 to 15,000 AF in normal weather years, and 11,000 to 15,000 AF in dry years (CLWA 2000). No long-term continuous or permanent decline in either water levels or the amount of groundwater in storage has occurred under this historical range of pumping (Slade, 2002). Based on the amount of water in storage and the historic aquifer performance, Slade (2002) identified that production from the Saugus Formation for dry period water supply could be increased from 15,000 to 20,000 AFY, and ultimately to 35,000 AFY if dry conditions continue. The increase to 35,000 AFY would be temporary and would need to return to, or be reduced below, the historical range of 7,500 to 15,000 AFY once rainfall patterns returned to normal in order to recharge, or replenish, storage and avoid long-term adverse effects to the aquifer.

From 1980 to 2002, groundwater extractions from the Saugus Formation for urban uses ranged between approximately 2,700 and 14,400 AFY, while total extraction for all uses ranged between about 3,700 and 14,900 AFY. Average extraction from the Saugus Formation during this same period has been approximately 6,200 AFY for urban uses and 6,800 AFY for all uses (SCVWP 2002); these values remain well within all historical estimates of the yield or recharge potential of the Saugus Formation. The use of four wells in the Saugus Formation has been suspended due to the detection of perchlorate. (Groundwater quality in the Saugus Formation is discussed in more detail under the subheading Groundwater Quality.)

There are numerous wells in the Saugus Formation, other than the wells that were voluntarily shut down due to perchlorate contamination. Additionally, other Saugus wells are planned for construction, including those included in CLWA's Capital Improvements Program. If operated continuously during the year, the wells not subject to perchlorate contamination have the capability to produce approximately 21,000 AFY (personal communication, L. Takaichi 2004). However, a more realistic production capability is 15,000 AFY due to periodic shutdown for maintenance, monitoring, or storage limitations (personal communication, L. Takaichi 2004). The current groundwater production capability from the Saugus Formation is estimated to be 5,000 AFY during normal years but could reach 15,000 AFY during dry periods or other periods of need (personal communication, L. Takaichi 2004). These capabilities will increase as additional production wells in the Saugus Formation are completed and a response action to perchlorate contamination is implemented.

With regard to the impacts of perchlorate on the water supply capacity of several wells as noted above, field studies and groundwater modeling activities are in progress to evaluate how best

to hydraulically contain the portion of the aquifer system where production wells have been shut down, while simultaneously preventing perchlorate movement to currently unimpacted areas. The field studies have included the installation and sampling of monitoring wells at multiple depths and locations on and around the Whittaker-Bermite site, the most likely source of perchlorate; water level monitoring in these wells; aquifer testing of two unimpacted water supply wells; and groundwater velocity testing in alluvial monitoring wells located between the site and the Santa Clara River. These studies have helped the Purveyors and the Whittaker Corporation further refine the current understanding of groundwater flow patterns in specific areas on and near the site (such as along the Holser Fault). This information has been incorporated into a regional groundwater flow model that has been developed by the Purveyors and whose calibration and construction was recently reviewed and approved by the DTSC. The model is being used to identify a pumping scheme that would meet the objectives of restoring the lost water supply from the impacted wells (with wellhead treatment) while simultaneously containing perchlorate and hydraulically limiting its movement downgradient to unimpacted wells and other portions of the aquifer system where new water supply wells might be constructed. The modeling analysis accounts not only for the pumping of impacted wells, but also (a) the UWMP's pumping plan for unimpacted wells throughout the Santa Clarita Valley and (b) the significant year-to-year variation in local hydrology (especially groundwater recharge) that occurs in the Valley (CH2MHill 2004). The modeling simulations will be used to guide selection of a final pumping plan for the impacted Alluvial Aquifer well and the impacted Saugus Formation wells. The selection of a final pumping plan will be made jointly by the Purveyors and the Whittaker Corporation, with regulatory oversight and permitting performed by CA DHS with technical support from DTSC. (Groundwater quality and perchlorate are discussed in more detail under the subheading Groundwater Quality.)

IMPORTED WATER

CLWA provides imported water supplies via the SWP to the CLWA service area. CLWA facilities and supplies of SWP water are described above.

SWP deliveries to CLWA from 1990 through 2002 are provided in Table 3.15-8. SWP supplies supplement local water sources and are used to meet the municipal and industrial demand of the region. From 1990 to 1999 (prior to implementation of the Project), CLWA's use of its SWP supply averaged approximately 18,000 AF. This low level of SWP delivery (relative to CLWA's Table A Amount) is a reflection of generally low demand in the CLWA service area for this water during this period and is not due to limited SWP supplies. With the exception of 1991, during 1990 to 1999 CLWA received adequate SWP supplies to meet its demands. As is shown on Table 3.15-8, SWP deliveries to CLWA generally have increased over the past decade because demands within the service area have risen during this time.

TOTAL SUPPLY

Table 3.15-8 shows total water deliveries in the CLWA service area from 1990 through 2002. These include deliveries by the four municipal water purveyors, along with groundwater pumped by agriculture and miscellaneous uses. Agriculture and miscellaneous uses include irrigated agriculture, landscape irrigation, golf course irrigation, and other miscellaneous uses within the service area.

**Table 3.15-8. Summary of Annual SWP and Local Groundwater Use within the CLWA Service Area, 1990 to 2002**

| *Year* | *SWP Table A Amount (AF)* | *SWP Allocation[1] (Percent)* | *SWP Deliveries (AF)* | *Local Groundwater Deliveries[2] (AF)* | *Agriculture and Miscellaneous Uses[3] (AF)* | *Total (AF)* |
|---|---|---|---|---|---|---|
| 1990 | 41,500 | 100 | 21,600 | 21,500 | 11,280 | 54,380 |
| 1991 | 54,200 | 30 | 7,970 | 31,800 | 10,280 | 50,050 |
| 1992 | 54,200 | 45 | 14,900 | 27,300 | 12,150 | 54,350 |
| 1993 | 54,200 | 100 | 13,840 | 30,000 | 11,220 | 55,060 |
| 1994 | 54,200 | 53 | 14,700 | 31,600 | 13,870 | 60,170 |
| 1995 | 54,200 | 100 | 17,000 | 28,700 | 14,350 | 60,050 |
| 1996 | 54,200 | 100 | 18,870 | 32,100 | 15,350 | 66,320 |
| 1997 | 54,200 | 100 | 23,220 | 32,000 | 16,390 | 71,610 |
| 1998 | 54,200 | 100 | 20,270 | 28,600 | 13,610 | 62,480 |
| 1999 | 54,200 | 100 | 27,300 | 30,000 | 17,140 | 74,440 |
| 2000 | 95,200 | 100 | 32,580 | 28,400 | 15,320 | 76,300 |
| 2001 | 95,200 | 39 | 35,370 | 25,320 | 16,090 | 76,780 |
| 2002 | 95,200 | 70 | 41,770 | 26,460 | 16,810 | 85,040 |

*Source:* SCVWP 2003.

1. SWP allocation (i.e. the percent of Table A Amount that each Contractor could have received based on that year's supply availability and Contractor requests), as determined by DWR for the year. The values shown are M&I Table A allocation percentages. In 1991, the Devil's Den Water District permanently transferred 12,700 AF of agricultural Table A Amount to CLWA. For years prior to implementation of the Monterey Amendment in 1996, agricultural Table A allocations were as follows: 0 percent in 1991; 45 percent in 1992; 100 percent in 1993; 53 percent in 1994; and 100 percent in 1995.
2. Groundwater deliveries by municipal water purveyors within the CLWA service area.
3. Includes groundwater pumped by, and SWP water delivered to, agricultural and miscellaneous uses within the CLWA service area. SWP deliveries to agricultural and miscellaneous uses within the CLWA service area occurred from 1992 to 2000, with a maximum of approximately 1,070 AF delivered in 1997.

*Water Demand*

In 1998, the total water demand within the CLWA service area in 2010 was projected to be approximately 106,300 AF. Table 3.15-9 provides CLWA's projected total future water demands in years of average local precipitation based on the UWMP, the most recent future water demand projections by CLWA. CLWA's demands vary from year-to-year depending on local hydrologic and meteorologic conditions, with demands generally increasing in years of below average local precipitation and decreasing in years of above average local precipitation. Based on various planning factors, CLWA's average year demand is expected to increase to approximately 75,100 AF in 2005 and 102,500 AF by 2020, or approximately 1,370 AFY (CLWA 2000). This is consistent with the annual average increase in CLWA's SWP deliveries from 1990 to 2001 of approximately 1,150 AFY (SCVWP 2002).

**Table 3.15-9. CLWA's Projected Total Water Demand in Average Hydrologic Years**
(AFY; reductions in parenthesis)

| | *2005* | *2010* | *2015* | *2020* |
|---|---|---|---|---|
| M&I | 66,600 | 77,700 | 90,900 | 106,000 |
| Other Demand[1] | 15,100 | 12,400 | 9,800 | 7,100 |
| *Subtotal* | *81,700* | *90,100* | *100,700* | *113,100* |
| Projected Conservation | (6,600) | (7,700) | (9,100) | (10,600) |
| **Total** | **75,100** | **82,400** | **91,600** | **102,500** |

*Source:* CLWA 2000.
1. Includes irrigated agriculture and miscellaneous uses.

Because growth has exceeded that projected when the UWMP was prepared in 2000, actual demand exceeds projected demand. The UWMP is scheduled to be updated in 2005. This EIR uses the best available data. New UWMP data is not available at this time.

In 2001, CLWA signed the Memorandum of Understanding Regarding Urban Water Conservation in California (MOU) on behalf of the CLWA service area, as recommended in the UWMP. By signing the MOU, CLWA became a member of the California Urban Water Conservation Council (CUWCC) and pledged to implement all cost-effective Best Management Practices (BMPs) for water conservation. CLWA has implemented 11 of the 14 BMPs recommended by CUWCC. CLWA has estimated that conservation measures within the service area can reduce total water demands by 6,600 AF in 2005 and up to 10,600 AF in 2020, or about 10 percent of demand.

*Water Quality*

With regard to water quality, the main regulatory driver for CLWA is the Safe Drinking Water Act[9], because CLWA, as a wholesale water purveyor, must deliver water that meets the applicable drinking water standards.

EXISTING WATER QUALITY

Existing water quality conditions for urban water uses in the CLWA service area are documented in the Santa Clarita Valley 2002 Water Quality Report (CLWA 2002). That report provides the cumulative results of thousands of water quality tests performed in the Santa Clarita Valley area on CLWA's and the local purveyors' water supplies. Table 3.15-10 provides basic water quality data for CLWA's drinking water supplies, which includes test results from both SWP water and groundwater.

9 The Safe Drinking Water Act is intended to protect public health by regulating the nation's public drinking water supply, and requires a variety of actions to protect drinking water and its sources. The Act authorizes the EPA to set national health-based standards for drinking water to protect against both naturally occurring and man-made contaminants that may be found in drinking water.

**Table 3.15-10. CLWA Drinking Water Quality Summary**

| *Constituent*[1] | *MCL*[2] | *Typical Value* | *Range* |
|---|---|---|---|
| Turbidity, nephelometric turbidity Unit (NTU) | 5 | 0.08 | 0.05-0.40 |
| Chloride[3], mg/L | 250 | 86 | 65-112 |
| Nitrate (as $NO_3$), mg/L | 45 | 2-2.8 | 2.0-2.8 |
| Fluoride, mg/L | 2 | 0.15 | 0.12-0.18 |
| Trihalomethanes (THMs) | 100 | 86 | 65-112 |
| Haloacetic Acids (HAA5) | 60 | 34 | 16-81 |
| Coliform, percent positive samples | 5 | 0 | 0-2 |
| Sulfates, mg/L | 250 | 52 | 38-64 |
| TDS, mg/L | 500 | 314 | -- |
| pH | None | 7.86 | 7.5-8.2 |

*Source*: CLWA 2002b.
1. Unless stated otherwise, all tests were run in 2001.
2. A MCL (Maximum Contaminant Level) is the maximum permissible level of a contaminant in drinking water that is delivered to any user of a public water system.
3. The chloride standard is a Secondary Standard. Secondary Standards are non-enforceable guidelines regulating contaminants that may cause cosmetic effects (such as skin or tooth discoloration) or aesthetic effects (such as taste, odor, or color) in drinking water. EPA recommends secondary standards to water systems but does not require systems to comply. States may choose to adopt them as enforceable standards, however.

### LOCAL SURFACE WATER QUALITY

In accordance with the Porter-Cologne Act and the Clean Water Act, the LARWQCB developed the Water Quality Control Plan for the Coastal Watersheds of Los Angeles and Ventura Counties (Basin Plan), as amended (LARWQCB 1994). The Basin Plan addresses five constituents of concern that are relevant for inland surface water and groundwater (TDS, sulfate, chloride, boron, and nitrogen) and considers local hydrology, land use, population, sensitive environmental resources, and established water quality objectives for each of the watersheds, including the Santa Clara River. New and proposed water quality objectives for the Santa Clara River watershed have either been established or are currently undergoing discussion for future approval and/or consideration. Within the Santa Clara River watershed, chlorides have been prioritized for further study, with higher priority given to nutrients. Other constituents are currently (2003) not prioritized.

On February 4, 2003, the SWRCB adopted the 2002 Clean Water Act Section 303(d) List of Water Quality Limited Segments for Surface Waters in California (referred to herein as "Section 303(d) List") (SWRCB 2003b). This list identifies water quality-limited water bodies and pollutants of concern for which a TMDL must be developed. Reach 3[10] of the Santa Clara River (Freeman Diversion to A Street) was listed as impaired for ammonia, chloride, and TDS. Reach 7 (Blue Cut near the Los Angeles/Ventura County line to West Pier Hwy 99 Bridge) was listed as

10 The Santa Clara River is divided into nine reaches for management purposes. Reach 1 begins at the Santa Clara River Estuary at the Pacific Ocean. Reach numbers increase upstream.

impaired for chloride, high coliform count, nitrite and nitrate, and delisted for ammonia. Reach 8 (West Pier Hwy 99 to Bouquet Canyon Road) was listed as impaired for chloride and for high coliform count. Lastly, Reach 9 (Bouquet Canyon Road to above Lang Gaging Station) was listed as impaired for high coliform count.

**Chlorides –** In recent years, high concentrations of chloride have been measured in waters of the Santa Clara River watershed. These concentrations are primarily due to various types of loading during beneficial water uses, including agricultural uses (irrigation and leaching); commercial uses; domestic uses; and water treatment (e.g., water softeners) (LACSD 2002a). In addition to loading from urban runoff, imported water in certain year types, and the discharge of treated wastewater, naturally occurring chloride concentrations contribute to excessive chloride concentrations in Santa Clarita Valley groundwater (LARWQCB 1999b). The identification of excessive chloride concentrations resulted in the addition of several reaches of the Santa Clara River in the Section 303(d) List, as identified above. Table 3.15-11 provides a timeline summary of the regulatory actions taken to regulate chloride loading within the Santa Clara River.

**Table 3.15-11. Regulatory Timeline for Chloride**

| *Time* | *Action* |
|---|---|
| January 1997 | LARWQCB adopts a Chloride Policy, which consists of Resolution No. 97-02: Amendment to the California Regional Water Quality Control Plan for the Los Angeles Region, to Incorporate a Policy for Addressing Levels of Chloride in Discharges of Wastewaters. |
| Fiscal Year 1997/1998 | Santa Clara River Reaches 3, 7 and 8 are added to the Section 303(d) List for chloride impairment, and TMDL monitoring commences. |
| October 2002 | LARWQCB amended the 1994 Basin Plan to incorporate a TMDL for chloride for the upper Santa Clara River, establishing the 100 mg/L surface water quality objective for Reaches 7 and 8 (SWRCB 2002). |
| February 2003 | SWRCB remanded the chloride TMDL back to the LARWQCB to consider sequentially phasing TMDL implementation tasks, extending the interim limits, and reevaluation of the chloride objective itself (SWRCB 2003a). |
| March 2003 | LACSD adopts an ordinance that prohibits the installation and use of new self-regenerating water softeners in the Santa Clarita Valley to help lessen the chloride loading in the region (LACSD 2002a). |
| May 2003 | EPA is developing chloride TMDLs for Reaches 3, 7 and 8 of the Santa Clara River, in the event that the LARWQCB does not adopt it's chloride TMDL by June 2003 (EPA 2003). |
| July 2003 | The LARWQCB adopted the chloride TMDL in light of the Remand Resolution, and revised the Basin Plan to incorporate the chloride TMDL. |

In October 2002, the LARWQCB amended the 1994 Basin Plan to incorporate a TMDL for chloride for the upper Santa Clara River, establishing a 100 mg/L surface water quality objective for Reaches 7 and 8 to protect the agricultural beneficial use of the river (SWRCB 2002). The TMDL is intended to reduce the sources in the upper Santa Clara River by reducing the sources of chloride discharged from households and industries and, if necessary, by constructing a chloride removal system to treat water reclamation plant effluent before discharge to the Santa Clara River. On February 19, 2003, the SWRCB remanded the chloride TMDL back to the LARWQCB to consider sequentially phasing TMDL implementation tasks,

extending the interim limits, and reevaluation of the chloride objective itself (SWRCB 2003a). The LARWQCB adopted the 100 mg/L chloride TMDL, and incorporated it into the Basin Plan on July 10, 2003 (LARWQCB 2003a). Because the State was not able to complete adoption of a chloride TMDL for Reach 3 (80 mg/L) of the Santa Clara River by the June 22, 2003 deadline, EPA is establishing the TMDL for Reach 3 to fulfill its legal obligations (EPA 2003). The EPA is also establishing chloride TMDLs for Reaches 5 and 6[11] (100 mg/L) at this time, at the request of the LARWQCB.

The Los Angeles County Sanitation Districts (LACSD) have compiled the Santa Clarita Valley Joint Sewerage System Chloride Source Report, a detailed and comprehensive study of the sources of chloride loading in the Santa Clarita Valley (LACSD 2002a). That study identified that residential water use, primarily from self-regenerating water softeners, greatly contributes to the chloride loading. Based on the results of that study, the LACSD adopted an ordinance that prohibits the installation and use of new self-regenerating water softeners in the Santa Clarita Valley. This ordinance took effect in March 2003.

**Nitrogen –**The LARWQCB adopted a nutrient TMDL in late 2003 for the upper Santa Clara River that addresses the Section 303(d) List for nitrate plus nitrite impairment (LARWQCB 2003b). The TMDL limits nitrate ($NO_3$), nitrite ($NO_2$), ammonia ($NH_3$), and total nitrogen (N). Principal sources of nitrogen to a watershed typically include discharges from water reclamation plants and runoff from agricultural activities. Elevated nitrogen concentrations (ammonia, nitrate, and nitrite) can cause impairments in warm water fish and wildlife habitat, along with contributing to eutrophic effects such as algae growth and low dissolved oxygen.

**Other Impairments –** Reaches 7, 8, and 9 of the Santa Clara River are listed as impaired on the Section 303(d) List for fecal coliform. Sources of coliform can include discharges from water reclamation plants, urban stormwater runoff, and septic tanks. A coliform TMDL for the upper Santa Clara River is scheduled for completion in 2006.

Typical data ranges for the Santa Clara River and Basin Plan objectives are provided in Table 3.15-12. Water quality in the Santa Clara River is considered generally impaired due to high concentrations of chlorides (LARWQCB 1999b). Much of the water present in the Santa Clara River west of Bouquet Canyon Road is a result of discharges from current wastewater treatment and reclamation plants. Beneficial uses for Pyramid and Castaic lakes as designated by the LARWQCB were presented in the discussion of the SWP facilities.

IMPORTED WATER QUALITY

Raw water from Castaic Lake delivered to the ESFP and RVWTP is generally of high quality. CLWA produces water that meets drinking water standards set by the EPA and the California Department of Health Services (CA DHS) (SCVWP 2003). A summary of the water quality data for 1990 to 2001 for Castaic Lake can be found in Table 3.15-4, in the discussion of SWP water quality.

11 The 303 (d) list identifies the impaired Reaches as 3, 7, and 8. Reaches 7 and 8, however, correspond to those identified as Reaches 5 and 6 in the Basin Plan and in the chloride TMDL. EPA is using the designations of Reaches 5 and 6 in the TMDL to correspond to the Basin Plan (EPA 2003).

**Table 3.15-12. Water Quality Summary for the Santa Clara River**

| *Constituent* | *Applicable Objective/Criteria* | *Typical Data Ranges Resulting in Impairment* | *303(d) Listed Waters/ Santa Clara River Reaches* |
|---|---|---|---|
| Ammonia[1] | 0.53-2.7 mg/L | ND-4.9 mg/L (mean of 1.4 ± 1.3) | Reaches 3, 7, and 8 |
| Chloride | 80-100 mg/L | 10-138 mg/L (mean of 105 ± 21) | Reaches 3, 7, 8, and 9 |
| Nitrate + Nitrite | ≤ 10 mg/L | 0.3-15.4 mg/L (mean of 5.7 ± 2.4) | Reach 8 |
| Organic enrichment/low Dissolved Oxygen | 5.0-7.0 mg/L[2] | 0.8-11.0 mg/L (mean of 7.7 ± 2.5) | Reaches 8 and 9 |
| Coliform | 100-400 MPN/100ml[3] | 20-24000 MPN/100ml | Estuary and Reach 8 |
| Sulfate | 150 mg/L | ND | Reach 9 |

*Source*: LARWQCB 2001.
*Abbreviations:* mg/L = milligrams per liter; MPN = most probable number; ND = none detected; ml = milliliter.

1. Basin Plan numeric objective varies depending on pH and temperature. The general range is 0.53-2.7 mg/L of total ammonia (at average pH and temp.) in waters designated as warm to protect against chronic toxicity and 2.3-28.0 mg/L to protect against acute toxicity.
2. Annual Basin Plan numeric objective mean greater than 7.0 mg/L and no single sample less than 5.0 mg/L.
3. Inland objective: fecal coliform not to exceed log mean of 200 most probable number (MPN)/100 milliliters (ml) in 30-day period and not more than 10 percent of samples exceed 400 MPS/100ml. Beach objective: total coliform not to exceed 1,000 MPN/100 ml in more than 20% of samples in 30 days and not more than 10,000 MPN/100 ml at any time.

### GROUNDWATER QUALITY

Groundwater monitoring in Alluvial Aquifer wells has shown chloride concentrations to be below the Basin Plan groundwater chloride objective of 150 mg/L, and nitrate concentrations to be below the 10 mg/L Basin Plan groundwater objective (LADRP 2003). The 1994 Basin Plan includes water quality objectives for bacteria, chemical constituents and radioactivity, mineral quality, nitrogen (nitrate, nitrite), taste and odor, TDS, sulfate, chloride and boron objectives for groundwater. All Basin Plan groundwater objectives are designed to protect groundwater for municipal drinking water purposes.

The groundwater quality of the Alluvial Aquifer is generally acceptable quality for domestic use without treatment, although Alluvial Aquifer water produced for domestic use is disinfected by the domestic water purveyors prior to delivery. The groundwater is generally of calcium bicarbonate, calcium sulfate or calcium-bicarbonate sulfate character, depending on location within the aquifer. TDS concentrations in the Alluvial Aquifer generally increase in concentration from approximately 550 to 610 mg/L in the eastern portion of the aquifer to approximately 660 to 710

mg/L in the western portion of the aquifer (Slade 2002). Other inorganic constituents follow similar trends.

The groundwater quality of the Saugus Formation is generally acceptable for domestic use without treatment, although Saugus Formation water produced for domestic use is disinfected by the domestic water purveyors prior to delivery. The groundwater is generally of calcium bicarbonate or calcium-magnesium sulfate character. Water quality generally deteriorates near the perimeter or base of the aquifer (e.g., near the geologic contact between the Saugus Formation and the underlying Pico Formation). Calculations of TDS concentrations in the Saugus Formation indicate levels greater than 800 ppm for both shallow (500 to 1,000 feet) and deep (2,000 to 2,500 feet) aquifers within the Saugus Formation (Slade 1988).

Groundwater produced by the water purveyors in the CLWA service area consistently meets drinking water standards set by the EPA and the CA DHS. In 2002, the local purveyors conducted additional water quality monitoring for constituents that lack drinking water standards in compliance with the federal and state Unregulated Contaminant Monitoring Rule (UCMR) regulations (SCVWP 2003).

**Perchlorate –** As of April 2003, according to the CA DHS, over 173 surface water and groundwater sampling points within the Los Angeles Region have detected perchlorate, ranging from 4 micrograms per liter (µg/L) to 159 µg/L (LARWQCB 2003). Within the CLWA service area, perchlorate has been a concern with respect to the groundwater quality since it was detected in four production wells in the eastern part of the Saugus Formation in 1997. Perchlorate is a chemical associated with many industrial applications, but primarily as a component of rocket fuel. Although there are neither Federal nor State limits/standards for perchlorate in drinking water, it was placed on the EPA's Drinking Water Contaminant Candidate List in 1998. In a further step to establish standards, the EPA required drinking water monitoring for perchlorate under the UCMR in 1999.

On December 6, 2002, the California Office of Environmental Health Hazard Assessment (OEHHA) proposed a public health goal, in the range of 2 to 6 parts per billion (ppb), for the amount of perchlorate present in drinking water (LADRP 2003a). Both the federal and state governments require monitoring for perchlorate and have recommendations for potable water uses of water sources exceeding 18 µg/L. The CA DHS has lowered the action level for perchlorate in drinking water from 18 ppb to 4 ppb (CA DHS 2002). In addition to the OEHHA's proposed public health goal, the CA DHS is required to adopt a primary drinking water standard for perchlorate by January 1, 2004 (LADRP 2003a). A Maximum Contaminant Level (MCL)[12] for perchlorate is not expected until 2004 (SCVWP 2003).

In 1997, perchlorate was detected in two production wells in the Saugus Formation, both of which are near the Whittaker-Bermite property, a former weapons manufacturing and testing site. These two wells had perchlorate levels above the 18 µg/L recommendation level and the use of these wells has been suspended. Two other production wells in the Saugus Formation

12 A MCL is the maximum permissible level of a contaminant in drinking water which is delivered to any user of a public water system. MCLs ensure that drinking water does not pose either a short-term or long-term health risk. MCLs are specified by the EPA, as authorized by the Safe Drinking Water Act.

have shown detectable levels of perchlorate below 18 µg/L and the use of these wells has been suspended. Due to the number and distribution of wells in the Santa Clarita Valley, the need to suspend use of these wells (the combined capacity of the four wells is 8,000 gallons/minute) has not had a substantial effect on overall water supply. In 2002, perchlorate was detected in one Alluvial Aquifer production well located near the Whittaker-Bermite property. That well tested positive for perchlorate at a level of 5.9 µg/L (SCVWP 2003). All five perchlorate-impacted wells have been removed from active water supply service (SCVWP 2003). The local purveyors are continuing to test for perchlorate in all of their active wells, and are developing a plan for a water treatment process to return the impacted wells to service.

The development and implementation of a cleanup plan for the Whittaker-Bermite site and the impacted groundwater is being coordinated among CLWA, the local purveyors, the City of Santa Clarita, DTSC, and the U.S. Army Corps of Engineers. In February 2003, the DTSC and the impacted local purveyors entered into an agreement in which DTSC will provide review and oversight of the response activities being undertaken by the impacted local purveyors related to the detection of perchlorate in the five impacted wells (SCVWP 2003). Under the scope of work of that agreement, the local purveyors will prepare: (a) well characterization reports; (b) a health-based risk assessment; (c) a regional groundwater flow model; and (d) a treatment technology evaluation report (SCVWP 2003). Several treatment technologies for the removal of perchlorate from water are currently available. As discussed above under the sub-heading of Water Supply, these various studies are underway.

In 2002, the EPA implemented the new Disinfectants and Disinfection Byproducts Rule, which in part, establishes a new MCL of 80 µg/L for total trihalomethanes (TTHM). TTHMs are a byproduct that is created when free chlorine is used as a means for disinfection. CLWA and the local purveyors are investigating alternative methods of disinfection to be able to maintain compliance with the new rule and future regulations relating to disinfection byproducts (SCVWP 2003).

Similarly, the EPA has revised the MCL for arsenic from 50 µg/L to 10 µg/L. Compliance with the federal standard is not required until 2006. However, in March of 2003, the OEHHA proposed a draft Public Health Goal for arsenic at 4 parts per trillion (ppt) (SCVWP 2003). CA DHS is required to establish a new MCL for arsenic by June 30, 2004. Historically, naturally occurring arsenic concentrations less than 5 µg/L have been detected in a few local groundwater supplies and less than 3 µg/L in SWP water supplies. Most groundwater wells in the Santa Clarita Valley have non-detectable concentrations of arsenic.

## 3.15.2 Impacts of the Project

### *3.15.2.1 Significance Criteria*

The criteria listed below are based on Appendix G of the State CEQA Guidelines. The Project would have a significant impact on water resources if it would:

- violate (or cause the violation of) any water quality standards or waste discharge requirement;

- substantially deplete groundwater supplies or interfere substantially with naturally occurring groundwater recharge;
- substantially alter the existing drainage pattern of the site or area, including the alteration of the course of a stream or river, in a manner which would result in substantial erosion or siltation on- or off-site;
- substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site;
- create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff;
- otherwise substantially degrade water quality;
- place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map;
- place within a 100-year flood hazard area structures which would impede or redirect flood flows;
- expose people or structures to significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam; or,
- cause inundation by seiche, tsunami, or mudflow.

### *3.15.2.2 Environmental Impacts*

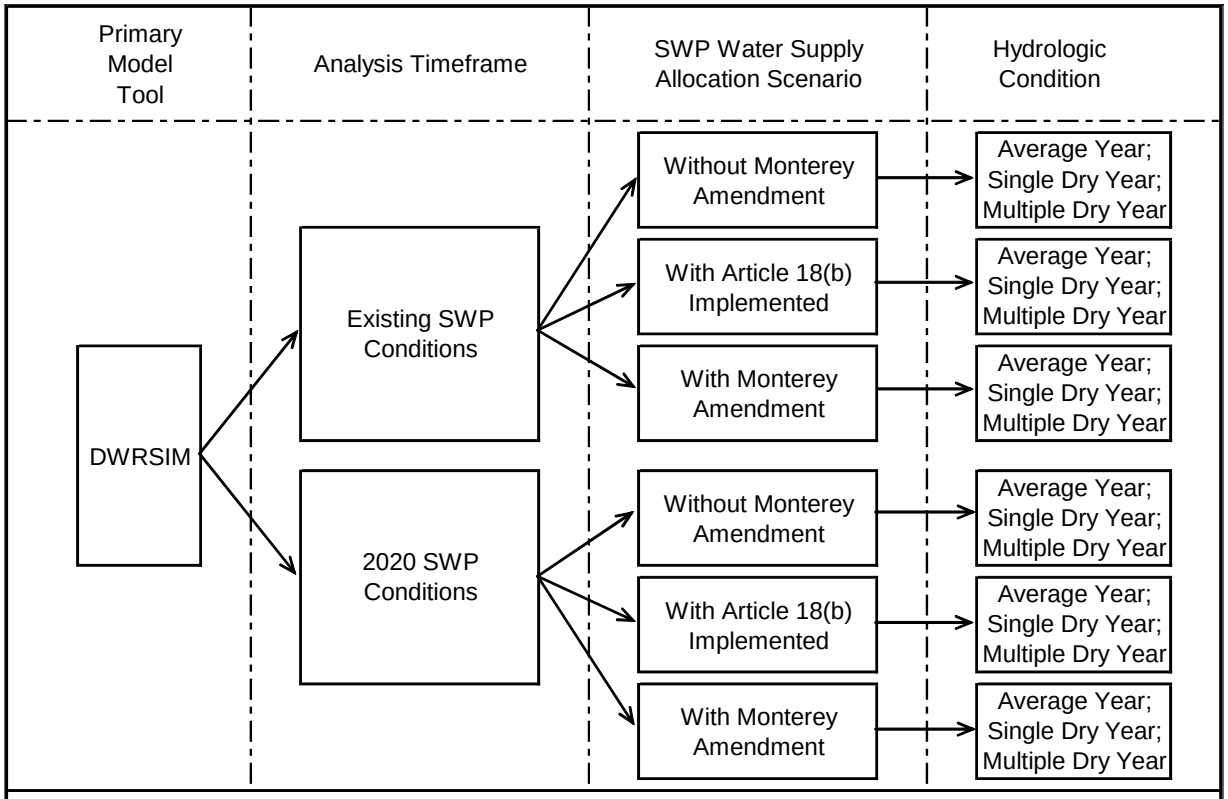
*Analysis Methodology*

The analysis of direct impacts focuses on the Project's potential to affect water quality, groundwater supplies, and surface water supplies associated with the SWP, WRMWSD, and CLWA. Alterations in elevation, depth, and surface area of water bodies, while not necessarily an impact to hydrology, can affect other resources such as aesthetics, biological resources, cultural resources, and geology and soils. These potential effects are considered within the impact discussions for the specific resources affected.

Figure 3.15-5 provides an overview of the SWP water supply analysis. The components shown in this figure, including the Primary Model Tool, Analysis Timeframe, SWP Water Supply Allocation Scenarios, and Hydrologic Conditions are described directly below. Following these discussions is a description of the general methodology followed in the analyses. Appendix D provides additional detail on the water supply analysis methodology and results.

PRIMARY MODEL TOOL AND ANALYSIS TIMEFRAME

The amount of SWP water supply that would be available for use by CLWA given the transfer of the Project's 41,000 AF of Table A Amount was assessed using results from DWR's planning




**Definitions:**

DWRSIM - DWR's SWP operations model. DWRSIM calculates the amount of water the SWP could deliver to Contractors in each month over a 73-year period of hydrologic record, based on a given set of facilities and operating constraints and for a given level of Contractor demand. (DWRSIM studies used were conducted by DWR in 1998 for CALFED Bay-Delta Program EIS/EIR [CALFED 2000].)

Existing SWP Conditions - A timeframe for anlaysis in the DWRSIM study. The existing condition study assumes the use of then-existing (1998) SWP facilities and operating constraints, along with then-current estimates of Contractor demands and upstream land and water use. (DWRSIM study 1995D06E-CALFED-771)

2020 SWP Conditions - A timeframe for analysis in the DWRSIM study. The 2020 condition study assumes the use of then-existing (1998) SWP facilities and operating constrains, along with estimated future (2020) Contractor demands upstream land and water use. (DWRSIM study 2020D09C-CALFED-786)

Without Monterey Amendment (Initial agricultural reduction in allocations) - Allocation of available SWP supplies based on the original terms of the Water Supply Contracts.

With Article 18(b) Implemented (Proportionate reduction in Table A Amounts) - Proportionate reduction in Contractor's Table A Amounts and allocation of available SWP supplies based on the original terms of the Water Supply Contracts, assuming DWR implemented Article 18(b) (i.e., the permanent shortage provision).

With Monterey Amendment (Proportionate reduction in allocations) - Allocation of available SWP supplies based on the terms of the Monterey Amendment to the Water Supply Contracts.

Average Year - The average quantity of supply available, based on the 73 years of DWRSIM model results.

Single Dry Year - Supply available in the single year with the lowest total SWP deliveries, based on the DWRSIM model results (1977). The single dry year supply is considered to be the worst-case scenario, with a probability of occurrence of once in 73 years, or about 1.4 percent of the time.

Multiple Dry Year - Average supply available over the four consecutive drought years of 1988 through 1991, based on the DWRSIM model results.

**Figure 3.15-5. Water Supply Analysis Overview**

model, DWRSIM. The two model studies used in this analysis simulate SWP and CVP operations and were conducted by DWR in 1998 for the CALFED Bay-Delta Program EIS/EIR (CALFED 2000). One of the model's inputs is a time series of monthly runoff based on historic hydrologic data from 1922 through 1994 (73 years), with that hydrologic data adjusted to reflect a current or future level of upstream land and water use. DWRSIM estimates the amount of water the SWP could deliver to Contractors in each month over the 73 years of operation, for a given set of facilities and operating constraints and for a given level of Contractor demand. The results are interpreted as the capability of the SWP to meet the assumed SWP demand, over a range of hydrologic conditions, for that assumed set of physical facilities and operating constraints.

The two DWRSIM studies both assume the use of SWP facilities and operating constraints that were present in 1998. One study uses 1998 estimates of existing Contractor demands and upstream land and water use, and the other uses 2020 projections for both Contractor demands and upstream land and water use.

These model runs provide the best estimates of SWP supply reliability that were available in 1998, and are consistent with the 1998 environmental setting used in this EIR. Since these studies were conducted, the modeling tool DWR uses to simulate operations has evolved (first to CALSIM I, and more recently to CALSIM II). However, while the modeling tool itself has changed, the criteria used in the models to simulate SWP operations have not significantly changed. While DWR has completed a more recent assessment of SWP reliability in its SWP Delivery Reliability Report using CALSIM II, the results of these new studies are comparable to the results of the DWRSIM studies (see Appendix D for a comparison of these model study results).

Although this EIR uses results from the two DWRSIM studies for determining SWP water supplies for both the pre-project 1998 environmental baseline and the project environmental impact analyses, it uses results from the CALSIM II studies from DWR's SWP Delivery Reliability Report (2003b) for determining estimates of SWP water supplies for the current environmental setting.

The estimates of SWP supplies associated with the 41,000 AF of Table A Amount based on DWR's SWP Delivery Reliability Report are slightly lower than the amounts under the DWRSIM studies for the comparable allocation scenario, particularly under "existing" conditions. The difference between SWP supply estimates in this EIR compared to estimates based on DWR's SWP Delivery Reliability Report is due to several reasons, including: (1) the use of two different models (DWRSIM in this EIR and CALSIM II in DWR's report), which show slightly different supply results in some years; (2) the results in this EIR account for the variable demand used by DWR in its model studies (consistent with the way DWR actually allocated water), while the results as presented in DWR's report do not (i.e., in DWR's report deliveries are presented as a percentage of Table A, regardless of the lower demands used in some years of the study); and, (3) the "existing" case in this EIR is based on 1998 SWP demand conditions, while the "existing" case in DWR's report is based on higher 2001 SWP demand conditions. The 2001 total SWP demand is higher than the 1998 demand due to increased M&I Contractor demands. A lower total demand can result in some years in more water being

allocated to the same Table A Amount, so the lower 1998 demand results in a slightly higher quantity of water associated with the 41,000 AF of Table A Amount.

SWP WATER SUPPLY ALLOCATION SCENARIOS

The Project could be authorized under Article 41 of CLWA's original Water Supply Contract with DWR or under terms added to CLWA's contract as part of the Monterey Amendment (Article 53). Both contract terms allow for the transfer of Table A Amount between SWP Contractors. As described in section 1.3.2 under the Monterey Amendment, Agricultural Contractors committed, on a willing buyer-willing seller basis, to make available 130,000 AF of Table A Amount for permanent transfer to M&I Contractors (Article 53). The transfer of Table A Amount that is the subject of this EIR was implemented under this permanent transfer provision of the Monterey Amendment, although the transfer could be implemented under Article 41 of CLWA's original Water Supply Contract.

As was discussed in Chapter 1, DWR is in the process of preparing a new EIR for the Monterey Amendment. Since the Monterey Amendment changes the way SWP supplies are allocated among Contractors, this EIR provides three separate analyses of the Project's impacts to water supply available to WRMWSD and CLWA. The three analyses represent three possible scenarios for allocating available SWP supplies among Contractors, and provide an evaluation of the amount of SWP supply that would be associated with the 41,000 AF of Table A Amount under each of the allocation scenarios. The three analyses are governed by specific terms in the Water Supply Contracts, and are referred to in this EIR as: "SWP Allocation without the Monterey Amendment" (Without Monterey Amendment); "SWP Allocation without the Monterey Amendment and with Implementation of Article 18(b) Permanent Shortage Provision" (With Article 18(b) Implemented); and, "SWP Allocation with the Monterey Amendment" (With Monterey Amendment). The SWP allocation scenarios that form the basis of the three analyses are described below and summarized in Table 3.15-13. DWR is currently allocating SWP supplies in accordance with the Water Supply Contract as amended by the Monterey Amendment ("With Monterey Amendment").

It is important to note that the total amount of SWP supply is independent of the allocation scenario. The total amount of SWP supply available in a given year is a result of that year's hydrology, the amount of storage in SWP reservoirs at the beginning of the year, and the operational constraints that govern operations in the Delta (in 1998, Order WR 95-6 and currently, SWRCB Decision 1641).

***SWP Allocation without the Monterey Amendment (i.e., Initial agricultural reduction in allocations), (Without Monterey Amendment) –*** Under the original terms of the Water Supply Contracts, water supply shortages, as well as any surplus water that might be available, were allocated differently among Contractors depending on whether Contractors' Table A Amounts were classified as agricultural or M&I. Under the original SWP contract terms, in a year with a water supply shortage (i.e., a year when total available SWP supplies were less than Contractor requests), available water supplies were allocated such that Agricultural Contractors received certain initial reductions in deliveries, and any remaining shortages were then allocated proportionately among all Contractors.

Conversely, when surplus water was available, Agricultural Contractors were given priority to this water. This priority to surplus water was given to both scheduled surplus water and unscheduled surplus water (refer to Table 3.15-3 for a definition of scheduled surplus water and unscheduled surplus water). Scheduled surplus water was generally available only during the early years of the SWP, when total Contractor demands were low. Due primarily to increasing Contractor demands for Table A supplies, scheduled surplus water has not been available since the mid-1980s.

Since WRMWSD's Table A Amount is classified as agricultural, the Table A Amount transferred to CLWA would be considered agricultural. Therefore, in this allocation scenario, under shortage conditions the 41,000 AF of Table A Amount would be subject to the initial agricultural reductions. Similarly, under surplus water conditions the 41,000 AF of Table A Amount would have the agricultural priority to surplus water.

***SWP Allocation without the Monterey Amendment and with Implementation of Article 18(b) Permanent Shortage Provision (i.e., Proportionate Reduction in Table A Amounts), (With Article 18(b) Implemented) –*** Under the original terms of the Water Supply Contracts, DWR could invoke Article 18(b) of the Water Supply Contracts if DWR determined that the SWP was in a "permanent shortage" situation. With implementation of Article 18(b), DWR would determine a new "minimum project yield" for the SWP, and reduce Contractors' Table A Amounts proportionately[13] until they equaled the reduced minimum project yield.

There is a great deal of controversy and uncertainty regarding this allocation scenario and how it might have been implemented by DWR. More specifically, there are several different legal and contractual interpretations, particularly between Agricultural and M&I Contractors, primarily regarding whether DWR could have validly invoked Article 18(b), and assuming that it could have done so, how it could have allocated water under Article 18(b). In general, the water allocation rules that would apply under this allocation scenario are similar to the allocation rules described for the Without Monterey Amendment scenario described above, with Agricultural Contractors receiving initial reductions in shortage years and priority to surplus water when it was available. However, with all Contractor Table A Amounts reduced, shortages (i.e., supplies insufficient to meet Contractor requests for Table A water) would occur much less frequently (because the SWP could deliver the smaller Table A Amounts more regularly), and the initial agricultural reduction would be applied to a smaller Table A Amount (i.e., the reductions would be smaller). And with Table A Amounts reduced, SWP supplies in excess of the reduced minimum project yield would be available for scheduled delivery in most years. Unscheduled surplus water would be available under the same conditions, in the same amounts, and allocated in the same way as in the Without Monterey Amendment scenario.

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13 Without the Monterey Amendment, Article 18(b) of the Water Supply Contracts stated "In the event that the State is unable to construct sufficient additional conservation facilities to prevent a reduction in the minimum project yield, or if for any other reason there is a reduction in the minimum project yield, which, notwithstanding preventive or remedial measures taken or to be taken by the State, threatens a permanent shortage in the supply of project water to be made available to the contactors: (1) The annual entitlements and the maximum annual entitlements of all Contractors, except to the extent such entitlements may reflect established rights under the area of origin statutes, shall, by amendment of Table A of this contract, be reduced proportionately by the State to the extent necessary so that the sum of the revised maximum annual entitlements of all Contractors will then equal such reduced minimum project yield…."

**Table 3.15-13. Summary of SWP Water Supply Contract Without Monterey Amendment, With Article 18(b) Implemented and With Monterey Amendment Allocation Scenarios**

| | *Without Monterey Amendment* | *With Article 18(b) Implemented* | *With Monterey Amendment* |
|---|---|---|---|
| SWP Supplies Allocated Based on: | Original terms of Water Supply Contracts. | Original terms of Water Supply Contracts, assuming DWR implemented Article 18(b), (i.e., if it determined SWP was in "permanent shortage" situation).<br>All Contractors' Table A Amounts proportionately reduced until they total new "minimum project yield," as determined by DWR. | Terms of Monterey Amendment to Water Supply Contracts. |
| Table A Water Shortage Allocation | Agricultural Contractors receive initial supply reduction (up to 50% of Table A Amount in one year, and up to 100% in any consecutive seven years).<br>Any remaining shortage allocated proportionately among all Contractors. | Same as Without Monterey Amendment[1]. | Shortages allocated in proportion to Contractors' Table A Amounts; no agricultural and M&I allocation differential. |
| Surplus Water Allocation | First priority given to Agricultural Contractors. Two categories of surplus water:<br>• Scheduled surplus.<br>• Unscheduled surplus. | Same as Without Monterey Amendment[2]. | Surplus allocated in proportion to Contractors' Table A Amounts.<br>Scheduled surplus water eliminated.<br>Unscheduled surplus water renamed; referred to as Article 21 water. |
| Results for Contractors | Agricultural Contractors have:<br>• Less reliable Table A supply than M&I Contractors (due to initial agricultural reductions), but,<br>• More access to surplus water. | Supplies shift from M&I Contractors to Agricultural Contractors, due to:<br>• Smaller and less frequent initial agricultural reductions, and,<br>• More of available supply classified as surplus water (with agricultural priority). | Reliability of both Table A supply and surplus supply is same for Agricultural Contractors and M&I Contractors. |

1. Same allocation rules apply, but because Table A Amounts are reduced, initial agricultural reductions are smaller and less frequent.
2. Same allocation rules apply, but because Table A Amounts are reduced, surplus supplies are available more frequently.

There are two primary uncertainties under this allocation scenario. This first unknown is what value of minimum project yield DWR would have used in reducing Table A Amounts. A specific value for minimum project yield had not been calculated in the several years leading up to the Monterey Amendment, but was commonly thought at the time to be in the range of 2.0 to 2.5 million AF (Cal. App. 3d PCL vs. DWR September 15, 2000). The second uncertainty is how any water supply in excess of minimum project yield would have been allocated. This is an area of controversy, with some Contractors contending it should be allocated as surplus water with Agricultural Contractors receiving a priority, and others contending it should be allocated in proportion to Table A Amounts.

Given these uncertainties, two Article 18(b) allocation scenarios that bound the various assumptions and interpretations described above were analyzed for this EIR. The first scenario assumes minimum project yield is reduced to 2.0 million AF, and scheduled surplus water is allocated with priority given to Agricultural Contractors. The second scenario assumes minimum project yield is reduced to 2.5 million AF, and deliveries above this amount are allocated in proportion to Table A Amounts. The first of these scenarios would result in more water being allocated to Agricultural Contractors than the second, and therefore would result in more water being associated with the Project's 41,000 AF of Agricultural Table A Amount. Because this first scenario would result in the worst case for purposes of analysis of potential growth impacts, only the results of the first scenario are presented in this EIR (for the water supply results of both scenarios, refer to Appendix D).

***SWP Allocation with the Monterey Amendment (i.e., Proportionate reduction in allocations), (With Monterey Amendment) –*** Under the terms of the Water Supply Contracts as amended by the Monterey Amendment, all SWP water supplies are shared among all Contractors in proportion to their Table A Amounts. Therefore, the 41,000 AF of Table A Amount transferred to CLWA from WRMWSD would be subject to the same shortages as all other Table A Amounts (i.e., it would not be subject to an initial agricultural reduction and would not have the priority to certain surplus deliveries), and would have access to the same proportionate share of any available surplus water as all other Table A Amounts. As part of the Monterey Amendment, the category of scheduled surplus water was eliminated because it was no longer available, the category of unscheduled surplus water was retained but is now referred to as Article 21 water, and Article 18(b) was deleted.

HYDROLOGIC CONDITIONS

Because SWP water supplies vary from year to year depending on a variety of factors, this EIR presents water supply results for three different hydrologic conditions. A Contractor's "average year" supply is the average quantity of water available to the Contractor, based on the 73 years of DWRSIM model results. A Contractor's "single dry year" supply is the amount of water available to the Contractor in the single year with the lowest total SWP deliveries, based on the DWRSIM model results, which was 1977. The single dry year supply is considered to be a worst-case scenario, with a probability of occurrence of once in 73 years, or about 1.4 percent of the time. A Contractor's "multiple dry year period" supply is the average amount of water available over the four consecutive years drought years of 1988 to 1991, based on the DWRSIM model results.

GENERAL METHODOLOGY

The potential impacts of the Project to WRMWSD and CLWA SWP water supplies and to SWP facilities were evaluated using the general methodology described below. Appendix D provides additional detail on the water supply analysis methodology.

First, the amount of SWP water supply available to WRMWSD and CLWA, including the amount associated with the 41,000 AF of Table A Amount, was analyzed. Data from the DWRSIM model studies discussed above (including the M&I and Agricultural Contractor demands used as input to the studies, and the total annual SWP deliveries to all Contractors from the model study results) were used as a starting point for the analysis. For this analysis, these total annual deliveries were allocated among Contractors in accordance with the three SWP water allocation scenarios described above (Without Monterey Amendment, With Article 18(b) Implemented, and With Monterey Amendment), for each year over the model's period of record. The results of these analyses were used to determine the SWP deliveries that could be expected by WRMWSD and CLWA under each water allocation scenario, for each hydrologic condition considered.

Next, impacts to SWP facilities were analyzed. This analysis also used data from these same DWRSIM model studies as a starting point for the analysis, using model study results related to San Luis Reservoir operations (i.e., reservoir storage, diversions to and releases from storage, and Aqueduct flows upstream and downstream of the reservoir). The change in reservoir storage and Aqueduct flow due to the Project was then estimated based on the difference between WRMWSD and CLWA in the timing of monthly deliveries (i.e., the difference in timing between agricultural use and M&I use), given the allocated supplies determined in the supply analysis.

In the supply analyses conducted for this EIR, the classifications of Table A Amounts as agricultural or as M&I were maintained. The 41,000 AF of Table A Amount transferred from WRMWSD (through KCWA) is agricultural. Although CLWA serves M&I users, the agricultural classification of the 41,000 AF Table A Amount would remain because the classification is determined by the original Water Supply Contract terms according to anticipated use (i.e., KCWA's original Water Supply Contract) and has not changed. Agricultural Table A Amount can be used for M&I uses and, conversely, M&I Table A Amount can be used for agricultural uses. Of CLWA's 54,200 AF of SWP Table A Amount without the Project, 41,500 AF is classified as M&I, and 12,700 AF as agricultural.

In addition to Table A supplies, CLWA and WRMWSD can also receive deliveries of surplus water (see Table 3.15-3 for descriptions of types of surplus water). Unscheduled surplus water/Article 21 water is not included in the water supply analysis for any of the three water allocation scenarios. This is because it is not available on a routine or predictable basis, and is generally only available for short periods of time during low demand months when most Contractors have a limited ability to use it. It is noted, however, that unscheduled surplus water/Article 21 water could provide additional water supplies that could be used by WRMWSD and CLWA. Scheduled surplus water is only included in the With Article 18(b) Implemented allocation scenario, because with the reduced Table A Amounts under that scenario scheduled surplus water would have been available on a scheduled or more

dependable basis similar to Table A supplies (i.e., Contractors could schedule in advance, in a manner similar to their annual Table A requests, deliveries of scheduled surplus water). Scheduled surplus water is assumed to not be available under the Without Monterey Amendment and With Monterey Amendment allocation scenarios because (1) for the Without Monterey Amendment allocation scenario, scheduled surplus water was generally available only during the early years of the SWP, when total Contractor demands were low, and has not been available since the mid-1980s due primarily to increasing Contractor demands for Table A supplies, and (2) for the With Monterey Amendment allocation scenario, the category of scheduled surplus water was eliminated as part of the Monterey Amendment because it was no longer available (refer to Table 3.15-3).

For the purposes of estimating the impacts of the Project, the impact analyses assume that CLWA will take delivery of the entire amount of water made available from the 41,000 AF Table A Amount transferred. This assumption conservatively provides the largest effect on SWP operations, even though CLWA may not currently have the local demand for this entire amount of water in average and wetter hydrologic years.

*State Water Project and Associated Facilities*

DIRECT IMPACTS

The Project would not result in a change in the total amount of SWP supply available for delivery to SWP Contractors. The total amount of SWP supply available in a given year is a result of that year's hydrology, the amount of storage in SWP reservoirs at the beginning of the year, and the operational constraints that govern operations in the Delta (in 1998, SWRCB Order WR 95-6 and currently, SWRCB Decision 1641). The total available SWP supply is then allocated among the SWP Contractors and is independent of the location of use south of the Delta. Impacts described below and summarized in Table 3.15-14 for the SWP and associated facilities are primarily due to two changes as a result of the Project, which are:

- *Change in end use of water associated with the 41,000 AF Table A Amount* – The project would result in a change from agricultural end use to M&I end use of water associated with the 41,000 AF Table A Amount. Typically, agricultural water users use proportionately more of their annual water supply during the heavy irrigation months of the late spring and summer than do urban water users, and proportionately less of their supply than urban users during the remainder of the year. In the case of WRMWSD and CLWA, this difference in delivery during the year would result in a net reduction in deliveries of water associated with the 41,000 AF Table A Amount in May through September, and a net increase in deliveries during the remaining months of the year (October through April). In addition, deliveries to WRMWSD historically have peaked in July, while CLWA's deliveries historically have peaked in August.

- *Changes in the amount of water transported to the CLWA turnouts* – The Project would result in the delivery of water to the CLWA turnout that could have otherwise been delivered to the WRMWSD turnouts. Because the CLWA turnout is located further

down the Aqueduct than the WRMWSD turnout (see Figure 1.3-1), water associated with the Table A transfer would need to be transported this additional distance.

**Table 3.15-14. Summary of Impacts to the SWP and Associated Facilities**

| | |
|---|---|
| The Delta | The Project would not change the total amount of SWP supply available for delivery to Contractors, so there would be no change in the total amount of water diverted from the Delta.<br><br>The difference in timing of water used for urban purposes rather than agricultural purposes would result in a slight change in timing of deliveries of the 41,000 AF of Table A Amount. This change in timing could also result in a slight change in the timing of the filling of San Luis Reservoir, which could result in minor changes in the timing of Delta diversions. However, these changes would fall well within the range of historical and future anticipated SWP diversions from the Delta. Any change in Delta diversions that did occur would result in an imperceptible or minor change in Delta water quality (slight salinity decreases withy lower diversions, and slight salinity increase with higher diversions). All changes would be within applicable water quality standards and agreements. Impacts would be less than significant. |
| California Aqueduct from the Delta to San Luis Reservoir | If the changes in Delta diversions described above occurred, there would be a corresponding change in the timing of water transported in the California Aqueduct from the Delta facilities to San Luis Reservoir. This would not result in an environmental impact to water resources. |
| San Luis Reservoir | The difference in timing of water used for urban purposes rather than agricultural purposes would result in a slight increase in storage at San Luis Reservoir from July through November, and a slight decrease in storage during the remainder of the year. The change in storage at San Luis Reservoir resulting from the Project would represent a small portion of the total average storage in the SWP share of San Luis Reservoir, reflecting storage changes of less than 0.5 percent of average monthly storage in most months and not more than two percent in any month. This would not result in an environmental impact to water resources. |
| California Aqueduct downstream of San Luis Reservoir | The Project would result in a minor change in the timing of water transported in the Aqueduct between San Luis Reservoir and the WRMWSD turnouts, with a slight increase in the amount of water transported from October to April, and a slight decrease during the remainder of the year (May to September). This would not result in an environmental impact to water resources.<br><br>The Project would result an annual increase of up to 41,000 AF transported in the California Aqueduct from the WRMWSD turnouts to the CLWA turnout. This increase would slightly increase the flow (velocity) in the California Aqueduct and may result in a minor change in the water level within the non-pipeline portions of the Aqueduct. This would not result in an environmental impact to water resources. |
| Castaic Lake | The Project would increase SWP water delivered to CLWA resulting in additional water being conveyed to, and delivered from, Castaic Lake, but would have little effect on the overall storage volume in the lake at any given time. This would not result in an environmental impact to water resources. |
| Other SWP Reservoirs (Quail and Pyramid lakes) | The Project would not result in changes to the overall volume of water stored in either Quail or Pyramid lakes, but would increase the amount of water that is conveyed to and released from the lakes. This would not result in an environmental impact to water resources. |

Unless otherwise noted, the impacts of the Project to the SWP and associated facilities would be similar regardless of the SWP water allocation scenario (Without Monterey Amendment, With Article 18(b) Implemented, and With Monterey Amendment), and under both SWP demand conditions (existing and 2020).

**The Delta –** As discussed above, the Project would not change the total amount of SWP supply available for delivery to the Contractors. Therefore, there would be no change in the total amount of water diverted from the Delta. The difference in the timing of water used for urban purposes by CLWA rather than for agricultural purposes by WRMWSD would result in a slight change in the timing of deliveries of the 41,000 Table A Amount south of the Delta. This slight change in the timing of deliveries would require a slight change in operations (i.e., either in diversions from the Delta or in San Luis Reservoir operations). Generally, the SWP operates to divert as much water from the Delta as is available under prevailing hydrologic conditions, within the water quality standards and operational constraints that govern Delta operations (i.e., currently, SWRCB Decision 1641 and in 1998, Order WR 95-6). This is true regardless of the timing of deliveries south of the Delta because when Delta diversions exceed downstream deliveries, that excess is stored in San Luis Reservoir for delivery later in the year.

Because Delta diversions are limited by either water availability or operational/regulatory constraints, the change in the timing of deliveries of the 41,000 AF of Table A due to the Project would primarily result in changes in San Luis Reservoir storage (as is discussed in more detail below). These changes in storage could in some years result in the reservoir reaching full capacity at a slightly different time than if the Project were not implemented, which in turn could result in a slight change in Delta diversions (because diversions would generally be reduced when storage becomes full). Given the small magnitude of the change in the timing of deliveries, any change in the timing of Delta diversions that did occur would be minor, and would likely be on the order of hours or days (i.e., with the Project, certain changes in Delta diversions that would have occurred without the Project would still occur, but might shift by a few hours or days).

Delta diversions and their effect on Delta water quality vary from year to year. Any minor change in Delta diversions that did occur as a result of the Project would be small relative to total SWP diversions and would fall well within the range of historical and future anticipated SWP diversions from the Delta. Any minor change in the timing of Delta diversions due to the Project would result in an imperceptible or minor change in Delta water quality (slight salinity decrease with lower diversions, and slight salinity increase with higher diversions). Because (1) the Project would not change the operating criteria for diversions from the Delta, (2) the Project would very infrequently result in minor changes to Delta diversions within the applicable environmental and regulatory constraints, and (3) under those conditions that diversions could change, the changes would be minor, the Project would result in less than significant impacts to water resources, including water quality, within the Delta.

**California Aqueduct from the Delta to San Luis Reservoir –** As described above, the change in the timing of deliveries for WRMWSD and CLWA could result in some years in minor changes to Delta diversions. However, these changes would fall well within the range of historical and future anticipated SWP diversions from the Delta. If these timing changes in Delta diversions occurred, there would be a corresponding change in the timing of water transported in the

California Aqueduct from the Delta facilities to San Luis Reservoir. These changes in water transported in the Aqueduct would be minor. Water associated with the 41,000 AF of Table A Amount has historically been transported through this reach, and the amount of water transported would not exceed the capacity of the Aqueduct. Changing the timing of water transported in the Aqueduct would not result in an environmental impact to water resources.

**San Luis Reservoir –** As discussed in section 3.15.1.1, the general operation at San Luis Reservoir is to try to fill the reservoir during the high runoff months of the winter and early spring, and then release the stored water to supplement the more limited diversions from the Delta during the higher-demand summer and fall months to meet Contractor demands. The Project, in combination with the net change in the timing of deliveries during the year between WRMWSD and CLWA, would result in a slight increase in storage at San Luis Reservoir from July through November, and a slight decrease in storage during the remainder of the year. The magnitude of the storage increase would be greatest in August and September, averaging approximately 4,500 AF at existing SWP demand conditions and approximately 4,200 AF at 2020 SWP demand conditions. The magnitude of the reduction in storage would be greatest in March and April, averaging approximately 3,000 AF at existing SWP demand conditions and approximately 2,700 AF at 2020 SWP demand conditions. As shown on Figure 3.15-6, the change in storage at San Luis Reservoir resulting from the Project would represent a small portion of the total average storage in the SWP share of San Luis Reservoir (SWP capacity is over 1 million AF), reflecting storage changes of less than 0.5 percent of average storage in most months and not more than 2 percent in any month. The information provided above and in Figure 3.15-6 is based on implementation of the Project under the terms of the With Monterey Amendment scenario. These storage changes would be similar under the Without Monterey Amendment and With Article 18(b) Implemented scenarios because the amount and timing of deliveries under each of the allocation scenarios is quite similar.

These changes in storage are well within the substantial differences in San Luis Reservoir storage that occur in normal SWP operations over the course of the year and from year to year, and would not result in an environmental impact to water resources at San Luis Reservoir.

**California Aqueduct downstream of San Luis Reservoir –** The Project would result in a minor change in the timing of water transported in the Aqueduct between San Luis Reservoir and the WRMWSD turnouts. Within this reach of the Aqueduct, a slight increase in the amount of water transported would occur from October to April, and a slight decrease would occur during the remainder of the year (May to September). These changes in the amount of water transported from the Delta to the WRMWSD turnouts would result from the change in end use of the water (urban rather than agricultural use) and the associated shift in the timing of delivery. These changes in water transported in the Aqueduct would be minor. Water associated with the 41,000 AF of Table A Amount has historically been transported through this reach, and the amount of water transported would not exceed the capacity of the Aqueduct. Changing the timing of water transported in the Aqueduct would not result in an environmental impact to water resources.

The Project would result in an annual increase of up to 41,000 AF transported in the California Aqueduct from the WRMWSD turnouts to the CLWA turnout. This increase would slightly increase the flow (velocity) in the California Aqueduct and may result in a minor change in the water level within the non-pipeline portions of the Aqueduct. Because these changes in the

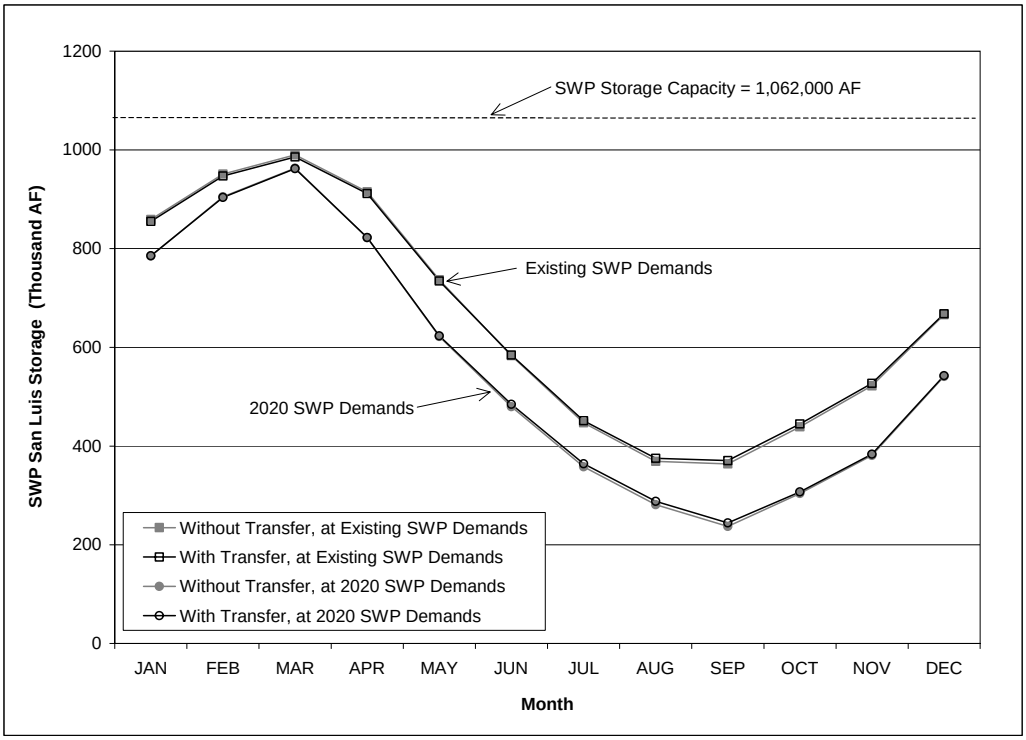


**Figure 3.15-6. Average Monthly SWP San Luis Reservoir Storage With and Without the Project, under With Monterey Amendment SWP Allocations**

amount of water transported in the Aqueduct would be minor, and because the Project would not result in changes to the operating criteria of the Aqueduct (i.e. the additional amount of water would not be allowed to exceed the capacity of the Aqueduct), these changes in timing of flows in the Aqueduct would not result in an environmental impact to water resources.

The Project would require the transport of water associated with the 41,000 AF Table A Amount through the Teerink, Chrisman, Edmonston, and Oso pumping plants (transport to WRMWSD also requires pumping a portion of the water through the Teerink and Chrisman pumping plants) and the Warne and Castaic power plants located within and between WRMWSD and Castaic Lake (refer to Figure 1.1-1). This would not result in an environmental impact to water resources.

The Project would not change the source of water in the California Aqueduct or otherwise affect water quality in the Aqueduct.

**Castaic Lake –** The amount of water stored at Castaic Lake would not be expected to change as a result of the Project. As discussed in section 3.15.1.2, Castaic Lake is the terminal reservoir on the West Branch of the California Aqueduct and is operated to help meet peak deliveries during the summer months for those SWP Contractors that receive deliveries from Castaic Lake and to provide an emergency water supply in case of a major supply system outage. Castaic Lake is also used for year-round recreational purposes. Under normal operations, the amount of storage that is withdrawn from Castaic Lake to make deliveries to Contractors over the summer (the amount withdrawn that exceeds the amount delivered to the lake) is typically about 30,000 AF (or about 10 percent of the lake's volume). The amount of this storage withdrawal is small

relative to total deliveries from the West Branch, which averaged about 403,000 AF from 1990 through 2000. In other words, most deliveries from the West Branch are conveyed through the California Aqueduct and Castaic Lake in about the same month the water is delivered to Contractors from the lake. In the future, DWR is expected to maintain this same general operation at Castaic Lake regardless of whether deliveries from the West Branch increase, and regardless of whether increased deliveries are due to increasing Contractor demands or due to Table A Amount transfers such as the Project.

Over the past decade, CLWA's Table A water deliveries from Castaic Lake have averaged only about 6 percent of the total SWP water delivered from the lake. Over this same period, the majority of the SWP water delivered from the lake (approximately 93 percent) was delivered to MWD due to its relatively larger Table A Amount and storage rights in Castaic Lake. The increase in water delivery to CLWA from the Project would result in additional water being conveyed to, and delivered from, Castaic Lake, but would have little effect on the overall storage volume in the lake at any given time. Because CLWA's deliveries from Castaic Lake with the Project would be minor compared to the total amount of water delivered from the lake, most of the SWP water is conveyed to the lake in the same month it is delivered to CLWA, and the Project would not change DWR's operating criteria for the lake, the Project would not result in an environmental impact to water resources at Castaic Lake. Because the Project would not change the source of water delivered to Castaic Lake and would result in minor, if any changes in the lake's volume, water quality would not be affected.

Although not an impact of the Project, it is noted that flexible storage is a component of the Monterey Amendment. CLWA would only have the ability to access water stored in Castaic Lake under the "flexible storage" provision of the Monterey Amendment in the With Monterey Amendment scenario. The amount of flexible storage available to CLWA would not change as a result of the Project.

**Other SWP Reservoirs –** Quail Lake and Pyramid Lake are located between the WRMWSD turnouts and the CLWA turnout on the West Branch of the California Aqueduct. DWR operates Quail Lake to re-regulate Aqueduct flows. Pyramid Lake is used in the operation of the Castaic Power Plant located between Pyramid and Castaic lakes, as well as to provide an emergency water supply for the West Branch Contractors. The Project would be implemented in accordance with DWR's existing operation of these lakes. As with Castaic Lake, most of the SWP water delivered to both Quail and Pyramid lakes is conveyed to, and released from, the lakes within the same month. Therefore, the Project would not result in changes to the overall volume of water stored in either Quail or Pyramid lakes, but would increase the amount of water that is conveyed to and released from the lakes. Because water is conveyed to and released from these lakes in approximately the same month, and because the project would not result in changes to DWR's operations of these facilities, the Project would not result in an environmental impact to water resources.

INDIRECT IMPACTS

Because the Project would be implemented in accordance with DWR's operation of the SWP and associated facilities, no indirect impacts to water resources would occur.

*Wheeler Ridge-Maricopa Water Storage District*

DIRECT IMPACTS

The Project reduces WRMWSD's Water Supply Contract Table A Amount by 41,000 AF (from 238,088 AF to 197,088 AF, a reduction of 17.2 percent). Because SWP water supplies are allocated among Contractors on the basis of Table A Amounts, this reduction in WRMWSD's Table A Amount would result in a reduction in the total amount of SWP water that WRMWSD could obtain (including both Table A and any available surplus supplies) from the SWP. Under all SWP allocation scenarios and hydrologic conditions, the Project would result in a maximum reduction in the SWP Table A water available to WRMWSD of approximately 17.2 percent.

As discussed in section 3.15.2.2, the supplies presented below are Table A supplies only (or in the case of the allocation scenario With Article 18(b) Implemented, Table A supplies and scheduled surplus water), and do not include unscheduled surplus water/Article 21 water.

Water Supply

***All SWP Allocation Scenarios under Existing SWP Demand Conditions –*** Table 3.15-15 presents the results of the analysis of WRMWSD's SWP Table A supply under the existing (1998) SWP demand conditions used in the DWRSIM study, and under the various hydrologic conditions (average year, single dry year, and multiple dry year period) and water allocation scenarios considered (With Monterey Amendment, Without Monterey Amendment, and With Article 18(b) Implemented). Under current SWP allocation rules (With Monterey Amendment), implementation of the Project would result in a reduction in the Table A supply available to WRMWSD of 34,400 AF, 9,200 AF, and 18,100 AF under the average year, single dry year, and multiple dry year period conditions, respectively. Considering all allocation scenarios, the largest reduction in supplies available to WRMWSD with implementation of the Project would be 35,300 AF under average year conditions With Article 18(b) Implemented; 9,200 AF under a single dry year With Monterey Amendment; and 18,100 AF under a multiple dry year period With Monterey Amendment.

With the Project, WRMWSD would have sufficient SWP supplies at least 57 percent of the time to deliver Table A water in an amount that would independently meet its minimum demands under favorable economic conditions (180,000 AF). In addition, the average amount of Table A water WRMWSD could expect to receive with the Project under all allocation scenarios (157,000 to 169,500 AF) is greater than the average amount of historic SWP water deliveries to WRMWSD from 1990 to 1999 (137,360 AF) by approximately 14 and 23 percent, respectively. With the Project, sufficient SWP Table A water would be available within the district in years of average or greater than average SWP supplies. In years of less than average SWP supplies, and depending on that year's specific demand, WRMWSD may not have sufficient SWP Table A water to meet demands. In these years, WRMWSD would need to rely on other water management actions, such as previously banked water, and/or individual farmers within the district would use additional local groundwater.

As previously discussed, the decision to use local groundwater (i.e., groundwater pumped from wells owned and operated by farmers) or previously banked water supplies on lands within the district is predominately an economic decision made by farmers. In years when SWP deliveries

**Table 3.15-15. WRMWSD's SWP Table A Supply at Existing SWP Demand Conditions, under all SWP Allocation Scenarios[1]**

(all values in AF, rounded to the nearest 100 AF)

| | | *Table A Amount* | *Average Year* | *Single Dry Year* | *Multiple Dry Year Period[2]* |
|---|---|---|---|---|---|
| **With Monterey Amendment** | Without the Project | 238,100 | 199,900 | 53,300 | 105,300 |
| | With the Project | 197,100 | 165,500 | 44,100 | 87,100 |
| | ***Difference[3]*** | ***41,000*** | ***34,400*** | ***9,200*** | ***18,100*** |
| **Without Monterey Amendment** | Without the Project | 238,100 | 189,700 | 0 | 79,700 |
| | With the Project | 197,100 | 157,000 | 0 | 65,900 |
| | ***Difference[3]*** | ***41,000*** | ***32,700*** | ***0*** | ***13,700*** |
| **With Article 18(b) Implemented[4]** | Without the Project | 113,800 | 204,800 | 11,500 | 100,600 |
| | With the Project | 94,200 | 169,500 | 9,500 | 83,200 |
| | ***Difference[3]*** | ***19,600*** | ***35,300*** | ***2,000*** | ***17,300*** |

*Note:* Numbers may not add due to rounding.
1. Based on water deliveries from DWRSIM study 1995D06E-CALFED-771. This study used 1998 DWR estimates of then-existing SWP Contractor demands.
2. Multiple dry year period supplies shown are average annual supplies over a four-year period.
3. Supplies shown are the amount of water attributable to the 41,000 AF of Table A Amount.
4. Under the SWP allocation scenario With Article 18(b) Implemented, the Table A Amounts shown are estimates of WRMWSD's reduced Table A Amount, based on its proportionate share of a reduced SWP minimum project yield of 2.0 million AF. The supplies shown include both Table A supplies and scheduled surplus supplies estimated to be available, with surplus supplies allocated based on priority for agricultural use.

are less than crop demands, individual farmers may choose to use local groundwater to meet demands. Because WRMWSD has substantially diversified its water sources through other water management actions, resulting in sufficient water available to the district to meet demands in most years at a lower fixed cost (when total costs are considered) than SWP water, increased reliance on groundwater would likely be a result of independent actions by the individual farmers (refer to Appendix C). However, it is reasonable to assume that some farmers may use local groundwater when SWP deliveries are not sufficient to meet demands, and, therefore, the Project may result in additional groundwater pumping in these years. Due to the complexity of factors that may be considered by individual farmers when deciding to use local groundwater in lieu of using imported water, the exact amount of additional reliance on groundwater that may occur in dry years cannot be determined. Because the Project could result in a reduction of up to 9,200 AF of Table A water in a single dry year and up to 18,100 AF of Table A water in a multiple dry year period, this is assumed to be the amount of additional groundwater use that could result from implementation of the Project in these year types. These amounts are small relative to the total amount of water in storage in the Kern County Groundwater Basin (total storage is 40 million AF; DWR 2003a) and the White Wolf sub-basin (total storage is about 2.5 million AF; BE 1975). Because groundwater levels in the portions of these basins underlying WRMWSD generally have been increasing over time (BE 1995), indicating that the basins could sustain an increase in use under these limited conditions

without resulting in a net deficit in aquifer volume or a lowering of the local groundwater table, impacts to groundwater would be less than significant.

As was discussed previously, the supplies presented above do not include unscheduled surplus water/Article 21 water. Generally, when this type of water is available, there is enough to meet all Contractor requests for it. It is only when total Contractor requests for this water exceed the amount available that DWR would need to allocate that limited supply among Contractors. If this situation occurred, the Project could result in a reduction in the amount of unscheduled surplus water/Article 21 water that WRMWSD could obtain (because it is allocated based on Contractor Table A Amounts). Because this reduction is minor, and would only occur infrequently, the reduction in the amount of unscheduled surplus water/Article 21 water that WRMWSD could obtain would not materially affect WRMWSD's surplus water supply and the impact would be less than significant.

***All SWP Allocation Scenarios under 2020 SWP Demand Conditions –*** Table 3.15-16 presents the results of the analysis of WRMWSD's SWP Table A supply under the 2020 SWP demand conditions used in the DWRSIM study, and under the various hydrologic conditions considered (average year, single dry year, and multiple dry year period) and water allocation scenarios (With Monterey Amendment, Without Monterey Amendment, and With Article 18(b) Implemented). Under current SWP allocation rules (With Monterey Amendment), implementation of the Project would result in a reduction in the Table A supply available to WRMWSD of 32,000 AF, 9,200 AF, and 17,600 AF under the average year, single dry year, and multiple dry year period conditions, respectively. Considering all allocation scenarios, the largest reduction in supplies available to WRMWSD with implementation of the Project would be: 34,900 AF under average year conditions With Article 18(b) Implemented; 9,200 AF under a single dry year With Monterey Amendment; and 17,600 AF under a multiple dry year period With Monterey Amendment.

The amount of SWP supply available for a given Table A Amount is somewhat less under 2020 SWP demand conditions than under the existing SWP demand conditions discussed previously. This SWP supply reduction is primarily due to two factors: an increase in future water use upstream of the Delta, which reduces the amount of water flowing into the Delta and therefore the amount available for SWP supplies; and, an increase in SWP Contractor demands, which in certain years when supplies are limited, can result in less SWP supply being allocated to a given Table A Amount. This supply reduction is independent of the Project, and can be seen by comparing the supplies between Table 3.15-15 (existing SWP demands) and Table 3.15-16 (2020 SWP demands). Assuming that future WRMWSD water demand remains at current levels, it is likely that WRMWSD would need to rely more on other water management actions and/or individual farmers within the district would use additional local groundwater (i.e., groundwater pumped from wells owned and operated by farmers) to meet demands within the district (refer to Appendix C). This would occur with or without the Project, although the Project would exacerbate this condition.

Under current SWP allocation rules (With Monterey Amendment) and with implementation of the Project, WRMWSD could expect to receive at least 180,000 AF (their minimum demands under favorable economic conditions) approximately 31 percent of the time, and at least 190,000 AF approximately 20 percent of the time. In addition, WRMWSD could expect to receive an

**Table 3.15-16. WRMWSD's SWP Table A Supply at 2020 SWP Demand Conditions, Under all SWP Allocation Scenarios[1]**
(all values in AF, rounded to the nearest 100 AF)

| | | *Table A Amount* | *Average Year* | *Single Dry Year* | *Multiple Dry Year Period[2]* |
|---|---|---|---|---|---|
| **With Monterey Amendment** | Without the Project | 238,100 | 185,700 | 53,500 | 102,200 |
| | With the Project | 197,100 | 153,800 | 44,300 | 84,600 |
| | ***Difference[3]*** | ***41,000*** | ***32,000*** | ***9,200*** | ***17,600*** |
| **Without Monterey Amendment** | Without the Project | 238,100 | 165,300 | 42,200 | 98,100 |
| | With the Project | 197,100 | 136,900 | 35,000 | 81,200 |
| | ***Difference[3]*** | ***41,000*** | ***28,500*** | ***7,300*** | ***16,900*** |
| **With Article 18(b) Implemented[4]** | Without the Project | 113,800 | 202,900 | 12,300 | 99,300 |
| | With the Project | 94,200 | 168,000 | 10,200 | 82,200 |
| | ***Difference[3]*** | ***19,600*** | ***34,900*** | ***2,100*** | ***17,100*** |

*Note:* Numbers may not add due to rounding.
1. Based on water deliveries from DWRSIM study 2020D09C-CALFED-786.
2. Multiple dry year period supplies shown are average annual supplies over the four-year period.
3. Supplies shown are the amount of water attributable to the 41,000 AF of Table A Amount.
4. Under the SWP allocation scenario With Article 18(b) Implemented, the Table A Amounts shown are estimates of WRMWSD's reduced Table A Amount, based on its proportionate share of a reduced SWP minimum project yield of 2.0 million AF. The supplies shown include both Table A supplies and scheduled surplus supplies estimated to be available, with surplus supplies allocated based on priority for agricultural use.

average SWP Table A supply approximately 11 percent greater than historic SWP deliveries to WRMWSD from 1990 to 1999 (137,360 AF). Considering all allocation scenarios, with implementation of the Project WRMWSD could expect to receive average SWP Table A supplies ranging from approximately 136,900 AF to 168,000 AF, which is approximately 0.3 percent less to 22 percent more than the amount of historic SWP deliveries to WRMWSD from 1990 to 1999.

As previously discussed, the decision to use local groundwater (i.e., groundwater pumped from wells owned and operated by farmers) or other previously banked water supplies on lands within WRMWSD is predominately an economic decision made by farmers. Due to the complexity of factors that may be considered by individual farmers when deciding to use local groundwater in-lieu of using imported water, the exact amount of additional reliance on groundwater that may occur in dry years cannot be determined (refer to Appendix C). Because the Project could result in a reduction in average year SWP supplies below historic average deliveries to WRMWSD from 1990 to 1999 (only in the Without Monterey Amendment scenario) of up to 9,200 AF of Table A water in a single dry year, and up to 17,600 AF of Table A water in a multiple dry year period, this is assumed to be the amount of additional use of local groundwater that could be contributed by the Project in these year types. These amounts are small relative to the total amount of water in storage in the Kern County Groundwater Basin (total storage is 40 million AF; DWR 2003a) and the White Wolf sub-basin (total storage is about 2.5 million AF; BE 1975). Because groundwater levels in the portions of these basins underlying

WRMWSD have been generally increasing over time (BE 1995), indicating that the basins could sustain an increase in use under these limited conditions without resulting in a net deficit in aquifer volume or a lowering of the local groundwater table, impacts to groundwater would be less than significant.

For reasons similar to those identified above, the Project would result in a minor reduction in the amount of unscheduled surplus water/Article 21 water that WRMWSD could obtain, although this reduction would not materially affect WRMWSD's surplus water supply.

***Comparison of WRMWSD Supplies Presented to Supplies based on DWR's Recent SWP Delivery Reliability Report –*** As discussed in section 3.15.2.2, DWR recently completed an analysis of the delivery reliability of the SWP in its SWP Delivery Reliability Report. This DWR report presents the results of CALSIM II model studies run using current allocation rules (i.e., With Monterey Amendment). Starting with these same DWR results and applying the same methodology suggested by DWR in its report, the Project would result in a decrease in WRMWSD's SWP supplies: under "existing" (2001 in DWR's SWP Delivery Reliability Report) conditions of 29,400 AF, 8,000 AF, and 14,800 AF under the average year, single dry year, and multiple dry year period conditions, respectively; and under 2020 conditions of 30,600 AF, 8,200 AF, and 15,000 AF under the average year, single dry year, and multiple dry year period conditions, respectively.

Water Quality

***All SWP Allocation Scenarios under Existing SWP Demand Conditions –*** Overall, within the WRMWSD the Project may result in a minor increase in the use of previously banked water and local groundwater in the drier hydrologic years. Water banked outside of the WRMWSD would be delivered to the district as a SWP water exchange, and would be the same quality as SWP supplies. Water banked within the WRMWSD would be the same quality as the groundwater quality, which has slightly higher TDS than SWP water. The Project may result in a minor increase in the use of water banked with the district and groundwater in the drier hydrologic years, and these sources generally have higher TDS concentrations. Because this water is of sufficient quality for agricultural operations, impacts to surface water quality would be less than significant. Because the increased use of water banked within the district and local groundwater would be minor and would occur infrequently (in drier hydrologic years), the minor use of these supplies and the additional increase in TDS from irrigation related uses would result in less than significant impacts to groundwater quality.

***All SWP Allocation Scenarios under 2020 SWP Demand Conditions -*** The decrease in SWP delivery reliability due to an increase in future levels of demand by M&I Contractors would result, with the transfer, in the use of more groundwater and banked water to meet agricultural needs within the WRMWSD. For the reasons noted above, impacts to surface and groundwater quality would be less than significant.

INDIRECT IMPACTS

No indirect impacts to water resources would occur.

*Castaic Lake Water Agency*

DIRECT IMPACTS

Potential direct impacts from implementation of the Project to water supply, including groundwater resources and water quality are addressed below. Because the Project would be implemented using existing CLWA facilities and new facilities would not be required, construction and land disturbance related impacts would not occur.

The Project increases CLWA's Water Supply Contract Table A Amount by 41,000 AF (from 54,200 AF to 95,200 AF, an increase of 75.6 percent). Because SWP water supplies are allocated among Contractors on the basis of Table A Amounts, this increase in Table A would result in an increase in the total amount of SWP water that CLWA could obtain (including both Table A and any available surplus water supplies). Under all SWP allocation and hydrologic scenarios, the Project would result in a maximum increase in the SWP Table A water available to CLWA of approximately 75.6 percent.

As discussed in section 3.15.2.2, the supplies presented below are Table A supplies only (or in the case of the allocation scenario With Article 18(b) Implemented, Table A supplies and scheduled surplus water), and do not include unscheduled surplus water or Article 21 water.

Water Supply

***All SWP Allocation Scenarios under Existing SWP Demand Conditions –*** Table 3.15-17 presents the results of the analysis of CLWA's SWP Table A supply under the existing (1998) SWP demand conditions used in the DWRSIM study, and under the various hydrologic conditions (average year, single dry year, and multiple dry year period) and water allocation scenarios (With Monterey Amendment, Without Monterey Amendment, and With Article 18(b) Implemented) considered. Under current SWP allocation rules (With Monterey Amendment), implementation of the Project would result in an increase in the Table A supply available to CLWA of 34,400 AF, 9,200 AF, and 18,100 AF under the average year, single dry year, and multiple dry year period conditions, respectively. Considering all allocation scenarios, the largest increase in supplies available to CLWA with implementation of the Project would be 35,300 AF under average year conditions With Article 18(b) Implemented; 9,200 AF under a single dry year With Monterey Amendment; and 18,100 AF under a multiple dry year period With Monterey Amendment. The Project would increase CLWA's SWP Table A Amount and increase the amount of SWP water that could be delivered to CLWA. This increased water supply would serve the needs of both existing water users and a portion of future water demand from anticipated growth within the CLWA service area.

Because CLWA could obtain up to an additional 41,000 AF of Table A water (depending on hydrologic conditions) to meet water demands of existing users and a portion of future water demand from anticipated growth within the service area, the Project would have a beneficial impact to water supplies in the CLWA service area. Because the Project would increase the amount of SWP water delivered to the CLWA service area, replacing water that could have otherwise been pumped from groundwater, the Project would have a beneficial impact to groundwater resources via indirect recharge (or percolation) through irrigation with SWP water.

**Table 3.15-17. CLWA's Total SWP Table A Supply at Existing SWP Demand Conditions, under all SWP Allocation Scenarios[1]**
(all values in AF, rounded to the nearest 100 AF)

| | | *Table A Amount* | *Average Year* | *Single Dry Year* | *Multiple Dry Year Period* |
|---|---|---|---|---|---|
| **With Monterey Amendment** | Without the Project | 54,200 | 46,500 | 12,100 | 24,000 |
| | With the Project | 95,200 | 80,900 | 21,300 | 42,100 |
| | ***Difference[3]*** | ***41,000*** | ***34,400*** | ***9,200*** | ***18,100*** |
| **Without Monterey Amendment** | Without the Project | 54,200 | 47,400 | 13,100 | 25,200 |
| | With the Project | 95,200 | 80,100 | 13,100 | 38,900 |
| | ***Difference[3]*** | ***41,000*** | ***32,700*** | ***0*** | ***13,700*** |
| **With Article 18(b) Implemented[4]** | Without the Project | 25,900 | 46,400 | 12,900 | 24,400 |
| | With the Project | 45,500 | 81,700 | 14,900 | 41,700 |
| | ***Difference[3]*** | ***19,600*** | ***35,300*** | ***2,000*** | ***17,300*** |

*Note:* Numbers may not add due to rounding.
1. Based on water deliveries from DWRSIM study 1995D06E-CALFED-771. This study used 1998 DWR estimates of then-existing SWP Contractor demands.
2. Multiple dry year period supplies shown are average annual supplies over the four-year period.
3. Supplies shown are the amount of water attributable to the 41,000 AF of Table A Amount.
4. Under the SWP allocation scenario With Article 18(b) Implemented, the Table A Amounts shown are estimates of CLWA's reduced Table A Amount, based on its proportionate share of a reduced SWP minimum project yield of 2.0 million AF. The supplies shown include both Table A supplies and scheduled surplus supplies estimated to be available, with surplus supplies allocated based on priority for agricultural use.

As was discussed previously, the supplies presented above do not include unscheduled surplus water/Article 21 water. Generally, when this type of water is available, there is enough to meet all Contractor requests for it. It is only when total Contractor requests for this water exceed the amount available that DWR would need to allocate that limited supply among Contractors. If this situation occurred, the Project could result in an increase in the amount of unscheduled surplus water/Article 21 water that CLWA could obtain (because it is allocated based on Contractor Table A Amounts). Since this increase would only occur infrequently, the increase in the amount of unscheduled surplus water/Article 21 water that CLWA could obtain would not materially affect CLWA's surplus water supply.

***All SWP Allocation Scenarios under 2020 SWP Demand Conditions –*** Table 3.15-18 presents the results of the analysis of CLWA's SWP Table A supply under the 2020 SWP demand conditions used in the DWRSIM study, and under the various hydrologic conditions (average year, single dry year, and multiple dry year period) and water allocation scenarios (With Monterey Amendment, Without Monterey Amendment, and With Article 18(b) Implemented) considered. Under current SWP allocation rules (With Monterey Amendment), implementation of the Project would result in an increase the Table A supply available to CLWA of 32,000 AF, 9,200 AF, and 17,600 AF under the average year, single dry year, and multiple dry year period conditions, respectively. Considering all allocation scenarios, the largest increase in supplies available to CLWA with implementation of the Project would be: 34,900 AF under the average year With Article 18(b) Implemented; 9,200 AF under a single dry year With Monterey Amendment; and 17,600 AF under a multiple dry year period With Monterey Amendment.

The Project would increase CLWA's SWP Table A Amount and increase the amount of SWP water that could be delivered to CLWA. This increased water supply would serve the needs of both existing water users and a portion of future water demand from anticipated growth within

the CLWA service area. Because CLWA could obtain up to an additional 41,000 AF of Table A water (depending on hydrologic conditions) to meet water demands of existing users and a portion of future water demand from anticipated growth within the service area, the Project would have a beneficial impact to water supplies in the CLWA service area. Because the Project would increase the amount of SWP water delivered to the CLWA service area, replacing water that could have otherwise been pumped from groundwater, the Project would have a beneficial impact to groundwater resources via indirect recharge (or percolation) through irrigation with SWP water.

For reasons similar to those identified above, the Project would result in an increase in the amount of unscheduled surplus water/Article 21 water that CLWA could obtain, although this increase would not materially affect CLWA's surplus water supply.

**Table 3.15-18. CLWA's Total SWP Table A Supply at 2020 SWP Demand Conditions, under all SWP Allocation Scenarios[1]**

(all values in AF, rounded to the nearest 100 AF)

| | | *Table A Amount* | *Average Year* | *Single Dry Year* | *Multiple Dry Year Period[2]* |
|---|---|---|---|---|---|
| **With Monterey Amendment** | Without the Project | 54,200 | 42,900 | 12,200 | 23,300 |
| | With the Project | 95,200 | 74,900 | 21,400 | 40,900 |
| | ***Difference[3]*** | ***41,000*** | ***32,000*** | ***9,200*** | ***17,600*** |
| **Without Monterey Amendment** | Without the Project | 54,200 | 43,500 | 12,400 | 23,300 |
| | With the Project | 95,200 | 72,000 | 19,600 | 40,200 |
| | ***Difference[3]*** | ***41,000*** | ***28,500*** | ***7,300*** | ***16,900*** |
| **With Article 18(b) Implemented[4]** | Without the Project | 25,900 | 43,000 | 12,800 | 23,300 |
| | With the Project | 45,500 | 78,000 | 15,000 | 40,400 |
| | ***Difference[3]*** | ***19,600*** | ***34,900*** | ***2,100*** | ***17,100*** |

*Note:* Numbers may not add due to rounding.
1. Based on water deliveries from DWRSIM study 2020D09C-CALFED-786.
2. Multiple dry year period supplies shown are average annual supplies over the four-year period.
3. Supplies shown are the amount of water attributable to the 41,000 AF of Table A Amount.
4. Under the SWP allocation scenario With Article 18(b) Implemented, the Table A Amounts shown are estimates of CLWA's reduced Table A Amount, based on its proportionate share of a reduced SWP minimum project yield of 2.0 million AF. The supplies shown include both Table A supplies and scheduled surplus supplies estimated to be available, with surplus supplies allocated based on priority for agricultural use.

***Comparison of CLWA Supplies Presented to Supplies based on DWR's Recent SWP Delivery Reliability Report –*** The existing SWP water supplies included in Table 3.15-7 are based on results from DWR's recent SWP Delivery Reliability Report, which presents the results of CALSIM II model studies run using current allocation rules (i.e., With Monterey Amendment). Starting with these same DWR results and applying the same methodology suggested by DWR in its report, the Project would result in an increase in CLWA's SWP supplies: under "existing" (2001 in DWR's SWP Delivery Reliability Report) conditions of 29,400 AF, 8,000 AF, and 14,800 AF under the average year, single dry year, and multiple dry year period conditions,

respectively; and under 2020 conditions of 30,600 AF, 8,200 AF, and 15,000 AF under the average year, single dry year, and multiple dry year period conditions, respectively.

Water Quality

The Project would result in the delivery of additional SWP water to the CLWA service area when demands are sufficient to make such deliveries feasible. Although SWP water quality varies from year to year depending on hydrologic conditions, regardless of the SWP allocation scenario (With Monterey Amendment, Without Monterey Amendment, and With Article 18(b) Implemented) and the SWP demand conditions (existing or 2020), the Project would not result in a direct impact to water quality within the CLWA service area. CLWA and the local purveyors would continue to meet all applicable drinking water standards and water quality criteria.

The Project would not result in direct surface water quality impacts. CLWA has no discharge permits regulating water quality and is only regulated with regard to the drinking water quality of distributed potable water. It is the actual use of the imported water and discharge after use (i.e., as wastewater) that has the potential to affect water quality of surface waters. This potential impact was considered in the Basin Plan and is considered in the discussion of indirect growth-related impacts in Chapter 4. The Project would not affect the frequency and magnitude of flood flow releases or spills from Castaic Lake. These events are related to rights of downstream users and not related to CLWA or the Project.

INDIRECT IMPACTS

Potential impacts from population growth that could occur as an indirect impact of the Project are addressed in Chapter 4, Growth-Inducing Effects and Growth-Related Impacts.

## 3.15.3 Mitigation Measures

### *3.15.3.1 State Water Project and Associated Facilities*

No significant direct or indirect impacts to water resources were identified; therefore no mitigation measures are required.

### *3.15.3.2 Wheeler Ridge-Maricopa Water Storage District*

No significant direct or indirect impacts to water resources were identified; therefore no mitigation measures are required.

### *3.15.3.3 Castaic Lake Water Agency*

No significant direct impacts to water resources were identified; therefore no mitigation measures are required. Mitigation measures for indirect impacts are addressed in Chapter 4, Growth-Inducing Effects and Growth-Related Impacts.

### 3.15.4 Significant Unavoidable Impacts

No direct or indirect significant unavoidable adverse impacts have been identified within the SWP and associated facilities or within WRMWSD. No direct significant unavoidable adverse impacts have been identified within the CLWA service area. Indirect impacts within the CLWA service area, including significant unavoidable adverse impacts are addressed in Chapter 4, Growth-Inducing Effects and Growth-Related Impacts.

# 4.0 GROWTH-INDUCING EFFECTS AND GROWTH-RELATED IMPACTS

## 4.1 GROWTH-INDUCING EFFECTS

**CEQA Requirements**

CEQA Guidelines Section 15126.2(d) states that an EIR must discuss the ways in which a Project could:

- foster economic or population growth, or the construction of additional housing, either directly or indirectly, in the surrounding environment;
- remove obstacles to population growth;
- require the construction of new community facilities that could cause significant environmental effects;
- encourage and facilitate other activities that could significantly affect the environment, either individually or cumulatively.

The Guidelines further state that it must not be assumed that growth in any area is necessarily beneficial, detrimental, or of little significance to the environment. The analysis below discusses whether the Project is growth inducing using the CEQA definition. Consistency with growth projections included in local and regional planning documents is addressed in Chapter 5.

**General Factors Affecting Population Growth**

Growth does not necessarily result from only one project or factor in a community. Rather, several factors affect the location, size, direction, timing, type and rate of population growth, depending on the region where the community is located. These factors include local government planning, public services, natural resources, economic climate, and political and environmental concerns. City and county planning agencies adopt and administer general and specific plans, zoning maps and ordinances, and other planning documents that contain policies and maps to identify the intensity and type of development that would be allowed in specific locations. As part of the local government development approval process, wholesale and retail water purveyors provide information on their ability to serve additional water users; however, local jurisdictions other than wholesale or retail water purveyors ultimately control development approval decisions.

Although local governments play a role in growth management, the location and timing of growth also depends on economic factors such as the availability and cost of developable land, recessions in local and national economies, interest rates, and demand for housing. Political factors include state and local laws that mandate businesses to comply with certain rules, regulations, and permitting requirements that address environmental and community concerns. Other political decisions also impact growth, such as alleviation of property taxes as an incentive to lure businesses to certain communities. Quality of life issues such as crime, climate, air quality, traffic and commuting distances, as well as the availability, cost and quality of

community services such as schools, transportation facilities, recreation facilities, and police and fire protection, may also be important factors influencing the timing and location of growth.

**Growth Inducement Associated with the State Water Project and Associated Facilities**

The Project does not include construction or modification of existing SWP facilities, nor would it change the current operating criteria or materially change the operation of the SWP and its associated facilities. As described in Chapter 3, implementation of the Project would result in no impacts or minor impacts to environmental resources associated with the SWP, none of which would trigger any of the four CEQA criteria listed above. The Project would not be growth inducing in the areas that comprise the SWP and its associated facilities.

**Growth Inducement in WRMWSD**

The Project does not include construction of new facilities or the modification of existing facilities within WRMWSD; nor would it change their existing operation. As described in Chapter 3, implementation of the Project would result in no impacts or minor impacts to environmental resources within the WRMWSD, none of which would trigger any of the four CEQA criteria listed above. The Project would not be growth inducing in the areas that comprise the SWP and its associated facilities.

**Growth Inducement in the CLWA Service Area**

The Project is an action by CLWA to maintain the water supply needed to meet water demands of existing users and a portion of future water demand from anticipated growth within the CLWA service area. As described in section 3.0, however, in order to provide a "worst-case" analysis, it is assumed that all of the Project water would be used to serve new population. Thus, it is assumed that the Project could serve 106,700 new persons and 35,600 new housing units given an average year water supply. The Project would remove an obstacle to population growth by providing additional SWP water within the CLWA service area. Because it would remove such an obstacle, the Project may indirectly foster economic or population growth or the construction of additional housing within the CLWA service area. CEQA Guidelines Section 15126.2 (d) states that it must not be assumed that growth in any area is necessarily beneficial, detrimental, or of little significance to the environment. Potential environmental impacts from growth that could result from the Project are addressed in section 4.2 below.

## 4.2 GROWTH-RELATED IMPACTS

**Introduction**

CEQA Guidelines Section 15064(d) requires that an EIR evaluate the indirect impacts of a project. Indirect impacts are those that are caused by a project and are reasonably foreseeable, but that may occur later in time or at some distance from the project site(s). Growth-related impacts are the indirect impacts of population growth or development, such as the conversion of open land to developed land, added traffic, and increased demand for public services.

CLWA has the responsibility to provide wholesale water to retail purveyors within the CLWA service area, but does not approve the locations of new development. City and county planning agencies are responsible for creating land use plans that direct where development should

occur and for enforcing those plans. The Project would provide water that could be used by new development in the CLWA service area, but it would not affect the specific locations of planned development.

This EIR generally discusses growth-related impacts in a qualitative manner based on the likely changes that could occur as a result of future land use changes and/or specific development projects within the CLWA service area. It references impacts identified in the Final EIR for the City of Santa Clarita General Plan (City of Santa Clarita 1991) since this document provides the most current and comprehensive overview of environmental impacts resulting from projected growth in the Santa Clarita Valley.

### 4.2.1 Aesthetic/Visual Resources

Significant growth-related impacts to aesthetic/visual resources may include changes to the visual characteristics and resources of the area through the development of open space and further urbanization of hillside and natural areas. Development could result in substantial adverse effects on scenic vistas, substantially damage scenic resources, or substantially degrade the existing visual character or quality of individual sites and their surroundings. Further, potential development within the CLWA service area could also result in an increase in the amount of night lighting and unwanted glare in presently undeveloped areas. Haphazard development could obstruct scenic views of, and from, the project area and contribute to a "confused urban image."

*Mitigation Measures*

Impacts to aesthetic/visual resources would be reduced by local governments implementing existing policies of the County of Los Angeles, County of Ventura, and City of Santa Clarita general and area plans (see Table 4.2-1 for a listing of applicable policies). Impacts may not be fully mitigable to less than significant, however, depending on the magnitude of future development and its specific location. Specific mechanisms for implementing these policies would be determined in the course of project-specific environmental review, as required under CEQA. Implementing these plans and policies would also reduce adverse but less than significant project impacts.

### 4.2.2 Agricultural Resources

The amount of land designated for agriculture within the Santa Clarita Valley planning area is small (roughly 1 square mile [City of Santa Clarita 1991]). Most of the land designated for agricultural purposes is present in the Ventura County portion of the CLWA service area. This land is located on the Santa Clara River floodplain, primarily along the Highway 126 corridor. A substantial portion of the agricultural land in the Los Angeles County portion of the service area has been recently re-designated by the County of Los Angeles to other land uses defined in the Newhall Ranch Specific Plan. The State of California Farmland Mapping and Monitoring Program has designated approximately 3 percent of the mapped area within the CLWA service area as either Prime Farmland, Unique Farmland, or Farmland of Statewide Importance. Impacts to agricultural resources could be significant because there is a potential for these lands to be

## Table 4.2-1. Summary of Mitigation Measures from Plans and Policies



| ***Environmental Resources*** | **APPLICABLE PLANS AND POLICIES** | | | | | |
|---|---|---|---|---|---|---|
| | *County of Los Angeles –General Plan* | *County of Los Angeles - Santa Clarita Area Plan* | *City of Santa Clarita – General Plan* | *County of Ventura – General Plan* | *County of Ventura – Piru Area Plan* | *Other Plans* |
| Aesthetic/Visual Resources | Scenic Highways Element Circulation policies 9 through 14. Conservation and Open Space Element policies 18, 19, and 24 | Circulation Element contains policies 4.1 - 4.3 Community Design Element policies (1.1, 2.1, 3.1, 3.2 through 3.7) | Community Design Element policies 1.1 through 1.3, 2.1 through 2.6, 3.1 through 3.6, 4.1 through 4.4, 5.1 through 5.3, 6.1 through 6.8, 7.1 through 7.4, 8.1 through 8.5, 9.1 through 9.10, 10.1 through 10.5, and 11.1 through 11.9 | Scenic Resources policies 1 through 5 | Scenic Resources policies (1 through 5) | None |
| Agricultural Resources | Land Use policy 7, 20 and 21. Conservation and Open Space Element policy 7 | None | None | Farmland Resources policies 1 through 6 | Agricultural Soils policies 1 and 2 | None |
| Air Quality | Conservation and Open Space Element policy 1 | Environmental Resources Management Element policy 1.8 | Air Quality Element 1.1, 1.2, 7.1, 8.1 through 8.3, 9.1, 14.1, 15.1, and 15.2. Mobile emissions are controlled by policies 1.1, 1.2, 12.1 through 12.3, 2.1 through 2.5, 3.1, 4.1, 5.1, 6.1, 10.1, 10.2, 11.1, and 11.2 | Air quality policies 1 through 6 | Air quality policies 1 through 5 | SCAQMD *1997 Air Quality Management Plan* and the *1999 Revised Ozone Plan* SCAQMD proposed comprehensive plan update, *Proposed 2003 Air Quality Management Plan* |
| Biological Resources | Conservation and Open Space Element policy 8 and 13 | Land Use Element policy 5.3 and 5.4. Environmental Resources Management Element policies 1.1through 1.4, 1.9, and 2.1 through 2.3 | Land Use Element policy 1.10. Open Space and Conservation Element policies 1.1, 1.5, 1.6, 1.7, 3.1, 3.2, 3.3, 3.4, 3.5, 3.6, 3.7, 5.5, and 7.7 | Biological Resources policies 1 through 5 | Biological Resources policies 1, 2 and 3 | Section 404 of the Clean Water Act, Section 10 of the Endangered Species Act, and Section 1600 of the Fish and Game Code |

## Table 4.2-1. Summary of Mitigation Measures from Plans and Policies



| *Environmental Resources* | APPLICABLE PLANS AND POLICIES | | | | | |
|---|---|---|---|---|---|---|
| | *County of Los Angeles –General Plan* | *County of Los Angeles - Santa Clarita Area Plan* | *City of Santa Clarita – General Plan* | *County of Ventura – General Plan* | *County of Ventura – Piru Area Plan* | *Other Plans* |
| Cultural Resources | Conservation and Open Space Element policies 20 through 23 | Environmental Resources Management Element policy 1.6 and 1.7 | Open Space and Conservation Element policies 10.1 through 10.6 | Paleontological and Cultural Resources policies 1 through 6 | Cultural Resources policies 1 through 3 | None |
| Geology, Soils, and Minerals | Land Use Element policies 7, 25, 26, and 28.<br>Safety Element policies 1 through 7, 8, and 10.<br>Conservation and Open Space Element policy 17 | Land Use Element policies 4.1, 4.2.<br>Safety Element policy 3.3, and 4.2.<br>Environmental Resources Management Element policy 3.3 | Open Space and Conservation Element policies 2.2, and 5.1.<br>Safety Element policies 1.3 through 1.6, 1.8, 1.12, 1.13 | Hazards policies 1 through 3.<br>Fault Rupture policies 1 through 6.<br>Ground Shaking policy 1.<br>Seiche policies 1 and 2.<br>Liquefaction policy 2, Subsidence policies 1 through 3, Expansive Soils policies 1 through 3, and Landslides/Mudslides policies 1 through 3.<br>Water Resources policy 3.<br>Mineral Resources policy 6 and 8 | This plan contains goals for protecting sand, gravel, oil, and gas resources, and avoiding land uses that would preclude or hamper access to or extraction of such resources | State of California Uniform Building Code. |
| Hazards and Hazardous Materials | Conservation and Open Space Element policy 29.<br>Safety Element's Wildland and Urban Fire Hazards policies 15 through 19.<br>Hazardous Materials policies 20 through 24.<br>Emergency Response, Preparedness and Recovery policies 25 through 35.<br>Research and Safety Information Systems policies 36 through 38 | Land Use Element policy 4.1.<br>Environmental Resources Management Element policy 4.3.<br>Safety Element policy 2.1 | Safety Element policies 2.1, 3.1 through 3.10, and 4.1 through 4.5 | Hazardous Materials and Waste policies 1 through 5.<br>Fire Hazards policies 1 through 4 | Fire Hazards policies 1 through 3. | None |
| Land Use and Planning | Land Use Element policies | Land Use Element policies | Land Use Element policies | Land Use Element policies 1 through 11 | General land use policies 1 through 8 | None |
| Noise | Noise Element policies 1 though 16 | Noise Element policies 1.2 and 1.3 | Noise Element policies 1.2 and 1.4, 2.1 through 2.8, 3.1 through 4.3 | Noise policies 1 through 3 | Noise policies 1 through 3 | None |

## Table 4.2-1. Summary of Mitigation Measures from Plans and Policies



| *Environmental Resources* | APPLICABLE PLANS AND POLICIES | | | | | |
|---|---|---|---|---|---|---|
| | *County of Los Angeles –General Plan* | *County of Los Angeles - Santa Clarita Area Plan* | *City of Santa Clarita – General Plan* | *County of Ventura – General Plan* | *County of Ventura – Piru Area Plan* | *Other Plans* |
| Population and Housing | Population projections | Population projections and Land Use Element policies | Population projections and Land Use Element policies | Population projections | Land use policy and associated building intensity/population density standards | None |
| Public Services | None | Land Use Element policy 7.1 | Land Use Element policies 1.2 through 1.5. Public Services, Facilities, and Utilities Element 1.2 through 1.5, 1.14, 1.16 through 1.18, 2.1, and 2.2 | Public Facilities and Services policies 1 through 3.<br>Law Enforcement and Emergency Services policies 1 through 5.<br>Fire Protection policies 1 through 2.<br>Fire Hazards policies 1 through 4 | Education policies 1 through 3. Law Enforcement policies 1 through 3. Fire Protection policy 1 | Leroy F. Green School Facilities Act of 1998 (SB 50) provides a statewide financing program for school facilities |
| Recreation | Conservation and Open Space Element policies 30 through 33 | Environmental Resources Management Element policies 5.1 through 5.7.<br>Trails policies 6.1 through 6.6.<br>Bikeways policies 7.1 through 7.6 | Parks and Recreation Element policy 4.1 | Parks and Recreation policies 1 through 3 and 6 | Recreation policies 2 and 3 | Los Angeles County Ordinance 21.24.340 *et seq.*, the Parkland Dedication Ordinance, requires that the subdivider of a residential subdivision "shall provide local park space to serve the subdivision, pay a fee in lieu of provision of such park land . . provide local park space containing less than the required obligation but developed with amenities equal in value to the park fee, or do a combination of the above. |
| Transportation and Circulation | Transportation Element Circulation policies 1 through 41. Plan of Bikeways policy 2 | Circulation Element policies 1.1 through 1.7, and 2.1 through 2.3 | Land Use Element policies 1.1, 1.8,and 1.9 | Transportation/Circulation policies 1 through 6 | Transportation and Circulation policies 1 through 6 | Southern California Association of Governments – 2001 Regional Transportation Plan |

## Table 4.2-1. Summary of Mitigation Measures from Plans and Policies



| ***Environmental Resources*** | **APPLICABLE PLANS AND POLICIES** | | | | | |
|---|---|---|---|---|---|---|
| | *County of Los Angeles –General Plan* | *County of Los Angeles - Santa Clarita Area Plan* | *City of Santa Clarita – General Plan* | *County of Ventura – General Plan* | *County of Ventura – Piru Area Plan* | *Other Plans* |
| Utilities/Service Systems | Public Facilities policies 1 through 10, 12 through 15, 17 through 20, and 25 | Public Services and Facilities Element policies 2.1 and 2.2.<br>Land Use Element policy 7.1 | Public Services, Facilities, and Utilities Element policies 1.2 through 1.5, 1.14, 1.16 through 1.18, 2.3, 2.6, 2.7, 5.1, and 5.6 | Waste Treatment and Disposal Facilities policies 1 through 6.<br>Flood Control and Drainage Facilities policies 1 and 2 | Sanitation Services policies 1 and 3 | None |
| Water Resources | Conservation and Open Space Element policies 4 through 6, and 26.<br>Safety Element policies 11 through 14 | Public Services and Facilities Element policies 1.1, 1.2, 3.3, and 4.1 | Open Space and Conservation Element policies 5.1 through 5.3, 5.6, and 7.1 through 7.15, and 7.3.<br>Public Services, Facilities, and Utilities Element policies 1.2, 1.3 through 1.7, and 1.8.<br>Public Safety Element policy 1.10 | Water Resources policies 1 through 5.<br>Flood Hazards policies 1 through 4.<br>Water Supply Facilities policies 1 and 2 | Water policies 1 and 2.<br>Flood Hazards policies 1 through 3 | The LARWQCB Basin Plan and Santa Clara River Basin Plan |

converted to non-agricultural use or for changes in agricultural zoning to be approved by local jurisdictions in order to allow a higher density or intensity of development.

*Mitigation Measures*

Impacts to agricultural resources would be mitigated to less than significant by local governments implementing existing policies listed in Table 4.2-1 of the County of Los Angeles General Plan, the County of Ventura General Plan, and the Piru Area Plan since these contain measures to preserve and protect agricultural land. Specific mechanisms for implementing these policies would be determined in the course of project-specific environmental review, as required under CEQA. Implementing these plans and policies would also reduce adverse but less than significant project impacts.

### 4.2.3 Air Quality

Population, employment, and manufacturing growth would result in increased air pollutant emissions for which the SCAB does not currently meet federal or state standards. Toxic emissions may result from some industrial development. Additionally, mobile emissions from vehicle operations would increase, including localized CO concentrations and $PM_{10}$ emissions. Fugitive dust emissions also would result from construction.

A determination of the Project's consistency with the 2003 AQMP, which includes assumptions and objectives that demonstrate future attainment of the ambient air quality standards within the project region, is largely dependent on the planning factors selected to estimate growth served by the Project. The SCAQMD used SCAG demographic and economic factors found in the 2001 Regional Transportation Plan (RTP) to forecast future emissions in the 2003 AQMP. SCAG currently projects that the 2025 population for the Santa Clarita Valley will be 352,382, with 126,563 households (personal communication, P. Gutierrez 2003). The Project can serve approximately 106,700 persons. Adding this to the 2000 population of 190,000 produces an estimated population of 296,700, which is lower than the SCAG 2025 projection. Therefore, the Project would be consistent with the 2003 AQMP.

Other impacts would be significant because development could violate air quality standards or contribute substantially to an existing or projected air quality violation. It also could result in a cumulatively considerable net increase in certain criteria pollutants for which the region is in non-attainment, and it could expose sensitive receptors to substantial pollutant concentrations. Certain types of industrial development could create objectionable odors affecting a substantial number of people if constructed without appropriate mitigations.

*Mitigation Measures*

Impacts to air quality would be reduced by local governments implementing existing policies of the County of Los Angeles, County of Ventura, and City of Santa Clarita general and area plans. Additionally, compliance with SCAQMD plans also would reduce air quality impacts (see Table 4.2-1). All impacts may not be reduced to less than significant levels, particularly since the Project area does not currently meet federal or state standards. Specific mechanisms for implementing these plans and policies would be determined in the course of project-specific

environmental review, as required under CEQA. Implementing these plans and policies would also reduce adverse but less than significant project impacts.

### 4.2.4 Biological Resources

The Project would provide water for land development, thereby indirectly affecting biological resources. Impacts to threatened and endangered species and other sensitive biological resources within the CLWA service area, including wetlands, generally would be adverse due to the conversion and degradation of habitat. Although increased water use may increase certain types of habitat areas (e.g., through increased runoff) resulting in a positive impact to wetlands, related land development would entail the loss, degradation, or fragmentation of habitats, which may result in local native plant and wildlife populations, including sensitive species, being reduced in size and made increasingly vulnerable to local extinction. Non-native species introduced through ornamental landscaping or habitat disturbances could compete with native species or invade previously disturbed habitats, including those of special status species. Additionally, development could disrupt established wildlife corridors and impede the use of native wildlife nursery sites. These impacts would be significant.

Increased wastewater treatment plant discharges, additional runoff from impervious surfaces (i.e., surfaces that are incapable of being penetrated by moisture) and new runoff from the irrigation of urban landscaping could increase the amount of wetlands and aquatic habitat below such discharges. However, water quality below these discharges could be degraded from pollutants (both point and non-point sources) carried in these waters. This could have a substantial adverse effect on riparian habitat and sensitive fish and amphibian populations, which would be a significant impact.

Development also could result in conflicts with local policies and ordinances protecting biological resources, which would be a significant impact. As noted in section 3.4, Biological Resources, however, there are no adopted HCPs or NCCPs within the CLWA service area. Federal and State Endangered Species Act compliance, as necessary, has been accomplished on a development-specific basis.

*Mitigation Measures*

Impacts to biological resources would be reduced by local governments implementing the existing policies of the County of Los Angeles, County of Ventura, and City of Santa Clarita general and area plans, although all impacts may not be reduced to less than significant depending on the magnitude and specific location of development (see Table 4.2-1). Specific mechanisms for implementing these policies would be determined in the course of project-specific environmental review, as required under CEQA. Implementing these plans and policies would also reduce adverse but less than significant project impacts. Regulatory agencies such as the U.S. Army Corps of Engineers (which has regulatory authority over wetlands), U.S. Fish and Wildlife Service, and California Department of Fish and Game also may impose permit conditions that reduce significant impacts.

### 4.2.5 Cultural Resources

As discussed in the EIR for the City of Santa Clarita General Plan, excavation and grading activities associated with future development could result in significant impacts to

archaeological, historical, and paleontological resources. Development also could result in significant impacts associated with the disturbance of human remains. Significant impacts on cultural resources may include the following:

- grading of prehistoric archaeological or paleontological sites, thereby demolishing the site and eliminating its ability to yield important information;
- construction of new buildings that could impair the setting of a historic structure or district, thereby altering the structure's or district's ability to embody distinctive characteristics of a type or period; or
- excavation of utility trenches for new developments that uncover human remains or a paleontologic deposit, thereby destroying those remains.

***Mitigation Measures***

Impacts to cultural resources would be mitigated to less than significant by local governments implementing the policies of the County of Los Angeles, County of Ventura, and City of Santa Clarita general and area plans since the policies contain measures for either avoiding impacts to such resources or providing adequate documentation of the resources (see Table 4.2-1). Specific mechanisms for implementing these policies would be determined in the course of project-specific environmental review, as required under CEQA. Implementing these plans and policies also would also reduce adverse but less than significant project impacts.

### 4.2.6 Geology, Soils, and Minerals

The County of Los Angeles, City of Santa Clarita, and Ventura County general plans all indicate that the CLWA service area contains a number of seismic hazards. Several active faults located in the general Project area, such as the San Gabriel, San Andreas, San Fernando, and Sierra Madre faults, could cause structural damage as a result of ground shaking, subsidence, and liquefaction. The San Gabriel fault is also capable of causing structural damage as a result of ground rupture. Depending on the location, new construction within the CLWA service area could expose people or structures to adverse effects, including risk of loss, injury, or death involving rupture of a known earthquake fault; strong seismic ground shaking; seismic-related ground failure, including liquefaction; and landslides. Liquefaction is most likely to occur in areas of the CLWA service area that are saturated at very shallow depths, such as adjacent to the Santa Clara River. Due to the rugged, high relief of the foothill and mountainous areas surrounding the Santa Clarita Valley, landslides and unstable slopes are present in many areas of the CLWA service area. The impacts on development are dependent upon the type of construction, proximity to faults, degree of slope, bedrock orientation within slopes, and soil type of individual project sites. Impacts throughout the CLWA service area could be significant.

There also is a potential for the CLWA service area to contain geologic units or soils that are unstable. Future development projects could be subject on- or off-site landslides, lateral spreading, subsidence, liquefaction, or collapse. This would be a significant impact.

As noted in the EIR for the City of Santa Clarita General Plan, new construction could result in localized soil erosion on or adjacent to future development sites, which could result in the loss

of topsoil and siltation of downstream drainages, creeks, and the Santa Clara River. This would be a significant impact.

The County of Los Angeles General Plan, City of Santa Clarita General Plan, and Ventura County General Plan all indicate that the CLWA service area contains expansive soils. Future development could be located on such soils, creating substantial risks to life or property. This would be a significant impact.

The County of Los Angeles General Plan, City of Santa Clarita General Plan, and Ventura County General Plan all indicate that the CLWA service area contains mineral resources such as gold, oil, and aggregate. The EIR for the City of Santa Clarita General Plan notes that if development encroached on mineral resource areas, the extraction of these resources could be incompatible if development is allowed in such areas. To the extent that future development resulted in the loss of availability of a known mineral resource that was of value to the residents of the region and state or the loss of availability of a locally important mineral resource recovery site delineated on a local general plan, specific plan, or other land use plan, impacts would be significant.

***Mitigation Measures***

Impacts to geology, soils, and minerals would be mitigated to less than significant by local governments implementing the existing policies of the County of Los Angeles, County of Ventura, and City of Santa Clarita general and area plans since these policies contain adequate measure to avoid or reduce such impacts (see Table 4-2). Specific mechanisms for implementing these policies would be determined in the course of project-specific environmental review, as required under CEQA. Implementing these plans and policies also would also reduce adverse but less than significant project impacts.

### 4.2.7 Hazards and Hazardous Materials

Operations of past and existing businesses and industries in the CLWA service area may have resulted in soil contamination from the use of hazardous materials, spills, or disposal of these materials. Therefore, depending on the specific location, new development on previously contaminated sites may require the removal or remediation of soils before property development can commence. New commercial and residential development also may result in increased transport, use, and disposal of hazardous materials, along with increased risks of hazardous substance releases. Certain types of development could impair implementation of or physically interfere with emergency response plans or emergency evacuation plans, and could result in increased exposure to wildland fires where urbanization is adjacent to such areas. These impacts would be significant. No airport-related risks would occur because the CLWA service area is not located within an airport land use plan area; nor is it in the vicinity of a public airport, public use airport, or private airstrip.

***Mitigation Measures***

Impacts to hazards and hazardous materials would be mitigated to less than significant by local governments implementing the following policies of the County of Los Angeles, County of Ventura, and City of Santa Clarita general and area plans since these contain adequate measures to avoid or reduce such impacts (see Table 4.2-1). Specific mechanisms for

implementing these policies would be determined in the course of project-specific environmental review, as required under CEQA. Implementing these plans and policies would also reduce adverse but less than significant project impacts.

### 4.2.8 Land Use and Planning

The residential, commercial, and industrial development that could occur in the future in the CLWA service area could convert undeveloped or agricultural portions of the service area to some form of urbanized development. While adopted policies and plans of local jurisdictions would reduce most potential conflicts between incompatible uses, these policies and plans may not eliminate building in some sensitive areas such as hillside management areas, open space areas, and sensitive wildlife habitat areas. In addition, as more land within the CLWA service area is developed, there may be more pressure to build in areas that have greater constraints, such as hillside areas, and to convert open space to developed uses. Depending on the location and type of development, there is the potential for new development to physically divide an established community. Without adequate mitigation, there also is a potential for some conflicts with adopted land use plans, policies, or regulations that were adopted for the purpose of avoiding or mitigating an environmental effect. These land use impacts would be considered to be significant. No HCPs or NCCPs have been adopted within the CLWA service area. Federal and State Endangered Species Act compliance has been accomplished on a development-specific basis. The County of Los Angeles has identified and protected areas of particular environmental concern through the designation of five specific SEAs in the Santa Clarita Valley. City and county planning agencies are responsible for creating land use plans that direct where development should occur and for enforcing those plans. While CLWA has the responsibility to provide wholesale water to water retailers within the CLWA service area, it does not approve the locations of new development. The Project would provide water that could be used by new development in the CLWA service area, but it would not affect the specific locations of planned development.

***Mitigation Measures***

Impacts to land use and planning would be mitigated to less than significant by local governments implementing the policies of the County of Los Angeles, County of Ventura, and City of Santa Clarita general and area plans since they contain adequate measures to reduce or avoid such impacts (see Table 4.2-1). Specific mechanisms for implementing these policies would be determined in the course of project-specific environmental review, as required under CEQA. Implementing these plans and policies would also reduce adverse but less than significant project impacts.

### 4.2.9 Noise

Development would result in an increase in ambient noise levels due to the potential increase in associated traffic. Long-term increases in noise levels also could be associated with commercial and industrial development. Residential areas and other sensitive receptors near transportation corridors and other noise generators may experience increased noise. Development also would result in short-term increases in local noise levels from construction and grading activities. Impacts would be significant if noise generated were in excess of local standards or if a substantial temporary or permanent increase in noise occurred. Impacts also would be

significant if development resulted in exposure of persons to excessive groundborne noise or vibration.

***Mitigation Measures***

Impacts to noise would be mitigated to less than significant by local governments implementing the policies of the County of Los Angeles, County of Ventura, and City of Santa Clarita general and area plans since they contain adequate measures to reduce or avoid such impacts (see Table 4.2-1). Specific mechanisms for implementing these policies would be determined in the course of project-specific environmental review, as required under CEQA. Implementing these plans and policies would also reduce adverse but less than significant project impacts.

### 4.2.10 Population and Housing

As described in section 3.0, given an average year water supply, it is assumed that the Project could serve 106,700 persons and 35,600 housing units. Impacts would be significant because the Project could indirectly induce substantial population growth in the CLWA service area. The Project would not displace substantial numbers of existing houses or substantial numbers of people.

***Mitigation Measures***

Impacts to population and housing would be mitigated to less than significant by local governments implementing the policies of the County of Los Angeles, County of Ventura, and City of Santa Clarita general and area plans since they contain adequate measures to reduce or avoid such impacts. Applicable plans and policies are listed in Table 4.2-1. Specific mechanisms for implementing these policies would be determined in the course of project-specific environmental review, as required under CEQA. Implementing these plans and policies would also reduce adverse but less than significant project impacts.

### 4.2.11 Public Services

Growth in the CLWA service area could result in impacts to the following public services:

*Police* - Increased demand for services from the Los Angeles County Sheriff's Department (which also contracts with the City of Santa Clarita to provide services), the Ventura County Sheriff's Department, and the California Highway Patrol would occur. This would include additional staffing, facilities, and equipment, and could affect response times to handle calls for service. Any special problems posed by new developments (e.g., roadway access or terrain) would be considered at the time the development is reviewed. Impacts could be significant since the new development could require new or physically altered governmental facilities, the construction of which could cause significant environmental impacts.

*Fire* - Increased demand for services from the Los Angeles County and Ventura County Fire departments and from private providers of emergency response/paramedic services for additional staffing, facilities, and equipment would occur and could affect response times to handle calls for service. Any special problems posed by new developments (e.g., roadway access or terrain) would be considered at the time the development is reviewed. Additional considerations such as the location of a proposed new development in moderate or high fire

hazard zones, the adequacy of water supplies/fire flows, and types of vegetative cover would be taken into account. In addition, State and County fire codes, standards and guidelines exist to which all developments must adhere. Impacts could be significant, since the new development could require new or physically altered governmental facilities, the construction of which could cause significant environmental impacts.

*Schools* - Growth would generate increased enrollments and the need for additional staffing, facilities, and resources in some or all of the school districts in the CLWA service area. All school districts in the service area have reported that they are either at capacity or are experiencing overcrowding, and temporary facilities are being used in every district. However, newly built schools since 2002 have eased the overcrowding to some degree. Additional enrollments would be considered at the time new development is reviewed, and would include input from affected school districts. Impacts are considered to be significant based on current capacity limitations since additional schools would likely have to be built, which could cause significant environmental impacts.

*Libraries* - Growth would generate increased demand for library services and associated need for staffing, facilities, and resources (books, magazines, periodicals, etc.) in some or all of the libraries in the CLWA service area. Library services provided by the County of Los Angeles Library Department in the Santa Clarita Valley are currently below planning standards, based on a planning standard of two material items per capita and 0.389 gross square feet of space per capita. Additional demands, including cumulative demands for square feet of library space and related resources would be considered at the time new development is reviewed. Impacts on libraries are considered to be significant based on current shortages, since additional libraries would likely have to be built, which could cause significant environmental impacts.

***Mitigation Measures***

Impacts to public services would be mitigated to less than significant by local governments implementing the policies of the County of Los Angeles, County of Ventura, and City of Santa Clarita general and area plans since they contain adequate measures to reduce or avoid such impacts (see Table 4.2-1). Specific mechanisms for implementing these policies would be determined in the course of project-specific environmental review, as required under CEQA. Implementing these plans and policies would also reduce adverse but less than significant project impacts.

### 4.2.12 Recreation

Significant growth-related impacts to recreational resources may include increased demand for recreational resources, such as public parks and trails and other recreation areas. This demand could exacerbate existing shortfalls in local parkland and may outpace the ability of public agencies to provide these resources.

***Mitigation Measures***

Impacts to recreation would be mitigated to less than significant by local governments implementing the policies of the County of Los Angeles, County of Ventura, and City of Santa Clarita general and area plans since they contain adequate measures to reduce or avoid such impacts (see Table 4.2-1). Specific mechanisms for implementing these policies would be

determined in the course of project-specific environmental review, as required under CEQA. Implementing these plans and policies would also reduce adverse but less than significant project impacts.

### 4.2.13 Transportation and Circulation

Growth in the CLWA service area would result in the following:

- Daily trips in the service area would potentially increase over current levels.
- There would be a related need for new private or public roadways, parking facilities, and for subsequent road maintenance.
- Increased demand for transit systems could occur, and there may be an alteration of present patterns of circulation.
- Roadways with existing capacity constraints could require upgrading or may experience further deterioration in levels of service.

The EIR for the City of Santa Clarita General Plan noted significant, potentially unmitigable impacts at certain isolated road segments from growth allowed under the General Plan. The segments most likely to be significantly affected are Bouquet Canyon Road near Haskell Canyon Road, McBean Parkway north of State Route 126, Soledad Canyon Road between Sierra Highway and Whites Canyon Road, Rye Canyon Road east of Interstate 5, and San Fernando Road between Newhall Avenue and State Route 14. In general, growth-related impacts would be significant because they could cause an increase in traffic that is substantial in relation to the existing load and capacity of the street system and could cause an exceedance of an established level of service standard. Specific developments could substantially increase hazards due to a design feature, or result in inadequate emergency access or parking capacity. Development also could conflict with adopted plans and policies or programs supporting alternative transportation. Air traffic is projected to increase throughout the southern California region regardless of whether the Project is implemented, and new or expanded airports are being evaluated. Planning efforts for these projects would be required to demonstrate that the new locations/expansions do not result in substantial safety risks.

***Mitigation Measures***

Impacts to transportation and circulation would be reduced, but not necessarily mitigated to less than significant, by local governments implementing the policies of the County of Los Angeles, County of Ventura, and City of Santa Clarita general and area plans due to the delay between the time improvements are needed and the time they can be provided (see Table 4.2-1). Specific mechanisms for implementing these policies would be determined in the course of project-specific environmental review, as required under CEQA. Implementing these plans and policies would also reduce adverse but less than significant project impacts. Impacts also would be reduced by compliance with the SCAG 2001 RTP.

### 4.2.14 Utilities/Service Systems

*Solid Waste*. Growth would generate increased demand for solid waste disposal services due to construction-related and operational impacts of new land development. Los Angeles County

and Ventura County operate several landfills that serve the CLWA service area. The location and volume of waste generation, including cumulative demands, provision of recycling programs, and existing landfill capacity and expansion plans, would be considered at the time new development is reviewed. Impacts are considered significant, however, because an adequate supply of landfill space has not been ensured for the future and would remain so unless additional landfill space or other disposal alternatives are approved.

*Water Treatment.* Growth would increase the need for potable water and consequently create an increased demand for water treatment facilities operated by the four local purveyors and CLWA. The current combined capacity of the existing facilities (ESFP at 33.6 mgd and RVWTP at 30 mgd in 2003) is sufficient to treat approximately 40,000 AFY for potable use on an average annual basis and 71,000 AFY while operating at peak capacity. With the ESFP expansion project (construction started in September 2003 and is expected to be completed in 2005), average annual treatment capacity will be increased to approximately 54,000 AFY, and the peak capacity will be 96,000 AFY. During an average year, given implementation of the Project, the total amount of water that could be treated at the two plants (i.e., CLWA's total SWP Table A Amount) would be 81,000 AFY. During average years, the water supply requiring treatment would be greater than the existing peak capacity of the two facilities, but less than the peak capacity that would be present after the ESFP expansion is completed. The Table A Amount would be available to CLWA as needed, and not all would be required in the immediate future. SWP deliveries have never exceeded 41,800 AF, and demand for water treatment would increase incrementally, as development is approved. Given the current expansion of the ESFP, impacts would be less than significant because adequate capacity is being provided to treat the water available as a result of the Project.

*Wastewater.* Growth would result in an increase in wastewater generation and demand for wastewater treatment primarily at facilities operated by County Sanitation District No. 26 and District No. 32 in Los Angeles County, which service the Santa Clarita Valley. These two districts jointly operate a regional system known as the SCVJSS for which the 2015 Joint Sewerage System Facilities System Plan has been approved (LACSD 1998). The SCVJSS has a current combined capacity (from the Saugus and Valencia treatment plants) of 19.1 mgd and plans to expand capacity to 28.1 mgd by 2004. The System Plan identified the need for further expansion to the practical site capacity of 34.1 mgd by 2010, which has been extended to 2020. To date, the efforts to expand capacity up to 28.1 mgd are on schedule, and completion is expected in Spring 2004. All expansions are occurring at the Valencia plant; however, nitrification and denitrification upgrades are currently underway at both facilities, and should be completed by the end of 2003. The deadline for the final expansion capacity (i.e., for increasing the capacity by 6 mgd from 28.1 to 34.1 mgd) has been extended to 2020 (personal communication, S. Highter 2003). The ultimate expansion is intended to serve a population of 321,000.

Assuming that the 41,000 AF of Table A Amount produces an average year supply of 34,400 AF that is delivered to users, and that roughly 50 percent of the delivered water requires treatment in a wastewater treatment plant, this would represent approximately 15.5 mgd (3,400 AF x 0.5 = 17,200 AF x 0.33 = 5,676 mg per year divided by 365 = 15.5 mgd).

Based on per capita demand, if the ultimate wastewater treatment plant expansion to 34.1 mgd is intended to serve 321,000 persons, the expansion to 28.1 mgd that is scheduled for completion

in 2004 would have the capacity to serve approximately 265,000 persons. The Project can serve approximately 106,700 persons. Adding this to the estimated population in the Santa Clarita Valley of 177,000 persons in 1998 (the original baseline year for the Project) would result in 283,700 persons. Adding this to the 2000 population of 190,000 produces an estimated population of 296,700. Given the approved plans to expand wastewater treatment facilities in the Santa Clarita Valley, impacts would be less than significant because adequate capacity is being provided to treat the water available as a result of the Project.

*Storm Water Drainage.* New construction would likely require the construction of new storm water drainage facilities or the expansion of existing facilities, which could cause significant environmental impacts.

***Mitigation Measures***

Impacts to utilities and service systems generally would be mitigated to less than significant by local governments implementing the policies of the County of Los Angeles, County of Ventura, and City of Santa Clarita general and area plans since they contain adequate measures to reduce or avoid impacts. Impacts to solid waste disposal, however, may not be avoidable unless additional landfill capacity is approved and constructed (see Table 4.2-1). Specific mechanisms for implementing these policies would be determined in the course of project-specific environmental review, as required under CEQA. Implementing these plans and policies also would reduce adverse but less than significant project impacts.

### 4.2.15 Water Resources

As local purveyors become increasingly dependent on SWP supplies, which are variable and may be reduced during dry years, local groundwater resources may be required to support a larger portion of the total demand from future development during periods of reduced SWP supplies. Should it occur, this short-term reliance on groundwater resources would be considered a significant impact since it could result in the substantial depletion of groundwater supplies on a short-term basis in dry hydrologic years.

Increased municipal and industrial use of water would increase the amount of water treated at the existing and planned raw and wastewater treatment plants. This could result in additional discharges from the wastewater treatment plants and increased flows in the portion of the Santa Clara River west of Interstate Highway 5. In the future, some of the water presently being discharged into the Santa Clara River could be diverted prior to discharge for landscape irrigation and other permitted uses of reclaimed water within the CLWA service area. Impacts would be significant if future development violated any water quality standard or waste discharge requirements.

The Project would not indirectly affect drinking water quality in the CLWA service area, but it could adversely affect the water quality of surface waters discharged by the local wastewater treatment plants. While the future inflow water to the water reclamation plants would have approximately the same concentration of chloride and other constituents as present today, the use of the 41,000 AF of Table A Amount would increase the load of chloride and other constituents treated and discharged by these treatment plants. As discussed in section 3.15, however, the LACSD recently has adopted an ordinance that prohibits the installation and use

of new self-regenerating water softeners in the Santa Clarita Valley, which would reduce the amount of chloride load in the watershed. The potential indirect impact would be less than significant because new development would be required to comply with this ordinance.

Future development within the CLWA service area could increase the amount of impervious surface (roads, buildings, other paved areas). This could reduce percolation of rainwater to groundwater in the urbanized portions of the CLWA service areas, alter surface flows, and increase the amount and rate of stormwater runoff through storm sewers or other engineered drainages. However, most surface runoff enters the Santa Clara River and recharges the Alluvial Aquifer. As noted in the EIR for the City of Santa Clarita General Plan, development could affect water quality from non-point source discharges. The Project would result in significant indirect impacts from increased urban runoff. The increase in impervious surface also could affect the peak flow rates of floodwaters and could increase flooding on- or off-site of future development. Increased flooding and peak flow rates could result in substantial erosion or siltation on- or off-site. Impacts could be significant.

If new development were allowed in floodplains, it could expose additional persons and property to flood hazards and would impede or redirect flood flows. Development, in particular the placement of impervious surfaces (i.e., surfaces that can not be penetrated by moisture), in areas critical to the recharge of the Alluvial Aquifer and Saugus Formation could reduce the rate of aquifer recharge. This effect would not alter the storage capabilities of these aquifers; however, it could, under certain circumstances, reduce aquifer recharge. These would be considered significant impacts.

Seiches (creation of large waves on a lake or reservoir) could occur as a result of earthquake-induced ground shaking or landslides in Castaic Lake, Pyramid Lake, or Bouquet Reservoir, potentially resulting in flooding of downstream communities. Mudflows also could occur, particularly in mountainous areas, as a result of new development.

***Mitigation Measures***

Impacts to water resources would be mitigated to less than significant by local governments implementing the policies of the County of Los Angeles, County of Ventura, and City of Santa Clarita general and area plans since they contain adequate measures for reducing or avoiding impacts (see Table 4.2-1). Specific mechanisms for implementing these policies would be determined in the course of project-specific environmental review, as required under CEQA. Implementing these plans and policies would also reduce adverse but less than significant project impacts. Additionally, compliance with the LARWQCB Water Quality Control Plan [Basin Plan] for the Coastal Watersheds of Los Angeles and Ventura Counties, as amended, also would reduce significant and less than significant impacts.

# 5.0 CONSISTENCY WITH ADOPTED PLANS AND POLICIES

CEQA Guidelines Section 15125(d) requires that a proposed project be compared to existing general and regional plans. The following sections address the consistency of the Project with adopted plans and policies of the local agencies that have planning authority over the area directly affected by the Project, including Los Angeles County, the City of Santa Clarita, and Ventura County for the CLWA service area, and Kern County for the WRMWSD. Project consistency with the SCAG Regional Comprehensive Plan and Guide (RCPG) and RTP also is addressed.

The Project would not result in new construction or the modification of existing SWP facilities, nor would it change SWP operating criteria or otherwise result in material changes to SWP operations. As discussed in detail in Chapter 3, the Project would not adversely affect environmental resources as a result using of SWP facilities between the Banks Pumping Plant and CLWA's Castaic Lake turnout; thus, use of SWP facilities would be consistent with general and regional plans applicable to the Project area, and they are not addressed further.

The discussion also focuses on growth management policies of planning agencies where indirect development could occur (i.e., within the CLWA service area). A discussion of Project consistency with growth projections in the relevant regional, general, or area plans, including those of SCAG, Los Angeles County, the City of Santa Clarita, and Ventura County is included. CLWA's UWMP (CLWA 2000) is addressed in section 5.6 below. Consistency with relevant air quality management plans is included in section 3.3, Air Quality.

## 5.1 SOUTHERN CALIFORNIA ASSOCIATION OF GOVERNMENT'S (SCAG) REGIONAL COMPREHENSIVE PLAN AND GUIDE (RCPG) AND REGIONAL TRANSPORTATION PLAN (RTP)

Scoping comments received from SCAG requested a review of the policies listed below. SCAG is a regional planning agency whose functions include regional transportation planning, air quality planning, demographic projections, and the review of projects of regional significance to determine consistency with regional plans, including SCAG's RCPG and RTP. The numbered policies and other text shown in italics below are taken directly from SCAG's comments on the NOP for this EIR.

### 5.1.1 Regional Comprehensive Plan and Guide

***Growth Management Chapter (GMC)***

*3.03 The timing, financing, and location of public facilities, utility systems, and transportation systems shall be used by SCAG to implement the region's growth policies.*

The Project would be consistent with this policy because it would not conflict with the timing, financing, and location of public facilities, utility systems, and transportation systems.

*GMC Policies Related to the RCPG Goal to Improve the Regional Standard of Living*

*The Growth Management goals to develop urban forms that enable individuals to spend less income on housing cost, that minimize public and private development costs, and that enable firms to be more competitive, strengthen the regional strategic goal to stimulate the regional economy. The evaluation of the proposed project in relation to the following policies would be intended to guide efforts toward achievement of such goals and does not infer regional interference with local land use powers.*

*3.09 Support local jurisdictions' efforts to minimize the cost of infrastructure and public service delivery, and efforts to seek new sources of funding for development and the provision of services.*

The Project does not include new construction of water system infrastructure but would provide an additional means of providing wholesale water service. It would be consistent with this policy.

*3.10 Support local jurisdictions' actions to minimize red tape and expedite the permitting process to maintain economic vitality and competitiveness.*

The Project would not change local jurisdictions' permitting processes and would be consistent with this policy.

*GMC Policies Related to the RCPG Goal to Improve the Regional Quality of Life*

*The Growth Management goals to attain mobility and clean air goals and to develop urban forms that enhance quality of life, that accommodate a diversity of life styles, that preserve open space and natural resources, and that are aesthetically pleasing and preserve the character of communities, enhance the regional strategic goal of maintaining the regional quality of life. The evaluation of the proposed project in relation to the following policies would be intended to provide direction for plan implementation, and does not allude to regional mandates.*

*3.18 Encourage planned development in locations least likely to cause environmental impact.*

While CLWA has the responsibility to provide wholesale water-to-water retailers within the CLWA service area, CLWA does not have the authority to approve new development in its service area. Rather, the authority and responsibility for approving and mitigating the impacts of specific development projects is primarily the responsibility of local governments and regulatory agencies.

*3.19 Support the protection of vital resources such as wetlands, groundwater recharge areas, woodlands, production lands, and land containing unique and endangered plants and animals.*

As discussed in Chapter 3, the Project would not directly affect wetlands, woodlands, production lands, or land containing unique and endangered plants and animals. It would not affect groundwater recharge areas but could have the potential to indirectly affect groundwater levels during period of lower than normal deliveries when, and if, potential future development water demands exceed local water supply. The Project could also indirectly reduce demand for groundwater when imported water supplies are high and they are delivered in a higher proportion and groundwater withdrawals are reduced. The Project could result in indirect, growth-related effects to the above-referenced vital resources, as discussed in section 4.2.

CLWA does not have the authority to approve new development in its service area, however. Rather, the authority and responsibility for approving and mitigating the impacts of specific development projects is primarily the responsibility of local governments and regulatory agencies. The Project would be consistent with this policy.

*3.21 Encourage the implementation of measures aimed at the preservation and protection of recorded and unrecorded cultural resources and archaeological sites.*

The Project would not have a direct impact on cultural resources. While it could result in indirect, growth-related effects on cultural resources, as discussed in section 4.2, CLWA does not have the authority to approve the location of new development in its service area or to impose mitigation measures. Rather, the authority and responsibility for approving and mitigating the impacts of specific development projects is primarily the responsibility of local governments and regulatory agencies. The Project would be consistent with this policy.

*3.22 Discourage development, or encourage the use of special design requirements, in areas with steep slopes, high fire, flood, and seismic hazards.*

The Project would not directly result in any development, including development in areas with steep slopes, high fire, flood, or seismic hazards. While it could result in indirect, growth-related development in such areas, as discussed in section 4.2, CLWA does not have the authority to approve the location of new development in its service area or to impose mitigation measures. Rather, the authority and responsibility for approving and mitigating the impacts of specific development projects is primarily the responsibility of local governments and regulatory agencies. The Project would be consistent with this policy.

*3.23 Encourage mitigation measures that reduce noise in certain locations, measures that would reduce exposure to seismic hazards, minimize earthquake damage, and to develop emergency response and recovery plans.*

The Project would not directly result in any development, including development that would generate noise, or result in exposure to seismic hazards, earthquake damage, or affect emergency response plans. While it could result in indirect, growth-related development that could have such effects, as discussed in section 4.2, CLWA does not have the authority to approve the location of new development in its service area or to impose mitigation measures. Rather, the authority and responsibility for approving and mitigating the impacts of specific development projects is primarily the responsibility of local governments and regulatory agencies. The Project would be consistent with this policy.

*GMC Policies Related to the RCPG Goal to Provide Social, Political, and Cultural Equity*

*The Growth Management Goal to develop urban forms that avoid economic and social polarization promotes the regional strategic goal of minimizing social and geographic disparities and of reaching equity among all segments of society. The evaluation of the proposed project in relation to the policy stated below is intended guide direction for the accomplishment of this goal, and does not infer regional mandates and interference with local land use powers.*

*3.27 Support local jurisdictions and other service providers in their efforts to develop sustainable communities and provide, equally to all members of society, accessible and effective services such as: public education, housing, health care, social services, recreational facilities, law enforcement, and fire protection.*

In its function as a water wholesaler, CLWA provides water to purveyors within its service area who, in turn, serve local customers. CLWA provides water without regard to the circumstances of the end-user customers. The Project would be consistent with this policy.

***Air Quality Chapter Core Actions***

*5.07 Determine specific programs and associated actions needed (e.g., indirect source rules, enhanced use of telecommunications, provision of community based shuttle services, provision of demand management based programs, or vehicle-miles-traveled/emission fees) so that options to command and control regulations can be assessed.*

The Project would not have an impact on local agencies' determination of air quality programs and actions and would be consistent with this policy.

*5.11 Through the environmental document review process, ensure that plans at all levels of government (regional, air basin, county, subregional and local) consider air quality, land use, transportation and economic relationships to ensure consistency and minimize conflicts.*

The Project would not have an impact on SCAG's environmental document review process for government plans and would be consistent with this policy.

***Open Space Chapter and Ancillary Goals***

*Public Health and Safety*

*9.04 Maintain open space for adequate protection of lives and properties against natural and man-made hazards.*

The Project would not directly result in any development that would affect open space. While it could result in indirect, growth-related development that could result in the loss of open space, as discussed in section 4.2, CLWA does not have the authority to approve the location of new development in its service area or to impose mitigation measures. Rather, the authority and responsibility for approving and mitigating the impacts of specific development projects is primarily the responsibility of local governments and regulatory agencies. The Project would be consistent with this policy.

*9.05 Minimize potentially hazardous developments in hillsides, canyons, areas susceptible to flooding, earthquakes, wildfire and other known hazards, and areas with limited access for emergency equipment.*

The Project would not directly result in any development, including development in hazardous areas. While it could result in indirect, growth-related development in such areas, as discussed

in section 4.2, CLWA does not have the authority to approve the location of new development in its service area or to impose mitigation measures. Rather, the authority and responsibility for approving and mitigating the impacts of specific development projects is primarily the responsibility of local governments and regulatory agencies. The Project would be consistent with this policy.

*9.06 Minimize public expenditure for infrastructure and facilities to support urban type uses in areas where public health and safety could not be guaranteed.*

The Project would not directly result in public expenditures for infrastructure and facilities to support urban uses and would be consistent with this policy.

*Resource Protection*

*9.08 Develop well-managed viable ecosystems or known habitats of rare, threatened, and endangered species, including wetlands.*

The Project would not have a direct effect on ecosystems or known habitats of sensitive species and would not preclude the management of ecosystems or habitats. While it could result in indirect, growth-related development in biologically sensitive areas, as discussed in section 4.2, CLWA does not have the authority to approve the location of new development in its service area or to impose mitigation measures. Rather, the authority and responsibility for approving and mitigating the impacts of specific development projects is primarily the responsibility of local governments and regulatory agencies. The Project would be consistent with this policy.

***Water Quality Chapter Recommendations and Policy Options***

*The Water Quality Chapter core recommendations and policy options related to the two water quality goals: to restore and maintain the chemical, physical and biological integrity of the nation's water; and, to achieve and maintain water quality objectives that are necessary to protect all beneficial uses of all waters.*

*11.02 Encourage "watershed management" programs and strategies, recognizing the primary role of local governments in such efforts.*

CLWA considers watershed management in its water management and capital improvement planning efforts, along with locally adopted plans. In addition, CLWA has supported local planning efforts intended to provide watershed management. For example, CLWA has participated in meetings to discuss the formulation of the Santa Clara River Enhancement Plan and has provided written comments on the plan. The Project would be consistent with this policy.

*11.05 Support regional efforts to identify and cooperatively plan for wetlands to facilitate both sustaining the amount and quality of wetlands in the region and expediting the process for obtaining wetlands permits.*

The Project would not directly affect wetlands and would not affect regional efforts to identify and cooperatively plan for wetlands. While it could result in indirect, growth-related development that could affect wetlands, as discussed in section 4.2, CLWA does not have the

authority to approve the location of new development in its service area or to impose mitigation measures. Rather, the authority and responsibility for approving and mitigating the impacts of specific development projects is primarily the responsibility of local governments and regulatory agencies. The Project would be consistent with this policy.

*11.06 Clean up the contamination in the region's major groundwater aquifers since its water supply is critical to the long-term economic and environmental health of the region. The financing of such clean-ups should leverage state and federal resources and minimize significant impacts on the local economy.*

The treatment of transferred water would result in additional utilization of hazardous chemicals, but the Project would not result in the contamination of the region's aquifers and could result in a smaller percentage of the Santa Clarita Valley's total water supply coming from groundwater sources. Therefore, the Project would be consistent with this policy since it would not result in the contamination of aquifers.

*11.07 Encourage water reclamation throughout the region where it is cost-effective, feasible, and appropriate to reduce reliance on imported water and wastewater discharges. Current administrative impediments to increased use of wastewater should be addressed.*

Water and reclamation efforts are part of CLWA's water management planning efforts, and the Project would be consistent with this policy.

### 5.1.2 Regional Transportation Plan

*The RTP links the goal of sustaining mobility with the goals of fostering economic development, enhancing the environment, reducing energy consumption, promoting transportation-friendly development patterns, and encouraging fair and equitable access to residents affected by socioeconomic, geographic, and commercial limitations.*

***Core Regional Transportation Plan Policies***

*4.02 Transportation investments shall mitigate environmental impacts to an acceptable level.*

The Project would not require transportation investments. While it could result in indirect, growth-related development that could require transportation improvements, as discussed in section 4.2, CLWA does not have the authority to approve the location of new development in its service area or to impose mitigation measures. Rather, the authority and responsibility for approving and mitigating the impacts of specific development projects is primarily the responsibility of local governments and regulatory agencies. The Project would be consistent with this policy.

*4.04 Transportation Control Measures shall be a priority.*

The Project would not directly affect transportation and would not require transportation control measures. While it could result in indirect, growth-related development that could require transportation control measures, as discussed in section 4.2, CLWA does not have the authority to approve the location of new development in its service area or to impose mitigation measures. Rather, the authority and responsibility for approving and mitigating the impacts of

specific development projects is primarily the responsibility of local governments and regulatory agencies. The Project would be consistent with this policy.

*4.16 Maintaining and operating the existing transportation system will be a priority over expanding capacity.*

The Project would not have a direct impact on the existing transportation system. While it could result in indirect, growth-related development that could affect this system, as discussed in section 4.2, city and county planning agencies are responsible for creating transportation plans that determine whether expansion should occur. CLWA does not have the authority to approve or implement transportation plans. The Project would be consistent with this policy.

### 5.1.3 Consistency with Growth Projections

The following section addresses the Project's consistency with SCAG's adopted growth forecasts. SCAG adopted demographic forecasts for the Santa Clarita Valley Area (i.e., Regional Statistical Area 8) in 1998 as part of its RTP (SCAG 1998) and updated the forecast in 2001 (SCAG 2001). This analysis is based on the latter forecast since it supersedes the 1998 projections. SCAG currently projects that the 2025 population for the Santa Clarita Valley will be 352,382, with 126,563 households (personal communication, P. Gutierrez 2003). The Project can serve approximately 106,700 persons (see section 4.1 for assumptions). Adding this to the 2000 population of 190,000 produces an estimated population of 296,700, which is lower than the SCAG 2025 projection. The Project also could serve about 35,600 housing units. Adding this to the 63,300 housing units present in the CLWA service area (based on 2000 Census data) would result in 98,900 housing units, which also is less than the 2020 projection. Thus, the Project would serve a portion of the growth projected by SCAG and would be consistent with SCAG's growth projections.

## 5.2 COUNTY OF LOS ANGELES GENERAL PLAN

### 5.2.1 Consistency with Policies

***General Goals and Policies***

*18. Conserve the available supply of water and protect water quality.*

Conservation is already part of CLWA's water resource management program, and the Project would not affect these water conservation efforts. As noted in section 3.15, Water Resources, the Project would not have a direct effect on water quality and would provide a portion of the water supply necessary to support anticipated future development. It could result in indirect impacts to groundwater supply and water quality that would be mitigable to less than significant by complying with local plans and policies, including the Basin Plan.

*43. Maintain a balance between increased intensity of development and the capacity of needed facilities such as transportation, water and sewage systems.*

As discussed in section 4.2.13, Transportation and Circulation and section 4.2.14, Utilities/Service Systems, the Project would not directly require or result in the construction or expansion of facilities such as those mentioned in this policy. The 41,000 AF of Table A Amount that would be made available by the Project would be used as needed to support a portion of the anticipated future development in the CLWA service area, which would be consistent with this policy. The portion of the anticipated future development served by the Project's water supply would require construction of additional transportation, water storage and delivery, and sewage collection systems that would either be provided by developers or various service providers, as appropriate. CLWA does not have the authority to approve new development or to increase the capacity of transportation, sewage, and other facilities not related to its role as a wholesale water provider. Rather, this is primarily the responsibility of local governments and regulatory agencies.

***Conservation, Open Space, and Recreation***

*1. Protect ground water recharge and watershed areas, conserve storm and reclaimed water, and promote water conservation programs.*

The Project could potentially reduce the portion of future water demand in the Santa Clarita Valley that is met by groundwater by providing additional imported surface water supplies. The Project would not include new construction and therefore would not have a direct impact on groundwater recharge and watershed areas. It would serve a portion of anticipated future development that could reduce recharge areas; however, CLWA does not have the authority to approve new development in its service area. Rather, the authority and responsibility for approving and mitigating the impacts of specific development projects is primarily the responsibility of local governments and regulatory agencies. Although the conservation of storm and reclaimed water and other conservation measures are not a part of the Project, it would not in any way inhibit these actions. The Project would be consistent with this policy.

*5. Encourage the maintenance, management, and improvement of the quality of imported domestic water, ground water supplies, natural runoff and ocean water.*

The Project would provide an additional supply of high quality, imported raw water received from the SWP. The delivery of imported water would not directly affect groundwater quality of the Alluvial or Saugus formations; nor would it affect natural runoff or ocean water. The Project would be consistent with this policy.

***Safety Element***

*20. Review proposed development projects involving the use or storage of hazardous materials, and disapprove proposals, which cannot properly mitigate unacceptable threats to public health and safety to the satisfaction of responsible agencies.*

Transferring an additional 41,000 AF of water for use within the CLWA service area would result in an increased use of hazardous materials to treat water. Any additional

use of hazardous materials to treat the water would be conducted in accordance with existing policies, procedures, and regulations to prevent upset or release into the environment. Thus, the Project would be consistent with this policy.

*21. Promote the safe transportation of hazardous materials.*

Chemicals used by CLWA for water treatment are shipped in containers and on vehicles approved by the U.S. Department of Transportation (DOT) and are restricted to approved roads. DOT requires periodic testing and inspection of containers that transport hazardous materials. CLWA uses measures to promote the safe transportation and delivery of hazardous materials, consistent with this policy.

*22. Encourage businesses and organizations which store and use hazardous materials to improve management and transportation of such materials.*

As noted above, all chemicals would be shipped in containers and on vehicles approved by the DOT and would be restricted to approved roads. State and local mandates require the development and implementation of hazardous materials-related plans. The Project would be consistent with this policy.

*24. Encourage improved, timely communications between businesses and emergency response agencies regarding hazardous materials/waste incidents.*

State and local mandates require the preparation of hazardous materials related plans. Measures to facilitate timely communications between CLWA and emergency response agencies are included in these existing plans. The Project would be consistent with this policy.

***Public Facilities Chapter***

*3. Encourage private firms and public agencies providing water and waste management services to cooperate with all levels of government in establishing, enacting and enforcing consistent standards and criteria.*

CLWA is subject to applicable standards and criteria regulating provision of water service. The Project would be consistent with this policy.

### 5.2.2 Consistency with Growth Projections

Growth projections for the Project area are included in the Santa Clarita Valley Area Plan, discussed under section 5.3.

## 5.3 SANTA CLARITA VALLEY AREA PLAN OF THE COUNTY OF LOS ANGELES GENERAL PLAN

The Santa Clarita Valley Area Plan (comprehensively updated December 6, 1990), in conjunction with other chapters and elements of the Los Angeles County General Plan, is used for making critical public decisions regarding the Santa Clarita Valley.

### 5.3.1 Consistency with Policies

The Area Plan states that for the Santa Clarita Valley, it shall be the policy of the Los Angeles County Board of Supervisors to:

***Land Use Element***

*1.1 Accommodate the year 2010 population and land use demand as projected for the Santa Clarita Valley, designating sufficient area for appropriate use and a reasonable excess to provide adequate flexibility.*

*1.2 Closely monitor growth in the Santa Clarita Valley, so that growth does not exceed the capacity of the existing or planned infrastructure nor result in significant negative environmental impacts.*

*1.3 Provide for development in the study area, which is consistent with the plan, and encourage other governmental and private agencies to do the same.*

*7.1 Encourage development of convenient services to meet the needs of Santa Clarita Valley residents including . . . public utilities. Such services should be expanded at a rate commensurate with population growth. Phasing of development and implementation should be timed to prevent gaps in service as the area grows.*

The Project could serve approximately 106,700 persons. When added to the 2000 population of the CLWA service area (190,000), the resulting population would exceed Los Angeles County's 2010 population projection of 270,000 persons by 26,700. Thus, the Project would accommodate the 2010 demand. The County of Los Angeles would be responsible for ensuring that future development, including development that could be served by the Project, would be consistent with these policies, which direct that development be consistent with the general plan and that adequate public and commercial services and infrastructure be provided to serve population growth, while minimizing environmental impacts. The Project would be consistent with these policies.

***Public Services and Facilities Element***

*1.2 Use imported water supply to relieve over drafted groundwater basins and maintain their safe yield for domestic uses outside of urban areas.*

The Project would be consistent with this policy since it would import SWP water. The Santa Clarita Valley groundwater basin is not classified as overdrafted (DWR 2003a).

***Energy Conservation Element***

*1.1 Conserve energy in all its forms to a degree commensurate with an optimum level of living and economic activities.*

The Project would utilize additional energy for increased treatment of raw imported water. CLWA utilizes energy conservation measures at its treatment facilities, however, and the Project would be consistent with this policy.

### 5.3.2 Consistency with Growth Projections

The Santa Clarita Valley Area Plan includes population and housing projections for the Santa Clarita Valley adopted by the County of Los Angeles. The projections are based on 1987 population estimates and extend to the year 2010. The area plan projects that the Santa Clarita Valley will contain 270,000 persons and 93,400 housing units in 2010. Los Angeles County is in the process of updating the General Plan and expects completion within approximately three years, at which time new demographic projections may be adopted.

As described in section 3.0, the Project can serve approximately 106,700 persons. Adding this to the 2000 population of 190,000 for the Santa Clarita Valley area produces an estimated population of 296,700. This exceeds the 2010 forecast of 270,000 persons. The Project is not intended, however, to serve population only through 2010, and CLWA's UWMP, which was prepared after the transfer of 41,000 of Table A Amount occurred, assumes that the full amount will not be needed by 2010. The UWMP assumes a rate of 2,240 connections per year. If all of these connections were residential (recognizing that the methodology utilized in the UWMP reflects that these connections may include other types of connections in addition to households), and assuming that three people are served by each connection, this would result in an annual increase of 6,720 people. This rate of growth would result in an increased population of 67,200 between 2000 and 2010, for a total population of 257,200. Thus, CLWA's projections in its UWMP indicate that the growth forecast for 2010 would not be exceeded as a result of the Project.

## 5.4 VENTURA COUNTY GENERAL PLAN

The Ventura County portion of the agency area contains 8,468 acres or approximately 13 square miles of property. This area is located the Piru Planning Area, which contains 42,945 acres or about 67 square miles. The Ventura County General Plan amended through October 28, 1997 (Ventura County 1997) contains a Countywide 1980-2010 Population Forecast of 310 persons in the "Piru Non-Growth Area," a smaller portion of the Piru Planning Area, which contains the agency area as well as other lands.

### 5.4.1 Area Plan for the Piru Area

The Piru Area Plan (amended through July 1997) contains goals, policies, and programs divided into four major categories: resources, hazards, land use, and public facilities and services. Growth management is addressed through a related land use policy and associated building intensity/population density standards.

*Land Use Policy 3.1.2.7: All discretionary development projects shall be reviewed and conditioned to ensure that they are in conformance with the Building Intensity/ Population Density Summary Table* (see Table 5-1).

As shown in Table 5-1, if full build-out were to occur under current land use designations, Ventura County projects a total population of 3,620 persons in the Piru Planning Area. The agency portion of the planning area is designated either Open Space (80-acre minimum lot size and 0.04 persons per acre) or Agricultural (40-acre minimum lost size and 0.08 persons per

acre). In addition, the area contains prime agricultural lands. These land use designations are intended to allow rural development densities and encourage preservation of agricultural uses.

CLWA does not presently provide water to this planning area. If the County of Ventura were to approve future General Plan land use or zoning designations which allow urban development within this portion of the agency area, CLWA would at that time determine its ability to provide service to specific development proposals.

**Table 5-1. Building Intensity/Population Density Standards — Piru Area Plan**

| *Designation* | *Acres* | *Population* |
|---|---|---|
| Open Space | 37,483 | 1,488 |
| Agricultural | 5,214 | 413 |
| R-4 | 13 | 165 |
| R-6 | 69 | 1,316 |
| R-15 | 5 | 238 |
| **Total** | **42,784** | **3,620** |
| *Designation* | *Acres* | *Employees* |
| Commercial | 10 | 130 |
| Hotel | 1 | 5 |
| Industrial | 36 | 627 |
| Community Facility | 114 | 496 |
| **Total** | **161** | **1,258** |

*Source*: Ventura County 1997.

### 5.4.2 Ventura County Save Open-Space and Agricultural Resources (SOAR) Initiative

This initiative was passed in 1998 in order to "ensure that Agricultural, Open Space and Rural lands are not prematurely or unnecessarily converted to other more intensive development uses." It requires a vote of the people for changes to the County's general plan policies and land use designations regarding open space, agricultural, and rural lands in unincorporated areas with certain exceptions. The Project would not result in land use changes to Ventura County and would be consistent with this policy.

## 5.5 CITY OF SANTA CLARITA GENERAL PLAN

The section below analyzes the consistency of the Project with relevant growth management policies and population forecasts in the City of Santa Clarita General Plan and its associated EIR.

The Final EIR for the City of Santa Clarita General Plan (1991) identifies low, moderate, and high buildout population estimates for the City of Santa Clarita Planning Area, which comprises 256 square miles within the Santa Clarita Valley. The City of Santa Clarita occupied approximately 42 square miles when the Planning Area was initially identified in 1991 and developed the larger Planning Area in recognition of its probable ultimate responsibility for services and governmental jurisdiction within the valley. The City of Santa Clarita has land development approval authority within the city boundaries and Los Angeles County has development approval authority in unincorporated Los Angeles County. The Final EIR

identifies several public services, such as schools, libraries and roads that "cannot at present adequately serve the existing population." The City of Santa Clarita reported a population of 143,800 persons in 1998 and 151,088 in 2000.

The population buildout estimates in the city's Final EIR are 228,274 persons (low), 256,944 (medium), and 521,977 (high). As described in section 4.1, the Project could serve approximately 106,700 persons. Adding the potential population served by the Project to the city's 2000 population (151,088) would result in a potential population of approximately 257,788 persons. This exceeds the low buildout estimate, is roughly comparable to the medium buildout estimate (exceeding it by 844 persons), and is less than the high buildout estimate.

**Growth Management**

*Goal 1:* *To preserve the character of communities and the integrity of the Santa Clarita Valley by permitting orderly growth through synchronization of development with the availability of public facilities such as roads, sewers, water service and schools needed to support it.*

The Project could make water available to local purveyors who provide water services for development within the CLWA service area and would be consistent with this goal.

*LU-1.1:* *Develop and implement a Public Facilities Ordinance that requires that adequate infrastructure exist or be programmed for construction within a defined period of time as a condition of development approval.*

The City of Santa Clarita's authority to develop and implement a Public Facilities Ordinance would not be affected by the Project, which seeks to make adequate water supply available for future development.

*LU-1.2:* *Develop and implement a program of Development Impact Fees to provide adequate public facilities and services in a timely manner.*

The City of Santa Clarita's authority to develop and implement a Development Impact Fee program would not be affected by the Project, which seeks to make adequate water supply available in a timely manner.

*LU-1.8:* *Encourage the concept of traffic mitigation agreements that provide a variety of transportation options included but not limited to automobiles, transit, commuter trains, light rail and bicycle pathways.*

The Project would not have a direct impact on traffic demand (see section 3.13, Transportation and Circulation). The City of Santa Clarita's authority to encourage traffic mitigation agreements that provide a variety of transportation options would not be affected by the Project.

*LU-1.9:* *Continue to pursue a policy of cooperation with Los Angeles County and seek adequate documentation, notification, and mitigation of infrastructure impacts beyond or bordering the City's boundaries.*

The Project would not affect cooperation between the City of Santa Clarita and Los Angeles County. This EIR provides information regarding potential indirect impacts of the Project to both Los Angeles County and the City of Santa Clarita, consistent with the spirit of this policy.

*H-1.1: Implement the land use plan which provides opportunities for the development of a wide range of new housing types within the city.*

The City of Santa Clarita has the authority to implement its General Plan by approving or denying residential and mixed-use development plans within its jurisdiction, which could include development served by the Project. CLWA does not have the authority to approve land development.

## 5.6 CLWA URBAN WATER MANAGEMENT PLAN 2000

A UWMP is a planning tool whose periodic preparation (every five years, in years ending with a 5 and 0) is mandated by the Legislature pursuant to the California Urban Water Management Planning Act. It generally guides the actions of water management agencies, serving as a management tool and providing a framework for action, but not functioning as detailed project development or action. As encouraged by the Act, the 2000 UWMP was prepared for the regional CLWA service area, which includes the service areas of the four retail water purveyors. The plan presents information about the water demand, water supply, water conservation, water recycling, and reliability planning in the CLWA's service area. The 2000 UWMP was prepared after the 41,000 AF of SWP Table A Amount was transferred; thus, it is included as part of the current water supply.

The UWMP was challenged in the Superior Court of Kern County, and a judgment was entered July 2003 upholding the UWMP in all respects. The petitioners in that case have appealed the judgment. The appellate court briefing is scheduled to be completed in March 2004, and oral argument is estimated to take place in the fall of 2004. The UWMP is and remains a valid document as of the time of the preparation of this EIR. Although information in the UWMP was considered in the analysis for the Project, an independent analysis and determination of environmental impacts was carried out for the Project.

## 5.7 CLWA GROUNDWATER MANAGEMENT PLAN, SANTA CLARA RIVER VALLEY GROUNDWATER BASIN, EAST SUBBASIN, LOS ANGELES COUNTY, 2003

In January 2002, CLWA initiated the preparation of a groundwater management plan pursuant to the requirements of Section 103-15.1 of the CLWA Act and section 10,750 et seq of the California Water Code. CLWA adopted the plan on December 10, 2003. The plan describes the Santa Clara River Valley Groundwater Basin and East Subbasin, historic and projected water use, and requirements of the affected area. In addition, the document provides a framework for present and future actions to develop groundwater while avoiding groundwater overdraft and preserving groundwater quality (including addressing perchlorate concentrations), and it also discusses interrelated surface water resources. Additionally, the document calls for integrating management of the groundwater basin with surface and groundwater resources of the United Water Conservation District, which is downstream along the Santa Clara River in Ventura

County. The Project is consistent with the groundwater management plan and would support the avoidance of overdrafting the groundwater basin by making supplemental water available, thus facilitating conjunctive use of local and imported water to the best advantage of the affected area.

## 5.8 KERN COUNTY GENERAL PLAN

The Land Use, Open Space, and Resource Element of the Kern County General Plan contains several policies that relate to preservation of agriculture and development of local surface water resources.

*Resource Policy 1: Areas with designated agricultural use, which include Class I and II soils with surface water delivery systems, will be protected against residential and commercial subdivision activities.*

No residential or commercial subdivisions are proposed as part of the Project, which would be consistent with this policy.

*Resource Policy 2: Areas identified by the Soil Conservation Service as having high rangesite value will be reserved for extensive agricultural uses, or as resource reserve if located within a County water district.*

SWP water is used only minimally on rangeland in the district (it is used for stock water rather than irrigation), and the Project would not have an impact on rangeland conversion. It would be consistent with this policy.

*Resource Policy 12: The County will support programs and policies that provide tax and economic incentives to ensure the long-term retention of agriculture, timber, and other resource land.*

Kern County participates in the Williamson Act program and provides tax incentives to landowners voluntarily enrolled in the program who preserve land in agricultural use. As described in section 3.2.2.2.2, the Project would not affect the County's participation in the Williamson Act program, nor would it conflict with Williamson Act contracts. The Project would be consistent with this policy.

*Resource Policy 15: Encourage effective management of groundwater resources for the long-term benefit of the county by any or all of the following: …development of alternative local and imported surface water supplies.*

As discussed in section 3.15, Water Resources, the Project would have a less than significant impact on groundwater resources in WRMWSD. The Project would not inhibit WRMWSD's implementation of water management actions that are intended to conjunctively manage the district's surface and groundwater resources for the long-term benefit of district lands. The Project would be consistent with this policy.

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# 6.0 CUMULATIVE IMPACTS

## 6.1 CEQA REQUIREMENTS

Cumulative impacts refer to two or more individual impacts that, when considered together, are considerable or that compound or increase other environmental impacts. A cumulative impact is the change in the environment that results from the incremental impact of a project when added to other closely related past, present, or reasonably foreseeable future projects. Cumulative impacts can result from individually minor but collectively significant impacts taking place over time. An EIR must discuss the cumulative impacts of a project when the project's incremental impact is cumulatively considerable (CEQA Guidelines section 15130[a]). "Cumulatively considerable" means that the project's incremental effects are considerable when viewed in connection with the impacts of other related projects (CEQA Guidelines section 15065 [c]). In this analysis, if the Project's incremental impact would be cumulatively considerable in combination with the impacts of other projects, the impact is identified as a "significant cumulative impact."

## 6.2 CUMULATIVE IMPACT ANALYSIS METHODOLOGY

Projects included in the cumulative impact analysis were identified using a list approach (CEQA Guideline section 15130[b][1]) and are those that could result in impacts to the same resources as the Project, in the same geographic areas. Projects considered in this analysis fall into two major categories:

- Water supply, management, and distribution projects, and
- Land use development within and adjacent to the three geographic areas being analyzed, the SWP area, the WRMWSD area, and the CLWA area.

The analysis of the water supply, management, and distribution projects principally addresses the amount and timing of diversions from the Delta, manner in which water is conveyed and stored in the SWP and associated facilities, and its eventual use. Since the specific magnitude, location, and timing of impacts from these projects is anticipated to vary from year to year or is not yet known, the cumulative impact analysis is qualitative. Individual water and land use development projects are evaluated for cumulative impacts in combination with the direct effects of the Project. Additionally, where the Project would have indirect growth-related effects (i.e., in the CLWA service area), the potential for cumulative indirect impacts resulting from projected growth associated with both water and land development projects is evaluated, as well.

## 6.3 ANALYSIS OF CUMULATIVE IMPACTS

This section describes the projects included in the cumulative impact analysis, the status of their environmental documentation, anticipated environmental impacts of those projects (identifying only those resources that also would be affected by the Project), and the potential cumulative impacts of those projects in combination with the Project. Projects are grouped according to the geographic area affected. Projects with environmental effects that extend over more than one geographic area are discussed in each of the applicable regions and only as to the resources that

are potentially affected. The analysis addresses impacts from large-scale water management programs (e.g., the CALFED Bay Delta Program [CALFED] discussed in section 6.3.1.1 below) that may affect environmental resources and projects that tier from those programs (e.g., the Environmental Water Account Project [EWA] discussed in section 6.3.1.2 below) that are sufficiently mature to have definable impacts.

### 6.3.1 Other Projects Affecting the SWP and Associated Facilities

The following are water supply, management, and distribution projects that could affect the SWP and associated facilities. As discussed in the preceding sections of this EIR, the Project would result in no significant impacts and no indirect impacts to environmental resources within and adjacent to SWP facilities. It would, however, have less than significant impacts that, which when considered and combined with other projects might have a significant effect on the environment. The less than significant impacts identified are: to aesthetics (minor seasonal changes in the volume of water stored in San Luis Reservoir); air quality (increased air emissions from the generation of additional electrical power to move water from WRMWSD to CLWA and increased fugitive dust emissions from exposed soil at San Luis Reservoir); cultural resources (minor seasonal changes in the volume of water stored in San Luis Reservoir could expose submerged cultural resources); geology and soils (minor seasonal changes in the volume of water stored in San Luis Reservoir could expose more soil to wind and water erosion); utilities and service systems (energy) resources (additional electricity would be required to convey water to CLWA); and water resources (minor changes in the timing of diversion of water from the Delta, amount of water transported in SWP facilities, and minor temporal changes in storage volume of SWP reservoirs). Thus, other projects that could affect these resources might contribute to a cumulative impact when considered in combination with the Project.

#### *6.3.1.1 CALFED Bay Delta Program (CALFED)*

*Project Description*

The CALFED Bay Delta Program is an association of agencies and stakeholders whose goal is to develop and implement a long-term plan to address chronic water supply and environmental problems in the Sacramento-San Joaquin River Delta and San Francisco Bay. This association has developed a Program Action Plan that provides a framework for the implementation of projects within the CALFED Program. The major program components are ecosystem restoration; water supply reliability (including water use efficiency, water transfers, watershed management, water storage, and water conveyance); water quality; and levee system integrity.

*Environmental Analysis Status and Anticipated Impacts*

An EIS/EIR was prepared for this project in 1999 and a Record of Decision (ROD) was published on August 28, 2000. In April 2003, a Sacramento Superior Court upheld the EIR and its certification under CEQA. (*Bay-Delta Programmatic Environmental Impact Report Coordinated Proceedings* [SCSC Case No. JC04152] May 5, 2003.) Two Notices of Appeal have been filed from the Judgment in this Coordinated case (Case No. C044267 on June 6, 2003 and Case No. C044577 on July 7, 2003).

*Cumulative Impacts with the Project*

The CALFED EIS/EIR identified potential impacts to the following environmental resources in and adjacent to the Delta, some of which also would be affected by the Project: aesthetics, air quality; cultural resources; geology and soils; utilities and public services; and water resources.

AESTHETIC RESOURCES

CALFED would affect aesthetic resources in the following ways: (1) long-term visual effects of new facilities or modified existing facilities; (2) effects in visually sensitive areas from restoration actions; (3) degraded watershed views from such actions as erosion control and fire management practices; (4) creation of borrow pits or spoils material disposal sites associated with storage, conveyance, levee projects, and other CALFED actions; and (5) long-term visual effects from construction activities extending more than 5 years. Project impacts would not compound or increase these impacts because Project-related impacts would be minor, seasonal in nature, and would generally not occur in the same areas as aesthetic impacts of CALFED. Therefore implementation of the Project in combination with CALFED would not have a cumulative impact to aesthetic resources.

AIR QUALITY

CALFED would affect air quality in the following ways: (1) direct, short-term air pollutant emissions during construction activities; (2) fugitive wind-blown dust emissions; (3) emissions associated with prescribed burning programs described in the CALFED Final EIS/EIR; (4) emissions from increases in equipment use and cultivation, agricultural chemical use, and crop shifting and burning; (5) emissions if land use changes lead to higher recreational uses; and (6) emissions from use of fossil fuels or other energy resources associated with pressurized irrigation systems; and (7) indirect air quality impacts from increased power generation (associated with pressurized irrigation systems) to meet CALFED energy consumption and changes in operation. The indirect impacts of increased power generation of the Project and CALFED would result in a less than significant cumulative impact to air quality because the Project and CALFED would utilize existing power plants that are already permitted, and no new power generation facilities would be required for either the Project or CALFED. Additionally, because the changes in storage of water in San Luis Reservoir that would result from the Project would fall within the range of fluctuations present under both current and historic operations, and would not produce fugitive dust emissions from exposed shorelines that differ from historic levels, cumulative impacts would be less than significant.

CULTURAL RESOURCES

CALFED would affect cultural resources in the following ways: (1) site-specific effects during construction, excavation, filling and flooding; and (2) alteration of historic setting of cultural resources. Project impacts would not compound or increase these impacts because the Project would not result in construction-related cultural resource impacts. Additionally, the Project would result in only minor impacts to cultural resources in San Luis Reservoir from lake elevation fluctuations that are within the range of fluctuations present under both current and historic operations and would not result in an alteration of the historic setting of cultural resources in the reservoir. Therefore the Project would not have a cumulative impact to cultural resources.

GEOLOGY, SOILS, AND MINERALS

CALFED would affect these resources in the following ways: (1) conversion of agricultural land soils for levee system construction and potential for erosion on outboard slope of levees; (2) increases in local subsidence from potential increased reliance on groundwater use; (3) increases in wind and soil erosion and in soil salinity due to fallowed agricultural lands; (4) increased construction-related short-term soil erosion, and increased sediment deposition and soil compaction; (5) potential changes in downstream geomorphology from enlarging existing storage facilities and other CALFED actions; and (6) ground disturbance, inundation, seepage, and shoreline wind- and wave-generated erosion from new storage facilities and other CALFED actions. The Project would result in minor changes to timing of water stored in San Luis Reservoir, but this would not compound or increase the impacts of CALFED because the Project impacts would be minor and lake elevation fluctuations would be within the range of fluctuations present under both current and historic operations. Therefore implementation of the Project in combination with CALFED would not have a cumulative impact to geologic, soil, and mineral resources.

UTILITIES AND PUBLIC SERVICES

CALFED would affect these resources in the following ways: (1) modify major infrastructural components (i.e., pipelines and powerlines) may need to be relocated or modified; and (2) increased risk of pipeline rupture during construction. Project impacts would not compound or increase these impacts because the Project would be implemented using existing SWP facilities and no modification or construction of facilities would occur. Therefore the Project would not have a cumulative impact on utilities and public services.

WATER RESOURCES

CALFED would temporarily affect surface water supplies and management characteristics by increasing turbidity during construction of CALFED facilities, levee construction and maintenance, and during habitat restoration activities. These impacts would not compound or increase with Project impacts because the Project would not require construction activities that would increase turbidity or otherwise affect water supplies and management. The Project would result in changes in the timing of diversions from the Delta, but because these changes would be minor and would not change the total amount diverted, cumulative impacts would be less than significant.

#### *6.3.1.2 Environmental Water Account Project (EWA)*

*Project Description*

The EWA is a cooperative water management program designed to provide protection to at-risk native fish species of the Delta estuary while improving water supply reliability for water users. Such a program was identified in the 2000 CALFED Programmatic ROD. The EWA program makes environmentally beneficial changes in the operations of the SWP and the CVP at no uncompensated water loss to the CVP and SWP water users. The protective actions for at-risk native fish species proposed as part of the EWA would range from reducing Delta export pumping to augmenting instream flows and Delta outflows. Beneficial changes in SWP and CVP operations could include changing the timing of some flow releases from storage and the

timing of water exports from the Delta pumping plants to coincide with periods of greater or lesser vulnerability of various fish species to environmental conditions in the Delta.

The purpose and need for the EWA project is to (1) provide a highly flexible, immediately implementable water management strategy that protects the at-risk native Delta-dependent fish species affected by SWP/CVP operations and facilities; (2) contributes to the recovery of these fish species; (3) allows timely water management responses to changing environmental conditions and changing fish protection needs; (4) improves water supply reliability for water users downstream from the Delta; and, (5) does not result in uncompensated water cost to the SWP's water users.

*Environmental Analysis Status and Anticipated Impacts*

The USBR and DWR published a Draft EIS/EIR in July 2003 that identifies a range of alternatives that could affect the following environmental resources that also could be affected by the Project: aesthetics, air quality, cultural resources, geology and soils, and utilities and service systems. The Final EIS/EIR was released in January 2004.

*Cumulative Impacts with the Project*

AESTHETIC RESOURCES

EWA would affect aesthetic resources by decreasing water levels in CVP and SWP reservoirs and non-CVP and SWP reservoirs. Consequently, scenic quality could be impacted at some SWP reservoirs south of the Delta that could also be impacted from the Project. However, the natural hydrology and pattern of Delta exports in combination with CVP and SWP Contractors' water demands already result in substantial reservoir level fluctuations and the combined change in fluctuation would not perceptibly change the scenic qualities. Additionally, the changes that would result from the Project and from EWA would be minor. Therefore, the Project would have a less than significant cumulative impact to aesthetic resources.

AIR QUALITY

EWA would affect air quality in the following ways: (1) direct, short-term air pollutant emissions from diesel-powered groundwater pumps, and (2) fugitive emissions of wind-blown dust for the idling of crops. The Project would result in increased air emissions from the generation of additional electrical power to move water from WRMWSD to CLWA and increased fugitive dust emissions from exposed soil at San Luis Reservoir. However, existing power plants that are already permitted would be used and no new power plants would be constructed. Additionally, the changes in storage in San Luis Reservoir that would result from the Project would be minor and fall within the range of fluctuations present under both current and historic operations. Therefore, the Project would have a less than significant cumulative impact to air quality.

CULTURAL RESOURCES

EWA acquisition of water from non-CVP or SWP reservoirs would lower water levels, thereby exposing potential cultural resources that would normally be inundated. Project impacts would compound or increase these impacts. However, the natural hydrology and pattern of

Delta exports in combination with CVP and SWP Contractors water demands already results in substantial reservoir level fluctuations and the combined change in fluctuation would less than significant. Therefore the Project would have a less than significant cumulative impact to cultural resources.

GEOLOGY, SOILS, AND MINERALS

EWA would affect local soils by the idling of crops. Project impacts would not compound or increase these impacts. Therefore the Project would not have a cumulative impact to geologic, soil and mineral resources.

UTILITIES AND SERVICE SYSTEMS

The storage and release of water from reservoirs for the EWA would alter the timing of hydroelectric power production. While the alteration of timing would be expected to somewhat overlap with the Project-related increased demands for electricity, Project impacts would compound or increase these impacts. However, the Project would have a less than significant cumulative impact to utilities and service systems because anticipated power supplies available or planned should be sufficient to meet demands in California and no expansion or construction of new electrical power generation facilities would be required.

WATER RESOURCES

EWA would temporarily affect surface water supplies and management characteristics by acquiring water (1) stored in non-CVP or SWP reservoirs after operators of those reservoirs have addressed refill criteria considering carryover storage and the potential for future hydrologic conditions, or (2) participating in a consumption reduction action with willing sellers able to idle agricultural water use. These actions would change the timing and amount of flows into the Delta and exports from Delta diversion facilities. These impacts would tend to ameliorate and not compound or increase with Project impacts.

EWA would affect water quality in the Delta by changing the timing of flows in the Delta. EWA would reduce Delta exports from December through June, thereby reducing the effects of seawater inflows. EWA fish actions would shift Delta exports from spring to later in the year in the same manner as the Project. This would produce a less than significant beneficial effect.

#### *6.3.1.3 State Water Resources Control Board Decision 1641 – Bay/Delta Water Quality Control Plan (Decision 1641)*

*Project Description*

Decision 1641 is an action by the SWRCB to establish water quality objectives for water uses in the Delta. The Bay/Delta Water Quality Control Plan was developed as a means to attain these water quality objectives and includes the following components: implementation of flow objectives for specific water quality criteria in the Bay-Delta Estuary; a petition to change the point of diversion for the Central Valley Project (CVP) and SWP in the southern Delta; and a petition for change in place of use and purpose of use of the Central Valley Project.

*Environmental Analysis Status and Anticipated Impacts*

The EIR for Decision 1641 was certified in 1999, and the SWRCB adopted Decision 1641 in December 1999. The Bay/Delta Water Quality Control Plan increases the quantity of water dedicated to protection of aquatic resources in the Delta. Consequently, water deliveries available for municipal and agricultural uses from the Delta and the SWP decline. Over the long term, annual average delivery reductions would be approximately 350,000 AF. Infrequently, in critically dry periods, the annual delivery reductions would be approximately 800,000 AF. This water would remain in the waterways of the Delta and would thus improve water quality. These reductions were considered in the analysis of the Project's impacts. Potential impacts were identified for the following resources that also would be affected by the Project: aesthetics; air quality; cultural resources; utilities and service systems (energy resources); and surface water supply.

*Cumulative Impacts with the Project*

AESTHETIC RESOURCES

Decision 1641 would affect aesthetic resources in the following ways: (1) changes in flow could have the effect of lowering water levels in reservoirs upstream of the Delta earlier in the season, for longer periods, or below the levels than would otherwise occur; and (2) lower water levels in some SWP and CVP reservoirs. Consequently, scenic quality could be impacted at some reservoirs upstream of the Delta and SWP and CVP reservoirs located south of the Delta. Project impacts would compound or increase these impacts to SWP and CVP reservoirs from the Delta to Castaic Lake, including San Luis Reservoir, which is a shared SWP and CVP facility. However, the natural hydrology and pattern of Delta exports in combination with CVP and SWP contractors' water demands already result in substantial reservoir level fluctuations and the combined change in fluctuation would not perceptibly change the scenic qualities. Additionally, the changes that would result from the Project and from Decision 1641 are minor. Therefore the Project would have a less than significant cumulative impact to aesthetic resources.

AIR QUALITY

The increased groundwater pumping to replace surface water supplies would lead to increased pumping lifts and increases in energy consumption, thereby increasing air pollution. However, no expansion or construction of new electrical power generation facilities would be anticipated and all existing and proposed electrical generation facilities would operate within existing permitted levels. The indirect impacts of increased power generation of the Project and Decision 1641 would result in a less than significant cumulative impact to air quality.

CULTURAL RESOURCES

Decision 1641 would affect cultural resources in the following ways: (1) changes in flow could have the effect of lowering water levels in reservoirs upstream of the Delta earlier in the season, for longer periods, or below the levels than would otherwise occur; and (2) lower water levels in some SWP and CVP reservoirs south of the Delta. Consequently, cultural resource subject to inundation could be impacted at some reservoirs upstream of the Delta and SWP and CVP reservoirs located south of the Delta. Project impacts would compound or increase these

impacts to SWP reservoirs from the Delta to Castaic Lake, including San Luis Reservoir, a shared SWP and CVP facility. However, the natural hydrology and pattern of Delta exports in combination with CVP and SWP Contractors water demands already results in substantial reservoir level fluctuations and the combined change in fluctuation would less than significant. Additionally, the changes that would result from the Project and from Decision 1641 are minor. Therefore, the Project would have a less than significant cumulative impact to cultural resources.

UTILITIES AND SERVICE SYSTEMS

Implementation of Decision 1641 results in higher net hydropower generation by the SWP and the CVP because exports would be somewhat reduced. The increased groundwater pumping to replace surface water supplies (described in the previous section) would lead to increased pumping lifts and increases in energy consumption. However, no expansion or construction of new electrical power generation facilities is anticipated. Project impacts would compound or increase these impacts by increasing the demand for electrical power generation. However, the Project would have a less than cumulative impact on utilities and service systems because anticipated power supplies available or planned should be sufficient to meet demands in California, and no expansion or construction of new electrical power generation facilities would be required.

WATER RESOURCES

The project would result in changes in the timing of diversions from the Delta, and Decision 1641 also would result in changes in the timing of diversions from the Delta or an overall reduction in the amount of water diverted. Surface water supply operations of the Project would be consistent with the implementation of Decision 1641 and would therefore not compound or increase the impacts of Decision 1641.

#### *6.3.1.4 Central Valley Improvement Act Project (CVPIA)*

*Project Description*

In addition to reauthorizing the CVP and mandating the renegotiation of water supply contracts, the CVPIA identified the protection, restoration, and enhancement of fish, wildlife, and associated habitats in the Central Valley. It established a requirement for the acquisition of water for protecting, restoring, and enhancing fish and wildlife populations.

*Environmental Analysis Status and Anticipated Impacts*

The U.S. Bureau of Reclamation (USBR) evaluated the CVPIA in a Programmatic EIS (USBR 2001) and a series of related project-specific evaluations (e.g., water delivery contract renewal NEPA evaluations). The Programmatic EIS identified potential impacts to the following environmental resources in and adjacent to the Delta, some of which also would be affected by the Project: cultural resources, utilities and service systems, and water resources. However, CVPIA potential effects to cultural resources were identified but could not be quantified until project-specific evaluations were conducted.

*Cumulative Impacts with the Project*

Project-related impacts to utilities and service systems would contribute to the impacts of CVPIA to these resources. CVPIA affects utilities (energy resources) as a result of changes in operations that shift patterns of power generation, resulting in a reduction in hydroelectric power generation. Project impacts would compound or increase these impacts by increasing the demand for electrical power generation. However, the Project would have a less than significant cumulative impact to utilities and service systems because anticipated power supplies available or planned should be sufficient to meet demands in California and all existing and proposed electrical generation facilities would operate within existing permitted levels.

CVPIA effects to surface water supplies and management include (1) reductions in deliveries from the Trinity River basin to the Sacramento River basin; (2) increased releases from Shasta Lake; (3) increased flows on Clear Creek (near Redding, California) in non-critical years; (4) changes in release from Folsom Lake to stabilize flows in the American River; and, (5) increased instream flows in non-critical years on the Stanislaus River. These impacts would not compound or increase with Project impacts because the Project would not affect these areas.

#### *6.3.1.5 Monterey Amendment*

*Project Description*

The Monterey Amendment describes a project that would amend the Water Supply Contracts between DWR and the SWP Contractors to improve the management of SWP supplies and operations. Additional discussions of the Monterey Amendment are provided in section 1.2.2, section 3.15, section 6.3.2.5, section 6.3.3.4, and Appendix D. The 41,000 AF transfer associated with the Project represents a portion of 130,000 AF of Agricultural Table A Amounts made available for permanent sale to M & I Contractors as part of the Monterey Amendment. The Project could also be completed under terms of the CLWA Water Supply Contract prior to the implementation of the Monterey Amendment.

*Environmental Analysis Status and Anticipated Impacts*

An EIR is being prepared to evaluate the potential environmental impacts of both the Monterey Amendment and the additional program components specified in the Settlement Agreement (see section 1.2.2 for a more detailed discussion of the Settlement Agreement). The NOP for the Monterey Agreement EIR does not specify the environmental resources to be addressed in the EIR or anticipated impacts of the project. Based on comment letters responding to the NOP, however, impacts to the following environmental resources in and adjacent to the Delta and SWP facilities that also would be affected by the Project include aesthetics, air quality, cultural resources, geology and soils, utilities and service systems, and water resources.

*Cumulative Impacts with the Project*

Impacts of the Monterey Amendment would vary depending on the various components and the location of their implementation. Impacts to the Delta and SWP facilities of the Agricultural to M&I water transfer components of the Monterey Amendment vary depending on the

location of the receiving agency (KCWA and its member units have committed to sell the 130,000 AF of Agricultural Table A Amounts) to M & I Contractors.

- Receiving agencies using the North Bay Aqueduct (e.g., Napa County Flood Control and Water Conservation District and Solano County Water Agency) would not utilize facilities south of that point of diversion and would decrease average demands on the Delta facilities and those south of the Delta. These impacts would not compound or increase with the Project impacts.
- Receiving agencies using the South Bay Aqueduct (e.g., Alameda County Flood Control and Water Conservation District, Zone 7) would continue to use pumping facilities in the Delta but would reduce average demands on facilities below where the South Bay Aqueduct braches off the California Aqueduct (approximately the City of Tracy or the end of Reach 2 of the California Aqueduct). These impacts would compound or increase with the Project impacts associated with the Delta pumping facilities but would not compound or increase with the Project impacts below Reach 2.
- Receiving agencies south of Kern County would utilize many of the same facilities as the Project (e.g., San Luis Reservoir, the same reaches of the California Aqueduct, and the same pumping facilities), and impacts to those facilities are likely to be similar to those created by the Project. Projects that that would affect these facilities include transfers from districts within Kern County to districts in southern California (e.g., to Mojave Water Agency and Palmdale Water District). These impacts would compound or increase with the Project impacts.

AESTHETIC RESOURCES

Table A Amount transfers would affect aesthetic resources by changing water levels in SWP reservoirs in a manner similar to the Project. Consequently, scenic quality would be impacted at some reservoirs. Project impacts would compound or increase these impacts. However, the natural hydrology and pattern of Delta exports in combination with SWP demands already results in substantial reservoir level fluctuations and the combined change in fluctuation would not perceptibly change the scenic qualities. Therefore, the Project would have a less than significant cumulative impact to aesthetic resources.

AIR QUALITY

Implementation of the Monterey Amendment would increase the amount of pumping in the SWP facilities and thereby adversely affect air quality by increasing the amount of air emissions necessary to generate electricity. Project impacts would compound or increase these impacts by increasing the demand for electrical power generation. However, the Project would have a less than cumulative impact air quality because anticipated power supplies available or planned should be sufficient to meet demands in California and all existing and proposed electrical generation facilities would operate within existing permitted levels.

CULTURAL RESOURCES

Table A Amount transfers would affect cultural resources by changing water levels in SWP reservoirs in a manner similar to the Project. Consequently, potential cultural resources normally inundated would be exposed and could be impacted at some reservoirs. Project

impacts would compound or increase these impacts. However, the natural hydrology and pattern of Delta exports in combination with SWP demands already results in substantial reservoir level fluctuations and the combined change in fluctuation would not perceptibly change reservoir water levels. Therefore the Project would have a less than significant cumulative impact to cultural resources.

GEOLOGY, SOILS, AND MINERALS

Table A Amount transfers would affect geology, soils, and mineral resources by changing water levels in SWP reservoirs in a manner similar to the Project. Consequently, soils and mineral resources that would normally be inundated would be exposed and could be eroded at some reservoirs. Project impacts would compound or increase these impacts. However, the natural hydrology and pattern of Delta exports in combination with SWP demands already results in substantial reservoir level fluctuations and the combined change in fluctuation would not perceptibly change reservoir water levels. Therefore the Project would have a less than significant cumulative impact to geology, soils and mineral resources.

UTILITIES AND SERVICE SYSTEMS

Implementation of the Monterey Amendment would increase the amount of pumping in the SWP facilities and thereby increase demand for electricity. Project impacts would compound or increase these impacts by increasing the demand for electrical power generation. The Project would have a less than cumulative impact on utilities and service systems since anticipated power supplies available or planned should be sufficient to meet demands in California and no expansion or construction of new electrical power generation facilities would be required.

WATER RESOURCES

Table A Amount transfers would affect surface water management and supply characteristics by slightly changing (1) the timing of water pumped from the Delta and, and (2) the timing of water withdrawals from SWP reservoirs. Consequently, springtime flows in the Delta would be greater and reservoir water levels would remain higher for a longer period of time at some reservoirs. Project impacts would compound or increase these impacts. However, the Project and the Monterey Amendment would not change the operating criteria for diversions from the Delta, and the changes in timing of Delta diversions would occur infrequently and would result in only minor changes to Delta diversions within the applicable environmental and regulatory constraints. Additionally, changes in timing of water withdrawals in SWP reservoirs would be within the substantial differences in San Luis Reservoir storage that occur in normal SWP operations over the course of the year and from year to year. Therefore the Project would have a less than significant cumulative impact on water resources.

#### *6.3.1.6 Sacramento Valley Water Management Agreement (SVWMA)*

*Project Description*

The SWRCB has engaged in several years of proceedings regarding the responsibilities for meeting flow-related water quality standards for the Delta (established in Decision 1641). In order to resolve and expedite this process, the parties of concern (including DWR, USBR, water right holders in the Sacramento Valley, and SWP and DWR Contractors) entered into the

SVWMA in April 2001. The SVWMA establishes a process to develop and implement a variety of local water management projects that will increase supplies in order to meet both in-basin demands and the water quality requirements for the Delta. The SVWMA will be implemented by a series of work plans facilitating groundwater management and planning, water conservation and efficiency, fish passage improvements, water transfers and exchanges, flood protection, conjunctive use and other environmental improvements (SVWMA 2002).

*Environmental Analysis Status and Anticipated Impacts*

Planning for an environmental evaluation under both CEQA and NEPA is underway. Since the SVWMA is a specific agreement to help satisfy the requirements of Decision 1641 the impacts of the SVWMA are anticipated to be similar to and less that those described for the Decision 1641 project. Potential impacts are anticipated for the following resources that also would be affected by the Project: aesthetics, air quality, cultural resources, utilities and service systems (energy), and, surface water supply. These impacts would primarily be a result of construction and other water management actions in the Sacramento Valley. However, the SVWMA would shift some of the burden for meeting water quality requirements in the Delta from SWP and CVP Contractors to water users in the Sacramento Valley thereby allowing for additional water exports to SWP and CVP Contractors south of the Delta.

*Cumulative Impacts with the Project*

The SVWMA would offset some of the impacts of Decision 1641 in the Delta and south of Delta because it would make more water available for environmental uses within the Delta, thereby allowing SWP and CVP water currently used for environmental purposes in the Delta to be exported to water users south of the Delta. Construction-related impacts of the SVWMA would occur outside of the area potentially affected by the Project and therefore would not be cumulative. The SVWMA's effects in the Delta would be beneficial. Therefore, no cumulative impacts would occur.

#### *6.3.1.7 San Luis Reservoir Low Point Improvement Project*

*Project Description*

The San Luis Reservoir Low Point Improvement Project would address the water quality issues associated with low water levels in the San Luis Reservoir (i.e., when the water level gets too low, excessive algae is produced, which creates water quality, reliability, and operational impacts on the CVP and to some SWP contractors). The problems presently include additional operating costs, risks to public health and safety from interruption in water supply, and economic losses to agriculture and industry. There are also significant opportunity costs to the CVP and SWP as a result of their inability to fully utilize all of the available storage in the reservoir that would increase in the future if the low point occurred more frequently and for a longer duration. In recognition of the need to resolve the low point problem, the San Luis Reservoir Low Point Improvement Project was included in the August 2000 CALFED Bay-Delta Program's ROD as a complementary conveyance action. The ROD referred to a bypass canal to the San Felipe Unit at the San Luis Reservoir as one complementary action. The bypass canal would allow the San Felipe Division contractors to receive water directly from the Delta pumping facilities and increase the effective storage capacity in San Luis Reservoir up to 200,000 AF.

*Environmental Analysis Status and Anticipated Impacts*

The Santa Clara Valley Water District and the USBR issued an NOP in August 2002. The NOP identified a range of alternatives that could affect the following environmental resources that also would be affected by the Project: air quality, cultural resources, geology, soils and minerals, and utilities and service systems.

*Cumulative Impacts with the Project*

The Project would result in less than significant impacts to aesthetics, cultural resources, geology and soils, and water resources associated with temporal changes in San Luis Reservoir's water elevation as a result of changes in the timing of deliveries to the reservoir. The Low Point project would reduce water levels and result in a larger, more effective storage capacity and better water quality in San Luis Reservoir. Because the Project would delay the removal of water from San Luis Reservoir (thereby ameliorating or delaying a portion of the impacts of the Low Point project) there would be less than significant cumulative impacts on these resources.

AESTHETIC RESOURCES

Scenic qualities at San Luis Reservoir could be impacted due to decreasing water levels associated with the Low Point project. Project impacts would compound or increase these impacts at certain times and reduce or ameliorate these impacts at other times. The natural hydrology and normal pattern of Delta exports in combination with SWP demands already results in substantial fluctuations in water levels (and associated aesthetic impacts) in San Luis Reservoir. The combined change in fluctuation would not perceptibly change the scenic qualities. Therefore the Project would have a less than significant cumulative impact to aesthetic resources.

AIR QUALITY

Implementation of the bypass canal alternative of the Low Point project would affect air quality by increasing the amount of air emissions necessary to generate electricity because additional electricity would be needed to pump water in the bypass canal. No expansion or construction of new electrical power generation facilities would be anticipated. Project impacts would compound or increase these impacts by increasing the demand for electrical power generation. However, the Project would have a less than cumulative impact on air quality because anticipated power supplies available or planned to meet demands in California and all existing and proposed electrical generation facilities would operate within existing permitted levels.

CULTURAL RESOURCES

The Low Point project would lower water levels in San Luis Reservoir, thereby exposing potential cultural resources that would normally be inundated. Project impacts would compound or increase these impacts under certain conditions for limited periods of time. However, the natural hydrology and pattern of Delta exports in combination with SWP demands already result in substantial reservoir level fluctuations. The combined change in fluctuation would be within current operational limits and would result in a less than significant impact to cultural resources.

GEOLOGY, SOILS, AND MINERALS

The Low Point project would affect geology, soils, and mineral resources in and adjacent to San Luis Reservoir by allowing water levels to be reduced below the current 300,000 AF pool under normal operational. Consequently, soils and mineral resources that would normally be inundated would be exposed and could be eroded. The Project would result in changes to the timing of storage of water in San Luis Reservoir and the Project's impacts would compound or increase impacts of the Low Point project. However, the natural hydrology and pattern of Delta exports in combination with SWP demands already result in substantial reservoir level fluctuations and the Project's contribution to the change in fluctuation would not perceptibly change reservoir water levels. Therefore, the Project would have a less than significant cumulative impact on geology, soils, and mineral resources.

UTILITIES AND SERVICE SYSTEMS

The storage and release of water from San Luis Reservoir for the Low Point project and alternatives would alter the timing of pumping demands and hydroelectric power production from releases from San Luis Reservoir. Project impacts would compound or increase these impacts. However, the Project would have a less than cumulative impact on utilities and service systems because anticipated power supplies available or planned should be sufficient to meet demands in California and no expansion or construction of new electrical power generation facilities would be required.

WATER RESOURCES

The Low Point project would affect surface water supplies and management characteristics by reducing the amount of water stored in San Luis Reservoir to meet export and environmental demands. These actions would change the timing and amount of flows into the Delta and exports from Delta diversion facilities. The Project would result in minor changes to the timing releases of water stored in San Luis Reservoir and minor changes in the timing of diversions from the Delta. Because these changes would be minor and would not alter the historical fluctuation amounts they would not substantially contribute to the impacts of the Low Point project. The Project would have a less than significant cumulative impact to water resources.

#### *6.3.1.8 South Delta Improvement Project (SDIP)*

*Project Description*

DWR and USBR are proposing the SDIP, which would increase the maximum allowable diversion capacity at the SWP's Clifton Court Forebay, provide an adequate water supply for South Delta Water Agency (SDWA) and improve conditions for San Joaquin River salmon in the southern portion of the Delta.

The SDIP would include the following components: increasing the maximum allowable diversion capacity at Clifton Court Forebay to 8,500 cubic feet per second (the same as that

identified in the "Delta Improvements Package")[1]; dredging portions of Old River and West Canal to improve conveyance capability during periods of high SWP and CVP Delta exports; constructing permanent operable barriers to improve water supply reliability and water quality in the south Delta; dredging local channels to reduce the frequency of barrier operations and to accommodate improvements to existing agricultural diversions both upstream and downstream of the proposed barriers; and constructing a permanent operable fish control structure at the head of Old River to reduce fish losses at the CVP and SWP export facilities.

The SDIP would result in increased water supply reliability for SWP, CVP, and the EWA (see section 6.3.1.2 above); increased water surface levels for SDWA agricultural water diverters; improved water quality for SDWA agricultural water diverters; improvement of conveyance capacity in portions of the south Delta; and improved conditions for San Joaquin River salmon.

*Project's Environmental Analysis Status and Anticipated Impacts*

DWR and USBR issued an NOP and NOI and held scoping meetings in October 2002. The Draft EIR/EIS is currently being prepared. The NOP identified issues for resolution including:

- physical and regulatory constraints limiting Clifton Court Forebay maximum allowable diversion rates;
- water supply availability for beneficial use within the SDWA service area; water supply availability from other programs and projects; effects of SWP and CVP export operations on San Joaquin River salmon;

The NOP also identified potential impacts to biology and water quality.

*Cumulative Impacts with the Project*

Although the SDIP EIR/EIS has not been completed, it is reasonable to assume that the SDIP would result in construction-related impacts, increased Delta diversions, and beneficial effects to SWP and CVP water supplies. The only construction-related impacts that could result in cumulative impacts with the Project would be air quality impacts. However, the Project would result in only minor air quality impacts and because the SDIP project's air quality impacts are expected to be temporary, cumulative impacts would be less than significant. Increased Delta diversions as a result of the SDIP would be conducted in a manner consistent with Decision 1641 and the Project's changes in the timing of diversions from the Delta would also be consistent with Decision 1641. Therefore, cumulative impacts of the Project and SDIP would be less than significant.

[1] The Delta Improvements Package is a proposed set of State Water Project/Central Valley Project (SWP/CVP) operating rules that may be evaluated and considered as part of a larger set of actions to improve the water supply reliability, water quality, and ecosystem health of the Bay-Delta system and includes increasing the SWP's pumping capacity to 8,500 cubic feet per second during periods when plentiful, high quality water is available.

#### 6.3.1.9 North Delta Improvement Project (NDIP)

*Project Description*

The channel system in several of the streams in the North Delta lacks capacity to convey flows from the upstream watershed through the Delta to the San Joaquin River and to the San Francisco Bay. In concert with the CALFED ROD, the NDIP is designed to implement flood control improvements in a manner that also contributes to ecosystem restoration, water quality, and water supply reliability concerns in the North Delta. The NDIP will improve water conveyance, improve water supply reliability, facilitate reductions in salinity, recommend ecosystem restoration actions, and improve levee stability and integrity while minimizing impacts to agricultural and recreation resources.

*Environmental Analysis Status and Anticipated Impacts*

The DWR and U.S. Army Corps of Engineers published an NOI/NOP for the EIS/EIR on this project in January 2003. The NOI/NOP identified a range of alternatives that could affect the following environmental resources that also would be affected by the Project: air quality, cultural resources, geology, soils and mineral resources, and water resources.

*Cumulative Impacts with the Project*

The impacts resulting from the NDIP would be primarily construction-related impacts. The only construction-related impacts that could result in cumulative impacts with the Project would be air quality impacts. However, the NDIP project's air quality impacts are expected to be temporary and the Project's indirect impacts to air quality would not compound or increase these impacts. The Project would have no cumulative impact to air quality. All other Project impacts would be in a different geographic location than those associated with the NDIP or would not involve ground disturbance and, therefore, no other cumulative impacts would result.

#### 6.3.1.10 16,000 AF Proposed Transfer of SWP Table A Amount From Kern County Water Agency, including Possible Annexations to CLWA

CLWA is studying a proposal to acquire additional SWP Table A Amount and to annex lands to the CLWA service area. This project is evaluated in this section because it would have the potential to adversely affect environmental resources associated with the use of SWP facilities. This project also is discussed in section 6.3.3.1 because it has the potential to affect environmental resources in the CLWA service area, as well.

*Project Description*

CLWA would acquire up to 16,000 AF of SWP Table A Amount from KCWA through an agreement with the Berrenda Mesa Water District (BMWD), thus increasing CLWA's SWP Table A Amount from 95,200 AF to up to 111,200 AF. The project would use existing SWP facilities to store and convey the water to CLWA. The 16,000-AF project would be completed either under the provisions of the Monterey Amendment or under the terms of CLWA's SWP water supply contract without the Monterey Amendment.

*Environmental Analysis Status and Anticipated Impacts*

CLWA issued a Draft EIR addressing the impacts of a smaller Table A Amount (9,500 AF) and proposed annexations in February 2000 (CLWA 2000). No Final EIR was issued. Subsequently, the Table A Amount transfer was increased to 16,000 AF and an NOP and Initial Study on the project were issued in July 2003. That NOP and Initial Study and the anticipated EIR (in-preparation) supersede the Draft EIR issued in February 2000.

According to the 2003 Initial Study, the 16,000 AF Transfer project would result in less than significant impacts to aesthetics, air quality, cultural resources, geology and soils, utilities/service systems (energy) resources, and water resources within and adjacent to SWP facilities. These impacts to resources within and adjacent to the SWP and associated facilities would be similar in nature to those described for the Project. The quantitative impact would be approximately 40 percent of the Project because the amount of water proposed for transfer is approximately 40 percent of the Project (16,000/41,000 = 0.39). These impacts would be included in those described as a permanent sale of an Agricultural SWP Table A from KCWA to the M & I Contractors under the Monterey Amendment south of KCWA, in section 6.3.1.5 above.

*Cumulative Impacts with the Project*

The Project's impacts would incrementally add to those of the 16,000 AF Transfer project. Cumulative impacts to the timing of diversions from the Delta would be less than significant because the two projects would result in only minor changes to the timing of Delta diversions and because these changes would be consistent with the water quality standards and operational constraints that govern Delta operations. Likewise, the cumulative impacts of these projects on aesthetics, cultural resources, and geology and soils associated with the SWP facilities would be less than significant because the overall changes to the timing of water stored in San Luis Reservoir would be minor (storage changes of less than 1 percent of average storage in most months and not more than 3 percent in any month for the Project and less than half of those amounts for the 16,000 AF Transfer project). Impacts to utilities/service systems (energy) resources would be cumulatively less than significant because the additional electrical energy would be acquired from the generation and supply reserve margins. These margins should be adequate to meet the reasonably foreseeable demands (CEC 2002b) and no expansion or construction of new electrical power generation facilities would be required.

### 6.3.2 Projects Affecting the WRMWSD

The Project impacts in the WRMWSD are associated with water resources. The Project would reduce WRMWSD's SWP Table A supply by approximately 17.2 percent, but this would not result in a material effect to WRMWSD's SWP water supply because this water would not otherwise be used. Under some conditions, this decrease in SWP water supply could result in increased reliance on other water sources and groundwater, but the impact would be less than significant. The Project would result in higher total dissolved solids (TDS) water used and recharged to local groundwater, but this would have a less than significant impact to water quality because increased use of other water and groundwater would be minor. The following projects are both land development and water supply, management, and distribution projects.

#### 6.3.2.1 Pastoria Power Plant

*Project Description*

The Pastoria Power Plant is a 750-megawatt natural gas-fired, combined cycle electric generating station presently under construction and located approximately 6.5 miles east of the Interstate 5/Pump Plant Road intersection. The plant is located on an approximately 31-acre site, approximately 1 mile north of the California Aqueduct and 1.3 miles north of the Edmonston Pumping Plant. The plant will connect with the Pastoria substation, located approximately 4,000 feet south of the proposed plant. Natural gas will be delivered to the project through an existing interstate natural gas pipeline that runs approximately 7 miles north of the plant site. The Pastoria Power Plant's annual average water demand of 2,443 gallons per minute (gpm) or approximately 3,750 AFY at 95 percent operation will be met by a contract with WRMWSD and a back-up water supply through a contract with the Kern Water Bank Authority (CEC 2000). Construction on the Pastoria Power Plant began in June 2001 and commercial operation is targeted for mid-2005 (Calpine 2002).

*Environmental Analysis Status and Anticipated Impacts*

WRMWSD issued a Notice of Exemption (NOE) for the water supply contract on June 29, 2000 (SCH # 2000068257). The Pastoria Power Plant project was certified and granted a license by the California Energy Commission (CEC) on December 20, 2000 (CEC 2002a). The environmental analysis described in the Application for Certification (CEC 2000) indicated that the project would result in the permanent loss of 36.1 acres of non-native grassland habitat due to the construction of the power plant and associated transmission line and access road, and the temporary loss of 124.5 acres of native and non-native grassland, which includes the construction laydown area and lands associated with the transmission line, access road, water supply pipelines, and a fuel gas supply pipeline. Environmental resources affected by the Pastoria Power Plant that would also be affected by the Project include water resources (surface water quality and drainage, and water supply).

*Cumulative Impacts with the Project*

WATER RESOURCES

The Pastoria Power Plant project would meet its water demand in most years through a contract with WRMWSD, which is "backed up" though a contract with the Kern Water Bank Authority. The water supply needed for the Pastoria Power Plant is small (3,750 AFY) in comparison to the overall supply of the WRMWSD. Additionally, WRMWSD has sufficient supplies to accommodate the demands of its customers without relying on the 41,000 AF of Table A Amount associated with the Project (personal communication, W. Taube 1997 and 2002). Significant but mitigable impacts to surface water quality and drainage related to earthmoving activities were identified in the power plant environmental analysis. The Project would not adversely affect surface water quality or drainage because the Project would not involve construction related activities. Therefore, the Project would have a less than significant cumulative impact to water resources.

#### 6.3.2.2 *Laval Farms Water Management and Exchange and WRMWSD Pump-Back*

*Project Description*

This project contains two components: (a) Laval Farms, the farming subsidiary of Tejon Ranchcorp (TRC) Water Management and Exchange, including water right applications to the SWRCB, and (b) WRMWSD's 850 Canal/Reservoir No. 1 Pump-back. The Water Management and Exchange component of the project would formalize the use of local water supplies to the extent feasible to meet TRC's water demand, for agricultural irrigation, livestock, and related operations on Tejon Ranch. The 850 Canal/Reservoir No. 1 Pump-back component of the project would reduce overall WRMWSD electrical power costs by reducing energy demands for pumping during on-peak hours and generating electrical energy during on-peak hours from SWP water stored in TRC's Reservoir No. 1.

The project is located in the southern portion of the San Joaquin Valley in Kern County. Approximately 8,200 acres of the project area are in the WRMWSD and are served by the C and D Laterals of WRMWSD's 850 Canal. Approximately 15,000 acres are part of Tejon Ranch's agricultural and range lands in the southeastern end of the San Joaquin Valley (a portion of these lands are located in the WRMWSD).

*Environmental Analysis Status and Anticipated Impacts*

A Notice of Preparation was issued for this project on November 15, 2001 and a Draft EIR for this project was released in late 2003 (SCH # 2001061013). It identified less than significant impacts to hydrology, water quality, and water supply, including a reduction in the duration and downstream extent of stream flows, minor changes in net groundwater recharge and groundwater levels in the White Wolf Sub-basin, and water quality and drainage impacts due to construction activities (WRMWSD 2003).

*Cumulative Impacts with the Project*

WATER RESOURCES

Under some conditions, the decrease in SWP water supply associated with the Project would result in increased reliance on other water sources and groundwater by users in WRMWSD. However, this would be a less than significant cumulative impact because these amounts are small relative to the total amount of water in storage in the Kern County Groundwater Basin and the White Wolf sub-basin, which underlie the WRMWSD. Also, groundwater levels in the portions of these basins underlying the service area generally have been increasing over time (BE 1995), indicating that the basins could sustain an increase in use under these limited conditions without resulting in a net deficit in aquifer volume or a lowering of the local groundwater table. The Laval Farms project would reduce the amount of net groundwater recharge and groundwater levels in the White Wolf Sub-basin, but net recharge and groundwater levels would continue to be positive (increasing). The Project would have a less than significant cumulative impact to water supply in WRMWSD and would not result in impacts to surface water drainage or flooding in the WRMWSD because it would not involve construction related activities. Thus, cumulative impacts would be less than significant. Minor impacts associated with increased TDS levels from the Project would compound with those of the Laval Farms project but both projects would result in minor impacts that would not

cumulative result in significant impacts to groundwater quality. Thus, the Project, in combination with the Laval Farms project, would have less than significant cumulative impacts to water quality.

#### *6.3.2.3 Tejon Industrial Complex East Specific Plan*

*Project Description*

Tejon Industrial Complex East (TICE) is a proposed 1,100-acre master-planned industrial complex on the east side of Interstate 5 at the Wheeler Ridge/Laval Road interchange, just north of the California Aqueduct. The project site currently consists of approximately 375 acres of previously irrigated vineyards in the central and northern portion of the site. The southern portion of the site abuts the California Aqueduct and is currently fallow land. The TICE would focus primarily on the needs of trucking, warehousing, and distribution industries. Under the TICE Specific Plan, approximately 990 acres of the site may be developed with industrial/warehouse uses (including associated roadways, landscaping, and parking areas), along with 110 acres of commercial uses, a 100-room hotel, and child-care facility. The site would utilize groundwater supplies in the White Wolf Sub-basin and SWP water (Kern County 2002). The area was annexed into the Tejon-Castac Water District (TCWD) and SWP water would be provided by TCWD.

*Environmental Analysis Status and Anticipated Impacts*

An NOP and Initial Study were issued by Kern County for the TICE Specific Plan in October 2001, and an EIR was completed in 2002 and certified in January 2003. The EIR (Kern County 2002a) identified less than significant impacts to hydrology and water quality due to increased runoff from impervious surfaces and/or groundwater contamination from abandoned oil wells, and a less than significant impact to groundwater from the White Wolf Sub-basin because the TICE would use groundwater as a possible water supply.

*Cumulative Impacts with the Project*

WATER RESOURCES

SWP water for TICE would come from the Table A Amount held by a separate member unit of KCWA, the TCWD. The TICE would also rely on groundwater, but because groundwater levels in the portions of the basins underlying WRMWSD have been generally increasing over time (BE 1995), the basins could sustain an increase in use under limited conditions without resulting in a net deficit in aquifer volume or a lowering of the local groundwater table. Similarly, implementation of the TICE Specific Plan would impact surface water quality and drainage from impervious surfaces and other surface water contaminants. These impacts to water quality would not be compounded or increased by the potential water quality impact associated with the Project because the Project would only result in a less than significant increase in TDS in groundwater. Further, the Project would not affect drainage in the WRMWSD. Therefore, the Project would have less than significant cumulative impacts to water resources.

#### 6.3.2.4 Tejon Industrial Complex West Specific Plan

*Project Description*

The Tejon Industrial Complex West (TICW) Specific Plan is a 350-acre master-planned industrial complex located between Interstate 5 on the east and Tecuya Creek on the west near the Wheeler Ridge/Laval Road interchange, and north of the California Aqueduct. The project includes the following: about 3,930,850 square feet of industrial/warehouse uses, two gas stations, up to four fast food restaurants with drive-throughs, one 5,000 square-foot high turnover restaurant with drive-through, one 6,000 square-foot sit-down restaurant, one motel, and two mini-marts. The project is currently approximately 50 percent completed. The TICW area was annexed into the TCWD and SWP water would be provided by TCWD; groundwater from the White Wolf Sub-basin would also be used as a water supply.

*Environmental Analysis Status and Anticipated Impacts*

The Final Environmental Impact Report (FEIR) for the project was completed in February 2000. Based on the Initial Study and NOP prepared for the project, either no significant impact or less-than-significant impacts were found for water resources and therefore, were not analyzed in detail in the FEIR. Based on the NOP, the TICW would result in a less than significant impact to groundwater from the White Wolf Sub-basin because the TICW would use groundwater as a possible water supply.

*Cumulative Impacts with the Project*

The Project and TICW in combination would have less than significant cumulative impacts to water resources. Although the Project would transfer water from WRMWSD, this water would not otherwise be used by WRMWSD and, therefore, no additional demands on groundwater would occur.

#### 6.3.2.5 Kern County Valley Floor Habitat Conservation Plan

*Project Description*

The Kern County Valley Floor Habitat Conservation Plan (VFHCP) is a program designed to conserve federally protected species, state protected species, and/or other species of concern within the VFHCP plan area. The objective of the VFHCP is to provide long-term protection of identified species while allowing for development and other land use changes within Kern County. The VFHCP plan area, generally described as the San Joaquin Valley floor, is bounded by San Luis Obispo County to the west, Kings and Tulare counties to the north, and the 2,000-foot elevation contour to the east and south, covering approximately 3,110 square miles.

*Project's Environmental Analysis Status and Anticipated Impacts*

An NOP for an EIR was issued by Kern County on November 11, 1997. However, this NOP is now obsolete due to changes in the project description and a new notice is to be issued in the future (personal communication, S. Strait 2003). A Notice of Intent (NOI) was issued by the U.S. Fish and Wildlife Service in October of 2002. The NOI states that the VFHCP will address the incidental take of 28 covered species, including the blunt-nosed leopard lizard [*Gambelia silas*],

Tipton kangaroo rat [*Dipodomys nitratoides nitratoides*], giant kangaroo rat [*Dipodomys ingens*], and San Joaquin kit fox [*Vulpes macrotis mutica*]. These wildlife species are listed as endangered under the federal Endangered Species Act. The VFHCP would have a compensation framework that encourages conservation of habitat areas and creates a system of conservation credits based on habitat quality. Credits are created by willing landowners and purchased by project proponents. Several compensation options are described in the VFHCP, including an option that would address incidental take of covered species that may occur as a result of certain activities associated with major land uses such as oil and gas, water systems, urban development, and public infrastructure. Potential impacts of the VFHCP may include impacts to water resources (treatment, storage, and conveyance systems) through the construction and maintenance of habitat.

*Cumulative Impacts with the Project*

The VFHCP may include construction and supply-related impacts to water resources through the treatment, storage, and conveyance systems for the construction and maintenance of habitat. Because the Project would not require construction activities, it would not have impacts to water resources from construction. Therefore, no cumulative impacts would occur. The Project would result in increased reliance on other water sources and groundwater. However, the total amount of water needed to implement the VFHCP is likely to be minor and the number of specific VFHCP projects that would be constructed within the WRMWSD is likely to be small. Therefore, cumulative impacts to water supply and groundwater of the VFHCP and the Project would be less than significant.

#### *6.3.2.6 Monterey Amendment*

*Project Description*

The Monterey Amendment describes a project that amends the Water Supply Contracts between DWR and the SWP Contractors to improve the management of SWP supplies and operations. More detailed discussions of the Monterey Amendment are provided in section 1.2.2, section 3.15, section 6.3.1.5, section 6.3.3.4, and Appendix D. The components of the Monterey Amendment evaluated in this section include the following:

- the permanent transfers of 130,000 AF of Agricultural to M & I (89,000 AF of SWP Table A Amounts from within Kern County), including the 41,000 AF of the Project;
- the permanent retirement of 45,000 AF of Table A Amount by Agricultural Contractors; and
- the transfer of the Kern Fan Element property to local control.

*Environmental Analysis Status and Anticipated Impacts*

As a result of the PCL Litigation Settlement Agreement, a new EIR is being prepared to evaluate the potential environmental impacts of both the Monterey Amendment and the additional program components specified in the Settlement Agreement. The NOP for the Monterey Agreement EIR does not specify the environmental resources to be addressed in the EIR or anticipated impacts of the project. Comment letters responding to the NOP, however,

expressed concern that impacts to water resources (water supply and groundwater) could occur in Kern County.

*Cumulative Impacts with the Project*

Impacts related to the Monterey Amendment components (the permanent transfers of water, the permanent retirement of water, and the transfer of the Kern Fan Element to local control discussed above) vary depending on the type of and location of its implementation. Impacts of the transfer of the Kern Fan Element property from DWR to local control and of the permanent retirement of the 45,000 AF of Table A Amount by Agricultural Contractors occurred prior to 1998 and are therefore considered in the existing environment. Preparation of the new EIR for the Monterey Amendment is still in its early stages, so there are no known changes proposed in the use of the Kern Fan Element property that would impact WRMWSD. Impacts of the 130,000AF Agricultural to M & I water transfer components of the Monterey Amendment vary depending on the location of the selling and receiving agency. All of the impacts of selling Table A Amounts from WRMWSD are included in the Project and, therefore, this component of the 130,000AF Agricultural to M & I water transfer is not considered a separate action and requires no cumulative impacts analysis.

#### *6.3.2.7 Proposed Projects in or Adjacent to the WRMWSD not Producing Cumulative Impacts*

The following projects were considered for inclusion in the cumulative analysis but not carried forward for the reasons noted:

- The San Emidio Specific Plan, a mixed-use new town planned for about 9,450 acres of land, is not included in this analysis because the project proponent has not gone forward with the proposed plan and potions of the lands have been sold or otherwise transferred ownership. Therefore, the project will likely not be developed.
- The Pastoria Energy Facility Expansion Project is not discussed here because the Application for Certification to the California Energy Commission was withdrawn and the project is not moving forward at this time.

### 6.3.3 Projects Affecting the CLWA Service Area

The only direct, adverse impact to the CLWA service would be a less than significant impact to hazards and hazardous materials resulting from an incremental increase in the use of chemicals for water treatment. Indirect impacts within the CLWA service area could occur because the Project would serve a portion of anticipated future growth and thus would indirectly cause impacts from new development. If all of the net water supply for the Project (41,000 AF) were used for anticipated future growth, it would be able to support between 9,500 and 35,600 new residential units (see Chapter 4, Growth-Inducing and Growth Related Impacts). Indirect impacts were identified for all resources analyzed in the present EIR (refer to Chapter 4). The projects described below consist of land development and water (supply, management, and distribution) projects.

#### 6.3.3.1 Other CLWA Projects

*16,000 AF Proposed Transfer of State Water Project Table A Amount From Kern County Water Agency, including Possible Annexations to CLWA*

PROJECT DESCRIPTION

This project is described above in section 6.3.1.10. Briefly, this project involves the transfer of up to 16,000 AF of SWP Table A Amount to CLWA from Berrenda Mesa Water District, a member unit of KCWA. This water would be used by CLWA to support anticipated future demands from proposed annexations to the CLWA service area and/or planned increases in water demand from future development. The cumulative impacts of this project are addressed in two places in this chapter because the project has the potential to affect environmental resources associated with SWP facilities as well as those within the CLWA service area.

ENVIRONMENTAL ANALYSIS STATUS AND ANTICIPATED IMPACTS

The CEQA status of this project is described in section 6.1.3.10. According to the 2003 Initial Study, the 16,000 AF Transfer project would result in indirect growth-related impacts similar to those of the Project (refer to Chapter 4). The quantitative impact would be approximately 40 percent of the Project since the amount of water proposed for transfer is approximately 40 percent of the Project (16,000/41,000 = 0.39).

CUMULATIVE IMPACTS WITH THE PROJECT

Project-related direct impacts related to hazards and hazardous materials would contribute to the impacts of 16,000 AF transfer project to these resources. The 16,000 AF transfer project would increase the direct use of hazardous chemicals and other material by CLWA during the raw water treatment process. Project impacts would compound or increase these impacts. However, these substances would be handled in compliance with applicable laws and regulations. Therefore, the Project would have a less than significant cumulative impact to hazards and hazardous materials.

Project-related indirect impacts to all environmental resources would contribute to the indirect impacts of 16,000 AF transfer project to these resources. The 16,000 AF transfer project would remove an obstacle to growth in the CLWA service area by providing a reliable water supply that would be available for future development of approximately 3,700 to 13,900 dwelling units within the CLWA service area or in the proposed annexation areas. This future development would impact the full range of environmental resources, as described in Chapter 4. Project impacts (providing a reliable water supply that would be available for future development of approximately 35,600 dwelling units within the CLWA service area) would compound or increase these impacts. Therefore, the Project would have a significant cumulative indirect impact to all environmental resources.

*Expansion of Rio Vista Water Treatment Plant (RVWTP)*

PROJECT DESCRIPTION

This project would expand the pumping capacity at the existing pump station and the water treatment capacity at the existing RVWTP site. The existing facility is located on Bouquet Canyon Road on approximately 600 acres near the CLWA Administration Building. The plant was designed to facilitate future expansion to help meet anticipated increasing demand for potable water in the Santa Clarita Valley. It is currently able to supply retail purveyors with an estimated 30 mgd of potable water. The associated pump station is located near the Bouquet Canyon Road crossing of the Santa Clara River.

The RVWTP's treatment capacity would be expanded to 60 mgd by expanding the existing clarifier/filter structure. The construction of the structure would be within a previously disturbed area at the treatment plant site. Additionally, minor modifications to the existing support systems would be completed, e.g., replacing existing equipment with higher capacity equipment. Replacement of equipment would be completely within existing structures and/or previously disturbed areas.

Detailed project-specific engineering design and environmental review have not yet commenced. However, anticipated increases in demand are likely to require consideration of this project within the next few years.

ENVIRONMENTAL ANALYSIS STATUS AND ANTICIPATED IMPACTS

The impacts of this project were programmatically evaluated by CLWA in 1988 (CLWA 1988), and in 1989, CLWA evaluated the environmental impacts of the original construction of the RVWTP in a Mitigated Negative Declaration (CLWA 1989). Because no project-level EIR has been done on the expansion, a preliminary analysis was conducted for purposes of the present EIR. In general, direct, construction-related impacts would be expected although limited because ground-disturbing activity would take place in previously disturbed areas. The total disturbed area is likely to be less than 5 acres. It is anticipated that construction could result in temporary but significant impacts to air quality (combustive and fugitive dust emissions), cultural resources (potential disturbance during construction), geology and soils (construction on expansive soils), noise, and transportation (increased traffic). The project would result in significant long-term impacts to hazards and hazardous materials (increased use of water treatment chemicals) and utilities and service systems (increase in electricity used for increased treatment and increased need for storm drainage facilities.

The expansion of the RVWTP would increase treatment capacity by approximately 30 mgd (total capacity would be 60 mgd) and thus would result in indirect, growth-related impacts. Assuming operations consistent with average annual capacity, the incremental increase in capacity would serve approximately 17,000 housing units, whereas the maximum (peak) increase in capacity could serve approximately 34,000 housing units. The RVWTP project would result in indirect growth-related impacts to all resource categories similar to the affects of the Project (refer to Chapter 4).

CUMULATIVE IMPACTS WITH THE PROJECT

Project-related direct impacts to hazards and hazardous materials would contribute to the impacts of RVWTP expansion project to these resources. The RVWTP project would increase the direct use of hazardous chemicals and other material by CLWA during the raw water treatment process. These substances would be handled in compliance with applicable laws and regulations. Project impacts would compound or increase these impacts. Therefore, the Project would have a significant cumulative impact to hazards and hazardous materials.

Project-related indirect impacts to all environmental resources would contribute to the direct and indirect impacts of the RVWTP expansion project. During construction the RVWTP expansion project would impact air quality, cultural resources, geology and soils, noise, and transportation. The RVWTP expansion project would result in significant long-term impacts to utilities and service systems. The RVWTP expansion project would also remove an obstacle to growth in the CLWA service area by providing potable water treatment for future development of approximately 17,000 dwelling units within the CLWA service area. This future development would impact the full range of environmental resources, as described in Chapter 4. Project impacts (providing a reliable water supply that would be available for future development of approximately 35,600 dwelling units within the CLWA service area) would compound or increase these impacts. Therefore, the Project would have a significant cumulative indirect impact to all environmental resources.

*Expansion of Earl Schmidt Filtration Plant*

PROJECT DESCRIPTION

CLWA is upgrading and expanding the treatment system of the existing Earl Schmidt Filtration Plant (ESFP) capacity from 33.6 mgd to 56 mgd. The existing ESFP is located at 32700 North Lake Hughes Road in the community of Castaic. Construction started in September 2003 and is anticipated to last approximately 18-24 months. The ESFP project will provide upgrades to meet water quality regulations, provide a greater degree of redundancy in treatment capacity in the event of an emergency, meet existing summer peaking needs, and serve future growth. The plant's expansion also includes process improvements to achieve compliance with current and proposed water quality regulations as well as replacement of an existing raw water pumping station.

PROJECT'S ENVIRONMENTAL ANALYSIS STATUS AND ANTICIPATED IMPACTS

In April 2003, CLWA certified the Final EIR on the ESFP Expansion project and filed the Notice of Determination (CLWA 2003a). Construction of the ESFP project would result in temporary but significant impacts to air quality, cultural resources (potential disturbance during construction), geology and soils (construction on expansive soils), noise, and transportation (increased traffic). Operation of the ESFP Expansion project would result in impacts to aesthetics, agricultural resources, biological resources, geology and soils, hazards and hazardous materials, land use and planning, noise, and recreation resources.

The ESFP expansion project would increase treatment capacity by approximately 22.4 mgd and thus would result in indirect, growth-related impacts. Assuming operations consistent with average annual capacity, the incremental increase in capacity would serve approximately 13,000

housing units, whereas the maximum (peak) increase in capacity could serve approximately 30,000 housing units. The ESFP expansion project would result in indirect growth-related impacts to all resource categories similar to the affects of the Project (refer to Chapter 4).

CUMULATIVE IMPACTS WITH THE PROJECT

Project-related direct impacts to hazards and hazardous materials would contribute to the impacts of ESFP expansion project to these resources. The ESFP project would increase the direct use of hazardous chemicals and other material by CLWA during the raw water treatment process. These substances would be handled in compliance with applicable laws and regulations. Project impacts would compound or increase these impacts. Therefore, the Project would have a significant cumulative impact to hazards and hazardous materials.

Project-related indirect impacts to all environmental resources would contribute to the direct and indirect impacts of ESFP expansion project. During construction the ESFP expansion project would impact aesthetics, agricultural resources, air quality, biological resources, cultural resources, geology and soils, land use and planning, populations and housing, public services, noise, transportation utilities and water resources. The ESFP expansion project would also remove an obstacle to growth in the CLWA service area by providing potable water treatment for future development of approximately 13,000 dwelling units within the CLWA service area. This future development would impact the full range of environmental resources, as described in Chapter 4. Project impacts (providing a reliable water supply that would be available for future development of approximately 35,600 dwelling units within the CLWA service area) would compound or increase these impacts. Therefore, the Project would have a significant cumulative indirect impact to all environmental resources.

*Honby Extension Storage Project*

CLWA is in the process of engineering the Honby Extension/Storage Reservoir Project (Honby Extension). The Honby Extension project is a 33-inch, approximately 30,000 foot long waterline, originating near the intersection of Honby Avenue and Santa Clara Street where a new pump station also will be constructed. The Pipeline will travel from the new pump station easterly and southerly, terminating in a new storage reservoir west of Rolling Hills Avenue and Warmuth Road. The new pump station would provide the lift to transport water to the proposed 21-million gallon storage reservoir. The Honby Extension is expected to be under construction starting in 2003, with construction lasting approximately 18 months.

PROJECT'S ENVIRONMENTAL ANALYSIS STATUS AND ANTICIPATED IMPACTS

CLWA completed a Mitigated Negative Declaration and approved the project in 1999. Hilltop construction of the storage reservoir will incorporate design elements to address site-specific geology including landslides, mudflows, and safety issues. Significant but mitigable impacts were identified for geology and soils (erosion, sedimentation, expansive soils, and collapsible soils), water quality (discharge of pollutants into adjacent water bodies), air quality (construction related air emissions), transportation and traffic (related to emergency access and bicycle/pedestrian traffic along the Santa Clara River), biological resources (e.g., least Bell's Vireo, southwestern willow flycatcher, alluvial scrub habitat, nesting of migratory birds), noise (construction related), and aesthetics (related to construction of the pump station and reservoir).

CUMULATIVE IMPACTS WITH THE PROJECT

Project-related direct impacts to hazards and hazardous materials would contribute to the construction impacts of the Honby Extension project because both projects would require the use of hazardous materials. These potentially cumulative impacts would be limited to the duration of the construction period and implementation of the identified mitigation measures for each project would reduce this impact to a less than significant level.

Project-related indirect impacts to all environmental resources in the CLWA service area would also contribute to the impacts of Honby Extension project. Construction of the Honby Extension project would impact soils, degrade air quality from construction emissions, temporarily restrict emergency access, create additional noise, and degrade terrestrial habitat. Project impacts (providing a reliable water supply that would be available for future development in the CLWA service area) would compound or increase these impacts. Therefore, the Project would have a significant cumulative indirect impact to aesthetics, air quality, biological resources, geology and soils, noise, and transportation.

*Pitchess Pipeline*

The Pitchess Pipeline is a 24-inch, approximately 4,300-foot-long pipeline that would originate east of Interstate 5 near the intersection of the Old Road and Sedona Way in unincorporated Los Angeles County. A portion of the pipeline is located within the Pitchess Honor Farm and portions also cross Castaic Creek and other locations. The Pitchess Pipeline will provide imported water to supplement existing groundwater supplies currently used by local purveyors for demand generated in the northwestern portion of the CLWA service area.

PROJECT'S ENVIRONMENTAL ANALYSIS STATUS AND ANTICIPATED IMPACTS

CLWA approved a Mitigated Negative Declaration for the project in 1999, at that time referred to as the Lateral Extension (CLWA 1998c). Construction of the Pitchess Pipeline project would result in temporary but significant impacts to air quality, biological resources, cultural resources, geology and soils, hazards and hazardous materials, noise, transportation, and water quality. Operation of the Pitchess Pipeline project would result in indirect impacts to environmental resources from growth-related development.

Surveys for the arroyo toad were conducted at the Castaic Creek crossing and surveys for active nests of migratory birds were conducted in the construction area. Based on the results of the surveys, no additional measures are needed to reduce biological impacts. Other mitigation measures have been identified for impacts to archaeological/paleontological resources (i.e., construction monitoring under certain conditions), geology and soils impacts (i.e., Best Management Practices for erosion/sedimentation control), and mitigation measures for traffic, geotechnical/fault rupture, seismic and other hazards, collapsible soils, erosion, water quality, construction emissions, emergency access, air quality, and other impacts.

CUMULATIVE IMPACTS WITH THE PROJECT

Project-related direct impacts to hazards and hazardous materials would contribute to the construction impacts of the Pitchess Pipeline project. These potentially cumulative impacts

would be limited to the duration of construction and implementation of the identified mitigation measures for each project would reduce this impact to a less than significant level.

Project-related indirect impacts to all environmental resources in the CLWA service area would also contribute to the impacts of Pitchess Pipeline project. Construction of the Pitchess Pipeline project would impact localized cultural resources, adjacent soils, and degrade terrestrial habitat by trenching and other direct disturbance. Construction would degrade air quality from construction emissions, temporarily restrict emergency access, create addition noise and. Project impacts (providing a reliable water supply that would be available for future development in the CLWA service area) would compound or increase these impacts. Therefore, the Project would have a significant cumulative indirect impacts to air quality, biological resources, cultural resources, geology and soils, noise, and transportation.

*2002 and 2003 Groundwater Banking Projects*

The Groundwater Banking Projects involve delivering a portion of CLWA's SWP Table A allocation that is not needed to meet anticipated demands in 2002 to the Semitropic Water Storage District (SWSD). SWSD would temporarily store up to 24,000 AF of CLWA's unused 2002 SWP deliveries and up to 35,000 AF of CLWA's unused 2003 SWP deliveries for later withdrawal and delivery to the CLWA service area in a future year or years, within 10 years from the date of banking the water in each project, i.e., 2012 and 2013, respectively. The 24,000 AF and 35,000 AF amounts would be stored in the SWSD Groundwater Banking Project, using SWSD's existing groundwater banking facilities. SWSD may use all or a portion of this SWP water in lieu of pumping groundwater for irrigation. Upon request, SWSD would return all or a portion of CLWA's previously stored water in one or more years, by either (1) pumping the water from its groundwater basin through pumpback facilities into the California Aqueduct, at which time the water would become part of the SWP water supply pool and would be conveyed to CLWA; or (2) by requesting that an equivalent amount of SWSD's SWP water be delivered to CLWA via the California Aqueduct. Storage of the water would not require the construction of new facilities or the improvement of any existing facilities within the CLWA or SWSD service areas.

PROJECT'S ENVIRONMENTAL ANALYSIS STATUS AND ANTICIPATED IMPACTS

CLWA circulated the Castaic Lake Water Agency 2002 Groundwater Banking Project Negative Declaration (and accompanying Initial Study) in August 2002 (CLWA 2002a). CLWA subsequently filed a Notice of Determination for this project in December of 2002. A lawsuit challenging this project was filed in Superior Court of Ventura County in February, 2003 (*California Water Network, Friends of the Santa Clara River v. Castaic Lake Water Agency* [Ventura County Superior Court Case No. CIV 215327]). Trial is scheduled for April, 2004. An additional lawsuit was filed on this project in Sacramento Superior Court in April 2003 (*Friends of the Santa Clara River v. State of California Department of Water Resources and Castaic Lake Water Agency* (Sacramento Superior Court Case No. 03-CS 00258) to challenge DWR approval of the point of delivery agreement to deliver the SWP water to the Semitropic Water Storage District. The case has been stayed until the completion of the Network case.

CLWA also circulated the Castaic Lake Water Agency 2003 Groundwater Banking Project Negative Declaration (and accompanying Initial Study) in December 2003 (CLWA 2003a). In

each case, it was determined that the implementation of this project would result in a shift in the timing of use of electrical energy required to convey temporarily stored water to CLWA. Specifically, there would be a reduction in overall energy use for pumping along the SWP when water is stored in SWSD, and an increase in overall energy use when the water is returned to CLWA. The net effect would be an increase in the use of electrical energy needed to inject and recover the stored water. This incremental increase in energy use would indirectly result in increased air emissions from power plant operations, which would have less than significant adverse impacts within the San Joaquin Valley air basin, given that power plants are required to effectively mitigate air emissions under the conditions of air permits. Implementation of the groundwater banking projects were determined to not have the potential to significantly affect an environmental resource and no mitigation measures were proposed. The Groundwater Banking Projects would not result in growth inducement because each project period is temporary (i.e., 10 years), and would not provide a long-term water supply to support growth.

#### CUMULATIVE IMPACTS WITH THE PROJECT

Project-related direct impacts to hazards and hazardous materials in the CLWA service area would contribute to the impacts of 2002 or 2003 Groundwater Banking projects. The water banking projects do not have impacts to environmental resources in the CLWA service area. Since there were no impacts identified to environmental resources in the CLWA service area there would be no cumulative impacts when this cumulative project is considered together with the Project. Water stored by these actions is considered to improve the reliability of the supply for the existing users in the CLWA service area but does not contribute to the reliability of water supplies for future development because it does not exceed 10 years from the date the water is banked.

### *Sky Blue Tank Site Additions*

In April 2003, CLWA approved a Mitigated Negative Declaration (MND) for the Sky Blue Tank Site Additions (the Sky Blue project), a project that will be built by now CLWA Santa Clarita Water Division, a retail purveyor. The project will include construction of two above-ground water storage tanks and an associated storm drainage system on a site owned by the purveyor. The initial construction timeframe would last for approximately 3-4 months in the summer or fall of 2003, followed by another similar construction time period 2 years later. This site already contains a 1-million-gallon water tank and a 2-million-gallon water tank. Access to the site would be provided by the existing access road off of Whites Canyon Road just north of Enderly Street. The project would provide peak hour water usage for an approved residential development and would complete the water supply for this development. A previous EIR for this development (Engineering Service Corporation 1987) addressed all issues relating to water supply for the development. The Sky Blue project MND addresses only impacts resulting from the construction of the tanks.

#### PROJECT'S ENVIRONMENTAL ANALYSIS STATUS AND ANTICIPATED IMPACTS

The Sky Blue Project MND identifies significant impacts that would be reduced to less than significant after implementation of mitigation measures for the following resources: biological resources, geology and soils, hazards (construction in a high fire hazard area), hydrology and water quality, and land use and planning. It identifies adverse, less than significant impacts for

the following resources: aesthetics, air quality, noise, transportation and traffic, and utilities/service systems.

CUMULATIVE IMPACTS WITH THE PROJECT

Project-related direct impacts to hazards and hazardous materials in the CLWA service area would contribute to the impacts of Sky Blue project. Operational impacts not covered in the Sky Blue project were addressed in the 1987 EIR and were considered as part of the existing environmental conditions evaluated for the Project. Impacts to hazards and hazardous materials used during construction of the Sky Blue Tasks project would combine with the increased use of hazardous materials by the Project although the types of hazardous materials for water treatment would not combine with the types of materials to be used for the Sky Blue project. The Sky Blue project would insignificantly impact aesthetic, air quality biological resources, cultural resources, geology ands soils, fire danger hazards, noise, transportation, and utilities. Project indirect impacts (providing a reliable water supply that would be available for future development in the CLWA service area) would compound or increase these impacts. Therefore, the Project would have a significant cumulative indirect impact to aesthetics, air quality, biological resources, cultural resources, geology and soils, hazards, noise, transportation, and utilities.

*Perchlorate Treatment and Aquifer Restoration*

In 1997, the Santa Clarita Water Company (CLWA's Santa Clarita Water Division) detected perchlorate in two production wells tapping the Saugus Formation, both of which are near the Whittaker-Bermite property, located east of San Fernando Road and south of Soledad Canyon Road. These wells, Saugus-1 and Saugus-2, had perchlorate levels as high as 45 µg/L and have been retired. Two other Saugus production wells in the valley have shown detectable levels of perchlorate below 18 µg/L and the use of these wells has been suspended. These wells are located in the Newhall County Water District and in Valencia Water Company's service area. The combined capacity of all four Saugus wells is 8,000 gallons/minute. In addition, perchlorate has recently (2002) been detected in one Alluvial production well located near the former Whittaker-Bermite facility, which has been the primary focus of potential perchlorate contamination that has impacted the wells in the region. That well tested positive for perchlorate at a level of 5.9 µg/L (SCVWP 2003). The five perchlorate-impacted wells have been removed from active water supply service (SCVWP 2003). The affected Los Angeles County Purveyors are continuing to test for perchlorate in all of their active Alluvial and Saugus wells, and are developing a plan for a water treatment process to return the impacted wells to service as soon as possible.

The development and implementation of a cleanup plan for the Whittaker-Bermite site and the impacted groundwater is being coordinated among CLWA, the Purveyors, the State Department of Toxic Substances Control (DTSC), and the U.S. Army Corps of Engineers. In February 2003, the DTSC and the impacted Purveyors entered into an agreement entitled *Environmental Oversight Agreement* [Agreement] (SCVWP 2003). Under the Agreement, DTSC will provide review and oversight of the response activities being undertaken by the impacted Purveyors related to the detection of perchlorate in the five impacted wells (SCVWP 2003). Under the Scope of Work of that Agreement, the purveyors will prepare (1) Well Characterization Reports; (2) a Health-Based Risk Assessment; (3) a Regional Groundwater

Flow Model; and (4) a Treatment Technology Evaluation Report (SCVWP 2003). Several treatment technologies for the removal of perchlorate from water are currently available and the affected water agencies intend to develop their understanding of the contamination to assist in the selection of appropriate treatment to remediate the perchlorate problem. A standard for Maximum Containment Level (MCL) for perchlorate is not expected to be adopted until 2004 or 2005 (SCVWP 2003).

PROJECT'S ENVIRONMENTAL ANALYSIS STATUS AND CUMULATIVE IMPACTS WITH THE PROJECT

CEQA compliance has not been initiated for the perchlorate restoration project. Although remediation using some form of treatment technology is reasonably foreseeable based on the Agreement referred to above, and investigations are underway, the type of treatment technology, project timing, location, and description of facilities and processes utilized for cleanup, and the potential environmental effects, are currently speculative. The project has therefore not been carried forward for cumulative analysis. Cumulative impacts would be addressed, as determined to be necessary, in the future when project-specific CEQA compliance for that project is undertaken.

*Honby Parallel*

Planned and anticipated development in the eastern portion of the CLWA service area requires the installation of additional treated water conveyance capacity to serve current and future customers. CLWA is in the process of initiating engineering design of the Honby Parallel Pipeline Project (Honby Parallel). The Honby Parallel would connect to the outlet work of the RVWTP and traverse undeveloped land and follow the existing pipeline alignment eastward along and across the Santa Clara River to the intersection of Santa Clara Street and Furnival Avenue in Santa Clarita.

PROJECT'S ENVIRONMENTAL ANALYSIS STATUS AND ANTICIPATED IMPACTS

When pipeline design and siting is sufficiently complete CLWA will complete a CEQA analysis. Best Management Practices and other actions will be identified and incorporated into the project to reduce the impacts aesthetics, air quality, biological resources, cultural resources, hazards, geology and soils, noise, transportation, utilities, and water quality impacts. However, the Honby Parallel project would impact these resources.

CUMULATIVE IMPACTS WITH THE PROJECT

Project-related direct impacts to hazards and hazardous materials would contribute to the construction impacts of Honby Parallel project. These potentially cumulative impacts would be limited to the duration of the construction period and implementation of the identified mitigation measures for each project would reduce this impact to a less than significant level.

Project-related indirect impacts to all environmental resources in the CLWA service area would also contribute to the impacts of Honby Parallel project. Construction of the Honby Parallel project would impact soils, degrade air quality from construction emissions, temporarily restrict emergency access, create addition noise, and degrade terrestrial habitat. Project impacts (providing a reliable water supply that would be available for future development in the CLWA service area) would compound or increase these impacts. Therefore the Project would have a

significant cumulative indirect impact to aesthetics, air quality, biological resources, geology and soils, noise, and transportation.

#### *6.3.3.2 Projects Listed in the County of Los Angeles Development Monitoring System (DMS)*

*Project Description*

The DMS system is a list of proposed and approved projects maintained by the County of Los Angeles to provide a current estimate of certain development and environmental parameters. The DMS includes information on pending, approved, and recorded projects filed within the unincorporated area of the Santa Clarita Valley, as well as the City of Santa Clarita. Data were obtained for the Santa Clarita Valley for 1998 and an update is included for 2002. The intended use of the DMS system is to determine individual project and cumulative demands for public services and infrastructure. Because the Project is a water supply augmentation rather than a development project, a standard analysis using the DMS data would not apply. However, the DMS can be used to determine how much new development is anticipated in addition to development potentially accommodated by the Project. An estimate of additional development that could potentially be served by the Project was identified in Chapter 4.0.

Pending, approved, and recorded land development projects listed in the 1998 DMS and an update for 2002 are shown in Tables 6.3-1 and 6.3-2, respectively. The exact timing of the completion of these projects is uncertain because the completion schedule is dependent upon many variables including market demand, construction phasing, capital resources of the individual developers and ability of the various governmental agencies to process and issue the required permits. In addition, it should be noted that projects listed in the DMS sometimes remain on the list beyond completion or after construction has been delayed or may no longer be likely, and therefore the DMS list is only an estimate of known future development.

**Table 6.3-1. 1998 DMS for the Santa Clarita Valley Planning Area (Housing Units)**

| *Zone District Description* | *Pending* | *Approved* | *Recorded* | *Totals* |
|---|---|---|---|---|
| Bouquet Canyon | 834 | 676 | 56 | 1,566 |
| Castaic Canyon | 714 | 3,128 | 0 | 3,842 |
| City of Santa Clarita | 1,516 | 1,793 | 167 | 3,476 |
| Newhall | 514 | 1,758 | 91 | 2,363 |
| North Claremount | - | - | - | - |
| Sand Canyon | 920 | 1,030 | 474 | 2,424 |
| Soledad | 595 | 203 | 0 | 798 |
| Miscellaneous. | - | - | 1,504 | 1,504 |
| **Total Units** | **5,093** | **8,588** | **2,292** | **15,973** |

*Source*: Los Angeles County 1998.

**Table 6.3-2. 2002 DMS for the Santa Clarita Valley Planning Area (Housing Units)**

| *Zone District Description* | *Pending* | *Approved* | *Recorded* | *Totals* |
|---|---|---|---|---|
| Bouquet Canyon | 427 | 0 | 956 | 1,383 |
| Castaic Canyon | 4,090 | 3,049 | 1,910 | 9,049 |
| City of Santa Clarita | 1,592 | 2,853 | 1,973 | 6,418 |
| Newhall | 1,092 | 2,646 | 2,864 | 6,602 |
| North Claremount | 0 | 0 | 12 | 12 |
| Sand Canyon | 1,543 | 5,038 | 2,073 | 8,654 |
| Soledad | 868 | 0 | 127 | 995 |
| **Total Units** | **9,612** | **13,586** | **9,915** | **33,113** |

*Source*: Los Angeles County 2002.

*Project's Environmental Analysis Status and Anticipated Impacts*

Projects listed in the DMS would impact a broad spectrum of environmental resources. As a result of the land use approval process, including the project-specific CEQA analyses, many of these impacts have been reduced to less than significant or no impact through the application of mitigation measures. However, project-specific findings have found that other community needs and other factors have over-ridden the concerns for environmental resources and impacts to these resources.

*Cumulative Impacts with the Project*

If all of the water supply for the Project were used for anticipated future growth, it would be able to support 35,600 new residential units in an average water year; thus, there is overlap between the amount of growth supported by the Project and the amount of growth projected by the DMS. The impacts from development included in the DMS would not exceed those described as growth-related impacts of the Project in Chapter 4. The types of cumulative impacts that would occur are as described in Chapter 4.

#### *6.3.3.3 Reasonably Foreseeable Land Development Projects Not Listed in the DMS*

Reasonably foreseeable land development projects not identified in the DMS because tentative tract maps have not been submitted were also considered.

*Newhall Ranch Specific Plan and Water Reclamation Plant*

PROJECT DESCRIPTION

The project would include residential, commercial and mixed-use development. The project would include a total of 21,308 dwelling units, 5,549,00 square feet of commercial/mixed use development, and a 6.8 mgd water reclamation plant. The specific plan includes establishment of San Fernando spineflower conservation/preserve areas. The project site is located wholly within the CLWA service area just east of Ventura County on the north slopes of the Santa

Susana Mountains west of Valencia and one-eighth of a mile from the Magic Mountain Theme Park.

The project's potable water supplies would be supplied, in part, by using the applicant's historical Alluvial Aquifer groundwater, which is presently committed to agricultural uses. The project applicant also has secured a potable water supply through a contract with Nickel Family, LLC (the source of this water is the Kern River and is secured through pre-1914 water rights). This contract has secured the applicant's rights to 1,607 acre-feet of water per year from this source.

In addition, the applicant has entered into an agreement to reserve and purchase water storage capacity of up to 55,000 acre-feet in Semitropic Water Storage District's existing groundwater banking project. Any water stored in this account in Semitropic's existing banking project could be extracted in dry years in amounts of up to 4,950 acre-feet per year. This supply would be used as a source for the Specific Plan in dry years only.

The applicant's non-potable water for the project would be supplied, in part, by reclamation of wastewater from the Water Reclamation Plant, which is to be constructed as part of the Newhall Ranch Specific Plan. In addition, CLWA would serve the project with reclaimed water from existing upstream Water Reclamation Plants, consistent with CLWA's draft Reclaimed Water System Master Plan, which is being implemented in stages. These two sources would supply all of the project's non-potable water needs.

PROJECT'S ENVIRONMENTAL ANALYSIS STATUS AND ANTICIPATED IMPACTS

The Board of Supervisors of Los Angeles County certified the Newhall Ranch Specific Plan Final EIR, as revised by an additional environmental analysis, and re-approved the Specific Plan and related project approvals, on May 27, 2003. The additional environmental analysis was required to address certain specified issues arising from litigation challenging the Specific Plan and environmental documentation ("Newhall Ranch litigation"), discussed below.

The County's initial certification of the Specific Plan EIR was challenged in a consolidated CEQA action in Kern County Superior Court (United Water Conservation District v. County of Los Angeles, et al., Case No. 239324-RDR). After a hearing in 2000, the trial court found that the Final EIR required additional environmental analysis on certain issues, including water supplies to serve the Specific Plan. As a result, the trial court set aside approval of the project and the EIR certification, but only with respect to the specified issues. The trial court did not set aside approval of the project or EIR certification with respect to any other issues.

On May 27, 2003, the County's Board of Supervisors certified the additional environmental analysis and re-approved the project. Project opponents again challenged the adequacy of the environmental documentation, but the trial court ruled in favor of both the County and the applicant by finding that the additional analysis met the requirements of both CEQA and the court's prior decision in the Newhall Ranch litigation.

On December 19, 2003, project opponents filed an appeal of the trial court's decision in the Newhall Ranch litigation. On April 1, 2004, the parties settled their differences, resulting in the dismissal of the appeal and the final resolution of the Newhall Ranch litigation. It also cleared

the way for the Newhall Ranch environmental documentation to be used as the programmatic EIR to guide development of the Specific Plan.

The Newhall Ranch Final EIR, as revised (Impact Sciences 2003), identified impacts and mitigation to the following environmental resource areas: aesthetics, agricultural resources, air quality, biological resources, cultural resources, geology and soils, hazards and hazardous materials, noise, pollution, housing and employment, public services, public utilities, traffic and transportation, and water resources.

CUMULATIVE IMPACTS WITH THE PROJECT

Project-related direct impacts to hazards and hazardous materials as well as indirect impacts to all environmental resources in the Santa Clarita valley would contribute to the impacts of the Newhall Ranch project. The Newhall Ranch project environmental analysis (Impact Sciences 2003) has identified unavoidable significant impacts to the following resource areas: agricultural resources (loss of Prime Farmland); visual (conversion of land from rural to suburban); air quality (vehicular, construction, and operational emissions); and solid waste disposal (landfill capacity for solid and hazardous waste).

Significant but mitigable impacts have been identified to geology and soils (impacts associated with grading activities); environmental safety (oil and natural gas related impacts); biological resources (impacts to the San Fernando Valley spineflower); traffic/access (increase in the amount of average daily traffic trips); noise (vehicular noise); water resources and wastewater disposal (water supply and water quality of wastewater entering the Santa Clara River); natural gas and electricity demand; education (impacts on school facilities); public services and fire hazards (impacts relating to fire and police services); libraries (demands for library materials and services); and parks, recreation, and trails (impacts to County parks and trails).

Less than significant impacts were identified for the following resource areas: cultural/ paleontological resources (potential impacts to undiscovered buried resources from grading activities); environmental safety (placement of development within a dam inundation area, hazards associated with electrical transmission lines and natural gas lines, transportation of hazardous waste along SR-126, and the proximity of the project to the Chiquita Canyon Landfill); biological resources (impacts to the use of Salt Canyon as a wildlife corridor, and impacts to species within a Significant Ecological Area (SEA); and population, housing, and employment.

Project indirect impacts (providing additional water supply that would be available for future development with potential impacts to various environmental resources in the CLWA service area) would compound or increase these impacts. Since the water demands for the Newhall Ranch Project would be supplied by local groundwater, recycled water, and imported supplies from the Kern River, the water supply component of utilities would not be cumulatively compounding or increased by the Project. However, future use of water supplied by the Project would result in development not identified in the Newhall Ranch project-specific environmental analyses. Therefore the Project would have a significant cumulative indirect impact to much of the full range of environmental resources listed above.

*Stevenson Ranch Phase V Specific Plan*

PROJECT DESCRIPTION

This project consists of the development of approximately 3,500 single family and multi-family dwelling units, three schools, a sports complex, library facilities, commercial, and other uses. The location is 0.5 miles west of I-5 and 1.25 miles south of Highway 126, southwest of Six Flags Magic Mountain in Stevenson Ranch. The land is outside the CLWA service area and an annexation to the CLWA service area is in process (see the discussion above regarding the CLWA 16,000 Acre-Foot Proposed Transfer of State Water Project Table A Amount From Kern County Water Agency, Including Possible Annexations to CLWA).

PROJECT'S ENVIRONMENTAL ANALYSIS STATUS AND ANTICIPATED IMPACTS

The NOP and Initial Study for the Stevenson Ranch Phase V Specific Plan were issued in April 1999 (County of Los Angeles Department of Regional Planning [LADRP] 1999). A Draft EIR has not yet been issued and changes to the specific plan may occur. The Initial Study identified impacts on the following environmental resources: aesthetics, air quality, biological resources, cultural resources, geology and soils, noise, traffic and transportation public services, public utilities, population and housing, recreation, and water quality/water resources.

CUMULATIVE IMPACTS WITH THE PROJECT

The Initial Study identified significant impacts for the following resources: geology and soils (landslides, slope instability, grading); hazards of flood (creeks, erosion) and fire (Fire Zone 4, transmission line); noise (oil extraction facilities, schools proposed); water quality (run-off into storm drain); air quality (exceeds state criteria); biological resources (oak trees, creeks and riparian habitat,); cultural resources (along water courses and outcropping); aesthetics (trail, grading, altered viewshed); transportation (exceeds congestion management program thresholds); utilities including sewage disposal (requires annexation to Sanitation District); education (school and library impacts); fire/sheriff (water, sewage, solid waste); population/housing/employment, and recreation (growth inducing; recreation facilities may be needed).

Project indirect impacts (providing additional water supply that would be available for future development in the CLWA service area) would compound or increase these impacts. Since the Stevenson Ranch Phase V Project would be supplied by new water sources not currently available within CLWA, current and future uses of water supplied by the Project would result in development not identified in the Stevenson Ranch Phase V environmental analyses. Therefore, the Project would have significant cumulative indirect impacts to the full range of environmental resources listed above.

#### *6.3.3.4 Monterey Amendment*

*Project Description*

A discussion of the Monterey Amendment is provided in section 1.2.2, section 3.15, section 6.3.1.5, section 6.3.2.5, and Appendix D. This amendment contains many provisions including ones that allow the Project. The cumulative components of the Monterey Amendment

evaluated in section 6.3 are those not addressed as a portion of the Project and that may apply to Project-related impacts in the CLWA service area. As indicated in Table 6.3-3, these include the permanent transfers of the balance of the remaining portion of the 130,000 AF of Agricultural to M & I transfer (89,000 AF) of SWP Table A Amounts from within Kern County, in addition to the 41,000 AF included in the Project.

*Project's Environmental Analysis Status and Anticipated Impacts*

An EIR is being prepared to evaluate the potential environmental impacts of both the Monterey Amendment and the additional program components specified in the Settlement Agreement (see section 1.2.2 for a more detailed discussion of the Settlement Agreement). The NOP for the Monterey Agreement EIR does not specify the environmental resources to be addressed in the EIR, anticipated impacts of the project, or potential mitigation measures. Comment letters responding to the NOP, however, expressed concern that impacts could occur to the following environmental resources in the CLWA service area that also would be affected by the Project: aesthetics, agricultural resources, air quality, biological resources, cultural resources, geology and soils; hazards and hazardous materials, noise, land use, population and housing, public facilities, recreation, transportation, utilities and water resources.

*Cumulative Impacts with the Project*

Project-related direct impacts to hazards and hazardous materials as well as indirect impacts to all environmental resources in the Santa Clarita Valley would contribute to the impacts of the Monterey Amendment project, as implemented in other locations outside of the CLWA service area. The permanent transfer of Table A Amounts to other nearby urban water agencies would have the similar indirect impacts in those locations as the indirect impacts anticipated for the CLWA service area. Additional development supported by the permanent transfer of Table A Amounts to the Palmdale-Lancaster region of Los Angeles County would increase traffic on Highway 14, thereby increasing air pollutants and noise, and risks from the transportation of hazardous materials. The implementation of the Monterey Amendment would have impacts outside the service area to aesthetics, agricultural resources, biological resources, cultural resources, geology and soils; land use, population and housing, public facilities, recreation, transportation, utilities and water resources. These types of impacts are localized and would not contribute to a cumulative impact in combination with the Project (e.g., impacts to public facilities in one geographic area would not create a cumulative impact in combination with impacts to public facilities in another geographic area). Therefore, the Project would have only significant cumulative impacts to air quality, hazards and hazardous materials, noise, and transportation resources.

## 6.4 CUMULATIVE IMPACTS BY RESOURCE

This section summarizes cumulative impacts by resource in each of the three geographic areas under consideration and identifies mitigation measures where appropriate (Public Resources Code sec. 21102; CEQA Guidelines secs. 15002, 15021). The implementation of these mitigation measures may be the responsibility of agencies other than CLWA, who would adopt them as part of their own environmental review and approval processes.

**Table 6.3-3. Permanent Table A Transfers Completed Under the Monterey Amendment Provisions (Article 53)**

| *From (Seller)* | *To (Buyer)* | *Amount (AF)* | *Year Effective* | *CEQA Status* |
|---|---|---|---|---|
| COMPLETED TRANSFERS | | | | |
| Berrenda Mesa Water District | Mojave Water Agency | 25,000 | 1998 | NOD – 11/1996 |
| Belridge Water Storage District | Palmdale Water Agency | 4,000 | 2000 | NOD – 7/1998; NOD – 4/1999 |
| Berrenda Mesa Water District | Alameda County Flood Control and Water Conservation District Zone 7 | 7,000 | 2000 | NOD – 3/1996 |
| Lost Hills Water District | Alameda County Flood Control and Water Conservation District Zone 7 | 15,000 | 2000 | NOD – 7/1998 |
| Wheeler Ridge-Maricopa Water Storage District | Castaic Lake Water Agency | 41,000 | 2000 | Subject of this EIR<br>NOD – 3/1999 |
| Belridge Water Storage District | Alameda County Flood Control and Water Conservation District Zone 7 | 10,000 | 2001 | NOD – 7/1998; NOD – 4/1999 |
| Belridge Water Storage District and Berrenda Mesa Water District | Solano County Water Agency | 5,756 | 2001 | NOD – 7/1998; NOD – 4/1999 |
| Belridge Water Storage District and Berrenda Mesa Water District | Napa County Flood Control and Water Conservation District | 4,025 | 2001 | NOD – 12/2000 |
| **Subtotal** | | **70,781** | | |
| ANTICIPATED TRANSFERS | | | | |
| Berrenda Mesa Water District | Alameda County Flood Control and Water Conservation District Zone 7 | 2,219 | Future Year | NOP issued |
| Berrenda Mesa Water District | Castaic Lake Water Agency | 16,000 | Future Year | NOP – July 2003; Draft EIR in preparation |
| **Subtotal** | | **18,219** | | |
| **Total** | | **130,000** | | |

**Cumulative Impacts Associated with the SWP and Associated Facilities by Resource**

**Aesthetic Resources**—The Project and other projects discussed in this section would result in adverse less than significant cumulative aesthetic impacts due to differences in the timing and location of the aesthetic impacts associated with the Project and other projects. Cumulative impacts to aesthetic resources associated with the SWP facilities would be less than significant because these projects would insignificantly change water levels in San Luis Reservoir, Quail Lake, Pyramid Lake, Castaic Lake, and other SWP facilities.

**Air Quality**—Significant cumulative impacts to air quality associated with the SWP and Associated Facilities geographic area would result from implementation of the Project and other projects because the Project impact, although less than significant, would increase the significant air quality impacts from the CALFED project and the San Luis Reservoir Low Point Project. The significant cumulative impacts would be reduced to less than significant through the implementation of the measures listed below. Significant impacts associated with the CALFED Bay Delta Program project would be mitigated with the implementation of the following mitigation strategies identified in the EIS/EIR: (1) setting traffic limits on construction vehicles; (2) maintaining properly tuned equipment; (3) limiting the hours of operation or amount of equipment; (4) limiting the amount of agricultural chemicals; (5) coordinating prescribed burning programs with relevant air quality management agencies; (6) regular, periodic watering of construction sites; (7) using soil stabilizers and dust suppressants on unpaved service roadways; (8) daily contained sweeping of paved surfaces; (9) limiting vehicle idling time; (10) using alternatively fueled equipment; (11) requiring selection of borrow sites that are closest to fill locations; (12) implementing construction practices that reduce generation of particulate matter; (13) hydroseeding and mulching exposed areas; (14) using cultivating practices that minimize soil disturbance; (15) following air basin management plans to avoid or minimize vehicle-related emissions; (16) restricting the kinds of recreational vehicles or the times of operation for certain off-road vehicles on fallowed agricultural land to limit the amount of fugitive dust. Although an EIR has not yet been published for the San Luis Reservoir Low Point Improvement Project, based on a preliminary analysis of the impacts, similar measures to those listed above for the CALFED project could be implemented to reduce significant impacts.

**Cultural Resources**—Less than significant cumulative impacts to cultural resources would result from the implementation of the Project and other cumulative projects because of differences in the timing and location of the cultural impacts associated with the Project and other cumulative projects. Cumulative impacts to cultural resources associated with the SWP facilities would be less than significant since these projects would insignificantly change water levels in San Luis Reservoir, Quail Lake, Pyramid Lake, Castaic Lake, and other SWP facilities.

**Geology, Soils and Minerals**—Less than significant impacts to geology, soils and minerals would result from the implementation of the Project and other cumulative projects mainly due to the differences in the timing, location and nature of the impacts associated with the Project and other projects. Cumulative impacts to geology, soils and mineral resources associated with the SWP facilities would be less than significant since these projects would insignificantly change water levels in San Luis Reservoir, Quail Lake, Pyramid Lake, Castaic Lake, and other SWP facilities.

**Utilities/Service Systems**—Less than significant cumulative impacts to utilities and service systems would result from the implementation of the Project and other cumulative projects. Increased energy consumption would result in cumulative impacts to utilities/service systems from the implementation of the Project and other projects, but impacts would be less than significant due to anticipated power supplies available or planned to meet demands in California and no expansion or construction of new electrical power generation facilities would be required (see section 3.14).

**Water Resources**—Less than significant cumulative impacts to water resources would result from the implementation of the Project and other cumulative projects due to the differences in the timing, location, and nature of the impacts associated with the Project and other projects. The Project impacts to water levels and water quality in the Delta would not cumulatively considerable.

### 6.4.1 Cumulative Impacts in the WRMWSD Service Area by Resource

This section considers the combined environmental impacts in WRMWSD of the Project and other projects discussed above on a resource-by-resource basis. Since the project would only affect water resources in the WRMWD, the Project would not contribute to cumulative impacts in other environmental resource categories.

**Water Resources**—Less than significant cumulative impacts to water resources would result from the implementation of the Project and other projects in the WRMWSD. As previously discussed in section 3.15, WRMWSD has sufficient supplies to accommodate the demands of its customers without relying on the 41,000 AF of Table A Amount associated with the Project. Under some conditions, the decrease in SWP water supply associated with the Project could result in increased reliance on other water sources and groundwater. However, this would not result in a significant cumulative effect for two reasons: these amounts are small relative to the total amount of water in storage in the Kern County Groundwater Basin and the White Wolf sub-basin; groundwater levels in the portions of these basins underlying the WRMWSD have been generally increasing over time. With regard to water quality, the potential minor increase in the use of water having higher TDS concentrations would result in a less than significant cumulative impact to water quality.

### 6.4.2 Cumulative Impacts in the CLWA Service Area by Resource

**Aesthetics/Visual Resources**—Cumulative aesthetics/visual resources impacts may include changes to the visual characteristics and resources of the area through the development of open space and further urbanization of hillside and natural areas. Development would result in substantial adverse effects on scenic vistas, substantially damage scenic resources, or substantially degrade the existing visual character or quality of individual sites and their surroundings. Further, potential development within the CLWA service area would also cumulatively result in an increase in the amount of night lighting and unwanted glare in presently undeveloped areas. Haphazard development would obstruct scenic views of, and from, the project area. These impacts are considered to be significant and unavoidable. Mitigation measures to reduce significant cumulative aesthetic/visual resources impacts are identified in section 4.2 but some significant impacts would be unavoidable.

**Agricultural Resources**—The amount of land designated for agriculture within the Los Angeles County/Santa Clarita Valley planning area is small (roughly 1 square mile [City of Santa Clarita 1991]), although more land is designated for agricultural purposes in the portion of the CLWA service area in Ventura County. This land is located on the Santa Clara River floodplain, primarily along the Highway 126 corridor. Lands in the County of Ventura would be subject to the limitations of the Save Open-Space and Agricultural Resources (SOAR) regulations. The State of California Farmland Mapping and Monitoring Program has designated approximately 3 percent of the mapped area within the CLWA service area as either prime farmland, unique farmland or farmland of statewide importance. Cumulative impacts to agricultural resources would be significant because there is a potential for these lands to be converted to non-agricultural use or for changes in agricultural zoning to be approved by local jurisdictions in order to allow a higher density or intensity of development, despite local legislation (e.g., see section 3.2.1.3 for a discussion of the SOAR initiative that provides for protection of agricultural resources and controls conversion of agricultural lands in portions of Ventura County). Mitigation measures to reduce these significant cumulative agricultural impacts to less than significant are identified in section 4.2.

**Air Quality**—Cumulative effects from population, employment, and manufacturing growth would result in increased air pollutant emissions for which the South Coast Air Basin does not currently meet federal or state standards. Toxic emissions could result from some industrial development. Additionally, mobile emissions from vehicle operations would increase, including localized CO concentrations and $PM_{10}$ emissions. Fugitive dust emissions would also result from construction. Cumulative impacts would be significant if development violated air quality standards or contributed substantially to an existing or projected air quality violation. The Project together with other related projects could also result in a cumulatively considerable net increase in certain criteria pollutants for which the region is in non-attainment, and could expose sensitive receptors to substantial pollutant concentrations. Certain types of industrial development would create objectionable odors affecting a substantial number of people if constructed without appropriate mitigation measures. Mitigation measures to reduce significant cumulative air quality impacts are identified in section 4.2, but some significant air quality impacts would be unavoidable.

**Biological Resources**—The Project would provide water for existing users and a portion of anticipated growth. The associated land development, together with land development from other cumulative projects, would have cumulative impacts on biological resources. Cumulative impacts to threatened and endangered species and other sensitive biological resources within the CLWA service area, including wetlands, generally would be adverse due to the conversion and degradation of habitat. Although increased water use may increase certain types of habitat areas (e.g., through increased untreated runoff), related land development would entail the loss, degradation, or fragmentation of habitats, which may result in local native plant and wildlife populations, including sensitive species, being reduced in size and made increasingly vulnerable to local extinction. Non-native species introduced through ornamental landscaping or habitat disturbances would compete with native species or invade previously disturbed habitats, including those of special status species. Additionally, cumulative development would disrupt established wildlife corridors and impede the use of native wildlife nursery sites. These cumulative impacts would be significant.

Increased wastewater treatment plant discharges, additional runoff from impervious surfaces and new runoff from the irrigation of urban landscaping would increase the amount of

wetlands and aquatic habitat below such discharges. However, water quality below these discharges would be degraded from pollutants (both point and non-point sources) carried in these waters. Implementation of Best Management Practices to reduce non-point source pollution and applicable permit requirements for point sources would reduce but not fully mitigate pollution from future development and cumulative projects. This would have a substantial adverse effect on riparian habitat and sensitive fish and amphibian populations, which would be a significant cumulative impact.

Development also could result in conflicts with local policies and ordinances protecting biological resources, which would be a significant cumulative impact. As noted in section 3.4, Biological Resources, however, there are no adopted HCPs or Natural Community Conservation Plans (NCCPs) within the CLWA service area.

Mitigation measures to reduce significant cumulative biological impacts are identified in section 4.2.4, but some significant cumulative impacts may be unavoidable depending on the magnitude and specific location of future development.

**Cultural Resources**—As discussed in the EIR for the City of Santa Clarita General Plan (City of Santa Clarita 1991), excavation and grading activities associated with future development could result in significant cumulative impacts to archaeological, historical, and paleontological resources. Development also could result in significant cumulative impacts associated with the disturbance of human remains. Significant cumulative impacts on cultural resources may include the following:

- grading of prehistoric archaeological or paleontological sites, thereby demolishing the site and eliminating its ability to yield important information;
- construction of new buildings that could impair the setting of a historic structure or district, thereby altering the structure's or district's ability to embody distinctive characteristics of a type or period; or
- excavation of utility trenches for new developments that uncover human remains or a paleontologic deposit, thereby destroying those remains.

Mitigation measures to reduce significant cumulative cultural resources impacts to less than significant are identified in section 4.2.

**Geology, Soils and Minerals**—The County of Los Angeles, City of Santa Clarita, and Ventura County general plans all indicate that the CLWA service area contains a number of seismic hazards. Several active faults located in the general project area, such as the San Gabriel, San Andreas, San Fernando, and Sierra Madre faults, could cause structural damage as a result of ground shaking, subsidence, and liquefaction. The San Gabriel fault is also capable of causing structural damage as a result of ground rupture. Depending on the location, new construction within the CLWA service area could expose people or structures to adverse effects, including risk of loss, injury, or death involving rupture of a known earthquake fault; strong seismic ground shaking; seismic-related ground failure, including liquefaction; and landslides. Liquefaction is most likely to occur in areas of the CLWA service area that are saturated at very shallow depths, such as adjacent to the Santa Clara River. Due to the rugged, high relief of the foothill and mountainous areas surrounding the Santa Clarita Valley, landslides and unstable slopes are present in many areas of the CLWA service area. The cumulative impacts of

development are dependent upon the type of construction, proximity to faults, degree of slope, bedrock orientation within slopes, and soil type of individual project sites. Cumulative impacts throughout the CLWA service area would be significant.

There also is a potential for the CLWA service area to contain geologic units or soils that are unstable or that could become unstable as a result of future development projects (i.e., either development served by the Project or other development) and result in on- or off-site landslides, lateral spreading, liquefaction, or collapse. This would be a significant cumulative impact.

As noted in the EIR for the City of Santa Clarita General Plan, new construction could result in localized soil erosion on or adjacent to future development sites, which could result in the loss of topsoil and siltation of downstream drainages, creeks, and the Santa Clara River. This would be a significant cumulative impact.

The County of Los Angeles General Plan, City of Santa Clarita General Plan, and Ventura County General Plan all indicate that the CLWA service area contains expansive soils. If future development were located on such soils, substantial risks to life or property could result. This would be a significant cumulative impact.

Sewers would serve future development in the urbanized portions of the CLWA service area, although the use of septic tanks or alternative wastewater disposal systems may be required in outlying areas. Cumulative impacts would be significant if construction were to occur on soils that were incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems.

The County of Los Angeles General Plan, City of Santa Clarita General Plan, and Ventura County General Plan all indicate that the CLWA service area contains mineral resources such as gold, oil, and aggregate. The EIR for the City of Santa Clarita General Plan notes that if development encroached on mineral resource areas, the extraction of these resources could be incompatible if development is permitted. To the extent that future development resulted in the loss of availability of a known mineral resource that was of value to the residents of the region and state or the loss of availability of a locally important mineral resource recovery site delineated on a local general plan, specific plan, or other land use plan, cumulative impacts would be significant.

Mitigation measures to reduce significant geological cumulative impacts to less than significant are identified in section 4.2.

**Hazards and Hazardous Materials**—Operations of past and existing businesses in the CLWA service area may have resulted in soil contamination from spills or disposal of hazardous materials. Therefore, depending on the specific location, new development on previously contaminated sites may require the removal or remediation of soils before property development can commence. New development also may result in increased transport, use, and disposal of hazardous materials, along with increased risks of hazardous substance releases. Certain types of development could impair implementation of or physically interfere with emergency response plans or emergency evacuation plans, and could result in increased exposure to wildland fires where urbanization is adjacent to such areas. These cumulative

impacts would be significant. No airport-related risks would occur because the CLWA service area is not located within an airport land use plan area; nor is it in the vicinity of a public airport, public use airport, or private airstrip. Mitigation measures to reduce significant cumulative hazards and hazardous materials impacts to less than significant are identified in section 4.2.

**Land Use and Planning**—The potentially accommodated residential, commercial, and industrial development that could occur in the CLWA service area could convert undeveloped or agricultural portions of the service area to some form of urbanized development. While adopted policies and plans of local jurisdictions would reduce most potential conflicts between incompatible uses, these policies and plans may not eliminate building in some sensitive areas such as hillside management areas, open space areas, and sensitive wildlife habitat areas. In addition, as more land within the CLWA service area is developed, there may be more pressure to build in areas that have greater constraints, such as hillside areas, and to convert open space to developed uses. Depending on the location and type of development, there is the potential for new development to physically divide an established community. Without adequate mitigation, there also is a potential for some conflicts with adopted land use plans, policies, or regulations that were adopted for the purpose of avoiding or mitigating an environmental effect. These cumulative land use impacts would be considered to be significant. No HCPs or NCCPs have been adopted within the CLWA service area. Mitigation measures to reduce significant land use and planning cumulative impacts to less than significant are identified in section 4.2.

**Noise**—Development would result in an increase in ambient noise levels due to the potential increase in associated traffic. Long-term increases in noise levels also could be associated with commercial and industrial development. Residential areas and other sensitive receptors near transportation corridors and other noise generators may experience increased noise. Development also would result in short-term increases in local noise levels from construction and grading activities. Cumulative impacts would be significant if noise levels exceed local standards or if a substantial temporary or permanent increase in noise occurred. Cumulative impacts would also be significant if development resulted in exposure of persons to excessive groundborne noise or vibration. Mitigation measures to reduce significant cumulative noise impacts to less than significant are identified in section 4.2.

**Population and Housing**—As discussed in section 4.1, the Project would be able to serve a population of between approximately 28,500 and 106,600 persons, based on assumptions regarding the availability of SWP water supply.

Depending on the planning assumptions outlined above, the Project could serve between 9,510 and 35,600 additional housing units. Impacts would be cumulatively significant because the Project, together with other projects, could cumulatively induce substantial population growth in the CLWA service area. The Project would not cumulatively displace substantial numbers of existing houses or substantial numbers of people. Mitigation measures to reduce significant cumulative population and housing impacts to less than significant are identified in section 4.2.

**Public Services**—Growth in the CLWA service area could result in cumulative impacts to the following public services:

*Police*—Increased demand for services from the Los Angeles County Sheriff's Department (which also contracts with the City of Santa Clarita to provide services), the Ventura County Sheriff's Department, and the California Highway Patrol would occur. This would include additional staffing, facilities, and equipment, and could affect response times to handle calls for service. Any special problems posed by new development (e.g., roadway access or terrain) would be considered at the time the development is reviewed. Impacts could be cumulatively significant because the new development could require new or physically altered governmental facilities, the construction of which could cause significant cumulative environmental impacts.

*Fire*—Increased demand for services from the Los Angeles County and Ventura County fire departments and from private providers of emergency response/paramedic services, including additional staffing, facilities, and equipment would occur and could affect response times to handle calls for service. Any special problems posed by new developments (e.g., roadway access or terrain) would be considered at the time the development is reviewed. Additional considerations such as the location of a proposed new development in moderate or high fire hazard zones, the adequacy of water supplies/fire flows, and types of vegetative cover would be taken into account. In addition, state and county fire codes, standards, and guidelines exist to which all developments must adhere. Impacts could be cumulatively significant, because the new development could require new or physically altered governmental facilities, the construction of which could cause significant cumulative environmental impacts.

*Schools*—Growth would generate increased enrollments and the need for additional staffing, facilities, and resources in some or all of the school districts in the CLWA service area. All school districts in the service area report that they are either at capacity or are experiencing overcrowding, and temporary facilities are being used in every district. Additional enrollments would be considered at the time new development is reviewed and would include input from affected school districts. Impacts would be cumulatively significant based on current capacity limitations because additional schools would likely have to be built, which could cause significant cumulative environmental impacts.

*Libraries*—Growth would generate increased demand for library services and associated need for staffing, facilities, and resources (books, magazines, periodicals, etc.) in some or all of the libraries in the CLWA service area. Library services provided by the County of Los Angeles Library Department are currently below planning standards, based on the per capita planning standard for the Santa Clarita Valley. Additional demands, including cumulative demands for square feet of library space and related resources would be considered at the time new development is reviewed. Impacts on libraries would be cumulatively significant based on current shortages, because additional libraries would likely have to be built, which could cause significant cumulative environmental impacts.

Mitigation measures to reduce significant cumulative public services impacts to less than significant are identified in section 4.2.

**Recreation**—Significant cumulative recreational impacts would result from increased demand for recreational resources, such as public parks and trails and other recreation areas. This demand would exacerbate existing shortfalls in local parkland and may outpace the ability of public agencies to provide these resources. Mitigation measures to reduce significant recreational cumulative impacts to less than significant are identified in section 4.2.

**Transportation and Circulation**—Growth in the CLWA service area would result in the following cumulative impacts:

- Daily trips in the CLWA service area would potentially increase over current levels.
- There would be a related need for new private or public roadways, parking facilities, and for subsequent road maintenance.
- Increased demand for transit systems could occur, and there may be an alteration of present patterns of circulation.
- Roadways with existing capacity constraints could require upgrading or may experience further deterioration in levels of service.

The EIR for the City of Santa Clarita General Plan identified significant, potentially unmitigable impacts at certain isolated road segments from growth allowed under the General Plan. The segments most likely to be significantly affected are Bouquet Canyon Road near Haskell Canyon Road, McBean Parkway north of State Route 126, Soledad Canyon Road between Sierra Highway and Whites Canyon Road, Rye Canyon Road east of Interstate 5, and San Fernando Road between Newhall Avenue and State Route 14. In general, growth-related cumulative impacts would be significant because they could cause an increase in traffic that is substantial in relation to the existing load and capacity of the street system and could cause an exceedance of an established level of service standard. Specific developments could substantially increase hazards due to a design feature, or result in inadequate emergency access or parking capacity. Development also could conflict with adopted plans and policies or programs supporting alternative transportation. Cumulatively, air traffic is projected to increase throughout the southern California region, and new or expanded airports are being evaluated. Planning efforts for these projects would be required to demonstrate that the new locations/expansions do not result in substantial safety risks. Mitigation measures to reduce a portion of the cumulative significant transportation and circulation impacts are identified in section 4.2, but significant cumulative impacts to transportation and circulation would be unavoidable.

**Utilities/Service Systems**—The following impacts were identified for utilities/service systems:

*Solid Waste*—Cumulative growth would generate increased demand for solid waste disposal services due to construction-related and operational impacts of new land development. Los Angeles County and Ventura County operate several landfills that serve the CLWA service area. The location and volume of waste generation, including cumulative demands, provision of recycling programs, and existing landfill capacity and expansion plans, would be considered at the time new development is reviewed. Impacts are considered cumulatively significant because an adequate supply of landfill space has not been ensured for the future and would remain so unless additional landfill space or other disposal alternatives are approved. No feasible mitigation measure has been identified.

*Raw Water Treatment*—The indirect impacts of the Project, together with cumulative growth from other projects, would increase the demand for potable water and consequently increase the demand for water treatment facilities. Impacts would be significant due to significant environmental impacts of expanding the two existing treatment facilities: the present expansion of the Earl Schmidt Filtration Plant and, based on a preliminary environmental analysis prior to

project-specific CEQA analysis, the future expansion of the Rio Vista Water Treatment Plant (a discussion of the potential impacts of these two projects is provided in section 6.2.3.6).

*Wastewater*—Cumulative growth would increase wastewater generation and demand for wastewater treatment primarily at facilities operated by the County Sanitation Districts (District No. 26 and District No. 32) of Los Angeles County in Los Angeles County, which service the Santa Clarita Valley. These two districts jointly operate a regional system known as the Santa Clarita Valley Joint Sewerage System (SCVJSS) for which the 2015 Joint Sewerage System Facilities System Plan has been completed (LACSD 1998). The SCVJSS has a current combined capacity of 19.1 mgd and plans to expand capacity to 28.1 mgd by 2004, with further expansion to the practical site capacity of 34.1 mgd by 2020. The ultimate expansion is intended to serve a population of 321,000. Cumulative impacts to wastewater treatment capacity would be less than significant based on an adopted facility plan being in place to accommodate growth through 2020.

*Storm Water Drainage*—New construction and development would likely require the construction of new storm water drainage facilities or the expansion of existing facilities, which could cause significant cumulative environmental impacts.

Mitigation measures to reduce significant utilities/service systems cumulative impacts to less than significant are identified in section 4.2.14. Cumulative impacts to solid waste disposal, however, may not be avoidable unless additional landfill capacity is approved and constructed.

**Water Resources**—As local purveyors become increasingly dependent on SWP supplies, which are variable and may be reduced during dry years, local groundwater resources may be required to support a larger portion of the total demand from future development during periods of reduced SWP supplies. Should it occur, this short-term demand for groundwater resources would be considered a significant cumulative impact because it could result in the substantial depletion of groundwater supplies on a short-term basis in dry hydrologic years. It is noted, however, that on an average basis, over time, the annual amount of local groundwater pumping to meet urban and agricultural demand in the Santa Clarita Valley will not appreciably change, but its fraction of total water supply will decrease.

Increased municipal and industrial use of water would increase the amount of water treated at the existing and planned raw and wastewater treatment plants. This would result in additional discharges from the wastewater treatment plants and increased flows in the portion of the Santa Clara River west of Interstate Highway 5. However, in the future, some of the water presently being discharged into the Santa Clara River could be diverted prior to discharge for landscape irrigation and other permitted uses of reclaimed water within the CLWA service area. Impacts would be cumulatively significant.

Future development could result in an increase in the total amount of salts (including chlorides) in water delivered to the CLWA service area due to the increased volume of water (depending on the quality of raw water). Water quality of SWP deliveries infrequently approaches or exceeds water quality standards. Future development would cause an increase in effluent volume from wastewater treatment plants in the CLWA service area. Given the recent implementation of the "Ordinance Prohibiting Installation of Certain Water Softening Appliances" (refer to section 3.15), however, it is reasonable to expect that new development

would have better effluent quality than existing development and would result in similar effluent quantity per residence. This would ultimately result in no detectable change in the chloride concentrations discharged from the water treatment plants. The potential change in chloride concentrations is a less than significant cumulative impact.

Future development within the CLWA service area could increase the amount of impervious surface (roads, buildings, other paved areas). This could reduce percolation of rainwater to groundwater, alter surface flows, and increase the amount and rate of stormwater runoff through storm sewers or other engineered drainages. Growth-related development could affect water quality from non-point source discharges. The increase in impervious surface could also affect the peak flow rates of floodwaters and could increase flooding on or off-site of future development. Increased flooding and peak flow rates could result in substantial erosion or siltation on or off site. Cumulative water quality impacts could be significant.

New development in floodplains could expose additional persons and property to flood hazards and could impede or redirect flood flows. Development, in particular the placement of impervious surfaces, in areas critical to the recharge of the Alluvial and Saugus aquifers could reduce the rate of aquifer recharge. This effect would not alter the storage capabilities of these aquifers; however, it could, under certain circumstances, reduce aquifer recharge. These would be considered significant cumulative impacts.

Seiches (creation of large waves on a lake or reservoir) could occur as a result of earthquake-induced ground shaking or landslides in Castaic Lake, Pyramid Lake, or Bouquet Reservoir, potentially resulting in flooding of downstream communities. Since the Project would not substantially change lake levels or other reservoir characteristics that could affect seiche frequency or height, no cumulative impact to seiches would occur. Mudflows could also occur as a result of new development, particularly in mountainous areas. This would be considered significant cumulative indirect impacts.

Mitigation measures to reduce significant cumulative water resources impacts to less than significant are identified in section 4.2.

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# 7.0 ALTERNATIVES TO THE PROJECT

## 7.1 ALTERNATIVES EVALUATION PROCESS

This section analyzes alternatives to the Project. CEQA Guidelines (Section 15126) require that an EIR describe a reasonable range of feasible alternatives to the project or project location that could feasibly attain most of the basic project objectives and would avoid or substantially lessen one or more of the significant environmental impacts of the Project. Project alternatives must be feasible based on specific economic, social, legal, and technical considerations. The EIR must explain the rationale for selecting the alternatives to be discussed, identify those that were not carried forward because they were infeasible, and briefly explain why they were not carried forward. The range of alternatives required in an EIR is governed by a "rule of reason," which requires the EIR to set forth only those alternatives necessary to permit a reasoned choice. Additionally, the No Project Alternative must be analyzed. If there is an "environmentally superior" alternative to the Project, it must be identified. If the environmentally superior alternative is the No Project Alternative, the EIR must identify an additional "environmentally superior" choice among the other project alternatives. Section 7.2 discusses the alternatives that were considered but eliminated from detailed consideration. Section 7.3 evaluates the impacts of those alternatives carried forward for detailed consideration, and section 7.4 identifies the environmentally superior alternative.

For purposes of this analysis, the long-term average amount of water available from the Project's 41,000 AFY Table A Amount is established as 34,400 AFY, based on modeling assumptions regarding the reliability of SWP Table A deliveries. As discussed in detail in section 3.15 and Appendix D, the annual allocations of SWP water made by DWR are based on that year's hydrologic conditions, the amount of water in storage in the SWP system, and Contractors' requests for SWP supplies. Thus, the transfer of 41,000 AFY of Table A Amount would not result in the availability of this amount of water under most hydrologic conditions. The use of the average water supply is considered a reasonable scenario for purposes of the alternatives analysis because it represents the most typical condition that would occur during a given year.

## 7.2 ALTERNATIVES CONSIDERED BUT NOT CARRIED FORWARD

### 7.2.1 Alternative Imported Water Sources

A variety of alternative imported water sources were considered. These include sources other than the SWP, such as water from the central valley of California (CVP), transfers from other water rights holders in the Sacramento Valley, and water from other water supply systems (Los Angeles Department of Water and Power [LA DWP]). In addition, alternative imported water sources from SWP Contractors other than KCWA were considered.

The use of water from the CVP and other water rights holders in the Sacramento Valley was not carried forward for a number of reasons. This water would be transported to CLWA via SWP facilities, and as non-SWP water, its transmission by these facilities would have a low priority. Therefore, the water supply would be less reliable than that of the Project, which would not meet Project objectives. Additionally, the permanent conveyance of this water through the Delta could result in economic and social impacts associated with transferring water from

agricultural use to urban use. Water transfers from CVP Contractors also would not be feasible because their water already has been allocated for other uses, including environmental restoration projects, and is not available for long-term, reliable sale or exchange.

Similarly, LA DWP does not have excess water available for transfer; thus, use of water from this source is infeasible at this time. Exchanges or acquisition of SWP Table A Amount with other SWP Contractors are considered feasible, but the environmental consequences of such transfers would be similar to those of the Project and would not reduce or avoid any Project impacts. The use of any of these alternative water sources would not change the environmental impacts that would occur in the CLWA service area from treatment and use of the water, which are the primary impacts of the Project.

### 7.2.2 Increased Conservation/Recycling

This alternative involves implementing an aggressive water conservation/recycling program that would conserve or reuse an average of 34,400 AFY in the CLWA service area that is over and above what is currently projected in the UWMP (CLWA 2000). Replacement of the new water supply would require an additional 35 percent savings. Recycled water can only be used for limited purposes (irrigation or other non-potable uses) depending on the degree of treatment; thus, recycled water would be able to replace only a portion of the 34,400 AFY, and conservation would be required to provide potable water.

This alternative was rejected for several reasons.

- The amount of conservation that would be required under this alternative is not anticipated to be achievable and sustainable. Therefore, it is judged to be technically infeasible. A number of water conservation measures already are in place in the CLWA service area, and CLWA has adopted a water conservation goal of further reducing water demand by 7,700 AF in 2010 and 10,600 in 2020, or about 10 percent of demand (CLWA 2000). As discussed in section 3.15, CLWA is a member of the CUWCC and has pledged to implement all cost-effective BMPs for water conservation in order to achieve these goals. It is unlikely that the amount of additional conservation that would be required under this alternative could be implemented in a timely manner, if at all, particularly since such levels of conservation have not been demonstrated in the Project area and other areas of the State to be sustainable over long periods of time.

- The Saugus and Valencia water reclamation plants reclamation plants have the existing or planned capacity to meet the projected 2020 demand for recycled water (CLWA 2000). Since the use of recycled water is limited to landscaping and other non-potable uses, it may not be feasible to increase recycling beyond that which is currently planned for. Additionally, the cost of recycled water is currently greater than that of additional SWP water. Recycled water currently costs approximately $818 per AF (personal communication, L. Takaichi 2003), as opposed to Project water, which would cost approximately $250 per AF.

- This alternative would not reduce or avoid significant indirect impacts of the Project occurring in the CLWA service area.

### 7.2.3 Transporting Desalinated Seawater from Ventura County to CLWA

Two options for obtaining an average of 34,400 AFY of water from a new seawater desalination facility in Ventura County were considered. An alternative that included CLWA's contributing to the development of a desalination facility in exchange for delivery of SWP water was carried forward for analysis in this EIR (see section 7.3.3).

The alternative that was eliminated would have resulted in the direct transfer of water from the desalination facility to the CLWA service area and would have required the construction of a pipeline approximately 50 miles in length to transport the water. This alternative was eliminated because it would create greater environmental impacts than the other desalination alternative due to pipeline construction. These include impacts or potential impacts to resources such as air quality, biology, and cultural resources. Additionally, it would result in the same impacts to the CLWA service area as the Project and thus would not reduce or avoid Project impacts.

### 7.2.4 Upgrading the CLWA Water Treatment Plants

This alternative would involve implementation of the Project along with upgrades to the CLWA water treatment plants to reduce chlorides. These upgrades would require construction of a brine disposal line from CLWA's treatment plants to the coast, resulting in environmental impacts from ground disturbance and impacts to marine resources from off-shore disposal of the brine. This alternative would create greater environmental impacts than the Project due to construction of the brine disposal line (e.g., to air quality, biological resources, and cultural resources). Additionally, LACSD recently has adopted an ordinance that prohibits the installation and use of new self-regenerating water softeners in the Santa Clarita Valley, which would reduce the amount of chloride load in the watershed, and it is considering the feasibility and cost of various measures that would reduce discharge of chlorides at its Santa Clarita Valley water reclamation plants (LACSD 2002b). These measures would be more effective than upgrades at CLWA water treatment plants because LACSD facilities treat both imported SWP water and local groundwater, whereas CLWA facilities only treat SWP water. Therefore, any action by CLWA would result in chloride reductions in only approximately 50 percent of the volume of water that could be treated by LACSD. This alternative also would result in the same impacts to the CLWA service area as the Project.

This alternative was rejected because it would result in greater environmental impacts than the Project, would be less effective in treating water than other methods that have been implemented or are in the planning stages, and would not reduce or avoid significant impacts of the Project in the CLWA service area.

## 7.3 ALTERNATIVES CARRIED FORWARD FOR DETAILED ANALYSIS

Five alternatives were carried forward for detailed analysis.

### 7.3.1 Alternative 1, No Project Alternative

Under the No Project Alternative, CLWA would not acquire the additional Table A Amount or acquire the associated contractual rights for delivery of water associated with the transfer. The demand for high quality surface water is expected to increase throughout all of southern

California as a result of continued growth, and local planning agency documents project continuing growth in the CLWA service area. The contract right to the Table A Amount that is the subject of the Project could be acquired and transferred to other portions of urbanized California. The amount, timing, and location of such a transfer are highly speculative, however, and this scenario is not considered further. Two hypothetical scenarios have been carried forward for detailed analysis that are intended to define a reasonable range of possible actions that could occur under this alternative. Future land development is not under the control of CLWA and depending upon the actions of agencies with land use planning and permitting authority the possible actions could vary.

The discussion provided below under the Moratorium Scenario and the Build-Out Scenario includes projects in the County of Los Angeles Development Monitoring System (DMS) which includes: pending projects (not yet approved); approved projects (subdivisions that have been granted an approved tentative tract map that is not yet recorded or expired); and recorded projects (subdivisions that have recorded a final tract map but are not yet built).

***Scenario 1 –Moratorium on New Development, Existing Users Subject to Delivery Cutbacks (Moratorium Scenario)***

Under the Moratorium Scenario, a moratorium on new development would be implemented. This assumes that the local retail water purveyors[1] within the CLWA service area decide that there is insufficient water to issue "will serve" letters to supply development and that local land use agencies respond by imposing a moratorium on new development in the CLWA service area.

The 1998 DMS included 15,973 housing units (8,588 approved, 2,292 recorded, and 5,093 pending). The 2002 DMS included 33,113 housing units (13,586 approved, 9,915 recorded, and 9,612 pending). These housing units would not be built under this scenario. Assuming three persons per household, this amount of development would result in a population of approximately 49,510 persons, using the 1998 DMS, and 99,339 persons, using the 2002 DMS.

As noted in section 1.1, the Project (Transfer of Table A Amount) serves existing demand (users) (it also is intended to serve a portion of future demand). Under the No Project Alternative, some additional groundwater production wells might be required to serve existing demand that would have been met by the Table A Amount transfer. Treatment at the wellhead likely would be needed, depending upon local groundwater characteristics. New underground distribution pipelines also may be required. Electric pumps would be used as needed.

Environmental impacts of this scenario to individual resources are described below. It also could result in considerable economic and social impacts to residential, commercial, industrial, and public/governmental users in the CLWA service area if water deliveries were cut back or rationing occurred. Reduced deliveries could affect the ability of public and private property owners to water lawns, parks, golf courses, landscaping, and open space areas and could result in these areas dying off with resulting economic loss. Businesses that use high volumes of water may be forced to cutback production or close. A moratorium on new development

1 The CLWA Act refers to "retail water distributors," although the term "retail water purveyors" also is commonly used. For purposes of this report, the terms are synonymous.

would result in a delay or failure to meet County of Los Angeles and City of Santa Clarita General Plan population, housing, and job projections for which local governments have planned and/or constructed infrastructure and expended funds. A moratorium on new development would have potential economic consequences related to increased costs of housing in an already expensive southern California housing market, and developers with approved or recorded and unbuilt projects may experience economic loss if projects are delayed or cannot be completed. In addition, businesses considering relocating or expanding in the CLWA service area may be reluctant to invest capital because of uncertainties related to water supplies, lack of affordable housing for employees and stagnant local markets for goods and services. Alternative locations for siting or expanding businesses outside the service area would become more attractive. This could in some cases result in increased commuting, resulting in greater traffic, air emissions and energy use.

***Scenario 2 – Build-Out of Recorded and Approved Projects in DMS (Build-Out Scenario)***

Under the Build-Out Scenario, approved and recorded projects listed in the DMS for the Santa Clarita Valley would be developed, notwithstanding the potential shortfall in reliable water supply. Based on the DMS from both 1998 and 2002, the number of housing units in approved and recorded DMS projects considered under this scenario (10,880 and 23,500 units, respectively) is less than the number of housing units that could be supported by the Project given an average year water supply of 34,400 AF (35,600 units). The population associated with the development identified in the 1998 DMS would be 32,640 persons; the population associated with the 2002 DMS development would be 70,500 persons. In comparison, the population that could be served by the Project would be 106,700 persons.

Under this scenario, existing demand currently met by the Table A Amount transfer and the increased water demand from new development would rely on existing water supplies (principally local groundwater resources) that are currently not used for urban purposes. Treatment at the wellhead likely would be needed, depending upon local groundwater characteristics. New underground distribution pipelines also may be required. Electric pumps would be used as needed.

*Impacts*

**Aesthetic/Visual Resources** — Under the Moratorium Scenario, impacts on aesthetic/visual resources from development would not occur in the CLWA service area, although they could occur in another area if projected growth were re-located elsewhere.

Under the Build-Out Scenario, significant, unavoidable impacts on aesthetic/visual resources from development could occur, but the indirect impacts of the Project would be reduced because development would be limited to recorded and approved DMS projects.

Under both scenarios, new groundwater production wells and treatment facilities could be constructed, which could result in significant aesthetic impacts if they were located in proximity to visually sensitive resources. Construction of distribution pipelines would cause temporary impacts, but the pipelines would be underground and it is assumed that the corridor would be restored to its prior condition once the pipeline was laid. This impact would be less than significant. This impact would not occur if the Project were implemented.

**Agricultural Resources** — Under the Moratorium Scenario, impacts on agricultural resources from development would not occur in the CLWA service area, although they could occur in another area if projected growth were re-located elsewhere.

Under the Build-Out Scenario, significant impacts on agricultural resources from development could occur, but the indirect impacts of the Project would be reduced because development would be limited to recorded and approved DMS projects. Under this scenario, however, agricultural water users in the CLWA service area may have to compete for water with urban users, which could adversely affect irrigated agriculture, particularly during periods of drought. This impact would be significant if it resulted in the conversion of a substantial amount of agricultural land to non-agricultural use. If new groundwater production wells, treatment facilities, and distribution pipelines were located on Important Farmland, impacts would be less than significant, because their construction would not involve the loss of a substantial amount of farmland. These impacts would not occur if the Project were implemented.

**Air Quality** — Under the Moratorium Scenario, short-term and long-term impacts on air quality from development would not occur in the CLWA service area, although they could occur in another area if projected growth were re-located elsewhere.

Under the Build-Out Scenario, significant, unavoidable impacts on air quality from development could occur, but the indirect impacts of the Project would be reduced because development would be limited to recorded and approved DMS projects. Construction of new groundwater production wells, treatment facilities, and distribution pipelines would generate combustive and fugitive dust emissions. Depending on the mix of equipment used, construction activities could exceed the AQMD's daily significance thresholds, which would be a significant impact. This impact would not occur if the Project were implemented.

**Biological Resources** — Under the Moratorium Scenario, impacts on biological resources from development would not occur in the CLWA service area, although they could occur in another area if projected growth were re-located elsewhere.

Under the Build-Out Scenario, significant, unavoidable impacts on biological resources from development could occur, but the indirect impacts of the Project would be reduced because development would be limited to recorded and approved DMS projects. Additionally, increased use of groundwater resources under the Build-Out Scenario would likely decrease the amount and longevity of habitats that are dependent on groundwater seeps (i.e., springs and other areas where groundwater surfaces). This would potentially result in significant impacts to biological resources that are dependent on wetlands, springs, and aquatic habitats, including the protected species that use these habitats. This impact would be greater than would occur under the Project and could be significant. Depending on the location of individual sites, construction of the groundwater production wells, treatment facilities, and distribution pipelines could impact sensitive biological resources, including special status species. Locating distribution facilities along rights-of-way would reduce the potential for impacts to biological resources, but in the absence of specific sites, it is assumed that impacts from the construction and operation of all new facilities could be significant. This impact would not occur if the Project were implemented.

**Cultural Resources** — Under the Moratorium Scenario, short-term and long-term impacts on cultural resources from development would not occur in the CLWA service area, although they could occur in another area if projected growth were re-located elsewhere.

Under the Build-Out Scenario, significant impacts on cultural resources from development could occur, but the indirect impacts of the Project would be reduced because development would be limited to recorded and approved DMS projects. Depending on the location of individual sites, construction of the groundwater production wells, treatment facilities, and distribution pipelines could have a significant impact on cultural resources. This impact would not occur if the Project were implemented.

**Geology, Soils, and Mineral Resources** — Under the Moratorium Scenario, impacts on geology, soils, and minerals from development would not occur in the CLWA service area, although they could occur in another area if projected growth were re-located elsewhere.

Under the Build-Out Scenario, significant impacts on geology, soils, and minerals from development could occur, but the indirect impacts of the Project would be reduced because development would be limited to recorded and approved DMS projects. The construction of new groundwater production wells, treatment facilities, and distribution pipelines could cause short-term soil erosion, which could be a significant impact that could be mitigated by implementing BMPs. This impact would not occur if the Project were implemented.

Increased groundwater pumping could potentially result in land subsidence under both scenarios. There has been no recorded historical inelastic (irreversible) subsidence, or indirect evidence of its occurrence (i.e., subsidence-related impacts on surface structures, drainage facilities, etc.), attributable to groundwater pumping in the Santa Clarita Valley. The most recent comprehensive review of historical groundwater conditions in the basin (Slade 2002) describes how temporary fluctuations in groundwater storage have occurred in response to natural variations in recharge and changes in groundwater discharge such as pumping, but how such fluctuations (only notable in the eastern portion of the basin) have only been temporary and have fully recovered in response to wet period rainfall and associated recharge. Slade (2002), however, identifies subsidence as a potential undesirable result of exceeding the perennial yield of the groundwater basin. In order for subsidence to occur, there would need to be a "continued and progressive decline in groundwater levels leading to a permanent loss of groundwater in storage." Such conditions could occur under this alternative, which would result in a significant and unavoidable impact.

**Hazards and Hazardous Materials** – Under the Moratorium Scenario, impacts on hazards and hazardous materials from development would not occur in the CLWA service area, although they could occur in another area if projected growth were re-located elsewhere.

Under the Build-Out Scenario, significant impacts on hazards and hazardous materials from development could occur, but the indirect impacts of the Project would be reduced because development would be limited to recorded and approved DMS projects. Hazardous materials would be used during the construction of groundwater production wells and associated facilities as well as during groundwater treatment. Any use of hazardous materials for these activities would be conducted in accordance with existing policies, procedures, and regulations to prevent upset or release into the environment. Thus, impacts from the incremental increase

in use of hazardous materials during construction and to treat water would be less than significant. The Project would require the use of hazardous materials to treat the transferred water, but would not require new construction. Thus, impacts would be incrementally greater under this scenario than under the Project.

**Land Use and Planning** — Under the Moratorium Scenario, impacts on land use and planning from development would not occur in the CLWA service area; thus, the significant growth-related impacts of the Project would not occur in the CLWA service area, although they could occur in another area if projected growth were re-located elsewhere.

Under the Build-Out Scenario, significant impacts on land use and planning from development could occur, but the indirect impacts of the Project would be reduced because development would be limited to recorded and approved DMS projects. The siting of groundwater production wells and associated facilities would take local land use planning requirements into consideration, although there is a potential for conflicts with adopted policies intended to protect the environment to occur. Impacts could be significant. This impact would not occur if the Project were implemented.

**Noise** — Under the Moratorium Scenario, impacts on noise from development would not occur in the CLWA service area, although they could occur in another area if projected growth were re-located elsewhere.

Under the Build-Out Scenario, significant impacts on noise from development could occur, but the indirect impacts of the Project would be reduced because development would be limited to recorded and approved DMS projects. Noise would result from the construction of new groundwater production wells and associated facilities and the operation of pumps. Impacts could be significant if sensitive receptors were located nearby. This impact would not occur if the Project were implemented.

**Population and Housing** — Under the Moratorium Scenario, a moratorium would be imposed on new development; thus, the future population of the Santa Clarita Valley and associated housing units would be less than could occur under the Project.

Under the Build-Out Scenario, population and housing growth in the Santa Clarita Valley would be less than could occur under the Project since it would be limited to approved and recorded DMS units.

**Public Services** — Under the Moratorium Scenario, impacts on public services from development would not occur in the CLWA service area, although they could occur in another area if projected growth were re-located elsewhere.

Under the Build-Out Scenario, significant impacts on public services from development could occur, but the indirect impacts of the Project would be reduced because development would be limited to recorded and approved DMS projects. The construction and operation of groundwater production wells would not affect public services. This impact would be comparable to that of the Project.

**Recreation** — Under the Moratorium Scenario, impacts on recreation from development would not occur in the CLWA service area, although they could occur in another area if projected growth were re-located elsewhere.

Under the Build-Out Scenario, significant impacts on recreation from development could occur (e.g., from increased use of facilities), but the indirect impacts of the Project would be reduced because development would be limited to recorded and approved DMS projects. The construction and operation of groundwater production wells would not result in physical changes to recreational facilities or lead to the construction of new facilities. This impact would be comparable to that of the Project.

**Transportation and Circulation** — Under the Moratorium Scenario, impacts on noise from development would not occur in the CLWA service area, although they could occur in another area if projected growth were re-located elsewhere.

Under the Build-Out Scenario, significant impacts on noise from development could occur, but the indirect impacts of the Project would be reduced because development would be limited to recorded and approved DMS projects. The construction of groundwater production wells and treatment facilities would generate minor amounts of traffic, which would not cause significant impacts. Construction of pipelines could result in temporary lane closures or other short-term traffic disruptions, but this would be less significant because standard procedures would have to be followed to allow safe access through the construction area. Long-term maintenance would generate minimal amounts of traffic. These impacts would not occur if the Project were implemented.

**Utilities/Service Systems** — Under the Moratorium Scenario, impacts on utilities/service systems from development would not occur in the CLWA service area, although they could occur in another area if projected growth were re-located elsewhere.

Under the Build-Out Scenario, significant impacts on utilities/service systems from development could occur, but the indirect impacts of the Project would be reduced because development would be limited to recorded and approved DMS projects. Increased operation of groundwater pumps and treatment facilities would require the consumption of additional electricity, but this would not require the construction or expansion of electrical power facilities. This impact would be less than significant and less than the impact associated with the Project.

**Water Resources** — Under the Moratorium Scenario, a moratorium would be imposed on new development in order to meet water demands of existing development. Thus, certain significant indirect impacts on water resources, such as water quality impacts and impacts from increased runoff would not occur in the CLWA service area, although they could occur in another area if projected growth were re-located elsewhere. Other impacts in the CLWA service area would be greater. For example, water supplies and delivery dependability within the CLWA service area would decrease compared to the Project. Since a portion of existing demand is served by the 41,000 AF transfer, this scenario would result in a greater dependence upon local groundwater and recycled water to meet the needs of the current population. Groundwater resources would likely be stressed, especially during periods of extended drought, and deliveries may be limited or reduced depending on demand. Mandatory conservation measures would be required during periods of drought. Groundwater basin

adjudication legal proceedings also could occur. Individual landowners may assert their rights to groundwater resources beneath their land and drill new groundwater production wells; however, they would not be able to receive development rights based on that water supply. Impacts to groundwater would be greater under the Moratorium Scenario than under the Project and would be significant and unavoidable if the substantial depletion of groundwater supplies occurred. Additionally, if groundwater production wells were improperly sited, there would be the potential for perchlorate contamination plumes to spread, which could cause a significant water quality impact. These impacts would not occur under the Project.

Under the Build-Out Scenario, allowed development would depend more heavily upon groundwater resources within the CLWA service area than under the Project and the Moratorium Scenario. Groundwater resources likely would be stressed, and local water purveyors may require mandatory conservation measures more frequently than under the Moratorium Scenario, especially during periods of extended drought when SWP deliveries would be reduced. Impacts to local water resources would be significant and unavoidable if the substantial depletion of groundwater supplies occurred. Additionally, if groundwater production wells were improperly sited, there would be the potential for perchlorate contamination plumes to spread, which could cause a significant water quality impact. These impacts would not occur under the Project.

### 7.3.2 Alternative 2, Increased Extractions from the Saugus Formation (Increased Groundwater Extractions)

Under this alternative, in lieu of the Project, an average of 34,400 AFY would be extracted from the Saugus Formation and delivered to users in the CLWA service area in lieu of the water anticipated from the transfer of SWP Table A Amount. This amount would be above what is currently extracted or planned for extraction. The extraction would be accomplished by increased use of existing wells and by the installation of 15 additional wells, pumps, and wellhead treatment facilities. Existing or new distribution facilities such as pipelines and pumping stations would be used to transport this water to existing and planned treated water distribution facilities. Pumps and treatment facilities would use electrical power. Wherever possible, distribution facilities would be placed in public rights-of-way, including streets, utility, and railroad corridors. Disturbed areas would be restored to their former appearance once construction was completed. It is estimated that approximately 40 acres would be disturbed by the new facilities, which would be constructed and operated either by CLWA, individual purveyors, or other parties. A detailed geohydrologic investigation would be necessary prior to drilling on a site-by-site basis.

Until contaminant remediation is completed, existing, localized perchlorate contamination in a small part of the Saugus Formation would limit potential well locations. Field studies and groundwater modeling activities are in progress to evaluate how best to hydraulically contain the portion of the aquifer system where production wells have been shut down, while simultaneously preventing perchlorate movement to currently unimpacted areas. The field studies have included the installation and sampling of monitoring wells at multiple depths and locations on and around the Whittaker-Bermite site, the most likely source of perchlorate; water level monitoring in these wells; aquifer testing of two unimpacted water supply wells; and groundwater velocity testing in alluvial monitoring wells located between the site and the Santa Clara River. These studies have helped the water purveyors and the Whittaker Corporation

further refine the current understanding of groundwater flow patterns in specific areas on and near the site (such as along the Holser Fault). This information has been incorporated into a regional groundwater flow model that has been developed by the purveyors and whose calibration and construction was recently reviewed and approved by the California Department of Toxic Substances Control (DTSC). The model is being used to identify a pumping scheme that would meet the objectives of restoring the lost water supply from the impacted wells (with wellhead treatment) while simultaneously containing perchlorate and hydraulically limiting its movement downgradient to unimpacted wells and other portions of the aquifer system where new water supply wells might be constructed. The modeling analysis accounts not only for the pumping of impacted wells, but also (a) the 2000 Urban Water Management Plan's (UWMP) pumping plan for unimpacted wells throughout the Santa Clarita Valley and (b) the significant year-to-year variation in local hydrology (especially groundwater recharge) that occurs in the Valley (CH2MHill 2004). The modeling simulations will be used to guide selection of a final pumping plan for the impacted Alluvial Aquifer well and the impacted Saugus Formation wells. The selection of a final pumping plan will be made jointly by the purveyors and the Whittaker Corporation, with regulatory oversight and permitting performed by the California Department of Health Services (CA DHS) with technical support from the DTSC.

There are numerous wells in the Saugus Formation, other than the wells that were voluntarily shut down due to perchlorate contamination. Additionally, other Saugus wells are planned for construction, including those included in CLWA's Capital Improvements Program. If operated continuously during the year, the wells not subject to perchlorate contamination have the capability to produce approximately 21,000 AFY (personal communication, L. Takaichi 2004). However, a more realistic production capability is 15,000 AFY due to periodic shutdown for maintenance, monitoring, or storage limitations (personal communication, L. Takaichi 2004). The current groundwater production capability from the Saugus Formation is estimated to be 5,000 AFY during normal years but could reach 15,000 AFY during dry periods or other periods of need (personal communication, L. Takaichi 2004). These capabilities will increase as additional production wells in the Saugus Formation are completed and a response action to perchlorate contamination is implemented.

***Impacts***

Growth inducement and growth-related impacts within the CLWA service area would be as described for the Project. This alternative, therefore, would not reduce or avoid the significant indirect impacts of the Project in the CLWA service area. Direct impacts of this alternative are described below and compared to those of the Project.

**Aesthetic/Visual Resources** – Depending on the location of specific sites, production wells and treatment facilities could be visible from sensitive viewpoints and could substantially degrade the character of the area or affect a scenic vista. This impact would be significant but would be mitigable to less than significant by siting these facilities to avoid sensitive viewpoints where feasible, and where it is necessary to place them in visually sensitive areas, to screen them from view. The distribution pipelines would be located below ground, generally in already disturbed rights-of-way; and pipeline corridors would be restored once construction was completed; therefore, no long-term impacts to aesthetic/visual resources would result from pipeline construction. Because no new facilities would be constructed as part of the Project, impacts of Alternative 2 to aesthetic/visual resources would be greater than under the Project.

**Agricultural Resources** — If new facilities were constructed on Important Farmland, it would result in the conversion of a small amount of this land to non-agricultural use. As noted above, however, distribution facilities would be placed in public rights-of-way to the extent possible, which would reduce the potential for this impact to occur. This impact would be less than significant because a substantial amount of Important Farmland would not be affected by this alternative. Increased groundwater extraction under this alternative would reduce groundwater levels in the CLWA service area, which could result in increased pumping costs and affect agricultural economics. In addition, it is possible that groundwater currently used for agricultural purposes could be used for urban purposes instead of to meet the increased demand, which could adversely affect irrigated agriculture. Impacts from increased groundwater cost and decreased availability would be significant since they could result in the substantial loss of agricultural productivity. No feasible mitigation measures have been identified for this impact. The Project would not directly affect agricultural resources; therefore, impacts would be greater under this alternative.

**Air Quality** — Since the pumps and treatment facilities would be powered by electricity, no long-term increases in air emissions would occur. Approximately 24 million kWh per year would be required to operate the wells, which would be considerably less than the power required to operate SWP pumps under the Project (approximately 140 million kWh per year). Thus, air emissions from facilities that generate electricity would be less than would occur under the Project. Short-term combustive and fugitive dust emissions would result from construction of required wells and distribution facilities. Depending on the mix of equipment used, construction activities could exceed the AQMD's daily significance thresholds, which would be a significant impact. Short-term impacts of this alternative would be mitigable to less than significant by implementing standard operating practices to ensure that fugitive dust ($PM_{10}$) emissions are minimized (e.g., applying water to areas where vehicles and equipment operate on bare soil and cover inactive soil stockpiles or treat them with soil binders, such as crusting agents or water them to keep moist) and implementing measures to reduce peak daily $NO_x$ emission impacts (e.g., using alternative diesel fuels, such as diesel emulsions or biodiesels, extending the duration of the construction period to reduce daily equipment usage, and maximizing the use of diesel-powered construction equipment manufactured after year 1995). No construction impacts would be associated with the Project; therefore, air quality impacts would be greater under this alternative.

**Biological Resources** — Depending on the location of individual sites, construction of the groundwater production wells and distribution facilities could either temporarily or permanently impact sensitive biological resources, including special status species present in the Santa Clarita Valley. Locating distribution facilities along rights-of-way would reduce the potential for impacts to biological resources, but in the absence of specific sites, it is assumed that impacts from the construction and operation of new facilities could be significant. Impacts would be mitigable to less than significant by surveying sites prior to construction to determine whether sensitive biological resources are present and taking appropriate measures to avoid or reduce impacts if they are present. Depending on the resources present, measures could include relocating the facilities to sites that do not contain sensitive resources or avoiding construction during the breeding season of sensitive species. Additionally, increased use of groundwater resources would likely decrease the amount and longevity of habitats that are dependent on groundwater seeps (i.e., springs and other areas where groundwater surfaces). This would potentially result in significant impacts to biological resources that are dependent

on wetlands, springs, and aquatic habitats, including the protected species that use these habitats. The Project would not directly impact biological resources in the CLWA service area; thus, impacts would be greater under this alternative.

**Cultural Resources** — Depending on the location of individual sites, construction of the groundwater production wells and distribution facilities could have a significant impact on cultural resources. This impact would be mitigable to less than significant by conducting a survey to identify whether cultural resources are present prior to construction and taking appropriate measures to avoid or reduce impacts. These may include relocating construction sites to avoid the cultural resources or performing testing, evaluation, and data recovery if relocating the sites is not feasible. Impacts would be e greater than the Project because no additional facilities would be constructed for the Project. The Project would not directly impact cultural resources in the CLWA service area; thus, impacts would be greater under this alternative.

**Geology, Soils, and Mineral Resources** — As described above under the No Project Alternative, Build-Out Scenario, increased groundwater pumping could lead to subsidence, which would be a significant and unavoidable impact. The limited construction required would not result in the substantial loss of availability of a known mineral resource. Construction activities could, however, result in erosion. This impact could be significant but would be mitigable to less than significant through the implementation of BMPs. The Project would not directly impact geology and soils in the CLWA service area; thus, impacts would be greater under this alternative.

**Hazards and Hazardous Materials** — Groundwater from the Saugus Formation would require disinfection prior to use. The present disinfectant used for groundwater treatment is gaseous chlorine, which is provided in 150 lb. cylinders and injected at the wellheads, although CLWA may switch to chloramines (e.g., by adding an ammonia solution, treating with chloramines) in several years. Because these treatment facilities would be sited at several locations, potential public exposure in the event of an accidental release could be higher than at the centralized treatment facilities utilized for the Project. These treatment facilities are located in relatively remote areas and have scrubbing facilities to mitigate potential accidental releases. Any use of hazardous materials would need to comply with applicable laws and regulations, and impacts would be less than significant. Because of the higher potential for public exposure to hazardous materials under this alternative, hazards and hazardous materials impacts would be greater than that of the Project.

**Land Use and Planning** — Where possible, the distribution pipelines would be placed in public rights-of-way; these underground pipelines would not affect nearby land uses. Depending on the location of production wells, their construction and operation could result in environmental impacts that would conflict with land use plans and policies adopted for the purpose of avoiding environmental impacts. Impacts could be significant but would be mitigable to less than significant by implementing measures such as those described elsewhere in this section that would bring the project into compliance with those policies. The Project would not result in land use impacts since no construction would occur or conflict with adopted plans and policies.

**Noise** — Noise would result from the construction of new facilities and the operation of pumps. Impacts could be significant if sensitive receptors were located nearby. Impacts could be mitigated to less than significant through the implementation of measures such as limiting construction to daylight hours on weekdays, using muffled construction equipment, and enclosing pumps. The Project would not directly impact noise in the CLWA service area; thus, impacts would be greater under this alternative.

**Population and Housing** — Construction of the groundwater production wells and distribution facilities would not displace existing housing or populations. This impact is comparable to that of the Project.

**Public Services** — Increased extractions from the Saugus Formation would not result in increased demands on public services, including police protection, fire protection, education, and library services. This impact is comparable to that of the Project.

**Recreation** — The construction and operation of groundwater production wells would not result in physical changes to recreational facilities or lead to the construction of new facilities. Neither this alternative nor the Project would result in adverse impacts to recreational resources.

**Transportation and Circulation** — The construction of groundwater production wells and treatment facilities would generate minor amounts of traffic, which would not cause significant impacts. Construction of pipelines could result in temporary lane closures or other short-term traffic disruptions, but this would be less significant because standard procedures would have to be followed to allow safe access through the construction area. Long-term maintenance would generate minimal amounts of traffic. The Project would not directly impact transportation and circulation in the CLWA service area; thus, impacts would be greater under this alternative.

**Utilities/Service Systems** — This alternative would affect utilities and service systems by requiring an increased amount of electrical power to operate groundwater pumps and treatment facilities. The increase of approximately 29 million kWh per year would be less than the Project's estimated 140 million kWh demand, and no expansion or new construction of power-generating facilities would be required. This impact would be less than significant and less than the Project impact.

**Water Resources** — Depending on individual site locations, construction of the groundwater production wells and distribution facilities could impact the water quality of drainage courses located adjacent to the facilities due to increased erosion. This impact could be significant but would be mitigable to less than significant by the implementation of BMPs. The Project would not directly cause erosion in the CLWA service area; thus, impacts would be greater under this alternative.

Extractions from the Saugus Formation vary according to hydrologic conditions. As shown on Table 3.15-8, extractions in recent years have ranged from 21,500 AF in 1990 to 32,100 in 1996. The formation should be capable of producing as much as 40,000 AFY during a dry period of five to six years (Montgomery Watson 1998). However, there are no historical records or studies that can guarantee that the Saugus Formation can reliably produce an additional 34,400 AFY over an extended period of time. Increasing the groundwater production to such an extent

without implementation of other measures (e.g., the reduction of non-urban use of groundwater resources and local aquifer storage and recovery programs) could exceed the normal year yield of the Saugus Formation. This would be a significant and unmitigable impact. This impact would be greater than those of the Project, which would have a beneficial impact to groundwater.

Perchlorate contamination has been discovered in parts of the Saugus Formation (see section 3.15.1.3 under the subheading Groundwater Quality for a more detailed discussion of perchlorate, some of which is summarized in this section). Field studies and groundwater modeling activities are in progress to evaluate how best to hydraulically contain the portion of the aquifer system where production wells have been shut down due to perchlorate contamination, while simultaneously preventing perchlorate movement to currently unimpacted areas. The field studies have included the installation and sampling of monitoring wells at multiple depths and locations on and around the Whittaker-Bermite site, the most likely source of perchlorate; water level monitoring in these wells; aquifer testing of two unimpacted water supply wells; and groundwater velocity testing in alluvial monitoring wells located between the site and the Santa Clara River. These studies have helped the water purveyors and the Whittaker Corporation further refine the current understanding of groundwater flow patterns in specific areas on and near the site (such as along the Holser Fault).

This information has been incorporated into the purveyor's regional groundwater flow model, which is being used to identify a pumping scheme for impacted wells that would meet the objectives of restoring the lost water supply from the impacted wells (with wellhead treatment) while simultaneously containing perchlorate and hydraulically limiting its movement downgradient to unimpacted wells and other portions of the aquifer system where new water supply wells might be constructed. The modeling analysis accounts not only for the pumping of impacted wells, but also (a) the 2000 UWMP's pumping plan for unimpacted wells throughout the Santa Clarita Valley and (b) the significant year-to-year variation in local hydrology (especially groundwater recharge) that occurs in the Valley (CH2MHill 2004). The modeling simulations will be used to guide selection of a final pumping plan for the impacted Alluvial Aquifer well and the impacted Saugus Formation wells. The selection of a final pumping plan will be made jointly by the purveyors and the Whittaker Corporation, with regulatory oversight and permitting performed by the CA DHS with technical support from the DTSC.

Development of additional wells or increased pumping from existing wells could be limited in some locations to avoid expansion of the contamination plumes. Because perchlorate historically has not been considered a common drinking water contaminant, no federal or state drinking water standards exist. In 2002, the OEHHA proposed a public health goal, in the range of 2 to 6 ppb, for the amount of perchlorate present in drinking water (LADRP 2003a). Both the federal and state governments require monitoring for perchlorate and have recommendations for potable water uses of water sources exceeding 18 µg/L or 18 ppb. The CA DHS has lowered the action level for drinking water in perchlorate from 18 ppb to 4 ppb (CA DHS 2002). In addition to the OEHHA's proposed public health goal, the CA DHS is required to adopt a primary drinking water standard for perchlorate by January 1, 2004 (LADRP 2003a). An MCL for perchlorate is not expected until 2004 (SCVWP 2003). Several treatment technologies for the removal of perchlorate from water are currently available, and

impacts to water quality would be less than significant because water would be treated prior to distribution. This would, however, increase the cost for treating water from these wells to achieve applicable water quality standards. This impact would be comparable to that of the Project, since SWP water also would require treatment.

The less than significant impacts to the resources associated with the SWP from changes in the timing of water use would not occur since no water would be transferred, nor would the less than significant impacts to groundwater and water quality in the WRMWSD.

### 7.3.3 Alternative 3, Exchange Desalinated Water for SWP Water (Desalination/Exchange)

This alternative comprises two primary components in lieu of the Project: (1) CLWA would contribute a portion of the funds needed by another agency to develop a seawater desalination facility along the southern California coast; and (2) an average of 34,400 AFY of desalinated water produced by this facility would be exchanged with CLWA for SWP water. A likely partner in such an arrangement would be The Metropolitan Water District of Southern California (Metropolitan). If both parties agreed, CLWA would enter into a contract with Metropolitan indicating that a portion of Metropolitan's annual SWP Table A Amount would be delivered to Castaic Lake for use by CLWA in exchange for CLWA's contribution to a desalination facility to be constructed by Metropolitan. CLWA would treat and distribute SWP this water in existing CLWA facilities, and Metropolitan would use water from the desalination facility in lieu of the SWP water exchanged with CLWA.

Assuming a 50 percent recovery rate, a plant capacity of approximately 61 mgd would be required to produce an average of 34,400 AFY. Depending on the extent of ancillary facilities included at the site, a site of at least 2 acres could be required. In addition to the desalting plant, the coastal facility would likely include new electrical power conveyance and control equipment, ocean water intake and brine disposal structures, and a treated water pumping plant. Total site area could be up to 5 acres. Depending on site location, additional pipelines and related pumping facilities may be required to convey the desalinated water a short distance to the existing Metropolitan distribution facilities.

*Impacts*

Growth inducement and growth-related impacts within the CLWA service area would be as described for the Project. This alternative, therefore, would not reduce or avoid the significant indirect impacts of the Project in the CLWA service area. Direct impacts of this alternative are described below and compared to those of the Project.

**Aesthetic/Visual Resources** — Construction of a desalination facility on 2 to 5 acres of land and associated pipelines could impact aesthetic/visual resources. These impacts could be significant but mitigable to less than significant if they were located in visually sensitive areas, which are common along the coast. Mitigation measures could include relocating, redesigning, or screening the desalination facility and restoring the pipeline corridor to minimize visual impacts. These impacts would be greater than those of the Project, which would not directly affect visual/aesthetic resources.

**Agricultural Resources —** Some agricultural areas are located along the southern California coast. If the desalination facility and pipeline were located on Important Farmland, the impact

would be less than significant because a substantial amount of farmland would not be converted to non-agricultural use. This impact would be greater than that of the Project, which would not directly affect agricultural resources.

**Air Quality —** Section 30253(3) of the Coastal Act requires that new development be consistent with requirements imposed by an air pollution district or the State Air Resources Control Board. In general, the air emissions from reverse osmosis desalination plant consist only of discharges of a degasifier. The production of electricity for use in desalination plants, however, would increase air emissions (Woodward-Clyde 1994), although they likely would not be significant because any existing fossil fuel-fired power plant that provides electricity for the Project would have to comply with all ambient air quality standards and applicable air permit conditions, such as emission offsets. Short-term combustive and fugitive dust emissions would result from construction of the desalination plant and any conveyance pipelines. Depending on the mix of equipment used, construction activities could exceed the relevant air pollution control district's daily significance thresholds, which would be a significant impact. Short-term impacts of this alternative would be mitigable to less than significant by implementing standard operating practices to ensure that fugitive dust ($PM_{10}$) emissions are minimized (e.g., applying water to areas where vehicles and equipment operate on bare soil and cover inactive soil stockpiles or treat them with soil binders, such as crusting agents or water them to keep moist) and implementing measures to reduce peak daily $NO_x$ emission impacts (e.g., using alternative diesel fuels, such as diesel emulsions or biodiesels, extending the duration of the construction period to reduce daily equipment usage, and maximizing the use of diesel-powered construction equipment manufactured after year 1995). Air quality impacts would be greater than under the Project.

**Biological Resources —** Marine resources in the vicinity of a desalination plant could be affected by the constituents present in the concentrate discharges, by the concentrate discharge method used, and by the process of feed water intake. Coastal Act Sections 30230 and 30231 provide for the maintenance, enhancement, and restoration of marine resources and biological productivity (California Coastal Commission 2003).

All desalination plants use chlorine or other biocides, which are hazardous to marine resources, to clean pipes and other equipment and sometimes to pretreat the feed water. The SWRCB does not permit chlorine or other biocides to be discharged directly to the ocean. Consequently, these chemicals would have to be neutralized before discharge (California Coastal Commission 2003). Concern over the potential adverse effects to marine resources of desalination plant discharges is tempered by the following factors: total volume of concentrate being released; the constituents of the concentrate discharge; and, the amount of dilution prior to release. The high salt concentration of the concentrate and resulting localized fluctuations in salinity levels may kill organisms near the outfall that cannot tolerate either high salinity levels or fluctuations in the levels. In addition, discharges from desalination plants would be denser than seawater and could sink to the ocean floor, potentially causing adverse impacts to benthic communities. These effects may be considerably reduced if desalination plant concentrate discharges are combined with sewage treatment plant discharges (which are less dense than seawater) or are diluted by mixing with power plant cooling water discharges. At this time, however, there is considerable uncertainty about how well desalination plant discharges, either alone or combined with other discharges, would be diluted in seawater. Metals in the concentrate discharge may become concentrated in the upper few micrometers of the ocean (the

microlayer), which could be toxic to fish eggs, marine organisms, and larvae that are located there. Impacts to biological resources could be significant but likely could be mitigated to less than significant by measures such as treating water prior to discharge. These impacts would be greater than those of the Project, which would not directly affect biological resources.

Construction activities also could result in disturbance to sensitive habitat and wildlife species. Impacts would be significant but could be mitigable to less than significant by measures such as modifying construction timing, avoiding construction sites when sensitive species are present, and restoring disturbed habitat. These impacts would be greater than those of the Project, which would not directly affect biological resources.

**Cultural Resources —** Depending on the location of individual sites, construction of the seawater desalination facility and conveyance pipelines could have a significant impact on cultural resources. This impact would be mitigable to less than significant by conducting a survey to identify whether cultural resources are present prior to construction and taking appropriate measures to avoid or reduce impacts. These may include relocating construction sites to avoid the cultural resources or performing testing, evaluation, and data recovery if relocating the sites is not feasible. The Project would not directly impact cultural resources; thus, impacts would be greater under this alternative.

**Geology, Soils, and Mineral Resources** —The limited construction required would not result in the substantial loss of availability of a known mineral resource. The seawater desalination facility and water conveyance pipelines could be subject to geologic hazards, including seismic hazards, expansive soils, and unstable ground units depending on site locations. Construction also could result in erosion and siltation. These impacts would be mitigable to less than significant through appropriate siting and the implementation of appropriate engineering practices and BMPs. The Project would not directly impact geology and soils; thus, impacts would be greater under this alternative.

**Hazards and Hazardous Materials** — The desalination plant would require the use of hazardous materials, such as chlorine, caustic soda (sodium hydroxide), acid, dechlorination chemicals, and carbon dioxide. An accidental release of these chemicals could have adverse effects on plant personnel, the general public, and plant and, possibly, aquatic life depending on the location of the facility (Woodward-Clyde 1991). Impacts could be significant but would be mitigable to less than significant through compliance with federal, state, and local laws and regulations. These regulations stipulate minimum standards for design of facilities, storage requirements, spill prevention procedures, emergency response and contingency plans, risk, management, and employee training procedures. The proposed desalination facility would have to adhere to pertinent regulations including the Uniform Building Code, the Uniform Fire Code, and related regulations related to risk management (Woodward-Clyde 1991). The Project would not directly impact hazards and hazardous materials; thus, impacts would be greater under this alternative.

**Land Use and Planning —** Depending on site location, the desalination facility could result in conflicts with existing land uses or with future development plans. The facility and associated pipeline also could result in environmental impacts that would conflict with relevant adopted plans and policies. Impacts could be significant but likely could be mitigated to less than significant through the implementation of measures such as those described elsewhere in this

section. These impacts would be greater than those of the Project, which would not directly affect land use or planning.

**Noise —** Noise would result from the construction of new facilities and the operation of pumps and an emergency generator. Impacts could be significant if sensitive receptors were located nearby. Impacts could be mitigated to less than significant through the implementation of measures such as limiting construction to daylight hours on weekdays, using muffled construction equipment, and enclosing pumps and the generator. The Project would not directly impact noise; thus, impacts would be greater under this alternative.

**Population and Housing —** Constructing and operating a desalination plant and pipeline would not displace population or housing, nor would it directly induce population growth. Impacts would be comparable to the Project.

**Public Services —** Constructing and operating a desalination plant and pipeline would place minimal demands on fire and police protection and would not affect schools or library services. No new public services facilities would be required as a result of this alternative. Impacts would be negligible and would be comparable to those of the Project.

**Recreation —** Depending on the site selected, coastal recreation and access could be restricted, and impacts could be significant. They could be mitigated to less than significant through the implementation of measures such as selecting sites that are not used for recreational purposes and providing public access where appropriate. Impacts could be greater than those of the Project since it would not affect recreational opportunities.

**Transportation and Circulation —** Constructing and operating the desalination facility and pipeline would result in increased traffic associated with the transportation of materials, equipment, and employees to and from the site(s). Existing traffic levels on surrounding freeways and roads leading to the facility would determine the level of impact on transportation, but impacts likely would be less than significant or mitigable to less than significant through scheduling of deliveries, use of flagpersons where needed, and other standard traffic control measures. Construction of pipelines could result in temporary lane closures or other short-term traffic disruptions, but this would be less significant because standard procedures would have to be followed to allow safe access through the construction area. The Project would not directly impact transportation and circulation; thus, impacts would be greater under this alternative.

**Utilities/Service Systems —** Constructing and operating the desalination facility and pipeline would generate some materials (e.g., construction materials, filters, and office materials) that would require disposal in a landfill. The significance of the impact would depend upon the amount of materials generated and the availability of disposal space. Electrical power would be needed to operate the desalination plant and water pumps. Impacts likely would be less than significant. This alternative would have greater impacts to solid waste disposal than the Project; the impacts to electrical power generation likely would be comparable to those of the Project.

**Water Resources** — Construction could result in erosion and short-term water quality impacts to nearby water bodies. This impact could be significant but would be mitigable to less than significant through the implementation of BMPs. Effluent discharge could affect the water

quality of coastal areas, but this impact would be mitigable to less than significant through compliance with permitting conditions imposed by the RWQCB. These impacts would be greater than the Project and would be significant, although incorporation of standard mitigation measures would reduce the severity of impacts. The Project would not directly cause erosion; thus, this impact would be greater under this alternative. The less than significant impacts to the resources associated with the SWP from changes in the timing of water use would not occur since no water would be transferred, nor would the less than significant impacts to groundwater and water quality in the WRMWSD.

### 7.3.4 Alternative 4, Transfer of a Smaller Table A Amount (Smaller Table A Amount)

Under this alternative, CLWA would acquire a smaller amount of SWP Table A Amount than under the Project. A transfer of approximately 20,000 AF of SWP Table A Amount was analyzed since it is the approximate mid-point between the amount that would be transferred under the Project and the No Project Alternative. Existing facilities would be used, as described for the Project.

Since the demand for high quality surface water is expected to increase in southern California as a result of anticipated growth, the remaining SWP Table A Amount (21,000 AF) could be acquired and transferred to other (unidentified) portions of urbanized southern California. The Table A Amount not acquired by CLWA would likely be acquired by other agencies with growing urban water demands. However, the timing, amount, and location of the transfer(s) as well as the associated impacts are speculative and are not evaluated under this alternative.

***Impacts***

Growth inducement and growth-related impacts within the CLWA service area generally would be as described for the Project but would be reduced proportionately. This alternative, therefore, would reduce the significant indirect impacts of the Project in the CLWA service area. Direct impacts of this alternative are described below and compared to those of the Project.

**Aesthetic/Visual Resources** – As described for the Project, no direct impacts to aesthetic/visual resources would occur.

**Agricultural Resources** — As described for the Project, no direct impacts to agricultural resources would occur.

**Air Quality** — This alternative would result in lower air emissions from power plants that provide electricity for pumping than the Project since approximately half of the water would be transported.

**Biological Resources** — As described for the Project, no direct impacts to biological resources would occur.

**Cultural Resources** —The same types of impacts on cultural resources from minor seasonal changes in the volume of water stored in San Luis Reservoir would occur as described for the Project, but would be lessened since less water would be transferred.

**Geology, Soils, and Mineral Resources** — The same types of impacts on erosion from minor seasonal changes in the volume of water stored in San Luis Reservoir would occur as described for the Project, but would be lessened since less water would be transferred.

**Hazards and Hazardous Materials** — The same types of impacts associated with hazardous materials from water treatment would occur as described for the Project, but lesser quantities would be required.

**Land Use and Planning** — As described for the Project, no direct impacts to land use and planning would occur.

**Noise** — As described for the Project, no direct impacts to noise would occur.

**Population and Housing** — As described for the Project, no direct impacts to population and housing would occur.

**Public Services** — As described for the Project, no direct impacts to public services would occur.

**Recreation** — As described for the Project, no direct impacts to recreation would occur.

**Transportation and Circulation** — As described for the Project, no direct impacts to transportation and circulation would occur.

**Utilities/Service Systems** — Less electrical power would be required for this alternative than for the Project, since less water would be transported and treated. Impacts would remain less than significant.

**Water Resources** — Like the Project, this alternative would have a beneficial impact to the CLWA service area's water supply, although less water would be provided. Thus, less benefit would result from this alternative. The less than significant impacts to the resources associated with the SWP from changes in the timing of water use would be lessened since less water would be transferred. Similarly, the less than significant impacts to groundwater and water quality in the WRMWSD would be lessened, as well.

Assuming groundwater resources are managed so that long-term groundwater extractions do not exceed long-term groundwater recharge, the water resource impacts from this alternative would be similar to those of the Project. However, if local groundwater resources were utilized on a long-term basis in excess of the long-term groundwater recharge to supply water during periods of drought or if overall water demand exceeded supply, significant impacts to water resources would occur.

As was the case in the No Project Alternative, local groundwater resources and other water management actions (including local and out-of-region conjunctive groundwater management, groundwater banking and mandatory conservation measures) may play a larger role in the satisfaction of future water demands. Should water demands exceed supplies, groundwater resources would likely be stressed, especially during periods of extended drought, and deliveries may be limited or reduced depending on demands. Under the Lower Table A alternative, individual landowners may be more likely to assert their rights to confined

groundwater resources beneath their land, drill groundwater production wells and seek development rights based on that water supply, however these impacts are not specifically quantified, evaluated or assumed. Since the Smaller Table A alternative does not identify a level of regional water demand, specific impacts on water resources and other water dependent indirect impacts (e.g. biological impacts to wetland habitats) cannot be specifically determined. In the absence of appropriate regional management of groundwater resources, the indirect impacts on local water resources from the Smaller Table A alternative could be similar to or greater than those from the Project, and would be significant.

### 7.3.5 Alternative 5, Transfer of a Larger Table A Amount (Larger Table A Amount)

Under this alternative, CLWA would acquire a larger SWP Table A Amount than under the Project. Such an alternative would require the use of a larger proportion of the SWP facilities and capacities than described for the Project, and would attempt to reduce or avoid the effects of reductions in SWP supplies (during periods of drought) on local groundwater resources. In order to provide an analysis of impacts of a transfer greater than the Project (transfer of 41,000 AF of Table A Amount), a transfer of approximately 60,000 AF of SWP Table A Amount was established for this alternative. This Table A Amount is potentially available from other KCWA member units who have expressed interest in reducing their Table A Amount and have completed CEQA analysis of the sale of this contract right (e.g., Belridge Water Storage District, Berrenda Mesa Water District, and Lost Hills Water District [BWSD 1998; BMWD 1996]). Existing facilities would be used, as described for the Project.

***Impacts***

*Indirect Impacts*

If development within the CLWA service area were held to the level that could be served by the Project, indirect impacts to most environmental resources would be the same as those described for the Project. This might occur if, for example, the additional Table A Amount (i.e., the incremental 20,000 AF above the Project Table A Amount) were used in lieu of groundwater pumping. Under this assumption, the larger Table A Amount (approximately 50 percent greater than the Project amount, or approximately 20 percent greater than the total CLWA Table A Amount with the Project) also would be used to avoid some of the adverse impacts during periods of reduced deliveries from the SWP to local groundwater and water-dependent biological resources that are described in Chapter 4. The additional Table A Amount would provide approximately 20 percent more water (under each of the hydrologic conditions described) than would be delivered by the total CLWA Table A Amount with the Project, thereby reducing the potential impact by about 20 percent (i.e., when the total Table A Amount is considered, or 50 percent if only the Project increment is considered).

If local governments approved development within the CLWA service area beyond a level that could be supported by the 41,000 AF of Table A Amount for the Project, indirect, growth-related impacts described in section 4.0 could increase proportionately.

*Direct Impacts*

**Aesthetic/Visual Resources** – As described for the Project, no direct impacts to aesthetic/visual resources would occur.

**Agricultural Resources** — As described for the Project, no direct impacts to agricultural resources associated with the SWP, WRMWSD, or the CLWA service area would occur. Prior environmental analyses by KCWA member units (e.g., BWSD 1998) have concluded that the sale of approximately this total amount of SWP Table A Amount would result in less than significant impacts to agricultural resources within areas served by the selling water district(s).

**Air Quality** — This alternative would result in greater air emissions from power plants that provide electricity for pumping than the Project since approximately 50 percent more water would be transported (approximately 210 million kWh per year would be required). As described for the Project, any existing fossil fuel-fired power plant that provides electricity for the Project would have to comply with all ambient air quality standards and applicable air permit conditions, such as emission offsets. Therefore, air quality impacts due to the generation of electrical power for this alternative would be less than significant.

**Biological Resources** — As described for the Project, no direct impacts to biological resources would occur.

**Cultural Resources** —The same types of impacts on cultural resources from minor seasonal changes in the volume of water stored in San Luis Reservoir would occur as described for the Project, but would be somewhat greater since more water would be transferred.

**Geology, Soils, and Mineral Resources** — The same types of impacts on erosion from minor seasonal changes in the volume of water stored in San Luis Reservoir would occur as described for the Project, but would be somewhat greater since more water would be transferred.

**Hazards and Hazardous Materials** — The same types of impacts associated with hazardous materials from water treatment would occur as described for the Project, but greater quantities would be required.

**Land Use and Planning** — As described for the Project, no direct impacts to land use and planning would occur.

**Noise** — As described for the Project, no direct impacts to noise would occur.

**Population and Housing** — As described for the Project, no direct impacts to population and housing would occur.

**Public Services** — As described for the Project, no direct impacts to public services would occur.

**Recreation** — As described for the Project, no direct impacts to recreation would occur.

**Transportation and Circulation** — As described for the Project, no direct impacts to transportation and circulation would occur.

**Utilities/Service Systems** — More electrical power would be required for this alternative than for the Project, since more water would be transported and treated (approximately 210 million kWh per year would be required). This is approximately 4-5 percent of the total electrical power used by the 25 SWP pumping and generating plants in 1998, which was a year in which

100 percent of Contractors' allocations were available and therefore power demand was high. It is approximately 2-3 percent of the electrical power used in 2000 (a 90 percent allocation year for the SWP). According to the California Energy Commission (CEC 2002b), for the foreseeable future, the addition of capacity will exceed increase in peak demand both within California and in the Northwest, Southwest, and Rocky Mountain regions. While various factors may trigger calls for load curtailments, supply reserve margins should be adequate to meet the reasonably foreseeable demands. Direct impacts would be greater than the Project, but would remain less than significant.

**Water Resources** — Like the Project, this alternative would have a beneficial impact to the CLWA service area's water supply, including a greater benefit to groundwater resources.

Assuming groundwater resources are managed so that long-term groundwater extractions do not exceed long-term groundwater recharge, the groundwater resource impacts from the Larger Table A alternative would be similar to those of the Project. In addition, the increased SWP Table A Amount transfer would result in additional water being delivered to the CLWA service area in years of lower SWP water deliveries. Provided the same amount of anticipated development occurred within the CLWA service area as under the Project, this increased delivery in drier years would reduce potential impacts to groundwater resources. However, if a more likely scenario occurs in which continued demand for additional housing in the Santa Clarita Valley results in incrementally greater development being approved by local government and if the additional 19,000 AF of Table A Amount supported this additional development, no benefit to the local groundwater resources would be realized and no enhanced water delivery capability would be developed. As with the Project, if local groundwater resources were utilized on a long-term basis in excess of the long-term groundwater recharge to supply water during periods of drought or if water demand exceeded supply, significant impacts to water resources would occur.

## 7.4 ENVIRONMENTALLY SUPERIOR ALTERNATIVE

Table 7.4-1 compares the direct and indirect environmental impacts of each of the alternatives carried forward for detailed analysis with those of the Project. Scenarios 1 and 2 of Alternative 1, the No Project Alternative, would reduce or avoid the significant indirect (growth-related) impacts of the Project in the CLWA service area, but these impacts could occur in another area if projected growth were re-located elsewhere. Each alternative would result in greater direct impacts since new groundwater wells, treatment facilities, and associated pipelines would be required. Additionally, each of these scenarios could result in significant unavoidable impacts to groundwater supply and groundwater quality. This alternative would not augment CLWA's water supply and therefore would not meet the Project objectives. Since the direct impacts of the No Project Alternative would be substantially greater than the Project and since it would not meet Project objectives, this alternative is not considered environmentally superior.

**Table 7.4-1. Comparison of Direct and Indirect Environmental Impacts of Alternatives with Project Impacts**

| | ALTERNATIVE | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *No Project* | | | | *Increased Groundwater Extractions* | | *Desalination/ Exchange* | | *Smaller Table A Amount* | | *Larger Table A Amount* | |
| *Resource Area* | *Moratorium Scenario** | | *Build-Out Scenario* | | | | | | | | | |
| | Dir. | Ind. | Dir. | Ind. | Dir. | Ind. | Dir. | Ind. | Dir. | Ind. | Dir. | Ind. |
| Aesthetic/Visual Resources | + | - - | + | - | + | = | + | = | = | - | = | + |
| Agricultural Resources | + | - - | + | - | + | = | + | = | = | - | = | + |
| Air Quality | + | - - | + | - | + | = | + | = | = | - | + | + |
| Biological Resources | + | - - | + | - | + | = | + | = | = | - | = | + |
| Cultural Resources | + | - - | + | - | + | = | + | = | - | - | + | + |
| Geology, Soils, and Mineral Resources | + | - - | + | - | + | = | + | = | - | - | + | + |
| Hazards and Hazardous Materials | + | - - | + | - | + | = | + | = | - | - | + | + |
| Land Use and Planning | + | - - | + | - | + | = | + | = | = | - | = | + |
| Noise | + | - - | + | - | + | = | + | = | = | - | = | + |
| Population and Housing | = | - | = | -- | = | = | = | = | = | - | = | + |
| Public Services | = | - - | = | - | = | = | = | = | = | - | = | + |
| Recreation | = | - - | = | - | = | = | + | = | = | - | = | + |
| Transportation and Circulation | + | - - | + | - | + | = | + | = | = | - | = | + |
| Utilities and Service Systems | - | - - | - | - | - | = | + | = | - | - | + | + |
| Water Resources | + | - -/+ | + | -/+ | + | = | + | = | - | - | + | + |

* Under the Moratorium Scenario, indirect, growth-related impacts would not occur in the CLWA service area, but could occur elsewhere if projected growth were relocated.
= Alternative's impacts comparable to Project
\- Alternative would reduce Project impacts
\- - Alternative would avoid Project impacts
\+ Alternative's impacts greater than the Project
\- / + Alternative would reduce or avoid some impacts, increase other impacts

Alternative 2, the Increased Groundwater Extractions Alternative, would result in the same indirect impacts as the Project and thus would not reduce or avoid the Project's significant growth-related impacts. It would result in greater direct impacts to many environmental

resources because new groundwater wells, treatment facilities, and pipelines would have to be constructed. It also would result in a significant, unavoidable impact to groundwater supply, whereas the Project would result in a beneficial impact to groundwater supply through recharge. This alternative would not augment CLWA's water supply for its customers and therefore would not meet the Project objectives. Because the direct impacts of the Increased Groundwater Extractions Alternative would be substantially greater than the Project and since it would not meet Project objectives, this alternative is not considered environmentally superior.

Alternative 3, the Desalination/Exchange Alternative, would result in the same indirect impacts as the Project and thus would not reduce or avoid the Project's significant growth-related impacts. It would result in greater direct impacts to many environmental resources from the construction and operation of a new desalination plant and pipeline. This alternative would augment CLWA's water supply since desalinated water would be exchanged with another water agency's SWP Table A Amount, which would be conveyed to existing CLWA facilities, and therefore would meet the Project objectives. Because the direct impacts of the Desalination/Exchange Alternative would be substantially greater than the Project, however, this alternative is not considered environmentally superior.

Alternative 4, the Smaller Table A Amount Alternative, would reduce the potentially significant indirect impacts of the Project and would result in similar or lessened direct impacts, as well. This alternative would not meet one of the two Project objectives, however, which is to "Augment CLWA's SWP Table A Amount to meet water demands of existing users and a portion of future water demand from anticipated growth within the CLWA service area." Thus, while this alternative would result in lessened direct and indirect impacts, it does not meet an important basic Project objective[2] and is not considered the environmentally superior alternative.

Alternative 5, the Larger Table A Amount Alternative, could increase the significant indirect impacts of the Project and would result in similar or greater direct impacts, as well. It would meet the Project objectives but would result in greater environmental impacts than the Project and is not considered environmentally superior.

The Project is identified as the environmentally superior alternative that meets Project objectives.

2 Under CEQA Guidelines 15126.6, an EIR must describe a range of reasonable alternatives that would feasibly attain most of the basic objectives of the proposed project but would avoid or substantially lessen significant impacts of the project.

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# 10.0 LIST OF ACRONYMS AND GLOSSARY OF TERMS

## ACRONYMS

| | |
|---|---|
| AF | acre-feet |
| AF/acre | acre-feet per acre |
| AFY | acre-feet per year |
| AQMP | Air Quality Management Plan |
| APCD | Air Pollution Control District |
| ARB | California Air Resources Board |
| BE | Bookman-Edmonston Engineering |
| BMP | Best Management Practice |
| BMWD | Berrenda Mesa Water District |
| BWSD | Belridge Water Storage District |
| CAA | Clean Air Act |
| CAAA | California Clean Air Act |
| CAAQS | California Ambient Air Quality Standards |
| CA DHS | California Department of Health Services |
| Cal OSHA | California Occupational Safety and Health Administration |
| CalTrans | California Department of Transportation |
| CCR | California Code of Regulations |
| CCWA | Central Coast Water Authority |
| CDEC | California Data Exchange Center |
| CDFG | California Department of Fish and Game |
| CDMG | California Division of Mines and Geology |
| CEQA | California Environmental Quality Act |
| CERCLA | Comprehensive Environmental Response, Compensation, and Liability Act |
| cfs | cubic feet per second |
| CHP | California Highway Patrol |
| CIP | Capital Improvements Plan |
| CIWMB | California Integrated Waste Management Board |
| CLWA | Castaic Lake Water Agency |
| CMP | Conservation Management Practice |
| CNEL | Community Noise Equivalent Level |

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|---|---|
| CNDDB | California Natural Diversity Data Base |
| CNPS | California Native Plant Society |
| CO | carbon monoxide |
| CPA | Citizens Planning Association of Santa Barbara County |
| CUWCC | California Urban Water Conservation Council |
| CVP | Central Valley Project |
| CVRWQCB | Central Valley Regional Water Quality Control Board |
| cy | cubic yard |
| D-1641 | Water Right Decision 1641 |
| dB | decibel |
| ° F | degree Fahrenheit |
| DEIR | Draft Environmental Impact Report |
| DMS | Development Monitoring System |
| DOGGR | California Department of Conservation, Division of Oil, Gas and Geothermal Resources |
| DOT | U.S. Department of Transportation |
| DTSC | California Department of Toxic Substances Control |
| DU/Ac | dwelling units per acre |
| DWR | California Department of Water Resources |
| EIR | Environmental Impact Report |
| EIS | Environmental Impact Statement |
| EPA | United States Environmental Protection Agency |
| ESA | Federal Endangered Species Act |
| ESFP | Earl Schmidt Filtration Plant |
| FEIR | Final EIR |
| FMMP | Farmland Mapping and Monitoring Program |
| GMC | Growth Management Chapter |
| HAA5 | Haloacetic Acids |
| HCP | Habitat Conservation Plan |
| HOV | high occupancy vehicle |
| ICU | intersection capacity utilization |
| IWRP | Integrated Water Resources Plan |
| JPOD | Joint Points of Diversion |

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|---|---|
| KCESSD | Kern County Engineering and Survey Services Department |
| KCFD | Kern County Fire Department |
| KCVFHCP | Kern County Valley Floor Habitat Conservation Plan |
| KCWA | Kern County Water Agency |
| kWh | kilowatt hour |
| LACSD | Los Angeles County Sanitation Districts |
| LADRP | Los Angeles Department of Regional Planning |
| LADWP | Los Angeles Department of Water and Power |
| LARWQCB | Los Angeles Regional Water Quality Control Board |
| $L_{dn}$ | Day/Night Average Sound Level |
| $L_{eq}$ | Energy-equivalent sound/noise descriptor |
| LOS | Level of Service |
| M&I | municipal and industrial |
| MAF | million acre-feet |
| MCE | Maximum Credible Earthquake |
| MCL | Maximum Containment Level |
| MCLG | Maximum Contaminant Level Goal |
| mgd | million gallons per day |
| $\mu g/m^3$ | micrograms per cubic meter |
| µg/L | micrograms per liter |
| mg/l | milligrams per liter |
| ml | millileters |
| MND | Mitigated Negative Declaration |
| MOU | Memorandum of Understanding |
| MPN | most probable number |
| MW | megawatt |
| MWD | Metropolitan Water District of Southern California |
| NAAQS | National Ambient Air Quality Standards |
| NCCP | Natural Community Conservation Plan |
| NCWD | Newhall County Water District |
| NEA | Northwest Economic Associates |
| NEPA | National Environmental Policy Act |
| $NH_3$ | ammonia |

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|---|---|
| $NO_2$ | nitrogen dioxide |
| $NO_3$ | nitrate |
| NOE | Notice of Exemption |
| NOP | Notice of Preparation |
| NPDES | National Pollution Discharge Elimination System |
| NTU | nephelometric turbidity unit |
| OEHHA | California Office of Environmental Health Hazard Assessment |
| $O_3$ | ozone |
| PCL | Planning and Conservation League |
| PG&E | Pacific Gas & Electric Company |
| PHG | Public Health Goal |
| $PM_{2.5}$ | particulate matter less than 2.5 microns in diameter |
| $PM_{10}$ | particulate matter less than 10 microns in diameter |
| ppb | parts per billion |
| ppm | parts per million |
| ppt | parts per trillion |
| PRC | Public Resource Code |
| RCPG | Regional Comprehensive Plan and Guide |
| RCRA | Resource Conservation and Recovery Act |
| RO | reverse osmosis |
| ROC | reactive organic compound |
| ROD | Record of Decision |
| ROG | reactive organic gas |
| ROI | region of influence |
| RTP | Regional Transportation Plan |
| RVWTP | Rio Vista Water Treatment Plant |
| RWQCB | Regional Water Quality Control Board |
| SCAB | South Coast Air Basin |
| SCAG | Southern California Association of Governments |
| SCAQMD | South Coast Air Quality Management District |
| SCVJSS | Santa Clarita Valley Joint Sewerage System |
| SCWC | Santa Clarita Water Company |
| SDIP | South Delta Improvements Program |

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|---|---|
| SDWA | Safe Drinking Water Act |
| SEA | Significant Ecological Area |
| SIP | State Implementation Plan |
| SJVAB | San Joaquin Valley Air Basin |
| SJVAPCD | San Joaquin Valley Unified Air Pollution Control District |
| SoCal Gas | Southern California Gas Company |
| SOAR | Save Open-Space and Agricultural Resources |
| $SO_2$ | sulfur dioxide |
| SWP | State Water Project |
| SWRCB | State Water Resources Control Board |
| TDS | total dissolved solids |
| THM | Trihalomethane |
| TMDL | Total Maximum Daily Load |
| TRVFHCP | Tejon Ranch Valley Floor Habitat Conservation Plan |
| TSCA | Toxic Substances Control Act |
| TTHM | Total Trihalomethanes |
| UCMR | Unregulated Contaminant Monitoring Rule |
| USACE | United States Army Corps of Engineers |
| USBR | U.S. Bureau of Reclamation |
| USFWS | United States Fish and Wildlife Service |
| USGS | United States Geologic Survey |
| UWMP | Urban Water Management Plan |
| VCFCD | Ventura County Flood Control District |
| VWC | Valencia Water Company |
| WR | Water Right |
| WRMWSD | Wheeler Ridge-Maricopa Water Storage District |

## GLOSSARY OF TERMS

| | |
|---|---|
| acre-foot | Volume of water (43,560 cubic feet, or 325,900 gallons) that would cover one acre to a depth of one foot. |
| affected environment | Existing biological, physical, social, and economic conditions of an area subject to change, both directly and indirectly, as a result of a proposed human action. |
| Agricultural Contractor | A public water agency that has contracted with DWR for the delivery of SWP water for "Agricultural Use", as defined in the contractor's Water Supply Contract. Agricultural Contractors can use SWP water for purposes other than agricultural uses. (DWR 1962.) |
| aquifer | Any underground formation that stores, transmits and yields water to wells and springs. |
| Article 21 water | Water that DWR makes available when water and capacity are available in excess of SWP storage needs and Table A supplies. This water is only available for limited time periods, generally only in the winter or early spring when Contractors demands are low, and only under specific conditions that do not occur on an annual basis. This type of water is identified in Article 21 of the Water Supply Contracts. It is the same as, but replaced, unscheduled surplus water as part of the Monterey Amendment. Additionally, Article 21 water was defined under the Monterey Amendment as "interruptible water," but it is more commonly referred to as "Article 21 water." |
| average year | For purposes of analyzing water supplies in the EIR, three hydrologic conditions were identified and evaluated: average year, single dry year and multiple dry year. The average year represents the average quantity of water available to the Contractor, based on the 73 years of DWRSIM model results. |
| candidate species | Plant or animal species not yet officially listed as threatened or endangered, but which is undergoing status review by the Service. |
| carryover water | SWP Table A water that is allocated to, and paid for by, a Contractor in one year, but is stored in San Luis Reservoir (when storage is available) for use by that Contractor in a following year. |
| Contractor or Contractors | Urban and agricultural public water agencies that hold Water Supply Contracts with DWR for the delivery of SWP water (DWR 1962). |

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| critical habitat | Specific areas with physical or biological features essential to the conservation of a listed species and that may require special management considerations or protection. These areas have been legally designated via *Federal Register* notices. |
| cumulatively considerable | When the incremental effects of an individual project are considerable when viewed in connection with the effect of past projects, the effects of other projects, and the effects of probably future projects. |
| cultural resource | Building, site, district, structure, or object significant in history, architecture, archeology, culture, or science. |
| direct groundwater recharge | Direct groundwater recharge is the process of recharging groundwater supplies by the percolation of surface water supplies into the groundwater basin, most commonly done through the use of groundwater recharge ponds. |
| DWR dry year purchase | Water from DWR's Dry Year Water Purchase Program, through which water is purchased by DWR in shortage years from willing sellers in areas that have available supplies, and is then sold by DWR to Contractors willing to purchase those supplies. |
| effluent | Solid, liquid or gaseous wastes that enter the environment as a by-product of human-oriented processes; or water that has undergone treatment to remove pollutants. |
| endangered species | A species or subspecies whose survival is in danger of extinction throughout all or a significant portion of its range. |
| erosion | Wearing away of earth rock by running water, glaciers, winds and waves. |
| expansive soils | Expansive soils shrink and swell in volume as a result of the wetting and drying of fine-grained, clay-rich sediments. Development on expansive soils can result in damage to overlying structures over a long period of time, due to continued movement of soil. |
| fallow land | Usually cultivated land that is allowed to lie idle during the growing season. |
| flexible storage | Storage available to Contractors that share in repayment of the costs of terminal reservoirs (Castaic and Perris lakes). These Contractors may withdraw water from their share of flexible storage, in addition to any other SWP supplies available to the Contractor. The Contractor must replace any water it withdraws from flexible storage within five years. Flexible storage was added to the Water Supply Contracts as part of |

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| | the Monterey Amendment. CLWA may withdraw up to 4,684 AF of water from Castaic Lake as flexible storage. (DWR 1995) |
| groundwater | Water stored beneath the surface in open pore spaces and fractures in rock. |
| groundwater recharge | Refers to the addition to the water within the earth that occurs naturally from infiltration of rainfall and from water flowing over the earth materials that allow water to infiltrate below the land surface. |
| hydrology | Science dealing with natural runoff and its effect on streamflow. |
| impaired waters | Water bodies for which existing pollution controls are insufficient to attain or maintain water quality standards pursuant to section 303(d) of the Clean Water Act. |
| inert pollutant | A pollutant that does not react in the atmosphere. |
| in-lieu groundwater recharge | In-lieu groundwater recharge is the process of recharging groundwater supplies by using surface water instead of groundwater that would otherwise be extracted and used. |
| insolation | Solar radiation received at the surface of the earth. |
| Interruptible water | Same as Article 21 water, described above. Water that DWR makes available when water and capacity are available in excess of SWP storage needs and Table A supplies. This water is only available for limited time periods, generally only in the winter or early spring when Contractors demands are low, and only under specific conditions that do not occur on an annual basis. This type of water is identified in Article 21 of the Water Supply Contracts, but it was more commonly referred to as "interruptible water" prior to the Monterey Amendment. |
| landslides | Landslides are ground failures that are dependent on the geology and slope of an area as well as the amount of rainfall and the potential for seismic activity. Areas most susceptible to landslides have high relief and an unstable accumulation of material. Areas least likely to have landslides are characterized by low relief, such as valleys. |
| lateral spreading | Lateral spreading is the separating or rupturing of the ground surface, generally associated with liquefaction, as a result of strong seismically induced ground shaking. Lateral spreading commonly occurs along drainage banks, cliff areas, or steep |

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| | shoreline areas, where generally loose sediments collapse due to a lack of lateral support. |
| Lead Agency | The agency initiating and overseeing the preparation of an environmental impact statement. |
| liquefaction | Liquefaction occurs when saturated soils lose cohesive strength as a result of strong seismically induced ground shaking of saturated, generally fine-grained sediments (i.e., typically silty fine sands). Strong ground motion of such sediments causes pore water pressure in the soil to increase, thereby turning the soil from a solid to a liquid state. |
| maximum contaminant level (MCL) | The maximum possible level of a contaminant allowed in water delivered to any user of a public water system. |
| megawatt (MW) | One million watts of electrical power (capacity). |
| megawatt hour (MWh) | One million watt-hours of electrical energy. |
| minimum project yield | The dependable annual supply of the SWP to be made available to SWP Contractors, as determined by DWR. The minimum project yield was originally estimated to be 4,000,000 AFY, was increased to 4,230,000 AFY in 1964, and decreased to 4,185,000 AFY as part of the Monterey Amendment. Under a recent amendment, estimated amounts are no longer included in the Water Supply Contract. (The minimum project yield would be reduced under a scenario in which DWR implemented Article 18(b); such a scenario is evaluated as part of this EIR.) |
| M&I Contractor | A public water agency that has contracted with DWR for the delivery of SWP water for "Municipal and Manufacturing Use", as defined in the contractor's Water Supply Contract. M&I Contractors can use SWP water for purposes other than municipal and manufacturing uses. (DWR 1962.) |
| multiple dry year | For purposes of analyzing water supplies in the EIR, three hydrologic conditions were identified and evaluated: average year, single dry year and multiple dry year. The multiple dry year represents the amount of water available to the Contractor over the four consecutive years drought years of 1988 to 1991, based on the DWRSIM model results. |
| percolation | The vertical movement of water within the soil. |
| reliability | Water supply reliability or reliability refers to the amount of water that a Contractor can anticipate to be delivered at a specific place and time (DWR 2003b). Water supply reliability |

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| | indicates a particular amount of water that can be delivered with a certain numerical frequency (e.g., the amount that can be delivered 1 in 10 years, or 10 percent of the time, etc.; DWR 2003b). |
| runoff | Rainfall or snow melt which is not absorbed by soil, evaporated, or transpired by plants, but finds its way into streams as surface flow. |
| scheduled surplus water | Water that DWR determined to be available, in addition to Table A supplies, which was scheduled for delivery throughout the year (in the same manner as Table A supplies). This water was generally available only during the early years of the SWP (when Contractor demands were low). |
| single dry year | For purposes of analyzing water supplies in the EIR, three hydrologic conditions were identified and evaluated: average year, single dry year and multiple dry year. The single dry year represents the amount of water available to the Contractor in the single year with the lowest total SWP deliveries, based on the DWRSIM model results, which was 1977. The single dry year is considered to be a worst-case scenario, with a probability of occurrence of once in 73 years, or about 1.4 percent of the time. |
| subsidence | Subsidence is the sinking and settling of surface sediment commonly as a result of an overdrawn water table or oil and gas over-development. |
| surplus water | SWP water that can be made available to Contractors when water and capacity are available in excess of SWP storage needs and Table A supplies. Note that surplus water terminology changed with implementation of the Monterey Amendment. Prior to the Monterey Amendment, surplus water was referred to as scheduled or unscheduled. With implementation of the Monterey Amendment, the category of scheduled surplus water was deleted and what was unscheduled surplus water is now referred to as Article 21 water. (DWR 1962; DWR 1995.) |
| SWP allocation or allocation | The percent of Table A amount, as determined by DWR, that each SWP Contractor can receive in any one year based on that year's supply availability and Contractor requests. |
| Table A amount | A term used in the Water Supply Contracts. The "Table A Amount" is the annual maximum amount of water to which a SWP Contractor has a contract right, and is specified in Table A of each Contractor's Water Supply Contract. The Table A Amount was previously referred to as "entitlement." |

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| Table A water | SWP water allocated to a Contractor pursuant to its annual request for SWP water. |
| tributary | River or stream flowing into a larger river or stream. |
| Turnback Pool water | Water sold or purchased through the SWP Turnback Pool. The Turnback Pool is a program in which Contractors with allocated Table A supplies that are in excess of their needs in a given year may turn back that excess supply for purchase by other Contractors that need additional supplies that year. The Turnback Pool can make water available in all types of hydrologic years, although there is generally less excess water turned back in dry years. |
| unscheduled surplus water | Water that DWR made available when water and capacity were available in excess of SWP storage needs and Table A supplies. This water was only available for limited time periods, generally only in the winter or early spring when Contractors demands are low, and only under specific conditions that do not occur on an annual basis. This is the same as Article 21 water, which replaced this category of surplus as part of the Monterey Amendment. |
| User Input Program | A program implemented by the WRMWSD that allows water users within the district to deliver water into the WRMWSD distribution systems. The water user is then credited with an equal amount of water, less any losses, to be delivered to the user by WRMWSD within the same calendar year. |
| watershed | The drainage area upstream of a specified point on a stream. |
| Water Supply Contracts | Contracts between DWR and individual urban and agricultural public water agencies for the delivery of SWP water. (DWR 1962.) |

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Lorraine B. Woodman, Project Manager/Senior Scientist, SAIC
B.A., Anthropology, Pomona College, Claremont, 1975
M.A., Anthropology, University of California, Santa Barbara, 1978
Ph.D., Anthropology, University of California, Santa Barbara, 1981
Years of Experience: 23 (Other Firms — 8)

## OTHER FIRMS

Nancy Clemm, P.E., Engineer, Consultant

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# *Appendix A*

**Notice of Preparation and Comments Received**

# NOTICE OF PREPARATION

**SUBJECT:** Notice of Preparation of a Draft Environmental Impact Report

**PROJECT TITLE:** Castaic Lake Water Agency Supplemental Water Project Transfer of 41,000 Acre-feet of State Water Project Table A Amount from Kern County Water Agency

**LEAD AGENCY:** Castaic Lake Water Agency

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The proposed project is the transfer of 41,000 acre-feet (AF) of State Water Project (SWP) Table A amount from Kern County Water Agency (KCWA), and its member district the Wheeler Ridge-Maricopa Water Storage District (WRMWSD), to the Castaic Lake Water Agency (CLWA). The proposed project also establishes the right to use the 41,000 AF as part of CLWA's SWP Table A amount of 95,200 AF pursuant to a Trial Court judgment on remand described below. Also, the 41,000 AF has been delivered to CLWA from KCWA through agreements including KCWA and its member district, the WRMWSD, as well as the California Department of Water Resources (DWR). The proposed project also includes possession of SWP contractual rights that provide a means of water storage and delivery of water associated with the Table A amount to CLWA. The proposed project results in a total CLWA SWP Table A amount of 95,200 AF. The SWP water is being transported from points of origin in the SWP system to the CLWA intake south of Castaic Lake via existing SWP facilities. The proposed project does not include the construction of any additional SWP facilities.

CLWA's prior environmental review of the project, the *Supplemental Water Project Environmental Impact Report* ("CLWA's 1999 EIR", State Clearinghouse No. 98041127), analyzing CLWA's Agreement ("Agreement") to transfer the 41,000 AF of SWP Table A amount, was ordered decertified by the Court of Appeal in January of 2002. *Friends of the Santa Clara River v. Castaic Lake Water Agency* (2002) 95 Cal. App. 3d 1373 ("*Friends*"). The decision in *Friends* occurred because an EIR on which the CLWA's 1999 EIR has been tiered was itself ordered decertified as a result of an appellate court decision issued while *Friends* was on appeal. "All other contentions" concerning CLWA's 1999 EIR were found to be "without merit". The Court of Appeal specifically ordered the Trial Court to "issue a writ of mandate vacating the certification of the EIR", and to "retain jurisdiction until [CLWA] certifies an EIR complying with CEQA [the California Environmental Quality Act]," and "consider such orders it deems appropriate under Section 21168.9 [of the Public Resources Code]." The CLWA Board of Directors decertified CLWA's 1999 EIR on November 27, 2002.

On remand, the Trial Court refused to invalidate the Agreement, maintained its jurisdiction over the matter, and authorized the CLWA to utilize "any of the 41,000 AFY [acre-feet per year]," albeit, with certain limitations:

> "Respondent [the CLWA] will not be prohibited from using the water to which it is entitled, but petitioner may renew its application for such prohibition based upon evidence of the actual use of such additional water for purposes it considers improper."

The above Order was issued without prejudice to a renewed request by the Petitioner to invalidate the Agreement. Pursuant to the Trial Court's Order, the EIR will contain a complete no project alternative analysis pursuant to the requirements of the CEQA Guidelines Section 15126.6(e).

The Agreement has been approved by KCWA, WRMWSD and CLWA, as well as DWR. WRMWSD is the KCWA member district providing this Table A amount.

The 1998 factual baseline utilized in the CLWA 1999 EIR must be combined with new material information that reflects environmental conditions that may have changed since 1998, which will allow informed and reasoned decision-making by the lead agency, other public agencies, and the general public. New material information is noted in the various sections of Attachment 1 to the Notice of Preparation (NOP), and where appropriate will be expanded and included in the EIR.

Attachment 1 describes the proposed project, the project location, and provides additional information on the types of impacts that may occur as a result of the implementation of the proposed project. CLWA will be the Lead Agency under CEQA, and will prepare an Environmental Impact Report (EIR) for the proposed project. CLWA is requesting comments from interested parties regarding the scope and content of the EIR.

A scoping meeting will be held on Monday, February 10, 2003 at 7:00 p.m. at the CLWA offices located at 27234 Bouquet Canyon Road in Santa Clarita. The meeting will provide an opportunity for agencies and the public to comment on the scope and content of the EIR. Due to the time limits mandated by State law, comments must be received at the earliest possible date, ***but not later than 30 days*** after receipt of this notice. Please send your comments to:

Castaic Lake Water Agency
Attention: Dan Masnada, General Manager
27234 Bouquet Canyon Road
Santa Clarita, CA 91350-2173
Phone: 661-297-1600

January 22, 2003
Date

Dan Masnada
General Manager, Castaic Lake Water Agency

# ATTACHMENT 1

## PROJECT DESCRIPTION

The proposed project is the transfer of 41,000 acre-feet (AF) of State Water Project (SWP) Table A amount[1] from Kern County Water Agency (KCWA), and its member district the Wheeler Ridge-Maricopa Water Storage District (WRMWSD), to the Castaic Lake Water Agency (CLWA). The proposed project also establishes the right to use the 41,000 AF as part of CLWA's SWP Table A amount of 95,200 AF pursuant to a Trial Court judgment on remand described below. Also, the 41,000 AF has been delivered to CLWA from KCWA through agreements including KCWA and its member district, the WRMWSD, as well as the California Department of Water Resources (DWR). The proposed project also includes possession of SWP contractual rights that provide a means of water storage and delivery of water associated with the Table A amount to CLWA. The proposed project results in a total CLWA SWP Table A amount of 95,200 AF. The SWP water is being transported from points of origin in the SWP system to the CLWA intake south of Castaic Lake via existing SWP facilities. The proposed project does not include the construction of any additional SWP facilities.

CLWA's prior environmental review of the project, the *Supplemental Water Project Environmental Impact Report* ("CLWA's 1999 EIR", State Clearinghouse No. 98041127), analyzing CLWA's Agreement ("Agreement") to transfer the 41,000 AF of SWP Table A amount, was ordered decertified by the Court of Appeal in January of 2002. *Friends of the Santa Clara River v. Castaic Lake Water Agency* (2002) 95 Cal. App. 3d 1373 ("*Friends*"). The decision in *Friends* occurred because an EIR on which the CLWA's 1999 EIR has been tiered was itself ordered decertified as a result of an appellate court decision issued while *Friends* was on appeal. "All other contentions" concerning CLWA's 1999 EIR were found to be "without merit". The Court of Appeal specifically ordered the Trial Court to "issue a writ of mandate vacating the certification of the EIR", and to "retain jurisdiction until [CLWA] certifies an EIR complying with CEQA [the California Environmental Quality Act]," and "consider such orders it deems appropriate under Section 21168.9 [of the Public Resources Code]." The CLWA Board of Directors decertified CLWA's 1999 EIR on November 27, 2002.

On remand, the Trial Court refused to invalidate the Agreement, maintained its jurisdiction over the matter, and authorized the CLWA to utilize "any of the 41,000 AFY [acre-feet per year]," albeit, with certain limitations:

> "Respondent [the CLWA] will not be prohibited from using the water to which it is entitled, but petitioner may renew its application for such prohibition based upon evidence of the actual use of such additional water for purposes it considers improper."

The above Order was issued without prejudice to a renewed request by the Petitioner to invalidate the Agreement. Pursuant to the Trial Court's Order, the EIR will contain a complete

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1. "Table A" is a term used in the SWP Water Supply Contracts. The "Table A amount" is the amount of water to which a SWP Contractor is contractually entitled, and is specified in Table A to each Contractor's Water Supply Contract. (The Table A amount was previously referred to as "entitlement".) However, the amount of water actually available for delivery in any year may be an amount less than the Contractor's Table A amount due to hydrology and a number of other factors.

no project alternative analysis pursuant to the requirements of the CEQA Guidelines Section 15126.6(e).

The Agreement has been approved by KCWA, WRMWSD and CLWA, as well as DWR. WRMWSD is the KCWA member district providing this Table A amount.

CLWA will be, and is the proper lead agency for preparation of the EIR. CLWA has the principle responsibility for carrying out and implementing the proposed project since 1) a substantial portion of the proposed project occurs within the CLWA's jurisdiction and substantially affects the CLWA, 2) CLWA has been the major proponent of the project with the KCWA and WRMWSD and has assumed the primary task of effectuating the agreement, 3) CLWA has the expertise for implementing the proposed project, and 4) the proposed project, although involving SWP facilities, only concerns three agencies (CLWA, KCWA and WRMWSD) within a limited geographic area and does not implicate the entire statewide water rights or supply framework.

## PROJECT LOCATION

The proposed project would utilize existing SWP facilities and could affect environmental resources in the CLWA, KCWA, and WRMWSD service areas (refer to Figure 1) as well as environmental resources associated with selected SWP facilities. The CLWA service area comprises approximately 195 square miles of land in northwestern Los Angeles County and eastern Ventura County. The KCWA service area includes all of the lands within Kern County, approximately 8,064 square miles. The WRMWSD service area comprises approximately 228 square miles of land in southern Kern County. The potentially affected SWP facilities include those SWP facilities that convey water to either CLWA or WRMWSD and include SWP facilities from the south Sacramento-San Joaquin Delta (Delta) facilities to Castaic Lake, including the California Aqueduct and associated pumping, storage and affected turnout facilities, along with San Luis Reservoir (refer to Figure 2). These potentially affected SWP facilities are collectively referred to as "SWP and associated facilities" within this Attachment.

## BACKGROUND AND ENVIRONMENTAL SETTING

*Castaic Lake Water Agency* - CLWA is a special district water agency created by the California Legislature in 1962 to acquire and distribute SWP water. CLWA currently holds contractual rights to delivery of water from the California SWP and contains incorporated and unincorporated areas in, or adjacent to, the Santa Clarita Valley area of Los Angeles County and also extends into eastern Ventura County. Elevations in the service area range from approximately 800 feet to in excess of 3,000 feet above sea level. Land use in the service area ranges from the urbanized environment of the Santa Clarita Valley (including the City of Santa Clarita and several developed, unincorporated communities in northern Los Angeles County) to the undeveloped environment of the eastern Santa Susana and western San Gabriel Mountains. Interstate Highway 5 and California State Routes 14 and 126 provide regional access to the Santa Clarita Valley. The population of the CLWA service area was estimated at approximately 190,000 persons in 2000 based on U.S. Census Bureau data. Substantial portions of the CLWA service area also contain ecologically important vegetation and wildlife habitats including sensitive plant and animal species. Major vegetation/habitat types include oak woodlands, chaparral, coastal and/or

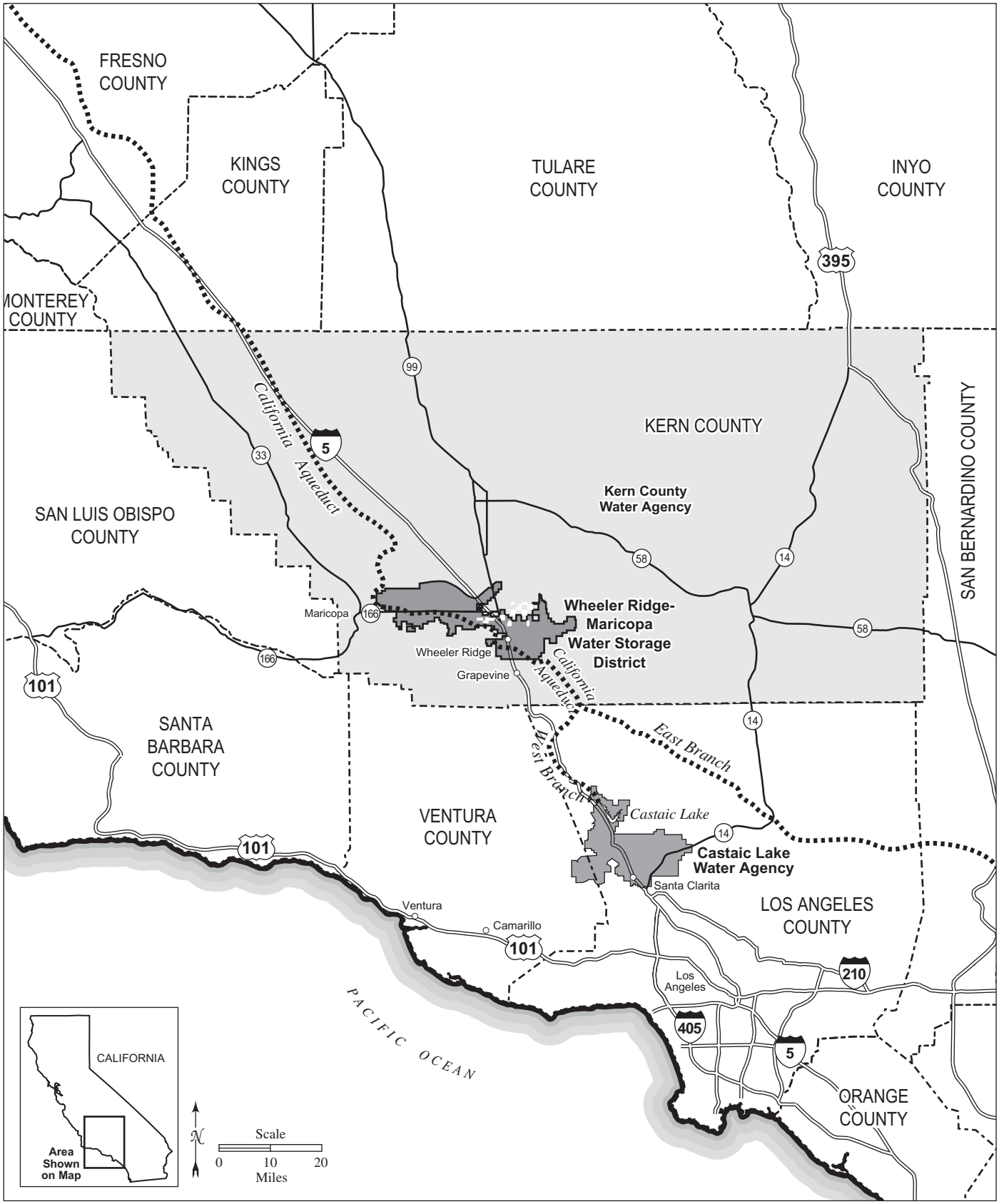
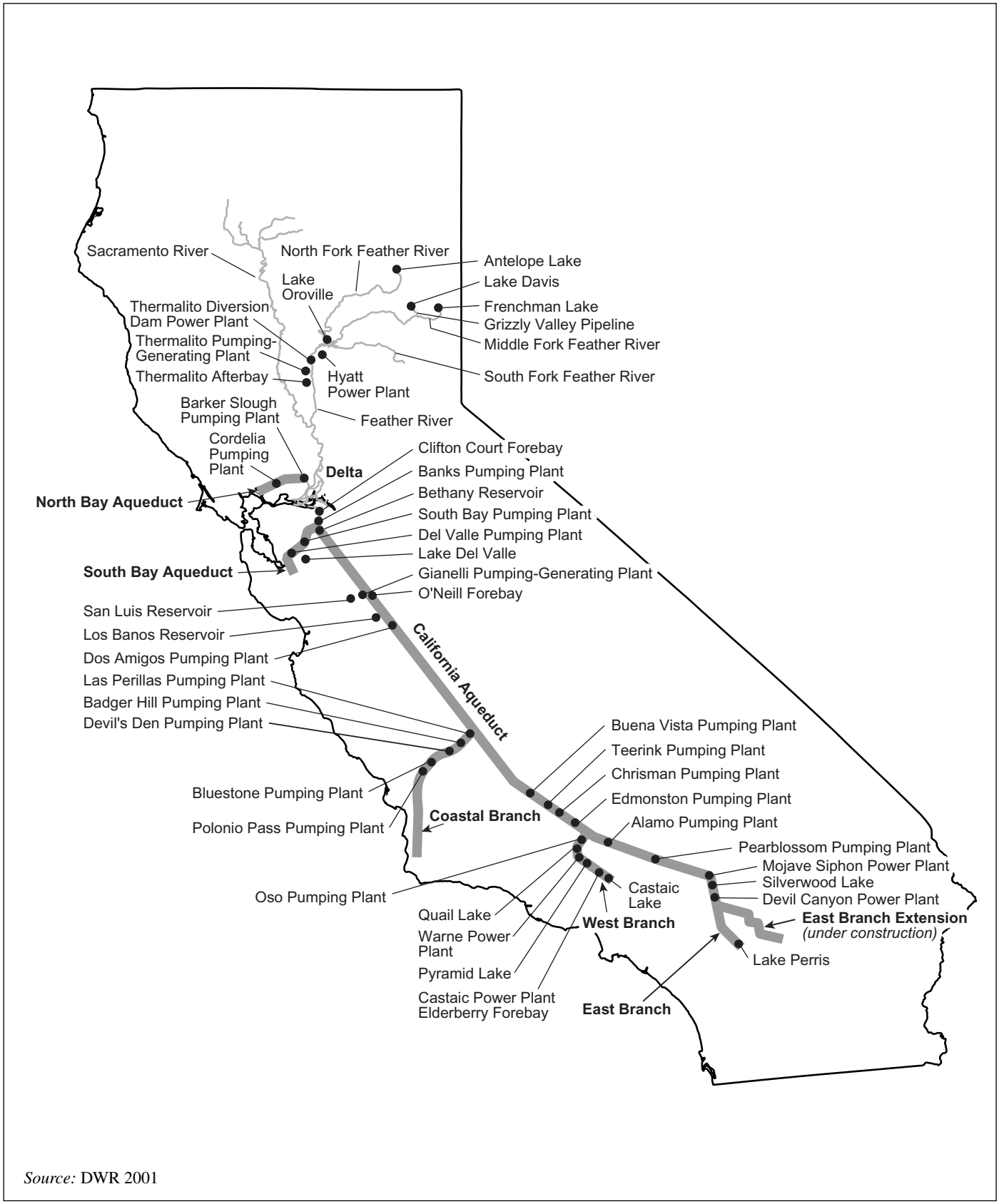



**Figure 1. Regional Setting Including Kern County Water Agency, Wheeler Ridge-Maricopa Water Storage District, and Castaic Lake Water Agency Service Areas**




*Source:* DWR 2001

**Figure 2. Primary SWP Facilities**

Riversidean (Venturan) sage scrub, non-native grassland, riparian scrub, and riparian woodlands. In addition, Castaic Lake, Castaic Lagoon, and limited areas along the Santa Clara River provide open water habitat. The Santa Clara River is a regionally significant habitat for native fish and other wildlife. The CLWA service area contains several Significant Ecological Areas designated for various sorts of protection by Los Angeles County.

*Kern County Water Agency and Wheeler Ridge-Maricopa Water Storage District* - KCWA was created by the California Legislature in 1961 to secure and supply water to its local member districts in Kern County. In 1998, KCWA, together with its 14 member water districts, including WRMWSD, held approximately 1,088,000 AF of SWP contractual rights. KCWA serves municipal, industrial and agricultural water users in Kern County.

The KCWA service area contains primarily agricultural lands with some oil, urban and industrial development. Urban and industrial development is concentrated within the metropolitan Bakersfield area and rural communities are scattered throughout the service area. In 2000, the population of Kern County was 661,645 persons with approximately 231,560 housing units. The KCWA service area includes areas within the southern San Joaquin Valley, Tehachapi Mountain Range, Sierra Nevada Mountain Range, and the Antelope Valley. The EIR will primarily focus on the KCWA service area within the San Joaquin Valley; although, where appropriate, other areas will be discussed. Lands which are no longer subjected to irrigation support a grassland community of introduced plants such as red brome (*Bromus madritensis rubens*), common foxtail (*Hordeum glaucum*), wild oats (*Avena fatua*), and thistles or remnant grains from previous farming. Riparian, wetland and open water habitats are limited to short stretches along intermittent or ephemeral stream channels, agricultural ponds and drainage ditches, and along the California Aqueduct. The KCWA service area supports a variety of sensitive plant and animal species including, although not limited to, the Bakersfield smallscale (*Atriplex tularensis),* Bakersfield cactus (*Opuntia basilaris* var. *treleasei),* Giant kangaroo rat (*Dipodomys ingens)*, Tipton kangaroo rat *(Dipodomys nitratoides nitratoides)*, Blunt-nosed leopard lizard (*Gambelia sila)*, and the San Joaquin kit fox (*Vulpes macrotis mutica).* Sensitive species within the KCWA service area will be further discussed in the EIR.

WRMWSD was formed in 1959, by an election of landowners as provided by Division 14 of the California Water Code. The service area mostly occupies the valley floor and smooth sloping foothill lands at the southern apex of the San Joaquin Valley between the Coast Mountain Range to the west and the Tehachapi Mountain Range to the south and east. The WRMWSD service area consists predominantly of agricultural lands, although small areas of industrial development and the unincorporated community of Lakeview are within the service area, along with the town site of Wheeler Ridge. Based on U.S. Census Bureau data, in 2000, the population of the WRMWSD service area was estimated to be 2,854 persons, or less than one percent of the population of Kern County. Agricultural production in WRMWSD service area includes nut orchards, grains, cotton, mixed produce and vineyards. Portions of the service area include fallowed lands, and some agricultural lands are also unplanted on a rotational basis as a part of normal agricultural practices. Other portions of the service area include fairly extensive areas of scrub vegetation and other plant and wildlife species as described above with respect to the KCWA service area. In addition, the WRMWSD service area supports a variety of sensitive plant and animal species including the species identified above with respect to the KCWA

service area. Sensitive species within the WRMWSD service area will be further discussed in the EIR.

WRMWSD obtains its water supplies from the SWP, through contract with KCWA, other surface water sources and groundwater sources, and delivers water to agricultural and industrial users within its service area. WRMWSD's contract right to SWP water through KCWA was approximately 238,000 AF in 1998. The WRMWSD also participates in groundwater recharge programs and groundwater banking outside of the service area.

*State Water Project and Associated Facilities* - The SWP is a large water supply, storage and distribution system authorized by an act of the California State Legislature in 1959. Today, the SWP includes 28 storage facilities, reservoirs and lakes; 20 pumping plants; six pumping-generating plants and hydroelectric power plants; and about 660 miles of aqueducts and pipelines. The primary purpose of the SWP is to distribute water to 29 urban and agricultural water contractors in Northern California, the San Francisco Bay Area, the San Joaquin Valley, the Central Coast, and Southern California. The SWP provides supplemental water to approximately 22 million persons and 750,000 acres of farmland. In addition to its primary purpose, the SWP is also operated to assist in the control of Feather River floodwaters, and to provide recreation, generate energy, and enhance fish and wildlife habitats.

The primary water source for the SWP is within the drainage of the Feather River, a tributary of the Sacramento River. Runoff released from Oroville Dam in Butte County flows down natural channels to the Delta. In the southern Delta, water is pumped from the Clifton Court Forebay by the Harvey O. Banks Delta Pumping Plant (Banks Pumping Plant) into the 444-mile-long California Aqueduct. The California Aqueduct travels along the west side of the San Joaquin Valley. The California Aqueduct conveys water to the primarily agricultural users in the San Joaquin Valley and the primarily urban regions of the San Francisco Bay Area, the Central Coast, and Southern California. Water from the California Aqueduct is delivered directly to contractors within the San Joaquin Valley, including WRMWSD and the other member districts of the KCWA, is stored in San Luis Reservoir, or continues down the aqueduct for delivery and/or storage in the Southern California area. (San Luis Reservoir, located approximately 60 miles south of the Banks Pumping Plant, is an off-stream storage reservoir for both SWP and Central Valley Project[2] water.) The California Aqueduct traverses the west side of the San Joaquin Valley through a series of four pumping plants before reaching the Edmonston Pumping Plant. The Edmonston Pumping Plant lifts the California Aqueduct water 1,926 feet to the Antelope Valley, where the California Aqueduct divides into the East and West Branches. Water intended for use in Southern California is conveyed through the West Branch to Castaic Lake and through the East Branch to Lake Perris.

## OTHER PROJECTS

In addition to the proposed project, CLWA is also planning or considering several other separate projects that would be analyzed further in the EIR if they would create cumulative environmental impacts:

2. The Central Valley Project is a federal water supply project that supplies water to users in Northern California and the San Joaquin Valley.

- An EIR addressing the proposed transfer of up to 16,000 AF of SWP Table A amount from the KCWA and its member district, the Berrenda Mesa Water District (BMWD) to CLWA. The 16,000 AF project would increase CLWA's total SWP Table A amount from its current level of 95,200 AF to up to 111,200 AF and would also involve annexing lands into CLWA's service area. The EIR for the 16,000 AF project will also address establishment of a program to create a possible mechanism for new development to comply with laws requiring specified showings of long-term water availability.

- An EIR for the Earl Schmidt Filtration Plant (ESFP) Expansion project. The ESFP project would increase the plant's raw water treatment capacity from 33.6 million gallons per day to 56 million gallons per day, replace an existing raw water pumping station, and construct treatment process upgrades to meet existing and anticipated water treatment regulatory requirements. The ESFP project is expected to cover a portion of the increased demands through 2010, based on the adopted Los Angeles County growth forecast. CLWA prepared a NOP in June 2002 for the ESFP project.

- CLWA currently is in the process of engineering the Honby Extension/Storage Reservoir Project ("Honby Extension"), approved by CLWA in 1999. An existing Mitigated Negative Declaration (prepared in December 1998 and adopted by CLWA in early 1999 with Board Resolution No. 2034) titled, *Initial Study and Mitigated Negative Declaration for the Extension of Imported Water Transmission Systems in the Castaic Lake Water Agency Service Area*) addressed the Honby Extension and capital facilities. The Honby Extension project is a 33-inch, approximately 30,000 foot long waterline, originating near the intersection of Honby Avenue and Santa Clara Street where a new pump station also will be constructed. The pipeline will travel from the new pump station easterly and southerly, terminating in a new storage reservoir west of Rolling Hills Avenue and Warmuth Road.

- The CLWA Board has approved an Initial Study, Negative Declaration, and Notice of Determination for CLWA's 2002 Groundwater Banking Project. CLWA will temporarily store, for up to 10 years, up to 24,000 AF of its 2002 SWP water that exceeds the 2002 demand, for later withdrawal and delivery to the CLWA service area. The 24,000 AF would be placed in storage during 2002 in the Semitropic Water Storage District (SWSD) Groundwater Banking Project. SWSD would store the delivered water using its existing groundwater banking facilities or through in lieu storage, and would withdraw and return the water to CLWA within a ten-year period, in one or more future years in which CLWA's demand exceed supply.

- CLWA is considering a proposal to deliver 6,786 AF of water to United Water Conservation District via Pyramid Lake and Piru Creek. CLWA will undertake the appropriate environmental review prior to implementation of the project.

- The CLWA Board of Directors may, in the future, consider adoption of a recycled water master plan, which would provide for approximately 17,000 AF of recycled water to be used in lieu of treated potable water.

The CLWA Board of Directors may, in the future, consider adopting other water management actions including the construction of additional facilities, which, if appropriate, would be

considered in the cumulative impacts section of the EIR. Projects other than those for which CLWA is the proponent, including projects within the KCWA and WRMWSD service areas, or projects where KCWA and WRMWSD are the project proponent, and other projects in the CLWA service area, would also be identified in the EIR and considered in the cumulative impacts section of the EIR, as required by CEQA. In addition, actions occurring in the Delta area, including but not limited to the CALFED program, may affect the SWP and would be addressed in the cumulative impacts section of the EIR.

As noted above, the CLWA is considering and/or implementing several other projects, including the transfer of 16,000 AF of SWP Table A amount from BMWD to the CLWA and the expansion of the ESFP. While these other projects contribute to CLWA's overall water management, these projects are proceeding separately since the completion of each project does not depend on any other project being completed, and each project would cause unique environmental impacts. The separate projects do not constitute parts of phases of a larger project since each project involves its own timeframe and serves differing purposes. Thus, unlike situations where the larger project's purpose would be compromised without the completion of related projects, none of the projects' purposes here would be compromised by the failure of other projects. For instance, the establishment of the right to use the 41,000 AF as part of CLWA's SWP Table A amount of 95,200 AF does not depend on whether the ESFP expansion will be completed or completed within the currently anticipated timeframe.

Nevertheless, the proposed project EIR will examine the cumulative impacts of the proposed project in combination with other projects, including the 16,000 AF of SWP Table A transfer and the ESFP expansion project. The cumulative impact analysis will examine how each project's potential individual environmental impacts may be greater than the sum of its parts, and will provide possible mitigation measures to address these significant cumulative impacts, if any. Thus, the environmental impacts of the proposed project along with the other projects proposed by CLWA will not be determined in isolation.

## ENVIRONMENTAL IMPACTS

Implementation of the proposed project would have the potential to have direct and indirect impacts on the physical environment within and adjacent to SWP facilities, and the service areas of KCWA, WRMWSD, and CLWA. The following discussions summarize the components of the proposed project that could affect environmental resources and potential impacts of the proposed project to environmental resources.

*Castaic Lake Water Agency* – Implementation of the proposed project would not directly require the construction of new CLWA facilities or modification of existing CLWA facilities, nor would it directly change the existing operation of CLWA facilities. Implementation of the proposed project would not directly require land disturbance nor would it directly change the existing land uses within the CLWA service area. Potential impacts of the proposed project within the CLWA service area would generally be associated with indirect effects of an increased water supply for users within the service area.

Substantial growth is expected in the Santa Clarita Valley. Future land use changes and/or new developments within the CLWA service area that could be implemented as a result of the

proposed project may result in potentially significant indirect impacts to environmental resources. Indirect impacts of the proposed project within the CLWA service area would result from land use changes, new developments, and associated population growth. These indirect, growth-related impacts of the proposed project are discussed below and will be addressed in the EIR.

*Kern County Water Agency and Wheeler Ridge-Maricopa Water Storage District* - Implementation of the proposed project would not require the construction of new facilities or modification of existing KCWA and WRMWSD facilities, nor would implementation of the proposed project change the existing operation of these facilities.

WRMWSD obtains its water supplies from the SWP, other surface water sources and groundwater sources, and delivers water to agricultural and industrial users within its service area. The WRMWSD also participates in groundwater recharge programs. Some of the landowners within the WRMWSD service area have executed long-term contracts with WRMWSD for the delivery of surface water, including SWP water, by the WRMWSD distribution system. These lands are collectively referred to as "contract lands" and principally rely on imported surface water. Lands in the service area that do not hold long-term contracts for surface water or "non-contract lands" principally rely on groundwater supplies to meet water demands. In addition, certain non-contract lands within the service area (generally those that have historically held contracts) can be delivered surface water, including SWP water, when available, utilizing the existing WRMWSD distribution system.

Since 1990, WRMWSD has not delivered its full pre-project SWP Table A amount (238,000 AF), nor has there been demand within the contract lands for this amount of water. In addition, from 1990 to 2000, the demand within the contract lands has not exceeded 197,000 AF (the amount of WRMWSD's SWP Table A amount with implementation of the proposed project). From 1990 to 2000, the demand within the contract lands has averaged approximately 156,100 AF, with a maximum of approximately 178,400 in 1998 and a minimum of approximately 112,600 AF in 1991. As previously noted, the WRMWSD participates in other water management actions, including groundwater recharge programs within the service area and groundwater banking programs outside of the service area. These water management actions are intended to supply the WRMWSD (or landowners within the WRMWSD) with additional water supplies when SWP supplies are insufficient to meet demands. WRMWSD estimates that it can deliver approximately 100,000 AF in four out of seven consecutive drought years through these other water management actions.

In summary, a combination of factors, which include varied water supply sources, historic water demand that is less than the amount of WRMWSD's Table A amount even following implementation of the proposed project, and landowners' flexibility to manage agricultural lands differently from year to year, indicate that implementation of the proposed project would result in less than significant direct and indirect impacts within the WRMWSD service area. As a result of long-term agricultural decisions and other water management practices used by farmers within the WRMWSD service area and by WRMWSD, implementation of the proposed project would not be expected to materially affect irrigated agriculture in the WRMWSD service area served by SWP water, nor would the proposed project change existing land uses within the WRMWSD service area.

Water in WRMWSD service area would continue to be made available from a combination of historic and current water management actions including, historic modification of surface water supply contracts, improved irrigation efficiency, historic changes in water supply management, and continuation of agricultural management approaches. A variety of factors, including the cost and availability of different water sources, the anticipated crop market value, anticipated or existing crop subsidies, and other factors (such as labor cost, regulation of the use of certain chemicals, etc.) are considered in the determination to plant certain crops.

*State Water Project and Associated Facilities* - Implementation of the proposed project would not require the construction or modification of existing SWP facilities, nor would implementation of the proposed project substantially change the current operation of the SWP and associated facilities. Implementation of the proposed project would not change the operating criteria[3] of the SWP and associated facilities.

The proposed project would result in a slight change in the timing of deliveries associated with the 41,000 AF of SWP Table A amount, although the proposed project would not affect the total amount of supply available. The total amount of SWP supply available is a function of SWP diversions from the Delta (governed almost exclusively by hydrology, water quality standards in the Delta and other operational criteria), and the operation of San Luis Reservoir (operated to store water in months when Delta diversions exceed demands, and to provide supplemental supplies when Delta diversions are less than demands). As the proposed project would not result in changes to the SWP operating criteria, the amount and timing of Delta diversions would not change with implementation of the proposed project.

The proposed project would change the amount of water transported within the SWP facilities to the CLWA. In addition, implementation of the proposed project would slightly change the timing of storage of water associated with the project in San Luis Reservoir and Castaic Lake. Overall, implementation of the proposed project would transfer the 41,000 AF of Table A amount and water associated with this amount from WRMWSD to CLWA and would not substantially change the operations of the SWP.

Therefore, implementation of the proposed project is not expected to have significant direct or indirect impacts to environmental resources within the SWP and associated facilities. Increased use of energy for pumping water would occur south of the San Luis Reservoir but would be partially offset by additional power generation within this portion of the SWP system.

**Environmental Resource Impacts**

Direct and indirect impacts that may result from implementation of the proposed project are addressed below by environmental resource area and geographic area. Direct impacts are those impacts caused by the project and that occur at the same time and place. Indirect impacts are those changes in the environment not immediately related to the project, but caused by the project, and may be later in time or farther removed in distance, but are still reasonably

3. The operating criteria of the SWP are the rules, regulations and other policies under which DWR operates SWP facilities. Operating criteria include, although are not limited to, environmental regulations and operating criteria for diversions from the Sacramento-San Joaquin Delta, operations of Oroville and San Luis Reservoirs, and criteria for terminal reservoirs such as Castaic Lake.

foreseeable. Indirect impacts may include growth-inducing effects and other effects related to induced changes in the pattern of land use, population density, or growth rate, and related effects on air and water and other natural systems, including ecosystems. State CEQA Guidelines Section 15358.

Pursuant to CEQA, an EIR must include a description of the physical environmental conditions in the vicinity of the project, as they exist at the time the notice of preparation is published, or if no notice of preparation is published, at the time environmental analysis is commenced, from both a local and regional perspective. This information constitutes the "baseline" and it is sometimes necessary to provide more recent baseline information in order to meaningfully review a project's environmental impacts. Since the factual baseline for this project was prepared in 1998, the 1998 baseline must be combined with new material information that reflects environmental conditions that may have changed since 1998, which will allow informed and reasoned decision-making by the lead agency, other public agencies, and the general public. New material information is noted in the various sections of this Attachment, and where appropriate will be expanded and included in the EIR.

***Aesthetic Impacts***

*Direct Impacts*

*Castaic Lake Water Agency* - The Angeles National Forest, the Los Padres National Forest, and their ridgelines provide a visual backdrop for much of the Santa Clarita Valley. The Santa Clara River, traversing the City of Santa Clarita and the Santa Clarita Valley, is another important visual element. The topography of the Santa Clarita Valley is varied with numerous canyons and waterways. Within this natural setting, several unincorporated communities developed, which are not part of the City of Santa Clarita. Implementation of the proposed project would not require land disturbance nor would it have a direct impact on the existing land uses within the CLWA service area or cause other changes that would directly affect aesthetic resources including scenic vistas, scenic resources and visual character. In addition, implementation of the proposed project would not create or increase light or glare. As identified within the discussion of the SWP and associated facilities below, changes in the timing of SWP deliveries to Castaic Lake would not be expected to change the visual character of the lake or surrounding area. Therefore, no direct impacts to aesthetic resources within the CLWA service area would result from implementation of the proposed project.

*Kern County Water Agency and Wheeler Ridge-Maricopa Water Storage District* - Kern County designates most of the county as having a visual rating of Class II, meaning that the area is excellent visual space. The foothills provide a dramatic backdrop for the area and can be clearly viewed throughout the county due to the flat plains and vast open space. The undeveloped lands and agricultural operations contribute to the rural character typical of the San Joaquin Valley. Implementation of the proposed project would not materially affect irrigated acreage in the WRMWSD service area served by SWP water on an average annual basis, nor would it change existing land uses within the KCWA or WRMWSD service areas. No scenic vistas or scenic resources would therefore be adversely affected. The visual character of the area would remain rural and agricultural. In addition, implementation of the proposed project would not create or increase light or glare. Therefore, implementation of the proposed project is not

anticipated to result in direct impacts to aesthetic resources within the KCWA and WRMWSD service areas.

*State Water Project and Associated Facilities* - From the southern Delta facilities to the Tehachapi Mountain Range, the undeveloped lands and agricultural operations contribute to the rural character that is typical of the San Joaquin Valley. Throughout the valley, the foothill areas and associated Coast Mountain Range to the west and Sierra Nevada Mountain Range to the east provide a dramatic backdrop. These foothill and mountain range areas can be viewed throughout the valley due to the relatively flat plains and vast open space. Within the Tehachapi Mountain Range to the SWP terminal reservoir at Castaic Lake, the visual resources of the area are similar to those described for the CLWA service area above. Minor changes in SWP storage and transport amounts would not be expected to have any significant adverse impacts to scenic vistas, scenic resources, and visual character. In addition, implementation of the proposed project would not create or increase light or glare. Therefore, no direct impacts are anticipated to occur to aesthetic resources within the SWP and associated facilities from implementation of the proposed project.

*Indirect Impacts*

*Castaic Lake Water Agency* - There is the potential for indirect impacts to aesthetic resources due to potential land use changes as a result of development in the CLWA service area that may be accommodated by an increased water supply. The potential development in the CLWA service area that may be supported by the proposed project could involve substantial alteration of topography, removal of an unknown number of trees, and construction of residences and other structures that may adversely affect scenic vistas and scenic resources. As a result, views from roadways and other developed and undeveloped areas could be altered. The visual alteration would be primarily a change of visual character from a natural landscape to a manmade or urban landscape. The project could cause and/or result in an increase in the amount of glare and night lighting in a presently undeveloped area. These indirect impacts are considered potentially significant.

*Kern County Water Agency and Wheeler Ridge-Maricopa Water Storage District* - Implementation of the proposed project would not result in land use changes within the KCWA or WRMWSD service areas or other changes that could affect aesthetic resources including scenic vistas, scenic resources, visual character, or light and glare. Therefore, indirect impacts to aesthetic resources within the KCWA and WRMWSD service areas are not anticipated to result from implementation of the proposed project.

*State Water Project and Associated Facilities* - As implementation of the proposed project would not result in construction or modification of existing SWP facilities, nor would it change the operating criteria of the SWP and associated facilities, no indirect impacts to aesthetic resources including scenic vistas, scenic resources, visual character, or light and glare are anticipated to result from implementation of the proposed project.

### *Agricultural Impacts*

*Direct Impacts*

*Castaic Lake Water Agency* - Agricultural and grazing areas within the CLWA service area are predominately located in the western portion of the service area along the State Route 126 corridor and adjacent hills in both Los Angeles and Ventura counties. Approximately 3,250 acres of active irrigated agriculture exist within the CLWA service area. Los Angeles County does not participate in the Williamson Act program. Implementation of the proposed project would not require land disturbance nor would it directly change the existing land uses within the CLWA service area. The proposed project would not directly convert agricultural areas to other non-agricultural uses, nor would it directly conflict with zoning for agricultural use or conflict with a Williamson Act contract. Therefore, no direct impacts to agricultural resources within the CLWA service area would result from implementation of the proposed project.

*Kern County Water Agency and Wheeler Ridge-Maricopa Water Storage District* - In 1998, Kern County had approximately 1,705,730 acres enrolled in Williamson Act contracts, or approximately 32 percent of the county area, and approximately 10 percent of the statewide Williamson Act lands (Department of Conservation 1998). In 1998, the WRMWSD service area contained approximately 146,620 acres of land (WRMWSD 2001). Land uses included the following: farmed area (94,269 acres or 64.3 percent); fallow lands (17,979 acres or 12.3 percent); miscellaneous and other lands, defined as developed but non-farmed areas within cultivated lands, such as farm roads, farmsteads, reservoirs, airstrips, cotton gins, tank farms, utility yards, etc. (8,201 acres or 5.6 percent); and native vegetation/non-developed lands (26,171 acres or 17.8 percent) (WRMWSD 2001). As a result of long-term agricultural decisions and other water management practices used by farmers within the WRMWSD service area and by WRMWSD, implementation of the proposed project would not be expected to materially affect irrigated agriculture in the WRMWSD service area served by SWP water, nor would it change existing land uses within the WRMWSD service area. In addition, the proposed project would not directly convert agricultural areas to other non-agricultural uses, nor would it directly conflict with zoning for agricultural use or conflict with a Williamson Act contract. Implementation of the proposed project would result in the reduction of WRMWSD's SWP Table A amount and therefore, a reduction in the amount of SWP Table A water that could be delivered to the WRMWSD service area. As water in WRMWSD service area would continue to be made available from a combination of historic and current water and agricultural management actions, implementation of the proposed project is anticipated to result in a less than significant impact to agricultural resources within the KCWA and WRMWSD service areas. Because all potential agricultural impacts cannot be strictly categorized as either direct or indirect when they relate to potential changes in water supply, agricultural issues in KCWA and WRMWSD are also discussed under the indirect impact section.

*State Water Project and Associated Facilities* - SWP water is used to irrigate approximately 750,000 acres of farmland with the state. In 1998, the SWP delivered approximately 1,745,000 AF of Table A water, of which, approximately 871,000 AF was delivered to agricultural users (DWR 2001). An additional 10,300 AF of unscheduled (Article 21) water was delivered to agricultural users in 1998 (DWR 2001). Agricultural resources are not specifically associated with the SWP system or its associated facilities. Implementation of the proposed project would not require

the construction or modification of existing SWP facilities, nor would it change the operating criteria of the SWP and associated facilities. In addition, implementation of the proposed project would not change the overall SWP supply, but would shift water that could have previously been requested by, and delivered to, WRMWSD to CLWA. The proposed project would not directly convert agricultural areas to other non-agricultural uses, nor would it directly conflict with zoning for agricultural use or conflict with a Williamson Act contract. Therefore, implementation of the proposed project is not anticipated to result in direct impacts to agricultural resources served by the SWP.

*Indirect Impacts*

*Castaic Lake Water Agency* - There is the potential for indirect impacts to agricultural resources due to potential land use changes as a result of future development in the CLWA service area potentially accommodated as a result of additional water supplies. Future development within the CLWA service area could utilize the additional proposed water supply and may require changes to zoning designations to allow residential, commercial and other uses in areas currently or previously used for agricultural purposes. The potential therefore exists for changes to agricultural lands, agricultural designations or zoning due to development within the CLWA service area and for conversion of Important Farmland designated by the State, which could result in significant impacts.

*Kern County Water Agency and Wheeler Ridge-Maricopa Water Storage District* – Due to a combination of factors which are discussed in the Environmental Impact section above, and which will be discussed further in the EIR, the project is anticipated to result in a less than significant indirect impact to agricultural resources within the WRMWSD service area. Due to the agricultural nature of the WRMWSD, water users within the service area have substantial flexibility to manage land uses, and therefore, water use, from year to year. A variety of factors, including the cost and availability of different water sources, the anticipated crop market value, anticipated or existing crop subsidies, and other factors (such as labor cost, regulation of the use of certain chemicals, etc.) are considered in the determination to plant certain crops. In addition, as the proposed project would not directly or indirectly result in land use changes within the KCWA or WRMWSD service areas, the proposed project would not convert agricultural areas to other non-agricultural uses, nor would it conflict with zoning for agricultural use or conflict with a Williamson Act contract.

*State Water Project and Associated Facilities* - As implementation of the proposed project would not result in construction or modification of existing SWP facilities, nor would it change the operating criteria of the SWP and associated facilities, the proposed project would not convert agricultural areas to other non-agricultural uses, nor would it conflict with zoning for agricultural use or conflict with a Williamson Act contract. Therefore, no indirect impacts to agricultural resources are anticipated to result from implementation of the proposed project.

***Air Quality Impacts***

*Direct Impacts*

*Castaic Lake Water Agency* - The CLWA service area is located in the Santa Clarita Valley, which is in the northwestern portion of the South Coast Air Basin (SCAB). The area of the SCAB that

encompasses the CLWA service area is presently in "extreme" nonattainment for ozone, and "serious" nonattainment for carbon monoxide and particulate matter less than 10 microns in diameter. The South Coast Air Quality Management District is responsible for regulating emission sources within the SCAB, and has developed the *1997 Air Quality Management Plan* and the *1999 Revised Ozone Plan* to bring the region into attainment of the state and national ambient air quality standards. Implementation of the proposed project would not require construction of facilities, or directly result in land disturbance, nor would it directly change the existing land uses within the CLWA service area or cause other changes that could materially affect air quality. In addition, implementation of the proposed project would not obstruct the implementation of any air quality plan in the SCAB, violate or contribute to the violation of an air quality standard, result in a cumulatively considerable increase of any pollutant for which the SCAB is in nonattainment for, create odors, or result in the exposure of sensitive receptors to substantial pollution concentrations. Therefore, no direct impacts to air quality within the CLWA service area would result from implementation of the proposed project.

*Kern County Water Agency and Wheeler Ridge-Maricopa Water Storage District* - The San Joaquin Valley floor areas of the KCWA and the WRMWSD are located in the southernmost region of the San Joaquin Valley Air Basin (SJVAB). The Kern County portion of the SJVAB is presently in non-attainment for ozone and particulate matter less than 10 microns in diameter. The San Joaquin Valley Unified Air Pollution Control District is responsible for regulating stationary sources of emissions within the SJVAB, and has developed rules and air quality attainment plans designed to reduce emissions to a level that will bring the region into attainment. With implementation of the proposed project, WRMWSD would continue to make water available from a combination of historic and current water and agricultural management actions within the service area. Implementation of the proposed project is not anticipated to obstruct the implementation of any air quality plan in the SJVAB, violate or contribute to the violation of an air quality standard, result in a cumulatively considerable increase of any pollutant for which the SJVAB is in nonattainment for, create odors, or result in the exposure of sensitive receptors to substantial pollution concentrations. In addition, implementation of the proposed project would not materially affect irrigated agriculture in the WRMWSD service area served by SWP water, nor would it change existing land uses within the WRMWSD service area. Therefore, implementation of the proposed project is anticipated to result in a less than significant impact to air quality within the KCWA and WRMWSD service areas.

*State Water Project and Associated Facilities* - The California Aqueduct and associated facilities of concern are predominately located within the SCAB and SJVAB. These air basins are discussed above. Implementation of the proposed project would not require the construction or modification of existing SWP facilities, nor would implementation of the proposed project substantially change the current operation of the SWP and associated facilities. In addition, implementation of the proposed project would not change the operating criteria of the SWP and associated facilities. Pumping of water south of the WRMWSD turnouts to CLWA would require additional energy use and could result in increased air emissions caused by increases in energy production or use. Although, power plants providing energy supplies are required to have air quality permits and to mitigate air quality impacts. Implementation of the proposed project would not obstruct the implementation of any air quality plan in the SCAB or the SJVAB, violate or contribute to the violation of an air quality standard, result in a cumulatively considerable increase of any pollutant for which the SCAB or the SJVAB is in nonattainment for,

create odors, or result in the exposure of sensitive receptors to substantial pollution concentrations. Therefore, no direct impacts to air quality are anticipated to result from implementation of the proposed project.

***Indirect Impacts***

*Castaic Lake Water Agency* - There is the potential for indirect impacts on air quality due to potential land use changes as a result of development in the CLWA service area. The potential development in the CLWA service area that may be supported by this project could result in a substantial amount of grading and other construction activities that would create temporary impacts on air quality including construction vehicle emissions and the creation of fugitive dust. Following construction, increased local traffic would substantially increase regional motor vehicle emissions and other emissions related to development of manufacturing, industrial, commercial facilities and infrastructure of various types could occur. These indirect impacts have the potential to obstruct the implementation of any air quality plan in the SCAB, violate or contribute to the violation of an air quality standard, result in a cumulatively considerable increase of any pollutant for which the SCAB is in nonattainment for, create odors, or result in the exposure of sensitive receptors to substantial pollution concentrations, and therefore, are considered potentially significant.

*Kern County Water Agency and Wheeler Ridge-Maricopa Water Storage District* - As the implementation of the proposed project would not result in land use changes within the KCWA or WRMWSD service areas, no aspect of the proposed project is anticipated to obstruct the implementation of any air quality plan in the SJVAB, violate or contribute to the violation of an air quality standard, result in a cumulatively considerable increase of any pollutant for which the SJVAB is in nonattainment for, create odors, or result in the exposure of sensitive receptors to substantial pollution concentrations. Therefore, indirect impacts to air quality are anticipated to be less than significant as a result of implementation of the proposed project.

*State Water Project and Associated Facilities* - As implementation of the proposed project would not result in construction or modification of existing SWP facilities, nor would it change the operating criteria of the SWP and associated facilities, no aspect of the proposed project is anticipated to obstruct the implementation of any air quality plan in the SCAB or the SJVAB, violate or contribute to the violation of an air quality standard, result in a cumulatively considerable increase of any pollutant for which the SCAB or the SJVAB is in nonattainment for, create odors, or result in the exposure of sensitive receptors to substantial pollution concentrations. Therefore, no indirect air quality impacts are anticipated to result from implementation of the proposed project.

***Biological Impacts***

*Direct Impacts*

*Castaic Lake Water Agency* - For the most part, the CLWA service area encompasses the Santa Clara River Valley, the east extension of the Santa Susana Mountains, the westernmost reaches of the San Gabriel Mountains, and the southern slopes of the Sierra Pelona. The principal natural features of the Santa Clarita Valley are the Santa Clara River, Castaic Valley, San Francisquito Canyon, Bouquet Canyon, Placerita Canyon, and Hasley Canyon. Although

substantial portions of the Santa Clarita Valley have been developed, a large portion of the lands within the CLWA service area still supports ecologically important vegetation and wildlife habitats including sensitive plant and animal species. Major vegetation/habitat types include oak woodlands (distinct stands of valley oak [*Quercus lobata*], coast live oak [*Quercus agrifolia*], and interior live oak [*Quercus wislizeni*] can be distinguished), chaparral, coastal and/or Riversidean (Venturan) sage scrub, non-native grassland, riparian scrub (characterized by mulefat and/or shrubby willows), and riparian woodlands (characterized by large willows [*Salix* sp.] and cottonwoods [*Populus fremontii*], including densely forested areas). In addition to the above habitats, there is open water habitat provided by Castaic Lake, Castaic Lagoon, and limited areas along the Santa Clara River. The Santa Clara River is a regionally significant habitat for native fishes and other wildlife.

The CLWA service area contains several Significant Ecological Areas designated for various sorts of protection by Los Angeles County. No habitat conservation plans, natural community conservation plans or similar plans have been adopted in the CLWA service area.

Implementation of the proposed project would not require land disturbance nor would it directly change the existing land uses within the CLWA service area or cause other changes that would create direct impacts to biological resources within the CLWA service area. In addition, implementation of the proposed project would not directly result in habitat modifications including the modification of sensitive habitat types such as riparian or wetland habitats, interfere with the movement or migration of wildlife species, impede the use of wildlife nursery sites, or conflict with local policies and ordinances protecting biological resources. Therefore, no direct impacts to biological resources within the CLWA service area would result from implementation of the proposed project. Castaic Lake is addressed under the discussion of SWP and associated facilities below.

*Kern County Water Agency and Wheeler Ridge-Maricopa Water Storage District* - Most of the lands in the KCWA and WRMWSD service areas are cultivated agricultural areas. Lands which are no longer subjected to irrigation support a grassland community of introduced plants such as red brome, common foxtail and wild oats. More recently, non-irrigated lands have more non-native species such as thistles or remnant grains from previous farming. The predominant habitat on lands not cultivated is grassland characterized by introduced annual grasses and forbs (Lower Sonoran grassland [Moe and Twisselmann 1995], California prairie [Williams 1998], or non-native grassland [Holland 1986]). Within the WRMWSD service area, there are also fairly extensive areas of scrub vegetation typically dominated by saltbush (*Atriplex* spp.). Riparian, wetland and open water habitats are limited to short stretches along intermittent or ephemeral stream channels, agricultural ponds and drainage ditches, and along the California Aqueduct. The KCWA and WRMWSD service areas support a variety of sensitive plant and animal species.

Implementation of the proposed project would not directly result in habitat modifications including the modification of sensitive habitat types such as riparian or wetland habitats, interfere with the movement or migration of wildlife species, impede the use of wildlife nursery sites, or conflict with local policies and ordinances protecting biological resources. With implementation of the proposed project, WRMWSD would continue to make water available from a combination of historic and current water and agricultural management actions within

the service area. Implementation of the proposed project would not materially affect irrigated agriculture in the WRMWSD service area, nor would it change existing land uses within the WRMWSD service area. Therefore, implementation of the proposed project is anticipated to result in a less than significant impact to biological resources within the KCWA and WRMWSD service areas.

The project would not conflict with any natural community conservation plans in the KCWA or WRMWSD service areas, since none have been adopted. A habitat conservation plan is being developed for the San Joaquin Valley floor within Kern County and in the vicinity of Tejon Ranch in the WRMWSD service area. In addition, a habitat conservation plan has been developed for the Bakersfield area. It is not anticipated that the project would conflict with these plans, the status of which would be described in the EIR.

*State Water Project and Associated Facilities* - The California Aqueduct begins in the southern Delta near the City of Tracy. Within the Delta region, agricultural lands occupy approximately 72 percent of the total land area with grassland and rural, open-water, wetland, and riparian habitats occupying the majority of the remaining area (CALFED 1999). The Delta region provides habitat for numerous sensitive plant communities and special status plant and animal species.

South of the SWP facilities in the Delta, the California Aqueduct traverses predominately the west side of the San Joaquin Valley to the Tehachapi Mountain Range in the southern end of the valley. The dominant land use within the San Joaquin Valley consists of agricultural and agricultural related uses. The aqueduct within the San Joaquin Valley is a concrete lined canal with a few short segments of enclosed pipe, and biological resources within the aqueduct are limited to common fish species, mostly introduced, and a variety of invertebrate species which may occupy the water column. Other upland species and birds may utilize the aqueduct in some locations for drinking water or to forage for fish and invertebrates. At the southern end of the San Joaquin Valley, the open canal structure of the aqueduct changes principally to a buried pipeline, which traverses the Tehachapi Mountains in a southerly direction and eventually empty water into Castaic Lake. No biological resources are associated with the piped portion of the aqueduct because it is a closed system.

San Luis Reservoir was constructed as an off-stream storage reservoir. Water is pumped from the O'Neil Forebay into the main reservoir during the winter and spring. The reservoir supports a large variety of fish and wildlife species, including sensitive species, both within the water column and in the surrounding riparian habitat. The dominant shoreline vegetation of the reservoir is grassland, making up approximately 70 percent of the shoreline. The remaining 30 percent of the shoreline vegetation consists of montane hardwood (USBR 1997).

Castaic Lake is a terminal water storage facility for the SWP located at the confluence of Castaic Creek and Elizabeth Lake Canyon Creek. The lake supports a large variety of fish and wildlife species, including sensitive species, both within the water column and in the surrounding riparian habitat. Adjacent to the lake, vegetation consists of dry upland scrub and chaparral communities on the steep slopes above the water. The steep banks along almost the entire perimeter of the lake and fluctuating water levels prevent the establishment of shoreline vegetation; therefore, there is minimal shoreline and aquatic vegetation associated with the lake.

Scattered willows (*Salix* sp.) and mulefat (*Bacharis salicifolia*) exist in areas with more gradually sloped banks.

Implementation of the proposed project would not result in construction or modification of existing SWP facilities. In addition, implementation of the proposed project would not substantially change the current operation of the SWP and associated facilities, nor would it change the operating criteria of the SWP and associated facilities. Due to the variety of water management criteria, and as implementation of the proposed project would deliver water to CLWA that could otherwise have been delivered to WRMWSD, or used in other water management activity within the KCWA or other areas served by the SWP, the total amount of water diverted from the Delta would not change with implementation of the proposed project. Water exportation from the Delta is accomplished while maintaining the Delta water quality standards and other related operating criteria, and implementation of the proposed project would not change these established operating criteria. As is currently the case, runoff would be captured when available and stored in SWP and local facilities, and used to meet SWP demand based on current SWP operating criteria and management practices. Implementation of the proposed project would not change these current operating criteria and management practices. In addition, changes to the timing and amount of water stored in both San Luis Reservoir and Castaic Lake are expected to be minimal and within the historic and current lake level fluctuations. Implementation of the proposed project would not directly result in habitat modifications including the modification of sensitive habitat types such as riparian or wetland habitats, interfere with the movement or migration of wildlife species, impede the use of wildlife nursery sites, conflict with local, regional and state-wide policies and ordinances protecting biological resources, or conflict with an adopted habitat conservation plan or natural community conservation plan. Therefore, implementation of the proposed project is anticipated to result in a less than significant impact to biological resources associated with the SWP and associated facilities.

*Indirect Impacts*

*Castaic Lake Water Agency* - Potential urban development within the CLWA service area that may be accommodated by this additional water supply could adversely impact plant and animal communities due to the potential for extensive grading and construction activities, hillside development, and the amount of overall urbanization that could occur. Potential land use changes may result in a substantial adverse affect to sensitive species, result in habitat modifications including the modification of sensitive habitat types such as riparian or wetland habitats, interfere with the movement or migration of wildlife species, impede the use of wildlife nursery sites, and conflict with local policies and ordinances protecting biological resources. The project would not conflict with any habitat conservation plan or natural community conservation plan in the CLWA service area, as none have been adopted. Potential indirect impacts to biological resources that may result from future land use changes are considered potentially significant.

*Kern County Water Agency and Wheeler Ridge-Maricopa Water Storage District* – As implementation of the proposed project would not change land use within the KCWA or WRMWSD service areas, the proposed project would not result in habitat modifications including the modification of sensitive habitat types such as riparian or wetland habitats, interfere with the movement or

migration of wildlife species, impede the use of wildlife nursery sites, conflict with local policies and ordinances protecting biological resources including adopted and anticipated habitat conservation plans, or otherwise result in changes that may affect biological resources. Therefore, implementation of the proposed project is anticipated to result in a less than significant indirect impact to biological resources within the KCWA and WRMWSD service areas.

*State Water Project and Associated Facilities* – As implementation of the proposed project would not change the operating criteria of the SWP and associated facilities, implementation of the proposed project would not result in habitat modifications including the modification of sensitive habitat types such as riparian or wetland habitats, interfere with the movement or migration of wildlife species, impede the use of wildlife nursery sites, conflict with local, regional and state-wide policies and ordinances protecting biological resources, or conflict with adopted habitat conservation plans or natural community conservation plans, or otherwise result in changes that may affect biological resources. Any changes in delivery schedules and amounts would be not expected to have indirect impacts on biological resources as changes are expect to be within the current and historic operation of the SWP and associated facilities. Therefore, implementation of the proposed project is anticipated to result in a less than significant indirect impact to biological resources in connection with the SWP and associated facilities.

***Cultural Impacts***

*Direct Impacts*

*Castaic Lake Water Agency* - The CLWA service area is located in Ventura and Los Angeles counties, where at least four distinct ethno-linguistic groups were living at the time of first European contact, including the Tataviam, the Ventureño Chumash, the Emigdiano Chumash, and the Castac Chumash. Native American archaeological sites from various time periods exist within the CLWA service area, especially along the Piru and Castaic drainage systems, at the Vasquez Rocks and Escondido Canyon, and along major ridgelines (Science Applications International Corporation 1998). Historic resources documented in the CLWA service area are usually associated with major routes of travel, water courses, and early homesteading practices in and around Newhall (Scientific Resource Surveys 1988). Implementation of the proposed project would not require land disturbance nor would it directly change the existing land uses within the CLWA service area or cause other direct changes that could affect cultural resources. Nor would implementation of the proposed project cause a change in the significance of a historic or cultural resource, directly destroy a unique paleontological resource or unique geologic feature, or disturb human remains. No direct impacts to cultural resources within the CLWA service area would result from implementation of the proposed project.

*Kern County Water Agency and Wheeler Ridge-Maricopa Water Storage District* - The KCWA and WRMWSD service areas are located in Kern County. Several ethnographic groups were scattered throughout what is now Kern County, including the Southern Valley Yokuts, Kitanemuk, Castac Chumash (Heizer 1978). Kern County contains numerous Native American sites; however, no Native American archaeological or cultural resources are known to exist in the cultivated areas of the WRMWSD service area. The cultivated areas are considered to have

a low to moderate cultural resource sensitivity. No historic resources are recorded in the cultivated areas of the WRMWSD service area.

Implementation of the proposed project would not require the construction of new facilities or modification of existing KCWA and WRMWSD facilities, nor would implementation of the proposed project change the existing operation of these facilities. The proposed project would not cause a change in the significance of a historic or cultural resource, directly destroy a unique paleontological resource or unique geologic feature, or disturb human remains. Implementation of the proposed project would not materially affect irrigated agriculture in the WRMWSD service area. Therefore, implementation of the proposed project is anticipated to result in a less than significant impact to cultural resources within the KCWA and WRMWSD service areas.

*State Water Project and Associated Facilities* - The California Aqueduct is a 444-mile-long concrete-lined canal running between the Delta and Lake Perris, the oldest sections of which were built in the early 1960s. The aqueduct and its branches pass through Contra Costa, Alameda, San Joaquin, Stanislaus, Merced, Fresno, Kings, Kern, Santa Barbara, San Luis Obispo, Los Angeles, and San Bernardino counties, and includes the areas traditionally inhabited by the Miwok, Northern Valley Yokuts, Southern Valley Yokuts, Chumash, Tataviam, Gabrielino, Serrano, Cahuilla and other neighboring tribes. No prehistoric, historic, or paleontological resources are located within the aqueduct.

San Luis Reservoir is located in the San Joaquin Valley, in land that was traditionally inhabited by the Northern Valley Yokuts at the time of first European contact. There may be historic, prehistoric, or paleontologic sites either along the reservoir margins or located on submerged knolls. Any sites located below the full pool level of the reservoir are subject to periodic inundation for short or long periods of time depending on location, due to normal reservoir operations. The creation of the Castaic Dam and lake facility in 1972 inundated cultural resources. No historic resources are recorded in the area; however, no systematic survey of the lake margins was conducted prior to the construction of the dam. Therefore, there may be unrecorded historic, prehistoric, or paleontologic sites either along the lake margins or located on submerged knolls.

Implementation of the proposed project would not result in construction or modification of existing SWP facilities. In addition, implementation of the proposed project would not substantially change the current operation of the SWP and associated facilities, nor would it change the operating criteria of the SWP and associated facilities. Changes in SWP water storage, transport amounts and delivery schedules could result in minor changes in water flows in the California Aqueduct and other conveyance facilities and may change water reservoir levels. These changes would be within current and historic operational ranges, and would not be expected to have any significant adverse direct impacts on cultural resources within the SWP and associated facilities. As implementation of the proposed project would not directly require construction, change land use, or change SWP operating criteria, implementation of the proposed project is not anticipated to result in a change in the significance of a historic or cultural resource, directly destroy a unique paleontological resource or unique geologic feature, or disturb human remains. Therefore, implementation of the proposed project is anticipated to

result in a less than significant impact to cultural resources within the SWP and associated facilities.

*Indirect Impacts*

*Castaic Lake Water Agency* - There is the potential for indirect impacts to cultural resources due to potential land use changes as a result of development in the CLWA service area. The potential development in the CLWA service area that may be supported by this project could result in disturbance to archaeological and historic resources as a result of grading and construction activities and other land use changes as well as erosion along natural and manmade slopes. These disturbances may result in the change in the significance of a historic or cultural resource, may destroy a unique paleontological resource or unique geologic feature, and may result in the disturbance of human remains. Potential impacts to cultural resources that may result from land use changes are considered potentially significant.

*Kern County Water Agency and Wheeler Ridge-Maricopa Water Storage District* - Most agricultural lands have been previously disturbed by cultivation activities or construction of agricultural structures and irrigation systems. Implementation of the proposed project would not result in land use changes within the KCWA or WRMWSD service areas, and therefore, is not anticipated to indirectly cause a change in the significance of a historic or cultural resource, destroy a unique paleontological resource or unique geologic feature, disturb human remains, or otherwise indirectly affect cultural resources. Implementation of the proposed project is anticipated to result in a less than significant indirect impact to cultural resources within the KCWA and WRMWSD service areas.

*State Water Project and Associated Facilities* - As implementation of the proposed project would not result in construction or modification of existing SWP facilities, nor would it change the operating criteria of the SWP and associated facilities, the proposed project is not anticipated to indirectly cause a change in the significance of a historic or cultural resource, destroy a unique paleontological resource or unique geologic feature, disturb human remains, or otherwise indirectly affect cultural resources. Implementation of the proposed project is anticipated to result in a less than significant indirect impact to cultural resources within the SWP and associated facilities.

***Geology and Soil Impacts***

*Direct Impacts*

*Castaic Lake Water Agency* - The CLWA service area encompasses the relatively flat-lying Santa Clarita Valley and portions of the surrounding hills and mountains. The geology of the CLWA service area consists of a relatively thick sequence of Plio-Pleistocene Saugus Formation, locally overlain by recent alluvial deposits. Areas within the CLWA service area may be subject to landslides, liquefaction, lateral spreading, subsidence, soil erosion, soil expansion, and other geologic hazards. Two faults, the active San Gabriel fault and the potentially active Holser fault, traverse the CLWA service area. The active San Andreas fault is located approximately 18 miles northeast of the central portion of the Santa Clarita Valley, and the San Fernando and Sierra Madre faults are also located in the vicinity of the CLWA service area. Implementation of the proposed project would not require land disturbance nor would it directly change the

existing land uses within the CLWA service area, and therefore, would not directly expose people or structures to geologic hazards including rupture of a known earthquake fault, strong seismic ground shaking, seismic-related ground failure, liquefaction and landslides. Nor would implementation of the proposed project directly result in substantial soil erosion, or be located on an unstable or expansive geologic unit or soil. In addition, the proposed project does not include the construct of structures or changes in land use that would result in impacts from septic tanks or alternative wastewater disposal systems. Therefore, no direct impacts to geologic resources within the CLWA service area would result from implementation of the proposed project.

*Kern County Water Agency and Wheeler Ridge-Maricopa Water Storage District* - The topography within the KCWA areas within the San Joaquin Valley and the WRMWSD service area is generally flat with rolling foothills and several ephemeral creeks. Sand and clay loams characterize the soils present in the WRMWSD service area. As the topography of the WRMWSD service area is generally flat to gently sloping, landslide potential is low. In addition, soils within the WRMWSD service area are generally not subject to expansion, subsidence, liquefaction and lateral spreading. Numerous earthquake faults have been identified in the vicinity of the WRMWSD service area. Implementation of the proposed project would not require the construction of new facilities or modification of existing KCWA and WRMWSD facilities, nor would implementation of the proposed project change the existing operation of these facilities. Implementation of the proposed project would not materially affect irrigated acreage in the WRMWSD service area served by SWP water on an average annual basis, nor would it change existing land uses within the WRMWSD service area. Therefore, implementation of the proposed project is not anticipated to directly expose people or structures to geologic hazards including rupture of a known earthquake fault, strong seismic ground shaking, seismic-related ground failure, liquefaction and landslides. Nor would implementation of the proposed project directly result in substantial soil erosion, or be located on an unstable or expansive geologic unit or soil. In addition, the proposed project does not include the construction of structures or changes in land use that would result in impacts from septic tanks or alternative wastewater disposal systems. Therefore, implementation of the proposed project is anticipated to result in a less than significant impact to geologic resources within the KCWA and WRMWSD service areas.

*State Water Project and Associated Facilities* - Geologic features for the areas traversed by the SWP, or containing SWP facilities within the San Joaquin Valley, are generally similar to those described for the KCWA and WRMWSD service areas above. Geologic features for the areas traversed by the SWP, or containing SWP facilities within and south of the Tehachapi Mountain Range, are generally similar to those described for the CLWA service area above. Implementation of the proposed project would not result in construction or modification of existing SWP facilities. In addition, implementation of the proposed project would not substantially change the current operation of the SWP and associated facilities, nor would it change the operating criteria of the SWP and associated facilities. Changes in SWP water storage, transport amounts, and delivery schedules could result in minor changes in water flows in the California Aqueduct and other conveyance facilities and could result in changes to water levels within San Luis Reservoir and Castaic Lake. These changes are expected to be within current and historic operational ranges, and would not be expected to have significant impacts to geology and soils within the SWP and associated facilities. Implementation of the proposed project is not

anticipated to directly expose people or structures to geologic hazards including rupture of a known earthquake fault, strong seismic ground shaking, seismic-related ground failure, liquefaction and landslides. Nor would implementation of the proposed project directly result in substantial soil erosion, or be located on an unstable or expansive geologic unit or soil. In addition, the proposed project does not include the construction of structures or changes in land use that would result in impacts from septic tanks or alternative wastewater disposal systems. Therefore, no direct impacts to geologic resources within the SWP and associated facilities would result from implementation of the proposed project.

*Indirect Impacts*

*Castaic Lake Water Agency* - There is the potential for indirect impacts to geologic resources due to potential land use changes as a result of development in the CLWA service area. Potential future development within the CLWA service area that could be served by this additional water supply could include areas with rugged topography. Slopes could range from relatively flat in some of the drainage channels to very steep on some of the canyon sides. Due to the existence of rugged topography and steep slopes, landslides have occurred in the area, and other areas of unstable slopes likely exist. Some of the lower elevation drainages have a potential for high groundwater and mudflows. Development would generally be served by the extension of existing sewer systems or would require soils and geologic studies to determine capability to adequately support alternative wastewater disposal systems. Potential development within the CLWA service area could require extensive grading and earthwork that would substantially alter the landforms and topography. Grading would require removal of vegetation and further destabilization of slopes during the construction period. This could lead to accelerated erosion and sedimentation in local drainages. Additionally, portions of the CLWA service area are within a seismically active region, and potential land use changes could expose people or structures to loss, injury or death involving seismic activity and seismic related ground failures. These indirect impacts are considered potentially significant.

*Kern County Water Agency and Wheeler Ridge-Maricopa Water Storage District* - As the implementation of the proposed project would not result in land use changes within the KCWA or WRMWSD service areas, implementation of the proposed project would not indirectly expose people or structures to geologic hazards from seismic activities and seismic related ground failures, result in substantial soil erosion, be located on an unstable or expansive geologic unit or soil, or include the construction of structures or changes in land use that would result in impacts from septic tanks or alternative wastewater disposal systems. Due to the variability and flexibility of agricultural management practices and varied water sources, implementation of the proposed project is anticipated to result in a less than significant indirect impact to geologic resources.

*State Water Project and Associated Facilities* - As implementation of the proposed project would not result in construction or modification of existing SWP facilities, nor would it change the operating criteria of the SWP and associated facilities, implementation of the proposed project would not indirectly expose people or structures to geologic hazards from seismic activities and seismic related ground failures, result in substantial soil erosion, be located on an unstable or expansive geologic unit or soil, or include the construction of structures or changes in land use that would result in impacts from septic tanks or alternative wastewater disposal systems.

Therefore, no indirect impacts to geologic resources are anticipated to result from implementation of the proposed project.

***Hazards and Hazardous Materials Impacts***

*Direct Impacts*

*Castaic Lake Water Agency* - As much of the CLWA service area is urbanized, it contains a range of industries and commercial enterprises that use, have used, or produced hazardous materials and/or hazardous wastes. Numerous fuels, chemicals, and other hazardous materials and hazardous wastes are also transported via roadways and railways. In addition, numerous hazardous materials/waste sites are present in the CLWA service area. A wide variety of potential safety hazards are present throughout the CLWA service area including open water bodies, and active industrial and commercial areas. Implementation of the proposed project would not require land disturbance nor would it directly change the existing land uses within the CLWA service area. No aspect of the proposed project would directly create a hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials, create a hazard to the public or the environment through the reasonably foreseeable upset or accident involving the release of hazardous materials, emit hazardous emissions or handle hazardous materials with one-quarter mile of an existing or proposed school, be located on an existing hazardous materials site, or impair or physically interfere with an adopted emergency plan. As no airport land use plans, public use airports, or private airports are located within the CLWA service area, implementation of the proposed project would not create safety or other hazards as a result of proximity to an airport. In addition, as no construction or land use changes would directly result from implementation of the proposed project, the proposed project would not expose people or structures to a significant risk involving wildfires. Due to the incremental increase in the use of hazardous materials for additional water treatment requirements, the proposed project is anticipated to result in a less than significant impact to hazards and hazardous materials within the CLWA service area.

*Kern County Water Agency and Wheeler Ridge-Maricopa Water Storage District* - Substantial portions of the KCWA and WRMWSD service areas are used for agricultural purposes. Agricultural operations use pesticides and fertilizers, some of which are considered hazardous materials. Industrial facilities and other entities in the KCWA and WRMWSD service areas use a wide variety of hazardous materials including fuels and solvents. A wide variety of potential safety hazards are present throughout the KCWA and WRMWSD service areas including open water bodies, agricultural equipment storage areas, and active industrial and commercial areas.

Implementation of the proposed project would not require the construction of new facilities or modification of existing KCWA and WRMWSD facilities, nor would implementation of the proposed project change the existing operation of these facilities. Implementation of the proposed project would not materially affect irrigated agriculture in the WRMWSD service area served by SWP water, nor would it change existing land uses within the WRMWSD service area. No increase in transport or use of hazardous materials or hazardous substances releases would occur. The project would not result in construction within a hazardous materials site, airport land use plan area or the vicinity of a private airstrip and would not disrupt an emergency plan or cause increased risk of wildland fires. Therefore, implementation of the proposed project

is not anticipated to result in a direct impact to hazards or hazardous materials within the KCWA and WRMWSD service areas.

*State Water Project and Associated Facilities* - Hazardous material use, hazardous waste production and potential hazards for the San Joaquin Valley area is similar to that described above for the KCWA and WRMWSD service areas. Hazardous material use, hazardous waste production and potential hazards for the SWP areas within the Tehachapi Mountain Range to Castaic Lake is similar to that described for the CLWA service area above. SWP facilities utilize a variety of fuels, solvents and other hazardous materials at the various facilities. Numerous fuels, chemicals, and other hazardous materials and hazardous wastes are also transported via roadways and railways that run adjacent to or traverse the California Aqueduct or other SWP facilities.

Implementation of the proposed project would not result in construction or modification of existing SWP facilities. In addition, implementation of the proposed project would not substantially change the current operation of the SWP and associated facilities, nor would it change the operating criteria of the SWP and associated facilities. Changes in the amount of water transported by the SWP between the WRMWSD turnouts and the CLWA turnouts could increase hazardous materials use related to increased pumping requirements. Changes in delivery schedules could result in changes in water flows in the California Aqueduct and other conveyance facilities and could result in changes in water levels within San Luis Reservoir and Castaic Lake. As such, these changes would be within current and historic fluctuations and would not be expected to increase hazards to the public or the environment through the routine transport, use, or disposal of hazardous materials, increase hazards to the public or the environment through the reasonably foreseeable upset or accident involving the release of hazardous materials, increase hazards from hazardous emissions or the handling hazardous materials with one-quarter mile of an existing or proposed school, increase hazards from being located on an existing hazardous materials site, increase safety hazards from being in the proximity of an airport land use plan, public use airports or private airports, or increase hazards as a result of wildfires. In addition, implementation of the proposed project is not anticipated to impair or physically interfere with an adopted emergency plan. Therefore, implementation of the proposed project is not anticipated to result in a direct impact to hazards and hazardous materials within the SWP and associated facilities.

*Indirect Impacts*

*Castaic Lake Water Agency* - There is the potential for indirect impacts as a result of increases in hazards and hazardous materials due to potential land use changes from development in the CLWA service area. Historic as well as present hydrocarbon exploration and extraction activities have resulted in soil contamination from spills or disposal of hazardous materials in the ground within the CLWA service area. Depending on the specific location, development within the CLWA service area potentially served by this additional water supply may require the removal or remediation of any such contamination before property development could commence. Increases in water treatment would result in greater use of hazardous or toxic materials used. In addition, potential indirect project effects associated with growth may create increased risks such as hazardous substance releases, changes in emergency response needs, and similar public health and safety hazards. In addition, potential land use changes may create a hazard to the public or the

environment through the routine transport, use, or disposal of hazardous materials, create a hazard to the public or the environment through the reasonably foreseeable upset or accident involving the release of hazardous materials, emit hazardous emissions or handle hazardous materials within one-quarter mile of an existing or proposed school, be located on an existing hazardous materials site, impair or physically interfere with an adopted emergency plan, or increase hazards as a result of wildfires. These impacts are considered potentially significant. No lands within the CLWA service area are located within an airport land use plan, nor are they located in the vicinity of a public airport, public use airport or private airstrip.

*Kern County Water Agency and Wheeler Ridge-Maricopa Water Storage District* - As the implementation of the proposed project would not result in land use changes within the KCWA or WRMWSD service areas, implementation of the proposed project would not indirectly create a hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials, create a hazard to the public or the environment through the reasonably foreseeable upset or accident involving the release of hazardous materials, emit hazardous emissions or handle hazardous materials within one-quarter mile of an existing or proposed school, be located on an existing hazardous materials site, impair or physically interfere with an adopted emergency plan, increase safety hazards from being in the proximity of an airport land use plan, public use airports or private airports, or increase hazards as a result of wildland fires. Therefore, no indirect impacts to hazards and hazardous materials would result from implementation of the proposed project.

*State Water Project and Associated Facilities* - As implementation of the proposed project would not result in construction or modification of existing SWP facilities, nor would it change the operating criteria of the SWP and associated facilities, implementation of the proposed project would not indirectly create a hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials, create a hazard to the public or the environment through the reasonably foreseeable upset or accident involving the release of hazardous materials, emit hazardous emissions or handle hazardous materials within one-quarter mile of an existing or proposed school, be located on an existing hazardous materials site, impair or physically interfere with an adopted emergency plan, increase safety hazards from being in the proximity of an airport land use plan, public use airports or private airports, or increase hazards as a result of wildland fires. Therefore, no indirect impacts are anticipated to hazards and hazardous materials would result from implementation of the proposed project.

### *Hydrology and Water Quality Impacts*

The implementation of the proposed project will be evaluated taking into consideration contract terms with and without the Monterey Amendments[4]. For example, under certain water shortage conditions without the Monterey Amendments in place, the amount of water delivered to holders of agricultural Table A amount in a particular year can be reduced first, prior to holders of Municipal and Industrial (M&I) Table A amount being affected. Whereas, under the Monterey Amendments, holders of both agricultural and M&I Table A amounts would, under defined shortage conditions, be subject to proportional reductions.

In *Planning and Conservation League, et al. v. Department of Water Resources* (2000) 83 Cal. App. 4th 892, the Court issued a writ of mandate ordering that the certification of the EIR for the Monterey Agreement be vacated since the Court found that the EIR failed to comply with CEQA. Although the Court ordered the decertification of the EIR, the Court did not invalidate nor stay the implementation of the Monterey Agreement. In the meantime, the trial court is continuing to retain jurisdiction over the CEQA litigation, which is currently in settlement by the parties.

*Direct Impacts*

*Castaic Lake Water Agency* - The primary surface water drainage course in the CLWA service area is the Santa Clara River. Surface water resources include the Santa Clara River, Bouquet

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4. The Monterey Amendment envisioned a long-term restructuring of the SWP Water Supply Contracts to reflect the compromises and give and take of the mediated settlement. The Monterey Amendment does not result in an increase in total SWP supplies but instead settles the dispute regarding how any available supplies are allocated, and also provides flexibility and cooperation among the SWP Contractors in more efficient use of existing facilities to better manage the available supplies. The Monterey Amendment has the following major provisions:
   - All SWP water supplies are allocated among SWP Contractors in proportion to their Table A amount.
   - Agricultural SWP Contractors have reduced their cumulative Table A amount by 45,000 AF.
   - Agricultural SWP Contractors (including KCWA) committed to make available 130,000 AF of Table A amount for permanent transfer to urban SWP Contractors on a willing buyer-willing seller basis.
   - The Kern Fan Element property would be transferred to agricultural SWP Contractors so that they may use it for water banking and other purposes.
   - SWP Contractors who are unable to use all of their allocated supply in a certain year may place any excess in a "turn-back pool" that will be available for sale at fixed rates, thereby making that water available to other SWP Contractors and allowing the selling Contractor to recover some of their fixed costs.
   - SWP Contractors are provided rate reductions or credits, starting in 1997 and continuing through 2035, based on formulas set forth in the Monterey Amendment.
   - In addition, the Monterey Amendment deleted a provision in the SWP Water Supply Contracts generally referred to as Article 18(b) that would reduce SWP Contractor's Table A amounts by an amount determined by DWR in the event that a "permanent shortage" were to exist.

   The Monterey Amendment has three primary objectives: (1) to increase the reliability of all SWP Contractors' water supplies; (2) to stabilize the rate structure to improve the financial viability of the SWP; and (3) to increase water management flexibility for all SWP Contractors. A permanent transfer of agricultural Table A amount to an area with urban development potential, such as that analyzed in this document, is one of the ways these objectives are intended to be met.

Reservoir, and Castaic Lake. Primary flood hazard areas occur in and along natural drainage channels, such as the Santa Clara River and its tributaries, and in areas where sheetflow may occur during high intensity rainfall (CLWA 1988; Slade 1986). CLWA receives SWP water through the terminus of the West Branch of the California Aqueduct at Castaic Lake.

The existing local water supply in the CLWA service area is groundwater extracted from the Alluvial aquifer and from the underlying Saugus Formation aquifer. Although the Alluvial aquifer is the smaller of the two-aquifer systems, as measured by storage capacity, most water wells within the CLWA service area are drilled into this aquifer. The Alluvial aquifer has supplied about 30,000 to 40,000 acre-feet per year (AFY) in normal weather years, and 30,000 to 35,000 AFY in dry years (CLWA 2000, Slade 2002). The Saugus Formation contains much greater quantities of groundwater than the Alluvial aquifer. Approximately 1.65 million AF of potentially usable groundwater is present from depths of 500 to 2,500 feet in the Saugus Formation. The principal source of recharge to the Saugus Formation is from precipitation on exposed outcrops and direct infiltration from the overlying alluvium (Slade 2002). Preliminary estimates of the combined potential recharge to the Saugus Formation from these two sources range from 20,000 to 22,000 AFY in wet periods, and from 11,000 to 13,000 AFY in dry periods. The Saugus Formation has supplied about 7,500 to 15,000 AFY in normal weather years, and 11,000 to 15,000 AFY in dry years (CLWA 2000). No long-term continuous or permanent decline in either water levels or the amount of groundwater in storage has occurred under the historical range of pumping (Slade 2002). Based on the volume of water in storage and the history of aquifer performance, extractions from the Saugus Formation could be increased from 15,000 to 25,000 AFY, and ultimately to 35,000 AFY on an infrequent basis (Slade 2002).

Implementation of the proposed project would not require land disturbance nor would it directly change the existing land uses within the CLWA service area. No aspect of the proposed project would (1) directly violate a water quality standard, wastewater discharge requirement or otherwise deplete water quality, (2) deplete groundwater supplies or interfere with groundwater recharge, (3) alter the existing drainage pattern of an area that would result in erosion, siltation or flooding, (4) create or contribute runoff which would exceed stormwater system capacity or generate polluted runoff, (5) place housing or structures within the 100-year floodplain, (6) create inundation by tsunami or mudflow, or (7) increase risk of inundation by seiche. Therefore, no direct impacts to hydrology and water quality within the CLWA service area would result from implementation of the proposed project.

*Kern County Water Agency and Wheeler Ridge-Maricopa Water Storage District* - KCWA is the entity that holds the SWP contract within Kern County. In 1998, KCWA, together with its 14 member water districts, including WRMWSD, held approximately 1,088,000 AF of SWP contract rights. KCWA serves municipal, industrial and agricultural water users in Kern County. WRMWSD obtains water from the SWP, local sources and groundwater sources. WRMWSD receives SWP water through turnouts along the California Aqueduct, and delivers this water through the existing WRMWSD conveyance system to lands within its service area. Lands within the service area that do not hold contracts for SWP water rely on groundwater to meet demands (although, excess SWP water can be delivered to these certain areas through existing conveyance facilities).

Sandy Creek, Bitterwater Creek, Santiago Creek, Pleitito Creek, Pleito Creek, Salt Creek, Tecuya Creek, Grapevine Creek, Pastoria Creek, Tunis Creek, El Paso Creek, Liveoak Creek, and Caparell Creek flow from the south into the WRMWSD; and Tejon Creek flows from the east into the WRMWSD. Most of these creeks are intermittent and do not provide significant water for irrigation or conveyance for irrigation water.

The WRMWSD service area overlies the Kern County groundwater basin. The Kern County groundwater basin is part of the main San Joaquin Valley groundwater basin. The Kern County groundwater basin is, itself, composed of smaller basins, referred to as sub-basins. The sub-basins underlying WRMWSD are the Wheeler Front and the White Wolf sub-basins. Generally both basins contain water of sufficient quality for agricultural use. Deep groundwater wells in the WRMWSD service area were initially drilled in the mid-1940s. Until the early 1970s, groundwater was the primary water supply in the southern Kern County area and, as a result, the groundwater levels declined by 150 to 200 feet from levels observed in the 1940s. Use of the SWP water has generally allowed the groundwater levels to rise to levels equal to or above levels observed in the late 1960s and early 1970s.

No aspect of the proposed project would (1) directly violate a water quality standard, wastewater discharge requirement or otherwise deplete water quality, (2) deplete groundwater supplies or interfere with groundwater recharge, (3) alter the existing drainage pattern of an area that would result in erosion, siltation or flooding, (4) create or contribute runoff which would exceed stormwater system capacity or generate polluted runoff, (5) place housing or structures within the 100-year floodplain, or (6) create inundation by seiche, tsunami or mudflow. With implementation of the proposed project, WRMWSD would continue to make water available from a combination of historic and current water and agricultural management actions within the service area. Implementation of the proposed project would not materially affect irrigated acreage in the WRMWSD service area served by SWP water on an average annual basis, nor would it change existing land uses within the WRMWSD service area. Therefore, implementation of the proposed project is anticipated to result in a less than significant impact to hydrology and water quality within the KCWA and WRMWSD service areas.

*State Water Project and Associated Facilities* - The SWP is the largest state-built, multi-purpose water project in the country, and includes 28 storage facilities, reservoirs and lakes; 20 pumping plants; six pumping-generating plants and hydroelectric power plants; and about 660 miles of aqueducts and pipelines. In general, the SWP is operated to fill storage reservoirs during the high runoff months of the winter and early spring. Under current operating criteria SWP diversions from the Delta are significantly reduced as of April 15 of each year. San Luis Reservoir, located approximately 60 miles south of the Banks Pumping Plant, is an off-stream storage reservoir with a total capacity of over two million AF (slightly more than half of the capacity is allocated to the SWP, and the remainder is allocated to the Central Valley Project). The SWP is operated to store as much water as possible in San Luis Reservoir prior to April 15. The stored water is then used during the high-demand summer and fall months to supplement the more limited pumping from the Delta in meeting contractor demands. Therefore, San Luis Reservoir water levels vary considerably during the year to provide storage of water in the winter months for later use in the summer months. Castaic Lake is operated to provide regulatory storage to meet peak deliveries during the summer months for those contractors that

receive water from the lake, and to provide an emergency supply in the case of a major supply system outage. Castaic Lake has a storage volume of approximately 323,700 AF.

Implementation of the proposed project would not result in construction or modification of existing SWP facilities. In addition, implementation of the proposed project would not substantially change the current operation of the SWP and associated facilities, nor would it change the operating criteria of the SWP and associated facilities. No aspect of the proposed project would (1) directly violate a water quality standard, wastewater discharge requirement or otherwise deplete water quality, (2) deplete groundwater supplies or interfere with groundwater recharge, (3) alter the existing drainage pattern of an area that would result in erosion, siltation or flooding, (4) create or contribute runoff which would exceed stormwater system capacity or generate polluted runoff, (5) place housing or structures within the 100-year floodplain, or (6) create inundation by seiche, tsunami or mudflow.

The proposed project involves the contractual transfer of SWP Table A amount as described in both CLWA and KCWA's water supply contracts. However, the proposed project would not change the annual aggregate amount of SWP water (Table A or other water class types) available for use by any SWP contractor. The proposed project includes changes in the amount of SWP Table A amounts available to KCWA (in particular WRMWSD), and CLWA as well as associated changes in the location and timing of SWP deliveries and changes in the utilization of conveyance and storage facilities.

Due to the variety of water management criteria, and as implementation of the proposed project would deliver water to CLWA that could otherwise have been delivered to WRMWSD, the total amount of water diverted from the Delta would not change with implementation of the proposed project. Water exported from the Delta must comply with established water quality standards and other operating criteria, and implementation of the proposed project would not change these established operating criteria.

Minor changes in SWP storage and transport amounts could occur within SWP facilities as a result of the proposed project. There is a potential for differences in monthly storage and release schedules, and pumping as a result of the change from agricultural to M&I use and the delivery of water further south within the SWP system. SWP water pumped from the Delta is stored in SWP and local facilities for later delivery. Releases from San Luis Reservoir could change based upon changes in timing of deliveries from agricultural to M&I use. Overall, implementation of the proposed project is anticipated to result in a less than significant impact to the SWP and associated facilities.

*Indirect Impacts*

*Castaic Lake Water Agency* - There is the potential for indirect impacts to hydrology and water quality due to potential land use changes as a result of development in the CLWA service area. Indirect effects within CLWA include potential changes in the use of local groundwater supplies. Increased availability of SWP supplies resulting from the proposed project could indirectly affect the use of local groundwater in the Santa Clarita Valley. Although the amount of the SWP Table A amount would increase, the SWP supply available to CLWA in any one year following the Table A amount transfer may vary due to hydrologic and weather

conditions, and the amount of delivery may vary due to local water demands and CLWA's ability to take the total amount of its annual delivery (i.e., due to limited local storage). This could result in increased use of groundwater in certain years and could also change (both potentially increasing and decreasing) the amount of groundwater recharge in some years.

The EIR would evaluate the potential effects of growth that could be served by the proposed project, with regard to its effects on hydrology and water quality for existing lands within the CLWA service area. The potential development of lands within the CLWA service area would increase the amount of impervious surface (roads, buildings, other paved areas). This could reduce percolation of rainwater to groundwater, alter surface flows and drainage, and increase the amount and rate of stormwater runoff through storm sewers or other engineered drainages. Increases in erosion and siltation could also result from land use changes. Projected increases in runoff could, in some cases, exceed existing capacities requiring additional engineered drainages or other alterations in on and off-site locations of development and increasing polluted runoff.

There is also the potential for growth to affect the 100-year floodplain, including, redirecting flood flows as a result of elevating lands above the floodplain, construction within the floodplain, or other similar measures that could slow or redirect flood flows. Depending upon the location of future growth served by the project and design factors, people or structures could be exposed to a significant risk of loss, injury or death involving flooding and inundation by seiche or mudflow.

The Santa Clarita Valley has water supplies from sources in addition to SWP water, including groundwater. In 1997, perchlorate, a toxic substance, was found in the groundwater of the Saugus Formation near the site of an old munitions factory in the Santa Clarita Valley. Four Saugus production wells and one Alluvial production well have been shut down due to perchlorate contamination. Water agencies are evaluating several methods of safely removing perchlorate from the groundwater. The proposed project and the effects associated with growth are not expected to have a significant adverse effect on perchlorate concentrations in the groundwater, however, the EIR will address potential effects of the proposed project on perchlorate concentrations in the groundwater.

Runoff from development in the CLWA service area would eventually drain into the Santa Clara River. Wastewater produced on these lands would be treated in existing and future water reclamation facilities. Discharges from these facilities would also be discharged into the Santa Clara River in compliance with existing discharge permits. The identification of excessive chloride concentrations has resulted in inclusion of Reaches 7 and 8 of the Santa Clara River in the Clean Water Act Section 303(d) List of impaired water bodies. This list identifies water quality-limited water bodies and pollutants of concern for which a total maximum daily load (TMDL) must be developed[5]. The Regional Water Quality Control Board is currently in the process of development of a TMDL plan for the Santa Clara River.

The proposed project would not be expected to substantially increase chloride concentrations in surface water runoff in the Santa Clarita Valley. However, the proposed project would result in an increase in wastewater effluent volume (and therefore increased total chloride load) into the

5. A TMDL is a number that represents the assimilative capacity of water for a particular pollutant, or the amount of a particular pollutant that water can receive without impacting its beneficial uses.

Santa Clara River. It is anticipated that development planned in the CLWA service area would be similar to existing uses in the Santa Clarita Valley (i.e., primarily residential) and therefore would be expected to produce wastewater with similar water quality characteristics, although the overall volume of wastewater would increase. The potential for the proposed project to have a significant impact on surface waters of the Santa Clarita Valley with respect to chloride concentrations would be evaluated in the EIR.

Overall, implementation of the proposed project has the potential to have significant indirect impacts to hydrology and water quality within the CLWA service area.

*Kern County Water Agency and Wheeler Ridge-Maricopa Water Storage District* - Implementation of the proposed project is unlikely to result in indirect impacts to hydrology and water quality within the KCWA and WRMWSD service areas. WRMWSD participates in groundwater recharge programs that are intended to augment surface water supplies when supply is insufficient to meet demand. Due to the flexibility of water management practices associated with agricultural lands, implementation of the proposed project is anticipated to result in a less than significant impact to hydrology and water quality within the KCWA and WRMWSD service areas. In addition, as implementation of the proposed project would not result in land use changes, the proposed project is not anticipated to result in indirect impacts that would (1) violate a water quality standard, wastewater discharge requirement or otherwise deplete water quality, (2) deplete groundwater supplies or interfere with groundwater recharge, (3) alter the existing drainage pattern of an area that would result in erosion, siltation or flooding, (4) create or contribute runoff which would exceed stormwater system capacity or generate polluted runoff, (5) place housing or structures within the 100-year floodplain, or (6) create inundation by seiche, tsunami or mudflow.

*State Water Project and Associated Facilities* - As implementation of the proposed project would not result in construction or modification of existing SWP facilities, nor would it change the operating criteria of the SWP and associated facilities, the proposed project would not result in indirect impacts that would (1) violate a water quality standard, wastewater discharge requirement or otherwise deplete water quality, (2) deplete groundwater supplies or interfere with groundwater recharge, (3) alter the existing drainage pattern of an area that would result in erosion, siltation or flooding, (4) create or contribute runoff which would exceed stormwater system capacity or generate polluted runoff, (5) place housing or structures within the 100-year floodplain, or (6) create inundation by seiche, tsunami or mudflow. Due to the slight changes in the SWP storage and transport amounts that could occur as a result of the proposed project, indirect impacts are considered to be less than significant.

***Land Use and Planning Impacts***

*Direct Impacts*

*Castaic Lake Water Agency* - The CLWA service area includes portions of unincorporated Los Angeles County, the City of Santa Clarita (including previously unincorporated communities of Newhall, Saugus, Valencia and Canyon Country), the communities of Stevenson Ranch, Castaic, Val Verde and unincorporated portions of eastern Ventura County. Land uses in the CLWA service area include urban uses such as higher density residential, commercial, industrial and

public/institutional uses, rural or lower density residential development, agricultural and open space uses, and national forest lands. Portions of the valley have development constraints due to steep terrain and potential flooding. Adopted plans and policies of local governments and planning bodies with jurisdiction in the CLWA service area include those adopted by the Southern California Association of Governments, Los Angeles County, Ventura County, and the City of Santa Clarita.

In addition, CLWA and certain local water purveyors developed and adopted a revised Urban Water Management Plan in 2000. This plan is a management tool, providing a framework for action but not functioning as detailed project development or action. The plan presents information about the water demand, water supply, water conservation, water recycling, and reliability planning in the CLWA service area.

Implementation of the proposed project would not require land disturbance nor would it directly change the existing land uses within the CLWA service area. In addition, implementation of the proposed project would not directly divide an established community, or conflict with adopted land use plans, policies, or regulations that were adopted for the purpose of avoiding or mitigating environmental effects. The project would not conflict with any habitat conservation plan or natural community conservation plan in the CLWA service area, as none have been adopted. Therefore, no direct impacts to land uses and planning within the CLWA service area would result from implementation of the proposed project.

*Kern County Water Agency and Wheeler Ridge-Maricopa Water Storage District* - Land use within Kern County is primarily agricultural with some oil and mineral development. Urban development is concentrated in the metropolitan Bakersfield area; rural communities are scattered throughout the county. Land use in unincorporated portions of Kern County is under the jurisdiction of the county, with the exception of non-jurisdictional lands such as those owned by federal or state governments. In 1998, the WRMWSD service area contained approximately 146,620 acres (WRMWSD 2001). Land uses included the following: farmed area (94,269 acres or 64.3 percent); fallow lands (17,979 acres or 12.3 percent); miscellaneous and other lands, defined as developed but nonfarmed areas within cultivated lands, such as farm roads, farmsteads, reservoirs, airstrips, cotton gins, tank farms, utility yards, etc. (8,201 acres or 5.6 percent); and native vegetation/non-developed lands (26,171 acres or 17.8 percent) (WRMWSD 2001).

Implementation of the proposed project would not require or promote the adoption or modification of existing land uses or land use plans within the KCWA and WRMWSD service areas. In addition, implementation of the proposed project would not directly divide an established community, or conflict with adopted land use plans, policies, or regulations that were adopted for the purpose of avoiding or mitigating environmental effects. With implementation of the proposed project, WRMWSD would continue to make water available from a combination of historic and current water and agricultural management actions within the service area. Implementation of the proposed project would not materially affect irrigated agriculture in the WRMWSD service area served by SWP water, nor would it change existing land uses within the WRMWSD service area. Therefore, no direct impacts to land use and planning within the KCWA or WRMWSD service areas are anticipated to result from implementation of the proposed project.

The project would not conflict with any natural community conservation plans in KCWA or WRMWSD service areas, since none have been adopted. A habitat conservation plan is being developed for the San Joaquin Valley floor within Kern County and in the vicinity of Tejon Ranch in the WRMWSD service area. In addition, a habitat conservation plan has been developed for the Bakersfield area. It is not anticipated that the project would conflict with these plans, the status of which would be described in the EIR.

*State Water Project and Associated Facilities* - Land use and planning directly associated with SWP facilities is under the jurisdiction of DWR or its designee for such things as facilities, easements, etcetera. Implementation of the proposed project would not result in construction or modification of existing SWP facilities. In addition, implementation of the proposed project would not substantially change the current operation of the SWP and associated facilities, nor would it change the operating criteria of the SWP and associated facilities. Implementation of the proposed project would not directly divide an established community, or conflict with adopted land use plans, policies, or regulations that were adopted for the purpose of avoiding or mitigating environmental effects. As no construction or land use changes would result with implementation of the proposed project, the project is not anticipated to conflict with any adopted habitat conservation plan or natural community conservation plan. Therefore, no direct impacts to land use and planning within the SWP and associated facilities are anticipated to result from implementation of the proposed project.

*Indirect Impacts*

*Castaic Lake Water Agency* - There is the potential for indirect impacts to land use and planning due to potential land use changes as a result of development in the CLWA service area. Potential development within the CLWA service area served by this additional water supply could, in some cases, require changes to zoning designations to accommodate residential, commercial, and other uses or to increase the density or intensity of allowed uses. Depending on the location and type of development, there is the potential for new development to physically divide an established community. Without adequate mitigation, there also is a potential for some conflicts with adopted land use plans, policies, or regulations that were adopted for the purpose of avoiding or mitigating environmental effects. Land use changes would not conflict with an adopted habitat conservation plan or natural community conservation plan as no habitat conservation plan or natural community conservation plan exist in the CLWA service area.

As a result of the proposed increased SWP water supply associated with this project, land development projects would potentially be accommodated within the CLWA service area. The approval of these development projects requires land use approvals by local governments. Potential land use changes are considered potentially significant.

*Kern County Water Agency and Wheeler Ridge-Maricopa Water Storage District* - As the implementation of the proposed project would not result in land use changes within the KCWA or WRMWSD service areas, the proposed project is not anticipated to divide an established community, conflict with adopted land use plans, policies, or regulations that were adopted for the purpose of avoiding or mitigating environmental effects, or conflict with an adopted or anticipated habitat conservation plan or natural community conservation plan. Therefore, no

indirect impacts to land use and planning are anticipated to result from implementation of the proposed project.

*State Water Project and Associated Facilities* - As implementation of the proposed project would not result in construction or modification of existing SWP facilities, nor would it change the operating criteria of the SWP and associated facilities, the proposed project is not anticipated to divide an established community, conflict with adopted land use plans, policies, or regulations that were adopted for the purpose of avoiding or mitigating environmental effects, or conflict with an adopted habitat conservation plan or natural community conservation plan. Therefore, no indirect impacts to land use and planning are anticipated to result from implementation of the proposed project.

***Mineral Resource Impacts***

*Direct Impacts*

*Castaic Lake Water Agency* - Much of the CLWA service area is classified as potential sand and gravel mineral resource areas. Most of the floodplain of the Santa Clara River drainage system is classified by the California Department of Mines and Geology as Zone MRZ-2, which is an area where adequate information indicates that significant mineral deposits are present or where it is judged that a high likelihood for their presence exists. Tertiary sedimentary rocks in the CLWA service area are also considered alternative sources of aggregate. Implementation of the proposed project would not require land disturbance nor would it directly change the existing land uses within the CLWA service area. The proposed project would not directly result in the loss of availability of a known mineral resource or the loss of availability of a locally important mineral resource, and therefore no direct impacts to mineral resources within the CLWA service area would result from implementation of the proposed project.

*Kern County Water Agency and Wheeler Ridge-Maricopa Water Storage District* - Numerous oil wells, groundwater wells and gravel mining operations are scattered throughout the KCWA and WRMWSD service areas. Implementation of the proposed project would not materially affect irrigated agriculture in the WRMWSD service area served by SWP water, nor would it change existing land uses within the WRMWSD service area. The proposed project would not directly result in the loss of availability of a known mineral resource or the loss of availability of a locally important mineral resource. Therefore, no direct impacts to mineral resources within the KCWA or WRMWSD service areas are anticipated to result from implementation of the proposed project.

*State Water Project and Associated Facilities* - Numerous oil wells, groundwater wells and gravel mining operations are scattered throughout the regions traversed or containing SWP facilities. Any mineral resources directly associated with SWP facilities would be under the jurisdiction of DWR or its designee. Implementation of the proposed project would not result in construction or modification of existing SWP facilities. In addition, implementation of the proposed project would not substantially change the current operation of the SWP and associated facilities, nor would it change the operating criteria of the SWP and associated facilities. The proposed project would not directly result in the loss of availability of a known mineral resource or the loss of availability of a locally important mineral resource. Therefore, no direct impacts to

mineral resources within the SWP and associated facilities are anticipated to result from implementation of the proposed project.

*Indirect Impacts*

*Castaic Lake Water Agency* - There is the potential for indirect impacts to mineral resources due to potential land use changes as a result of development in the CLWA service area. Hydrocarbon resources occur in portions of the Santa Clarita Valley. Most wells were developed in the 1940s and 1950s. Many of these wells have been abandoned. Since the proposed project may also remove an impediment to growth, there may be indirect impacts related to increased gravel mining and production caused by a growth-related demand for aggregate to build roads and other infrastructure. To the extent that future development will result in the loss of availability of a known mineral resource that is of value to the residents of the region and state or the loss of availability of a locally important mineral resource recovery site, impacts would be significant.

*Kern County Water Agency and Wheeler Ridge-Maricopa Water Storage District* - As the implementation of the proposed project would not result in land use changes within the KCWA or WRMWSD service areas, the proposed project would not result in the loss of availability of a known mineral resource or the loss of availability of a locally-important mineral resource. Therefore, no indirect impacts to mineral resources would result from implementation of the proposed project.

*State Water Project and Associated Facilities* - As implementation of the proposed project would not result in construction or modification of existing SWP facilities, nor would it change the operating criteria of the SWP and associated facilities, the proposed project would not directly result in the loss of availability of a known mineral resource or the loss of availability of a locally-important mineral resource. Therefore, no indirect impacts to mineral resources would result from implementation of the proposed project.

***Noise Impacts***

*Direct Impacts*

*Castaic Lake Water Agency* - The CLWA service area includes developed urban areas, primarily within the City of Santa Clarita and developed portions of unincorporated Los Angeles County, as well as lower density residential or rural/agricultural areas, including portions of eastern Ventura County. Common sources of noise are highways, railroads, buses, and aircraft. The Union Pacific Railroad, Interstate 5, State Route 14 and Highway 126 traverse the Santa Clarita Valley and contribute to ambient noise levels. Implementation of the proposed project would not require land disturbance nor would it directly change the existing land uses within the CLWA service area. No aspect of the proposed project would expose persons to or generate noise levels in excess of established standards, expose persons to or generate excessive ground-borne vibration or ground-borne noise levels, or cause a substantial permanent temporary or periodic increase in ambient noise levels. No lands within the CLWA service area are located within an airport land use plan, nor are they located in the vicinity of a public airport, public use airport or private airstrip. Therefore, no direct noise impacts within the CLWA service area would result from implementation of the proposed project.

*Kern County Water Agency and Wheeler Ridge-Maricopa Water Storage District* - Noise within Kern County is primarily related to agricultural and vehicular uses in rural areas, and within areas of urban development routine noise related primarily to vehicular traffic and other noises commonly associated with residential, commercial, industrial, public facilities, recreation and other developed uses. Land use within the WRMWSD service area is predominantly agricultural use (farming and grazing), undeveloped lands or open space. The main noise sources are from agricultural uses and vehicular traffic (particularly along Interstate 5, U.S. 99 and State Highway 166).

Implementation of the proposed project would not require the construction of new facilities or modification of existing KCWA and WRMWSD facilities, nor would implementation of the proposed project change the existing operation of these facilities. Therefore, no aspect of the proposed project is anticipated to expose persons to or generate noise levels in excess of established standards, expose persons to or generate excessive ground-borne vibration or ground-borne noise levels, or cause a substantial permanent temporary or periodic increase in ambient noise levels. Implementation of the proposed project would not materially affect irrigated agriculture in the WRMWSD service area served by SWP water, nor would it change existing land uses within the WRMWSD service area. The project would not expose people residing or working in the KCWA or WRMWSD service areas to excessive noise levels associated with lands subject to an airport land use plan, or in the vicinity of a public airport, public use airport or private airstrip. Therefore, implementation of the proposed project is not anticipated to result in direct impacts to noise within the KCWA and WRMWSD service areas.

*State Water Project and Associated Facilities* - Noise associated the SWP and related facilities can vary from minimal amounts along the aqueduct to higher levels of noise due to vehicular traffic and other noises commonly associated with pumping facilities, recreational facilities, highways, and other noise generating uses along and associated with the operation of the aqueduct and related facilities. Implementation of the proposed project would not result in construction or modification of existing SWP facilities. In addition, implementation of the proposed project would not substantially change the current operation of the SWP and associated facilities, nor would it change the operating criteria of the SWP and associated facilities. Therefore, no aspect of the proposed project is anticipated to expose persons to or generate noise levels in excess of established standards, expose persons to or generate excessive ground-borne vibration or ground-borne noise levels, cause a substantial permanent temporary or periodic increase in ambient noise levels, or expose people to excessive noise levels in the vicinity of a public airport, public use airport or private airstrip. No direct noise impacts within the SWP and associated facilities are anticipated to result from implementation of the proposed project.

*Indirect Impacts*

*Castaic Lake Water Agency* - There is the potential for indirect noise impacts due to potential land use changes as a result of development in the CLWA service area. Potential development within the CLWA service area that could be served by this additional water supply could substantially alter the land uses from vacant land, low density and agricultural uses to urban uses (residential, commercial and other uses) with associated activities, traffic, and noise sources which could change ambient noise levels on a temporary or permanent basis. In addition, potential land use changes could expose persons to or generate noise levels in excess of established standards,

expose persons to or generate excessive ground-borne vibration or ground-borne noise levels, or cause a substantial permanent temporary or periodic increase in ambient noise levels. These impacts are considered potentially significant. The CLWA service area is not located within an airport land use plan, nor is it in the vicinity of a public airport, public use airport or private airstrip.

*Kern County Water Agency and Wheeler Ridge-Maricopa Water Storage District* - As the implementation of the proposed project would not result in land use changes within the KCWA or WRMWSD service areas, the proposed project is not anticipated to expose persons to or generate noise levels in excess of established standards, expose persons to or generate excessive ground-borne vibration or ground-borne noise levels, cause a substantial permanent temporary or periodic increase in ambient noise levels, or expose people to excessive noise levels in the vicinity of a public airport, public use airport or private airstrip. Therefore, no indirect noise impacts would result from implementation of the proposed project.

*State Water Project and Associated Facilities* - As implementation of the proposed project would not result in construction or modification of existing SWP facilities, nor would it change the operating criteria of the SWP and associated facilities, the proposed project is not anticipated to expose persons to or generate noise levels in excess of established standards, expose persons to or generate excessive ground-borne vibration or ground-borne noise levels, cause a substantial permanent temporary or periodic increase in ambient noise levels, or expose people to excessive noise levels in the vicinity of a public airport, public use airport or private airstrip. Therefore, no indirect noise impacts would result from implementation of the proposed project.

***Population and Housing Impacts***

*Direct Impacts*

*Castaic Lake Water Agency* - In 1998, it was estimated that there was approximately 177,000 persons, 57,000 housing units, and 59,000 jobs in the Santa Clarita Valley (SCAG 1998). These estimates reflect increases of approximately 9-10 percent since 1994 when there were approximately 162,000 persons, 52,000 households, and 53,000 jobs in the Santa Clarita Valley (SCAG 1998). The population of the CLWA service area was estimated at approximately 190,000 persons in 2000 based upon the U.S. Census. Los Angeles County projects a population of 270,000 persons, 93,400 housing units, and 111,000 jobs by the year 2010. Compared to the 1998 estimates, the 2010 projections anticipate an increase of 53 percent for population, 64 percent for housing, and 88 percent for jobs. Implementation of the proposed project would not require land disturbance nor would it directly change the existing land uses within the CLWA service area. The proposed project would not result in increased employment or make other changes in activities that would directly affect population and housing. In addition, the proposed project would not directly displace a substantial number of people or existing houses. Therefore, no direct impacts to population and housing within the CLWA service area are anticipated to result from implementation of the proposed project.

*Kern County Water Agency and Wheeler Ridge-Maricopa Water Storage District* - The population of Kern County in 1990 was 543,477 persons, and 661,645 persons in 2000 (U.S. Census Bureau 2000). From 1990 to 2000, the population grew approximately 21 percent. Based on Census

data, in 2000, Kern County contained approximately 231,560 housing units, as compared to approximately 198,640 housing units in 1990. The WRMWSD service area consists predominantly of agricultural lands, although small areas of industrial development and the unincorporated community of Lakeview are within the service area, along with the town site of Wheeler Ridge. Based on U.S. Census Bureau data, the population of the WRMWSD service area in 1990 was estimated to be 3,029 persons, or less than one percent of the population of Kern County. In 2000, the population of the WRMWSD service area was estimated to be 2,854 persons, or less than one percent of the population of Kern County. The WRMWSD service area does not contain large areas of residential development.

Implementation of the proposed project would not require the construction of new facilities or modification of existing KCWA and WRMWSD facilities, nor would implementation of the proposed project change the existing operation of these facilities. Implementation of the proposed project would not materially affect irrigated agriculture in the WRMWSD service area served by SWP water, nor would it change existing land uses within the WRMWSD service area. In addition, the proposed project would not directly induce substantial population growth, nor would it displace a substantial number of people or existing houses. Therefore, no direct impacts to population and housing within the KCWA or WRMWSD service areas would result from implementation of the proposed project.

*State Water Project and Associated Facilities* - As the SWP and associated facilities are a statewide water distribution system, there are no population and housing resources directly associated with the SWP facilities. Implementation of the proposed project would not result in construction or modification of existing SWP facilities. In addition, implementation of the proposed project would not substantially change the current operation of the SWP and associated facilities, nor would it change the operating criteria of the SWP and associated facilities. The proposed project would not directly induce substantial population growth, nor would it displace a substantial number of people or existing houses. Therefore, no direct impacts to population and housing within the SWP and associated facilities would result from implementation of the proposed project.

*Indirect Impacts*

*Castaic Lake Water Agency* - There is the potential for indirect impacts to population and housing due to potential land use changes as a result of accommodation of development in the CLWA service area. The project is considered to be growth inducing because it would remove an obstacle to growth by providing additional SWP water to CLWA that could be used to serve existing as well as future water users. Further, it is possible that future land use development approvals for lands that could be served as a result of the project would include amendments to the existing general plans, zoning, and adopted growth forecasts, which could be considered growth inducing. These impacts are considered potentially significant. Potential development within the CLWA service area served by the proposed additional water supply could create a large number of new housing units, employment increases and associated population. While it is possible that new development in certain areas could in some cases result in the displacement of older dwellings or relocation of individuals, no substantial redevelopment or relocation is anticipated. Growth inducement and growth related indirect impacts are potentially significant and will be addressed further in the EIR.

*Kern County Water Agency and Wheeler Ridge-Maricopa Water Storage District* - As the implementation of the proposed project would not result in land use changes within the KCWA or WRMWSD service areas, the proposed project would not induce substantial population growth, nor would it displace a substantial number of people or existing houses. Therefore, no indirect impacts to population and housing would result from implementation of the proposed project.

*State Water Project and Associated Facilities* - As implementation of the proposed project would not result in construction or modification of existing SWP facilities, nor would it change the operating criteria of the SWP and associated facilities, the proposed project would not induce substantial population growth, nor would it displace a substantial number of people or existing houses. Therefore, no indirect impacts to population and housing would result from implementation of the proposed project.

***Public Services Impacts***

*Direct Impacts*

*Castaic Lake Water Agency* - Public services within the CLWA service area are provided by a variety of state, regional and local agencies including, although not limited to the following: California Department of Forestry, California Highway Patrol, County of Los Angeles, County of Ventura, and the City of Santa Clarita. Implementation of the proposed project would not require land disturbance nor would it directly change the existing land uses within the CLWA service area. In addition, the proposed project would not create direct changes in demand for public services that would require the construction or modification of governmental facilities to maintain acceptable response service ratios, response times or other performance objectives. Therefore, no direct impacts to public services within the CLWA service area would result from implementation of the proposed project.

*Kern County Water Agency and Wheeler Ridge-Maricopa Water Storage District* - Public services within the KCWA and WRMWSD service areas are provided by a variety of state, regional and local agencies including, although not limited to: California Department of Forestry, California Highway Patrol, Kern County, and the City of Bakersfield. Implementation of the proposed project would not require the construction of new facilities or modification of existing KCWA and WRMWSD facilities, nor would implementation of the proposed project change the existing operation of these facilities. Implementation of the proposed project would not materially affect irrigated agriculture in the WRMWSD service area served by SWP water, nor would it change existing land uses within the WRMWSD service area. In addition, the proposed project would not create direct changes in the demand for public services that would require the construction or modification of governmental facilities to maintain acceptable response service ratios, response times or other performance objectives. Therefore, no direct impacts to public services within the KCWA or WRMWSD service areas would result from implementation of the proposed project.

*State Water Project and Associated Facilities* - Public services associated with the SWP facilities are provided by a variety of state, regional and local agencies including, although not limited to the following, California Department of Forestry and California Highway Patrol. Implementation

of the proposed project would not result in construction or modification of existing SWP facilities. In addition, implementation of the proposed project would not substantially change the current operation of the SWP and associated facilities, nor would it change the operating criteria of the SWP and associated facilities. The proposed project would not create direct changes in the demand for public services that would require the construction or modification of governmental facilities to maintain acceptable response service ratios, response times or other performance objectives. Therefore, no direct impacts to public services within the SWP and associated facilities would result from implementation of the proposed project.

*Indirect Impacts*

*Castaic Lake Water Agency* - There is the potential for indirect impacts to public services due to potential land use changes as a result of development in the CLWA service area. Potential development within the CLWA service area that could be served by this additional water supply could increase the population within the CLWA service area. As a result, additional demands could be generated for public facilities (e.g., fire stations, police stations, schools, parks, or other facilities) and services that could result in expansion of facilities or construction of new facilities that could have potentially significant impacts on the environment. These impacts are considered potentially significant. Potential development within the CLWA service area accommodated by this additional water supply could increase human activity in high fire hazard areas. Development plans would be required to incorporate or address adequate fire protection infrastructure, fire stations and water systems, as well as other fire protection techniques such as adequate clear zones.

*Kern County Water Agency and Wheeler Ridge-Maricopa Water Storage District* - As the implementation of the proposed project would not result in land use changes within the KCWA or WRMWSD service areas or create increased demands for public services, no indirect impacts to public services would result from implementation of the proposed project.

*State Water Project and Associated Facilities* - As implementation of the proposed project would not result in construction or modification of existing SWP facilities, nor would it change the operating criteria of the SWP and associated facilities, the proposed project would not indirectly create changes in the demand for public services. Therefore, no indirect impacts to public services would result from implementation of the proposed project.

***Recreation Impacts***

*Direct Impacts*

*Castaic Lake Water Agency* - Recreational resources in the CLWA service area consist of state, county/regional and local parks, and designated regional and local recreational trails. The Los Angeles County Department of Parks and Recreation provides local parks and recreation facilities for northwestern Los Angeles County residents and provides regional parks for all residents of the county. The Ventura County Parks Department provides this function for eastern Ventura County portions of the CLWA service area. The City of Santa Clarita provides local parks within the city boundaries. Regional recreation areas under the control of the federal government include the Angeles National Forest, the Los Padres National Forest, and the Santa Monica Mountains National Recreation Area. Implementation of the proposed project

would not require land disturbance nor would it directly change the existing land uses within the CLWA service area or directly create increased demands for recreation. In addition, the proposed project would not directly increase the use of exiting recreational facilities, nor does the project require or include the construction or modification of recreational facilities. Therefore, no direct impacts to recreation resources within the CLWA service area are anticipated to result from implementation of the proposed project.

*Kern County Water Agency and Wheeler Ridge-Maricopa Water Storage District* - Parks and/or recreation services within Kern County are under the jurisdiction of the county, eight recreation and park districts, other special districts, cities, school districts, the state and federal governments, and private organization. Three state parks, Fort Tejon State Historical Park, Tule Elk State Reserve, and Red Rock Canyon State Park, and two national forests, Los Padres National Forest and Sequoia National Forest, along with other federal lands, are located, in total or in part, within Kern County. Implementation of the proposed project would not require the construction of new facilities or modification of existing KCWA and WRMWSD facilities, nor would implementation of the proposed project change the existing operation of these facilities. Implementation of the proposed project would not materially affect irrigated agriculture in the WRMWSD service area served by SWP water, nor would it change existing land uses within the WRMWSD service area. Therefore, implementation of the proposed project would not create changes in demand for recreation, nor does the project require or include the construction or modification of recreational facilities. No direct impacts to recreation resources within the KCWA or WRMWSD service areas are expected to result from implementation of the proposed project.

*State Water Project and Associated Facilities* - The SWP facilities provide year-round recreational opportunities including fishing, boating, swimming, camping, hiking, and wildlife viewing within both the California Aqueduct (limited to fishing at designated locations only) and associated reservoirs. Implementation of the proposed project would not result in construction or modification of existing SWP facilities. In addition, implementation of the proposed project would not substantially change the current operation of the SWP and associated facilities, nor would it change the operating criteria of the SWP and associated facilities. With implementation of the proposed project, and depending on the volume and schedule of water deliveries to CLWA, reservoir levels in San Luis Reservoir and Castaic Lake could change, which could in turn affect recreation use. Although, changes in lake levels at both San Luis Reservoir and Castaic Lake as a result of implementation of the proposed project are expected to be minor, and are not expected to have a substantial adverse effect on the environment or recreation facilities. Other changes in SWP facilities, such as changes in aqueduct flow associated with implementation of the proposed project are not expected to affect recreation in a manner that would alter the environment. As implementation of the proposed project is not anticipated to result in substantial changes that would adversely affect recreation, and, as implementation of the proposed project would not change the SWP operating criteria, the proposed project is anticipated to result in a less than significant impact to recreation resources within the SWP and associated facilities. In addition, the proposed project would not directly increase the use of exiting recreational facilities, nor does the project require or include the construction or modification of recreational facilities.

*Indirect Impacts*

*Castaic Lake Water Agency* - There is the potential for indirect impacts to recreation resources due to potential land use changes as a result of development in the CLWA service area. Opportunities for recreation on developed sites and natural recreation such as hiking, jogging, bicycling, water-based recreation and horseback riding are available within the CLWA service area. Potential development within the CLWA service area accommodated by this additional water supply could have impacts on these and other existing recreation opportunities within the CLWA service area. Increased demand on recreational facilities could exacerbate existing shortfalls in local and regional park space. Residential development is subject to applicable requirements to provide public park sites or in-lieu fees based on population-based ratios (e.g., Quimby Act requirements). These impacts are considered potentially significant given the potential for increased demand and impacts to the environment from facility expansion, such as construction of developed recreation areas.

*Kern County Water Agency and Wheeler Ridge-Maricopa Water Storage District* - As the implementation of the proposed project would not result in land use changes within the KCWA or WRMWSD service areas, the proposed project would not increase the use of existing recreational facilities, nor does the project require or include the construction or modification of recreational facilities. Therefore, no indirect impacts to recreation resources would result from implementation of the proposed project.

*State Water Project and Associated Facilities* - Implementation of the proposed project would not result in construction or modification of existing SWP facilities, nor would it change the operating criteria of the SWP and associated facilities. As a result of land use changes within the CLWA service area, the proposed project may increase the recreational use of Castaic Lake. This increase is not anticipated to require the construction or modification of recreational facilities, and therefore, would result in less than significant indirect impact to recreational resources within the SWP and associated facilities.

***Traffic/Transportation Impacts***

*Direct Impacts*

*Castaic Lake Water Agency* - The circulation system in the Santa Clarita Valley is limited by the topography of the area including steep slopes, canyons, and the Santa Clara River. Local roadways are under the jurisdiction of the City of Santa Clarita and/or Los Angeles and Ventura counties. The primary agency responsible for the planning, design, construction, and operation of regional transportation systems in the Santa Clarita Valley is the California Department of Transportation (CalTrans) District 7. Greyhound, Amtrak, and Santa Clarita Transit provide passenger bus service within the CLWA service area. The closest commercial airport to the CLWA service area is the Burbank Glendale Pasadena Airport, approximately 15 miles from the City of Santa Clarita. Implementation of the proposed project would not require land disturbance nor would it directly change the existing land uses or traffic generating activities within the CLWA service area. Therefore, no direct impacts to transportation and traffic within the CLWA service area are anticipated to result from implementation of the proposed project.

*Kern County Water Agency and Wheeler Ridge-Maricopa Water Storage District* - Planning, design, construction, and operation of regional transportation systems in the Kern County area are primarily the responsibility of CalTrans, District 6. General aviation airports are scattered throughout Kern County, but the major commercial airport is Meadows Field, located northwest of Bakersfield. Passenger bus and train service are available to and from Bakersfield, provided by Greyhound and Amtrak. The WRMWSD is served by several major transportation routes service area, although the service area does not contain any commercial or general aviation airport facilities, nor is it served by scheduled passenger rail or bus services. Implementation of the proposed project would not require the construction of new facilities or modification of existing KCWA and WRMWSD facilities, nor would implementation of the proposed project change the existing operation of these facilities. Implementation of the proposed project would not materially affect irrigated agriculture in the WRMWSD service area served by SWP water, nor would it change existing land uses within the WRMWSD service area. Therefore, implementation of the proposed project would not materially affect traffic generating activities within the KCWA and WRMWSD service area, and is anticipated to result in a less than significant impact to transportation and traffic within the KCWA and WRMWSD service areas.

*State Water Project and Associated Facilities* - The SWP and associated facilities are served by, lie adjacent to, or are traversed by, several major transportation routes. Numerous general aviation airports exist within the regions traversed by the SWP and associated facilities. Passenger bus and rail service are generally available in the urbanized areas traversed by the SWP and associated facilities. Implementation of the proposed project would not result in construction or modification of existing SWP facilities. In addition, implementation of the proposed project would not substantially change the current operation of the SWP and associated facilities, nor would it change the operating criteria of the SWP and associated facilities. Therefore, implementation of the proposed project would not affect traffic generating activities within the SWP and associated facilities, and would have no direct impacts to transportation and traffic within, or related to, the SWP and associated facilities.

*Indirect Impacts*

*Castaic Lake Water Agency* - There is the potential for indirect impacts to transportation and traffic due to potential land use changes as a result of development in the CLWA service area. Potential development within the CLWA service area that could be served by this additional water supply could result in a substantial increase in vehicle trips within and adjacent to the CLWA service area. Increased vehicle trips would affect local and regional roads resulting in an increase in traffic congestion, and may exceed of level of service standards and volume to capacity ratios on roads. In addition, increased vehicle trips may result in increased hazards due to a design failure or incompatible uses. Land use and associated traffic changes may also result in inadequate emergency access, inadequate parking capacity and conflict with adopted policies, plans, or programs supporting alternative transportation. These impacts are considered potentially significant. Changes in demand for air travel and changes in air traffic patterns are anticipated to be less than significant.

*Kern County Water Agency and Wheeler Ridge-Maricopa Water Storage District* - As the implementation of the proposed project would not result in land use changes or other traffic

generating activities within the KCWA or WRMWSD service areas, no indirect impacts to transportation and traffic are expected to result from implementation of the proposed project.

*State Water Project and Associated Facilities* - As implementation of the proposed project would not result in construction or modification of existing SWP facilities, nor would it change the operating criteria of the SWP and associated facilities, the proposed project would not indirectly result in changes to traffic generating activities. Therefore, no indirect impacts to transportation and traffic are expected to result from implementation of the proposed project.

***Utilities & Service System Impacts***

*Direct Impacts*

*Castaic Lake Water Agency* - Utilities and service systems associated with the CLWA service area are provided by a variety of state, regional and local agencies, along with a variety of private agencies. Implementation of the proposed project would not require land disturbance nor would it directly change the existing land uses within the CLWA service area. No aspect of the proposed project would directly exceed wastewater treatment requirements of the applicable Regional Water Quality Control Board, require or result in the construction of new water or wastewater treatment facilities or expansion of existing facilities, require or result in the construction of new storm water drainage facilities or expansion of existing facilities, exceed water supplies available to serve the project, exceed existing wastewater treatment capacity, exceed existing landfill capacity; and/or not comply with federal, state, and local statutes and regulations related to solid waste. No direct impacts to utilities and service systems within the CLWA service area are anticipated to result from implementation of the proposed project.

*Kern County Water Agency and Wheeler Ridge-Maricopa Water Storage District* - Utilities and service systems associated with the KCWA and WRMWSD service areas are provided by a variety of state, regional and local agencies, along with a variety of private agencies. Implementation of the proposed project would not require the construction of new facilities or modification of existing KCWA and WRMWSD facilities, nor would implementation of the proposed project change the existing operation of these facilities. Implementation of the proposed project would not materially affect irrigated acreage in the WRMWSD service area served by SWP water on an average annual basis, nor would it change existing land uses within the WRMWSD service area. No aspect of the proposed project would directly exceed wastewater treatment requirements of the applicable Regional Water Quality Control Board, require or result in the construction of new water or wastewater treatment facilities or expansion of existing facilities, require or result in the construction of new storm water drainage facilities or expansion of existing facilities, exceed water supplies available to serve the project, exceed existing wastewater treatment capacity, exceed existing landfill capacity; and/or not comply with federal, state, and local statutes and regulations related to solid waste. Therefore, no direct impacts to utilities and service systems within the KCWA or WRMWSD service areas are expected to result from implementation of the proposed project.

*State Water Project and Associated Facilities* - Utilities and service systems associated with the SWP facilities are provided by a variety of state (including DWR), regional and local agencies, along with a variety of private agencies. Energy needed to operate the SWP comes from a combination

of SWP hydroelectric facilities, the Reid Gardner coal-fired generation plant, and power purchased from other utilities. As part of the operation of the SWP, DWR both buys and sells energy under long and short-term contracts. Implementation of the proposed project would not result in construction or modification of existing SWP facilities. In addition, implementation of the proposed project would not substantially change the current operation of the SWP and associated facilities, nor would it change the operating criteria of the SWP and associated facilities. Current and future availability of a reliable supply of electricity at a stable cost to consumers is uncertain given the current energy environment. Energy utilized to deliver water associated with the proposed project to CLWA rather than KCWA would vary depending on the amount of SWP water delivered to CLWA in any one year. Some power would be recovered at the Warne and Castaic power plants, as water flows down the California Aqueduct from the south side of the Tehachapi Mountain Range to Castaic Lake. The proposed project may result in less than significant environmental impacts with respect to energy requirements to transport water that could have been delivered to WRMWSD to CLWA. These potential impacts will be further evaluated in the EIR.

No aspect of the proposed project would exceed wastewater treatment requirements of the applicable Regional Water Quality Control Board, require or result in the construction of new water or wastewater treatment facilities or expansion of existing facilities, require or result in the construction of new storm water drainage facilities or expansion of existing facilities, exceed water supplies available to serve the project, exceed existing wastewater treatment capacity, exceed existing landfill capacity; and/or not comply with federal, state, and local statutes and regulations related to solid waste.

*Indirect Impacts*

*Castaic Lake Water Agency* - There is the potential for indirect impacts to utilities and service systems due to potential land use changes as a result of development in the CLWA service area. Potential development within the CLWA service area that could be served by this additional water supply could increase the population within the CLWA service area. As a result, additional demands could be generated for utilities and service systems including water and wastewater treatment, storm water drainage facilities, solid waste disposal/landfills, energy and other utilities. These impacts are considered potentially significant.

*Kern County Water Agency and Wheeler Ridge-Maricopa Water Storage District* - As the implementation of the proposed project would not result in land use changes within the KCWA or WRMWSD service areas, no indirect impacts to utilities and service systems would result from implementation of the proposed project.

*State Water Project and Associated Facilities* - As implementation of the proposed project would not result in construction or modification of existing SWP facilities, nor would it change the operating criteria of the SWP and associated facilities, no indirect impacts to utilities and service systems would result from implementation of the proposed project.

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## ACRONYMS

| | |
|---|---|
| AF | acre-feet |
| AFY | acre-feet per year |
| BMWD | Berrenda Mesa Water District |
| CEQA | California Environmental Quality Act |
| CLWA | Castaic Lake Water Agency |
| EIR | Environmental Impact Report |
| ESFP | Earl Schmidt Filtration Plant |
| DWR | California Department of Water Resources |
| KCWA | Kern County Water Agency |
| M&I | Municipal and Industrial |
| NOP | Notice of Preparation |
| SCAB | South Coast Air Basin |
| SJVAB | San Joaquin Valley Air Basin |
| SWP | State Water Project |
| SWSD | Semitropic Water Storage District |
| TMDL | total maximum daily load |
| USBR | United States Department of the Interior, Bureau of Reclamation |
| WRMWSD | Wheeler Ridge-Maricopa Water Storage District |

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# PUBLIC COMMENTS ON THE NOP

**DEPARTMENT OF TRANSPORTATION**
DISTRICT 7, REGIONAL PLANNING
IGR/CEQA BRANCH
120 SO. SPRING ST.
LOS ANGELES, CA 90012
PHONE: (213) 897-4429
FAX: (213) 897-1337

RECEIVED
JAN 30 2003

*Flex your power!*
*Be energy efficient!*

IGR/CEQA No. 030162AL
Castaic Lake Water Agency Supplemental Water Project Transfer of 41,000 Acre-feet of State Water Project Table A Amount from Kern County Water Agency
Vic. LA-5 / Various Locations

January 28, 2003

Mr. Dan Masnada
Castaic Lake Water Agency
27234 Bouquet Canyon Road
Santa Clarita, CA 91350-2173

Dear Mr. Masnada:

Thank you for including the California Department of Transportation (Caltrans) in the environmental review process for the above referenced project. The proposed project is the transfer of 41,000 acre-feet of State Water Project Table A amount from Kern County Water Agency, and its member district the Wheeler Ridge-Maricopa Water Storage District, to the Castaic Lake Water Agency, CLWA.

Please discuss the transportation method for transferring the water to Castaic Lake Water Agency. Additionally, please discuss the potential indirect traffic impact and mitigation as a result of potential development within and adjacent to the CLWA service area that could be served by this additional water supply.

If you have any questions, please feel free to contact me at (213) 897-4429 or Alan Lin the project coordinator at (213) 897-8391 and refer to IGR/CEQA No. 030162AL.

Sincerely,

STEPHEN J. BUSWELL
IGR/CEQA Branch Chief

Steve Buswell/AL

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FEB 21 2003
By

SOUTHERN CALIFORNIA

**ASSOCIATION of GOVERNMENTS**

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**Ventura County:** Judy Mikels, Ventura County • Glen Becerra, Simi Valley • Carl Morehouse, San Buenaventura • Toni Young, Port Hueneme

**Riverside County Transportation Commission:** Robin Lowe, Hemet

**Ventura County Transportation Commission:** Bill Davis, Simi Valley

February 19, 2003

Mr. Dan Masnada
General Manager
Castaic Lake Water Agency
27234 Bouquet Canyon Road
Santa Clarita, CA 91350 - 2173

RE: **Comments on the Notice of Preparation for a Draft Environmental Impact Report for the Castaic Lake Water Agency Supplemental Water Project Transfer of 41,000 Acre Feet of State Water Project Table A Amount from Kern County Water Agency – SCAG No. I 20030030**

Dear Mr. Masnada:

Thank you for submitting the **Notice of Preparation for a Draft Environmental Impact Report for the Castaic Lake Water Agency Supplemental Water Project Transfer of 41,000 Acre Feet of State Water Project Table A Amount from Kern County Water Agency** to SCAG for review and comment. As areawide clearinghouse for regionally significant projects, SCAG reviews the consistency of local plans, projects, and programs with regional plans. This activity is based on SCAG's responsibilities as a regional planning organization pursuant to state and federal laws and regulations. Guidance provided by these reviews is intended to assist local agencies and project sponsors to take actions that contribute to the attainment of regional goals and policies.

We have reviewed the **Notice of Preparation** and have determined that the proposed Project is regionally significant per SCAG mandates for regionally significant projects that directly relate to policies and strategies contained in the Regional Comprehensive Plan and Guide (RCPG) and Regional Transportation Plan (RTP). CEQA requires that EIRs discuss any inconsistencies between the proposed project and applicable general plans and **regional plans (Section 15125 [d])**. If there are inconsistencies, an explanation and rationalization for such inconsistencies should be provided.

Policies of SCAG's Regional Comprehensive Plan and Guide and Regional Transportation Plan, which may be applicable to your project, are outlined in the attachment. **We expect the Draft EIR to specifically cite the appropriate SCAG policies and address the manner in which the Project is consistent with applicable core policies or supportive of applicable ancillary policies. Please use our policy numbers to refer to them in your Draft EIR. Also, we would encourage you to use a side-by-side comparison of SCAG policies with a discussion of the consistency or support of the policy with the Proposed Project.**

Please provide a minimum of 45 days for SCAG to review the Draft EIR when this document is available. If you have any questions regarding the attached comments, please contact me at (213) 236-1867. Thank you.

Sincerely,

JEFFREY M. SMITH, AICP
Senior Regional Planner
Intergovernmental Review

**COMMENTS ON THE PROPOSAL TO DEVELOP A DRAFT ENVIRONMENTAL IMPACT REPORT FOR THE CASTAIC LAKE WATER AGENCY SUPPLEMENTAL WATER PROJECT TRANSFER SCAG NO. I 20030030**

## PROJECT DESCRIPTION

The proposed Project considers the transfer of 41,000 acre-feet (AF) of State Water Project (SWP) Table A amount from Kern County Water Agency (KCWA), and its member district the Wheeler Ridge-Maricopa Water Storage District, to the Castaic Lake Water Agency (WRMWSD). The proposed Project also establishes the right to use the 41,000 acre-feet as part of Castaic Lake Water Agency's State Water Project Table A amount of 95,200 acre-feet pursuant to a Trial Court judgement on remand. Also, the 41,000 AF has been delivered to CLWA from KCWA through agreements including KCWA and its member district, the WRMWSD, as well as the California Department of Water Resources (DWR).

The proposed Project also includes possession of SWP contractual rights that provide a means of water storage and delivery of water associated with the Table A amount to CLWA. The proposed project results in a total CLWA SWP Table A amount of 95,200 AF. The SWP water is being transported from points of origin in the SWP system to the CLWA intake south of Castaic Lake via existing SWP facilities. The proposed project does not include the construction of any additional SWP facilities.

## CONSISTENCY WITH REGIONAL COMPREHENSIVE PLAN AND GUIDE POLICIES

The **Growth Management Chapter (GMC)** of the Regional Comprehensive Plan and Guide (RCPG) contains the following policies that are particularly applicable and should be addressed in the Draft EIR for the Castaic Lake Water Agency Supplemental Water Project Tansfer.

*3.03 The timing, financing, and location of public facilities, utility systems, and transportation systems shall be used by SCAG to implement the region's growth policies.*

## GMC POLICIES RELATED TO THE RCPG GOAL TO IMPROVE THE REGIONAL

## STANDARD OF LIVING

The Growth Management goals to develop urban forms that enable individuals to spend less income on housing cost, that minimize public and private development costs, and that enable firms to be more competitive, strengthen the regional strategic goal to stimulate the regional economy. The evaluation of the proposed project in relation to the following policies would be intended to guide efforts toward achievement of such goals and does not infer regional interference with local land use powers.

*3.09 Support local jurisdictions' efforts to minimize the cost of infrastructure and public service delivery, and efforts to seek new sources of funding for development and the provision of services.*

*3.10 Support local jurisdictions' actions to minimize red tape and expedite the permitting process to maintain economic vitality and competitiveness.*

## GMC POLICIES RELATED TO THE RCPG GOAL TO IMPROVE THE REGIONAL QUALITY OF LIFE

The Growth Management goals to attain mobility and clean air goals and to develop urban forms that enhance quality of life, that accommodate a diversity of life styles, that preserve open space and natural resources, and that are aesthetically pleasing and preserve the character of communities, enhance the regional strategic goal of maintaining the regional quality of life. The evaluation of the proposed project in relation to the following policies would be intended to provide direction for plan implementation, and does not allude to regional mandates.

*3.18 Encourage planned development in locations least likely to cause environmental impact.*

*3.20 Support the protection of vital resources such as wetlands, groundwater recharge areas, woodlands, production lands, and land containing unique and endangered plants and animals.*

*3.21 Encourage the implementation of measures aimed at the preservation and protection of recorded and unrecorded cultural resources and archaeological sites.*

*3.22 Discourage development, or encourage the use of special design requirements, in areas with steep slopes, high fire, flood, and seismic hazards.*

*3.23 Encourage mitigation measures that reduce noise in certain locations, measures aimed at preservation of biological and ecological resources, measures that would*

*reduce exposure to seismic hazards, minimize earthquake damage, and to develop emergency response and recovery plans.*

## GMC POLICIES RELATED TO THE RCPG GOAL TO PROVIDE SOCIAL, POLITICAL, AND CULTURAL EQUITY

The Growth Management Goal to develop urban forms that avoid economic and social polarization promotes the regional strategic goal of minimizing social and geographic disparities and of reaching equity among all segments of society. The evaluation of the proposed project in relation to the policy stated below is intended guide direction for the accomplishment of this goal, and does not infer regional mandates and interference with local land use powers.

*3.27 Support local jurisdictions and other service providers in their efforts to develop sustainable communities and provide, equally to all members of society, accessible and effective services such as: public education, housing, health care, social services, recreational facilities, law enforcement, and fire protection.*

## REGIONAL TRANSPORTATION PLAN

The **Regional Transportation Plan (RTP)** also has goals, objectives, policies and actions pertinent to this proposed project. This RTP links the goal of sustaining mobility with the goals of fostering economic development, enhancing the environment, reducing energy consumption, promoting transportation-friendly development patterns, and encouraging fair and equitable access to residents affected by socio-economic, geographic and commercial limitations. Among the relevant goals, objectives, policies and actions of the RTP are the following:

Core Regional Transportation Plan Policies

*4.02 Transportation investments shall mitigate environmental impacts to an acceptable level.*

*4.04 Transportation Control Measures shall be a priority.*

*4.16 Maintaining and operating the existing transportation system will be a priority over expanding capacity.*

## AIR QUALITY CHAPTER CORE ACTIONS

The **Air Quality Chapter** core actions related to the proposed project includes:

*5.07 Determine specific programs and associated actions needed (e.g., indirect source rules, enhanced use of telecommunications, provision of community based shuttle services, provision of demand management based programs, or vehicle-miles-traveled/emission fees) so that options to command and control regulations can be assessed.*

*5.11 Through the environmental document review process, ensure that plans at all levels of government (regional, air basin, county, subregional and local) consider air quality, land use, transportation and economic relationships to ensure consistency and minimize conflicts.*

## OPEN SPACE CHAPTER ANCILLARY GOALS

Public Health and Safety

*9.04 Maintain open space for adequate protection of lives and properties against natural and man-made hazards.*

*9.05 Minimize potentially hazardous developments in hillsides, canyons, areas susceptible to flooding, earthquakes, wildfire and other known hazards, and areas with limited access for emergency equipment.*

*9.06 Minimize public expenditure for infrastructure and facilities to support urban type uses in areas where public health and safety could not be guaranteed.*

Resource Protection

*9.08 Develop well-managed viable ecosystems or known habitats of rare, threatened and endangered species, including wetlands.*

## WATER QUALITY CHAPTER RECOMMENDATIONS AND POLICY OPTIONS

The **Water Quality Chapter** core recommendations and policy options relate to the two water quality goals: to restore and maintain the chemical, physical and biological integrity of the nation's water; and, to achieve and maintain water quality objectives that are necessary to protect all beneficial uses of all waters.

*11.02 Encourage "watershed management" programs and strategies, recognizing the primary role of local governments in such efforts.*

*11.05 Support regional efforts to identify and cooperatively plan for wetlands to facilitate both sustaining the amount and quality of wetlands in the region and expediting the process for obtaining wetlands permits.*

*11.06 Clean up the contamination in the region's major groundwater aquifers since its water supply is critical to the long-term economic and environmental health of the region. The financing of such clean-ups should leverage state and federal resources and minimize significant impacts on the local economy.*

*11.07 Encourage water reclamation throughout the region where it is cost-effective, feasible, and appropriate to reduce reliance on imported water and wastewater discharges. Current administrative impediments to increased use of wastewater should be addressed.*

## CONCLUSIONS

All feasible measures needed to mitigate any potentially negative regional impacts associated with the proposed project should be implemented and monitored, as required by CEQA.

## SOUTHERN CALIFORNIA ASSOCIATION OF GOVERNMENTS

### *Roles and Authorities*

**THE SOUTHERN CALIFORNIA ASSOCIATION OF GOVERNMENTS** (SCAG) is a ***Joint Powers Agency*** established under California Government Code Section 6502 et seq. Under federal and state law, SCAG is designated as a Council of Governments (COG), a Regional Transportation Planning Agency (RTPA), and a Metropolitan Planning Organization (MPO). SCAG's mandated roles and responsibilities include the following:

SCAG is designated by the federal government as the Region's ***Metropolitan Planning Organization*** and mandated to maintain a continuing, cooperative, and comprehensive transportation planning process resulting in a Regional Transportation Plan and a Regional Transportation Improvement Program pursuant to 23 U.S.C. '134, 49 U.S.C. '5301 et seq., 23 C.F.R. '450, and 49 C.F.R. '613. SCAG is also the designated ***Regional Transportation Planning Agency***, and as such is responsible for both preparation of the Regional Transportation Plan (RTP) and Regional Transportation Improvement Program (RTIP) under California Government Code Section 65080 and 65082 respectively.

SCAG is responsible for developing the demographic projections and the integrated land use, housing, employment, and transportation programs, measures, and strategies portions of the ***South Coast Air Quality Management Plan***, pursuant to California Health and Safety Code Section 40460(b)-(c). SCAG is also designated under 42 U.S.C. '7504(a) as a ***Co-Lead Agency*** for air quality planning for the Central Coast and Southeast Desert Air Basin District.

SCAG is responsible under the Federal Clean Air Act for determining ***Conformity*** of Projects, Plans and Programs to the State Implementation Plan, pursuant to 42 U.S.C. '7506.

Pursuant to California Government Code Section 65089.2, SCAG is responsible for ***reviewing all Congestion Management Plans (CMPs) for consistency with regional transportation plans*** required by Section 65080 of the Government Code. SCAG must also evaluate the consistency and compatibility of such programs within the region.

SCAG is the authorized regional agency for ***Inter-Governmental Review*** of Programs proposed for federal financial assistance and direct development activities, pursuant to Presidential Executive Order 12,372 (replacing A-95 Review).

SCAG reviews, pursuant to Public Resources Code Sections 21083 and 21087, Environmental Impacts Reports of projects of regional significance for consistency with regional plans [California Environmental Quality Act Guidelines Sections 15206 and 15125(b)].

Pursuant to 33 U.S.C. '1288(a)(2) (Section 208 of the Federal Water Pollution Control Act), SCAG is the authorized ***Areawide Waste Treatment Management Planning Agency***.

SCAG is responsible for preparation of the ***Regional Housing Needs Assessment***, pursuant to California Government Code Section 65584(a).

SCAG is responsible (with the Association of Bay Area Governments, the Sacramento Area Council of Governments, and the Association of Monterey Bay Area Governments) for preparing the ***Southern California Hazardous Waste Management Plan*** pursuant to California Health and Safety Code Section 25135.3.

Revised July 2001

COUNTY OF LOS ANGELES
DEPARTMENT OF PARKS AND RECREATION

RECEIVED
MAR 06 2003
By

March 4, 2003

Mr. Dan Masnada, General Manager
Castaic Lake Water Agency
27234 Bouquet Canyon Road
Santa Clarita, California 91350-2173

Dear Mr. Masnada:

**NOTICE OF PREPARATION FORCASTAIC LAKE WATER AGENCY SUPPLEMENTAL WATER PROJECT TRANSFER OF 41,000 ACRE-FEET OF STATE WATER PROJECT TABLE A AMOUNT FROM KERN COUNTY WATER AGENCY**

The Above stated Notice of Preparation for the Castaic Lake Water Agency Supplemental Water Project has been reviewed for its potential impact on the Parks and Recreation facilities. Transferring the water through the California Aqueduct will not impact the facilities under the jurisdiction of this Department as described in the Notice of Preparation. However, we would appreciate review of the Draft and Final Environmental Impact Reports for internal information with this Department.

Thank you for including this Department in the review of the Notice of Preparation. If we may be of further assistance, you may contact Ms. Lillie Lowery, Departmental Facilities Planner I, at (213) 738-3235.

Sincerely,

Lillie Lowery

Lillie Lowery, Departmental Facilities Planner I For
Joan Rupert, Section Head
Environmental and Grants Section

C: Lillie Lowery, DPR

# COUNTY OF LOS ANGELES

## DEPARTMENT OF PUBLIC WORKS

900 SOUTH FREMONT AVENUE
ALHAMBRA, CALIFORNIA 91803-1331
Telephone: (626) 458-5100
www.ladpw.org

JAMES A. NOYES, Director

ADDRESS ALL CORRESPONDENCE TO:
P.O. BOX 1460
ALHAMBRA, CALIFORNIA 91802-1460


IN REPLY PLEASE
REFER TO FILE: W-0

February 3, 2003

Mr. Dan Masnada, General Manager
Castaic Lake Water Agency
27234 Bouquet Canyon Road
Santa Clarita, CA 91350-2173

**LOS ANGELES COUNTY WATERWORKS DISTRICT NO. 36, VAL VERDE NOTICE OF PREPARATION OF A DRAFT ENVIRONMENTAL IMPACT REPORT COMMENTS**

Thank you for the opportunity to review your Notice of Preparation of a Draft Environmental Impact Report for the transfer of 41,000 acre-feet of State Water Project Table A Amount from Kern County Water Agency to you. We have no comments to offer.

Very truly yours,

JAMES A. NOYES
Director of Public Works

for BRIAN D. HOOPER
Assistant Deputy Director
Waterworks and Sewer Maintenance Division

GMP:lb
WW3262

# COUNTY OF LOS ANGELES

**FIRE DEPARTMENT**

1320 NORTH EASTERN AVENUE
LOS ANGELES, CALIFORNIA 90063-3294

(323) 890-4330


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By

P. MICHAEL FREEMAN
FIRE CHIEF
FORESTER & FIRE WARDEN

February 28, 2003

Dan Masnada, General Manager
Castaic Lake Water Agency
27234 Bouquet Canyon Road
Santa Clarita, CA 91350

Dear Mr. Masnada:

**NOTICE PREPARATION FOR THE DRAFT ENVIRONMENTAL IMPACT REPORT CASTAIC LAKE WATER AGENCY SUPPLEMENTAL WATER PROJECT, TRANSFER OF 41,000-ACRE FEET OF STATE WATER PROJECT TABLE A AMOUNT FROM KERN COUNTY WATER AGENCY, "CITY OF CASTAIC" -- (EIR #1586/2003)**

The Notice of Preparation for the Draft Environmental Impact Report for the Castaic Lake Water Agency Supplemental Water Project has been reviewed by the Planning Section, Land Development Unit, and Forestry Division of the County of Los Angeles Fire Department. The following are their comments:

**LAND DEVELOPMENT UNIT:**

The County of Los Angeles Fire Department, Land Development Unit appreciates the opportunity to comment on this project. However, this project does not propose structures or any other improvements that appear to have a significant impact that requires a comment from the Land Development Unit.

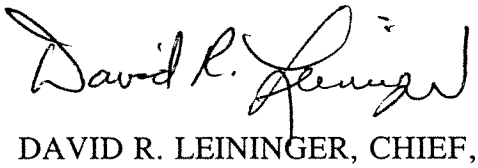
Should any questions arise regarding subdivision, water systems, or access please contact Inspector J. Scott Greenelsh at (323) 890-4235.

**FORESTRY DIVISION:**

The statutory responsibilities of the County of Los Angeles Fire Department, Forestry Division include erosion control, watershed management, rare and endangered species, vegetation, fuel modification for Very High Fire Hazard Severity Zones or Fire Zone 4, archeological and cultural resources and the County Oak Tree Ordinance. Potential impacts in these areas should be addressed in the Environmental Impact Report.

If you have any additional questions, please contact this office at (323) 890-4330.

Very truly yours,



DAVID R. LEININGER, CHIEF, FORESTRY DIVISION
PREVENTION BUREAU

DRL:lc

County of Los Angeles Public Library
7400 East Imperial Hwy., P.O. Box 7011, Downey, CA 90241-7011
(562) 940-8461, TELEFAX (562) 803-3032

Library

MARGARET DONNELLAN TODD
COUNTY LIBRARIAN

February 25, 2003

Castaic Lake Water Agency
Attn: Dan Masnada, General Manager
27234 Bouquet Canyon Road
Santa Clarita, CA 91350-2173

**CASTAIC LAKE WATER AGENCY SUPPLEMENTAL WATER PROJECT TRANSFER FROM KERN COUNTY WATER AGENCY REQUEST FOR COMMENTS**

Dear Mr. Masnada:

This is in response to your request for comments on the above-referenced project. We have reviewed the material and are providing the following comments concerning library service.

The project area is in the Santa Clarita Valley Bookmobile service area, located at 22704 West Ninth St., Santa Clarita, CA 91321. The expansion project does not propose development of new residential units, therefore, there will be no impact on library service. Impact on library service is based on an increase in population, which triggers the need for additional facility space, books, and other materials. Any increase in population would create an impact on library service.

Thank you for the opportunity to respond to the Notice of Preparation. If you have any questions or need additional information please call me at (562) 940-8455.

Sincerely,

Michele Mathieu

Michele Mathieu
Administrative Assistant

:mm

c: Margaret Donnellan Todd
David Flint

LEROY D. BACA, SHERIFF

County of Los Angeles
Sheriff's Department Headquarters
4700 Ramona Boulevard
Monterey Park, California 91754-2169
(805) 255-1121

RECEIVED
JAN 31 2003

January 27, 2003

Castaic Lake Water Agency
Attn: Dan Masnada, General Manager
27234 Bouquet Canyon Road
Santa Clarita, California 91350

Dear Mr. Masnada:

NOTICE OF PREPARATION
CASTAIC LAKE WATER AGENCY
TRANSFER OF 41,000 ACRE-FEET OF STATE WATER

I am in receipt of your letter dated January 22, 2003, regarding the Castaic Lake Water Agency and its acquisition of 41,000 acre feet of water from the Kern County Water Agency.

I have reviewed the document and do not anticipate any impacts on our agency as a result of the implementation of this project.

If you have any further questions please feel free to call me at (661) 255-1121 ext. 5101 or Deputy Patrick Rissler at ext. 5159.

Sincerely,

LEROY D. BACA, SHERIFF

Donald A. Rodriquez, Captain
Santa Clarita Valley Station

DAR:par

*A Tradition of Service*

county of ventura

PUBLIC WORKS AGENCY
RONALD C. COONS
Agency Director

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APR 14 2003
By

Transportation Department
**Wm. Butch Britt**, Director

Water Resources & Development Department
**John C. Crowley**, Director

Central Services Department
**Lane B. Holt**, Director

Environmental & Energy Resources Department
**Kay Martin**, Director

Watershed Protection District
**Jeff Pratt**, Director

Engineering Services Department
**Alec T. Pringle**, Director

April 8, 2003

Castiac Lake Water Agency
Mr. Dan Masnada, General Manager

**27234 Bouquet Canyon Rd.**
**Santa Clarita, Ca 91350**

SUBJECT: Supplemental Water Project Transfer, 41,000 Acre Feet of Water from Kern County Water Agency to Castaic Water Agency, State Water Project

Dear Mr. Masnada :

The Ventura County Watershed Protection District (District) has reviewed the submittal for the transfer of water from Kern County Water Agency to the Castiac Water Agency. The project has no existing or proposed direct connections to District jurisdictional facilities and does not indicate any encroachments to District Rights of Way. The District has no comments with respect to flood control and NPDES issues. If you have questions regarding this review, please call the undersigned at 654-2906.

Very truly yours,

Kevin Keivanfar, P.E.
Permit Engineer, Permit Section
Flood Control Department

KK/tt

LOG NO. 20030122-006

# Friends of the Santa Clara River

*660 Randy Drive, Newbury Park, California 91320-3036 • (805) 498-8328*



RECEIVED
FEB 21 2003
By



**Board of Directors**

Ron Bottorff
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Santa Clarita Organization for Planning the Environment (SCOPE)

Sierra Club
*Angeles Chapter*
*Los Padres Chapter*

Surfrider Foundation

Audubon Society
*Ventura Chapter*

Ventura County Environmental Coalition


February 20, 2003

Castaic Lake Water Agency
Attention: Dan Masnada, General Manager
27234 Bouquet Canyon Road
Santa Clarita, CA 91350-2173

Re: Notice of Preparation, EIR for 41,000 Acre-feet Transfer from Kern County Water Agency, Dated January 22, 2003

Dear Mr. Masnada,

Friends of the Santa Clara River (FSCR) offers the following comments on the referenced Notice of Preparation (NOP).

The Castaic Lake Water Agency (CLWA) is not the proper Lead Agency to prepare an Environmental Impact Report (EIR) for this project under the California Environmental Quality Act.

The 1995 Monterey Agreement between the California Department of Water Resources (DWR) and water contractors of the State Water Project was put in place to control transfers of the type described in the subject document. There is at present no Monterey Agreement EIR because of the PCL decision of September 2000, which held that the Monterey Agreement EIR prepared by CCWA was inadequate. The court held that the DWR was the proper Lead Agency for this Agreement because only the DWR has the statewide perspective needed to evaluate the environmental impacts to the entire water distribution system.

The EIR for the 41,000 acre-feet transfer must tier from a certified Monterey Agreement EIR, which does not currently exist. This was indeed suggested by the Second Appellate District Court decision of January 2002 in the case brought against CLWA by FSCR. Page 19 of this decision states that "Respondent may be able to cure the PCL problem by awaiting action by the state DWR complying with the PCL decision, then issuing a subsequent EIR, supplement to EIR, or Addendum to EIR (Guidelines 15162, 15163, 15164) tiering on a new Monterey Agreement EIR."

Since CLWA cannot legally be the Lead Agency for the subject transfer, the only legitimate way for CLWA to proceed with EIR preparation is to await DWR's preparation and certification of a Monterey Agreement EIR.

Thank you for the opportunity to comment.

Sincerely,

Ron Bottorff

Ron Bottorff, Chair

cc: California Department of Water Resources

RECEIVED 2/24/03 LF


**SCOPE**

**Santa Clarita Organization for Planning and the Environment**

TO PROMOTE, PROTECT AND PRESERVE THE ENVIRONMENT, ECOLOGY AND QUALITY OF LIFE IN THE SANTA CLARITA VALLEY

POST OFFICE BOX 1182, SANTA CLARITA, CA 91380


2-23-03

Attn: Dan Masnada, General Manager
Castaic Lake Water Agency
27234 Bouquet Canyon Rd.
Santa Clarita, Ca. 91350-2173

Re: Notice of Preparation - 41,000 AF Water Transfer EIR

Dear Mr.Masnada:

We are concerned that your Notice of Preparation ignores the ruling by the 2nd District Appellate Court set which set aside the original EIR in this matter. That EIR was set aside because the Monterey Agreement EIR on which it was tiered had been set aside. The new Monterey Agreement EIR has not yet been completed, therefore CLWA must wait to complete their new document until this program EIR is completed.

Further, we protest your Agency's continued reliance on this 41,000AF transfer in your Urban Water Management Plan and to support, new, additional and unapproved development. Such actions make a mockery of the EIR pprocess. No valid evaluation of impacts can be discussed, if you are proceeding with the project no matter what is disclosed. This is illegal and is not supported by Judge Yaffee's decision.

An EIR that purports to address all impacts statewide, thus eliminating the need for a program EIR on the Monterey Agreement, must be prepared by the Dept. of Water Resources as the lead agency. The 3rd District Appellate Court, in its decision on the Monterey Agreement EIR, found that Central Coast Water Agency, was the wrong lead agency. We urge you not to attempt to move forward using the same judicial error for which a previous action, very well known to you, was set aside as it will be a waste of the public's time and money

We therefore ask that you do not proceed with this EIR as the lead agency, since this action is clearly illegal. If you wish to proceed, then the Dept. of Water Resources must be the lead agency for the EIR

Sincerely,

Pat Salatore

Pat Salatore
Faxed to 661 297-1611

SIERRA CLUB
FOUNDED 1892
Angeles Chapter

3435 Wilshire Boulevard
Suite 320
Los Angeles, CA 90010-1904

(213) 387-4287 phone
(213) 387-5383 fax
www.angeles.sierraclub.org

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FEB 25 2003
By

2-22-03

Castaic Lake Water Agency
Attn: Dan Masnada, General Manager
27234 Bouquet Canyon Rd.
Santa Clarita, Ca. 91350-2173

Re: Notice of Preparation
41,000 AF Water Transfer EIR

Dear Sir:

As you are well aware, the 2nd District Appellate Court set aside the original EIR in this matter because the Monterey Agreement EIR on which it was tiered had been set aside. The new Monterey Agreement EIR has not yet been completed, therefore CLWA must wait to complete their new document until this program EIR is completed.

Further, if the water transfer EIR purports to address all impacts statewide, thus eliminating the need for a program EIR on the Monterey Agreement, then the Dept. of Water Resources must be the lead agency. The 3rd District Appellate Court, in its decision on the Monterey Agreement EIR, found that Central Coast Water Agency (then headed by yourself, Mr. Masnada), was the wrong lead agency. The Sierra Club finds it incredible that you would attempt to move forward using the same judicial error for which a previous action, very well known to you, was set aside. You are wasting the public's time and money.

We therefore ask that you do not proceed with this EIR as the lead agency, since this action is clearly illegal. If you wish to proceed, then the Dept. of Water Resources must be the lead agency for the EIR.

Sincerely,

Gordon LaBedz MD

Dr. Gordon LaBedz
Conservation Chair

Faxed to 661 297-1611
Hard copy to follow by regular mail

In re: Castaic Lake Water Agency )
Supplemental Water Project )
Transfer of 41,000 Acre-feet )
Water Project Table A Amount from )
Kern County Water Agency EIR. )
)
)
)

Public Comment Hearing Castaic Lake Water Agency Supplemental Water Project Transfer of 41,000 Acre-feet Water Project Table A Amount from Kern County Water Agency EIR, at Castaic Water Agency, 27234 Bouquet Canyon Road, Santa Clarita, California, scheduled for 7:00 p.m., Monday, February 10, 2003, before Lisa DiGiovanni, Certified Shorthand Reporter No. 11969.



BARKLEY
Court Reporters

1 A P P E A R A N C E S

2

3

4 LISBETH A. SPRINGER, A.I.C.P.
5 SCIENCE APPLICATIONS INTERNATIONAL
CORPORATION
6 525 Anacapa Street
Santa Barbara, California 93101
7 (805) 564-6154
springerl@saic.com
8 ALSO PRESENT:
9 ALICIA GASDICK
DAN MASNADA
10

11

12

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SANTA CLARITA, CALIFORNIA

MONDAY, FEBRUARY 10, 2003; 7:32 P.M.

MS. SPRINGER: My name is Lisbeth Springer. We are here to open the scoping meeting for the Castaic Lake Water Agency Supplemental Water Project Transfer of 41,000 Acre-feet Water Project Table A Amount from Kern County Water Agency EIR. The date is February 10th, 2003. No members of the public are present to provide comments. It's 7:32, and since no one has appeared from the public to provide comments, we will go ahead and close the scoping meeting.

(Meeting adjourned at 7:32 p.m.)



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# *Appendix B*

**Biological Resources**

**Table 1. Sensitive Plant Species Potentially Occurring in the WRMWSD or the San Joaquin Valley Floor Area**
(page 1 of 3)

| *Scientific Name/ Common Name* | *Regulatory Status Federal/State/CNPS* | *Habitat and Regional Occurrence*[1] |
|---|---|---|
| **Federally or State-Listed Rare, Threatened or Endangered Species** | | |
| *Atriplex tularensis* Bakersfield smallscale | FSC/E/1B | Chenopod scrub; possibly extinct, the only recent reported occurrence at Kern Lake Preserve (within the WRMWSD) may be *A. serenana* and not *A. tularensis* (CNPS 2001); KCVFHCP. |
| *Caulanthus californicus* California jewel-flower | E/E/1B | Sandy soils in chenopod scrub, pinyon and juniper woodland, valley and foothill grassland; historically reported from within the WRMWSD about 8 miles north of Taft, but believed to be extirpated from this location (CNDDB 2002); KCVFHCP. |
| *Eremalche kernensis* Kern mallow | E/-/1B | Chenopod scrub, valley and foothill grassland; KCVFHCP. |
| *Eriastrum hooveri* Hoover's eriastrum | T/-/4 | Chenopod scrub, pinyon and juniper woodland, valley and foothill grassland; possible in grassland-scrub habitats; KCVFHCP. |
| *Fritillaria striata* Striped adobe-lily | FSC/T/1B | Usually clay soils in cismontane woodland, valley and foothill grassland; known only from Kern and Tulare counties, reported from the Tejon Ranch area within the WRMWSD; KCVFHCP. |
| *Monolopia (= Lembertia) congdonii* San Joaquin woollythreads | E/-/1B | Chenopod scrub, valley and foothill grassland; KCVFHCP. |
| *Opuntia basilaris* var. *treleasei* Bakersfield beavertail cactus | E/E/1B | Chenopod scrub, cismontane woodland, valley and foothill grassland; several reported occurrences in the WRMWSD (CNDDB 2002); KCVFHCP. |
| *Pseudobahia peirsonii* San Joaquin adobe sunburst | T/E/1B | Found in adobe clay soils in cismontane woodland, valley and foothill grassland in Kern, Tulare and Fresno counties; KCVFHCP. |
| **Federal Species of Special Concern and Species Listed by CNPS** | | |
| *Antirrhinum ovatum* Oval-leaved snapdragon | -/-/4 | Clay or gypsum, often alkaline soils in chaparral, cismontane woodland, pinyon and juniper woodland, valley and foothill grassland. |
| *Atriplex cordulata* Heartscale | FSC/-/1B | Found in saline or alkaline, sandy soils in chenopod scrub, meadows and seeps, valley or foothill grassland; reported from within the WRMWSD in the vicinity of the Buena Vista Lake Bed (CNDDB 2002); KCVFHCP. |
| *Atriplex depressa* Brittlescale | FSC/-/1B | Alkaline, clayey soils in chenopod scrub, meadows and seeps, valley and foothill grassland, vernal pools. |
| *Atriplex vallicola* Lost Hills crownscale | FSC/-/1B | Chenopod scrub, valley and foothill grasslands, vernal pools, alkaline soils; KCVFHCP. |
| *Calochortus striatus* Alkali mariposa lily | FSC/-/1B | Chaparral, chenopod scrub, Mojavean desert scrub, alkaline meadows and ephemeral washes; reported from the Buena Vista Aquatic Recreation Area (CNDDB 2002) within the WRMWSD. |

**Table 1. Sensitive Plant Species Potentially Occurring in the WRMWSD or the San Joaquin Valley Floor Area**
(page 2 of 3)

| *Scientific Name/ Common Name* | *Regulatory Status Federal/State/CNPS* | *Habitat and Regional Occurrence*[1] |
|---|---|---|
| *Calycadenia villosa* Dwarf calycadenia | FSC/-/1B | Chaparral, cismontane woodland, meadows and seeps, valley and foothill grassland; believed extirpated from Kern County (CNPS 2001). |
| *Canbya candida* Pygmy poppy | -/-/4 | Joshua tree "woodland," Mojavean desert scrub, pinyon and juniper woodland. |
| *Cirsium crassicaule* Slough thistle | FSC/-/1B | Chenopod scrub, marshes and swamps (sloughs), riparian scrub in Kings, Kern and San Joaquin counties; KCVFHCP. |
| *Clarkia tembloriensis* ssp. *calientensis* Vasek's clarkia | FSC/-/1B | Valley and foothill grassland; endemic to Kern County, known from three occurrences near Caliente Creek; KCVFHCP. |
| *Cordylanthus mollis* ssp. *hispidus* Hispid bird's-beak | FSC/-/1B | Alkaline areas in meadows and seeps, playas, valley and foothill grasslands; believed extirpated from much of the lower San Joaquin Valley, reported from the Tulare Basin within the WRMWSD (CNDDB 2002). |
| *Delphinium recurvatum* Recurved larkspur | FSC/-/1B | Cismontane woodland, chenopod scrub, valley and foothill grassland; reported from the WRMWSD (CNDDB 2002); KCVFHCP. |
| *Erodium macrophyllum* Round-leaved filaree | -/-/2 | Cismontane woodland, valley and foothill grassland; reported from Wind Wolves Preserve within the WRMWSD (CNDDB 2002). |
| *Eschscholzia lemmonii* ssp. *kernensis* Tejon poppy | FSC/-/1B | Valley and foothill grassland; endemic to Kern County, reported from several occurrences within the WRMWSD (CNDDB 2002). |
| *Heterotheca shevockii* Shevock's golden-aster | -/-/1B | Sandy soils in chaparral, cismontane woodland; endemic to Kern County, known only from the lower Kern River canyon in the Greenhorn Mountains. |
| *Layia leucopappa* Comanche Point layia | FSC/-/1B | Chenopod scrub, valley and foothill grassland; endemic to Kern County, several occurrences reported near Comanche Point in the Tejon Hills (CNDDB 2002) within the WRMWSD; KCVFHCP. |
| *Layia munzii* Munz's tidy-tips | FSC/-/1B | Alkaline or clayey areas in chenopod scrub, valley and foothill grassland in Fresno, Kern and San Luis Obispo counties. |
| *Lepidium jaredii* ssp. *jaredii* Jared's pepper-grass | FSC/-/1B | Alkaline, adobe areas in valley and foothill grassland in Kern and San Luis Obispo counties; known only from the Devil's Den area in Kern County. |
| *Linanthus serrulatus* Madera linanthus | FSC/-/1B | Cismontane woodland, lower montane coniferous forest. |
| *Madia radiata* Showy madia | FSC/-/1B | Cismontane woodland, valley and foothill woodland. |

**Table 1. Sensitive Plant Species Potentially Occurring in the WRMWSD or the San Joaquin Valley Floor Area**
(page 3 of 3)

| *Scientific Name/ Common Name* | *Regulatory Status Federal/State/CNPS* | *Habitat and Regional Occurrence*[1] |
|---|---|---|
| *Mimulus pictus* Calico monkeyflower | FSC/-/1B | Broadleaved upland forest, cismontane woodland in Kern and Tulare counties; reported in the vicinity of Tejon Ranch within the WRMWSD (CNDDB 2002). |
| *Navarretia peninsularis* Baja navarretia | -/-/1B | Mesic areas in openings in chaparral, lower coniferous forest. |
| *Navarretia setiloba* Piute Mountains navarretia | FSC/-/1B | Cismontane woodland, pinyon-juniper woodland, valley and foothill grasslands in Kern and Tulare counties; known from fewer than ten occurrences, reported near Grapevine Peak within the WRMWSD (CNDDB 2002). |
| *Phacelia nashiana* Charlotte's phacelia | FSC/-/1B | Joshua tree "woodland," Mojavean desert scrub, pinyon and juniper woodland in Inyo, Kern and Tulare counties. |
| *Stylocline citroleum* Oil neststraw | FSC/-/1B | Chenopod scrub, coastal scrub (?), valley and foothill grassland, clay soils in oil-producing areas, Kern and San Diego counties (believed extirpated from San Diego County); known from approximately ten occurrences in the East Elks Hills, historically reported from the Buena Vista Hills within the WRMWSD (CNDDB 2002). |
| *Stylocline masonii* Mason's neststraw | FSC/-/1B | Chenopod scrub, pinyon and juniper woodland. |

*Notes*: 1. WRMWSD denotes species reported from the Wheeler Ridge-Maricopa Water Storage District (CNDDB 2002); KCVFHCP denotes species identified in the Kern County Valley Floor Habitat Conservation Plan (Kern County 2001); other special status plants are reported from Kern County (CNDDB 1999) but not within WRMWSD.

*Status*:

Federal:
- E = Listed as Endangered.
- T = Listed as Threatened.
- FSC = Federal Species of Concern.

State:
- E = Listed as Endangered.
- T = Listed as Threatened.

CNPS:
- 1B = List 1B - Plants rare and endangered in California and elsewhere
- 2 = List 2 - Plants rare and endangered in California but more common elsewhere
- 4 = List 4 - A watch list, plants of limited distribution

**Table 2. Sensitive Wildlife Species Potentially Occurring in the WRMWSD or the San Joaquin Valley Floor Area**
(page 1 of 4)

| *Scientific Name/ Common Name* | *Regulatory Status Federal/State* | *Habitat and Regional Occurrence* |
|---|---|---|
| **Federally or State-Listed Rare, Threatened or Endangered Species** | | |
| *Ammospermophilus nelsoni* San Joaquin antelope squirrel | FSC/T | Open, sparsely vegetated grassland, desert scrub with gullies and washes. Numerous records within the region; KCVFHCP. |
| *Charadrius alexandrinus nivosus (nesting)* Western snowy plover | T/CSC | Sandy beaches, salt pond levees, and shores of large alkali lakes. Needs sandy, gravelly, or friable soils for nesting. Historical record from Buena Vista Lake bed. |
| *Charina bottae umbratica* Southern rubber boa | FSC/T | Fossorial to semi-fossorial occurring in higher elevation forests and meadows as well as lower elevation riparian woodlands. May occur on Central Valley floor. |
| *Coccyzus americanus occidentalis (nesting)* Western yellow-billed cuckoo | -/E | Riverine woodlands, thickets, and farms. Historic records from Buena Vista Lake bed. |
| *Desmocerus californicus dimorphus* Valley elderberry longhorn beetle | T/- | Elderberry trees associated with riparian habitat along rivers throughout the Central Valley. No known populations in southern San Joaquin Valley region. |
| *Dipodomys ingens* Giant kangaroo rat | E/E | Annual grasslands on the western side of the San Joaquin Valley; marginal habitat in alkali scrub. Several records from region; KCVFHCP. |
| *Dipodomys nitratoides nitratoides* Tipton kangaroo rat | E/E | Saltbrush scrub and sink scrub communities in the Tulare Lake Basin of the southern San Joaquin Valley. Several occurrences in the region; KCVFHCP. |
| *Empidonax traillii* (*nesting*) Willow flycatcher | -/E | Riparian woodlands that contain water and low growing willow thickets. Known to occur in higher elevations and may occur in foothills and valley bottom. |
| *Empidonax traillii extimus (nesting)* Southwestern willow flycatcher | E/E | Riparian woodlands that contain water and low growing willow thickets. Known to occur in higher elevations and may occur in foothills and valley bottom. |
| *Euproserpinus euterpe* Kern primrose sphinx moth | T/- | Adult females lay their eggs on evening primrose plants, *Camissonia* sp. in southern Kern County. No known populations. |
| *Gambelia silus* (=*G. sila*) Blunt-nosed leopard lizard | E/E | Prefers sparsely vegetated plains, alkali flats, low foothills, desert scrub, and large washes. Several records documented in the region; KCVFHCP |
| *Vulpes macrotis mutica* San Joaquin kit fox | E/T | Grasslands and blue oak savannas of San Joaquin Valley; loose soils for burrowing. Numerous records within the region; KCVFHCP. |

**Table 2. Sensitive Wildlife Species Potentially Occurring in the WRMWSD or the San Joaquin Valley Floor Area**
(page 2 of 4)

| *Scientific Name/ Common Name* | *Regulatory Status Federal/State* | *Habitat and Regional Occurrence* |
|---|---|---|
| **Federal Species of Concern and State Species of Special Concern** | | |
| *Accipiter cooperii (nesting)* Cooper's hawk | -/CSC | Open woodlands especially riparian woodland. Occurs throughout southern San Joaquin Valley. |
| *Agelaius tricolor (nesting colony)* Tricolored blackbird | FCS/CSC | Inhabits freshwater marshes and riparian scrub. Several occurrence documented in the region. |
| *Antrozous pallidus* Pallid bat | -/CSC | Nests in dry, rocky habitats/caves, crevices in rocks, arid habitats including deserts, chaparral, and scrublands. Occurs throughout San Joaquin Valley. |
| *Aquila chrysaetos (nesting and wintering)* Golden eagle | -/CSC | Mountains, deserts, and open country. Suitable nest habitat is primarily cliffs and rocky ledges, sometimes trees, and occasionally ground and man-made structures. Occasionally observed in the region. |
| *Asio otus* Long-eared owl | -/CSC | Riparian and live oak woodlands. Dense stands of trees. Known to occur in the region. |
| *Athene cunicularia (burrow sites)* Burrowing owl | FSC/CSC | Open grasslands, deserts, scrublands; low growing vegetation; small mammal burrows. Several records within the region. |
| *Clemmys marmorata pallida* Southwestern pond turtle | FCS/CSC | Inhabits ponds, marshes, rivers, streams, and irrigation ditches. Several observations within the region have been documented. |
| *Corynorhinus townsendii pallescens* Pale big-eared bat | FSC/CSC | Needs caves, tunnels, or other structures for roosting, vegetation and mesic edges for feeding; maternity roosts are in warm places. Known to occur in the region. |
| *Dendroica petechia brewsteri (nesting)* Yellow warbler | -/CSC | Riparian woodlands, montane chaparral, and mixed conifer habitats. Known to occur throughout southern San Joaquin Valley. |
| *Dipodomys nitratoides brevinasus* Short-nosed kangaroo rat | FSC/CSC | Western side of San Joaquin Valley in grassland and desert shrub associations; highly alkaline soils. Several records within southern San Joaquin Valley; KCVFHCP. |
| *Eremophila alpestris actia* California horned lark | -/CSC | Open habitats, grasslands along the coast, deserts near sea level to alpine dwarf shrub habitat, uncommonly in coniferous and chaparral habitats. May occur in region. |
| *Eumops perotis californicus* California mastiff bat | FSC/CSC | Primarily arid lowlands, especially deserts; open, semiarid to arid habitats including conifer and deciduous woodlands, coastal scrub, annual and perennial grasslands, palm oases, chaparral, desert scrub, and urban. Known to occur throughout region. |
| *Falco mexicanus (nesting)* Prairie falcon | -/CSC | Grasslands, savannahs, rangeland, agricultural fields, and desert scrub; often uses sheltered cliff ledges for cover. Known to occur in the region. |

**Table 2. Sensitive Wildlife Species Potentially Occurring in the WRMWSD or the San Joaquin Valley Floor Area**
(page 3 of 4)

| *Scientific Name/ Common Name* | *Regulatory Status Federal/State* | *Habitat and Regional Occurrence* |
|---|---|---|
| *Icteria virens (nesting)* Yellow-breasted chat | -/CSC | Riparian woodlands with a thick understory. Known to occur in the region. |
| *Lytta hoppingi* Hopping's blister beetle | FSC/- | Vernal pools and grasslands in San Joaquin Valley. Known to occur in region |
| *Lytta molesta* Molestan blister beetle | FSC/- | Most likely grasslands; adults are plant feeders. Several records from San Joaquin Valley including within Kern County. |
| *Masticophis flagellum ruddocki* San Joaquin whipsnake | FCS/CSC | Dry, hot, open vegetation with little or no tree cover such as valley grasslands. Known to occur in the region. |
| *Myotis ciliolabrum* Small-footed myotis | FSC/- | Cliff-face crevices, erosion cavities, and beneath rocks on the ground; also hibernating in caves or mines. Known to occur throughout the region. |
| *Myotis yumanensis* Yuma myotis | FSC/- | Caves, tunnels, or buildings; prefers open forests and woodlands with water but uses a variety of habitats; arid areas. Known to occur throughout Central Valley. |
| *Onychomys torridus tularensis* Tulare grasshopper mouse | FSC/CSC | Arid shrubland communities, arid grassland and shrubland associations, blue oak woodlands, alkali sink and mesquite associations on Valley Floor. No recent records in southern San Joaquin Valley; KCVFHCP. |
| *Perognathus inornatus inornatus* San Joaquin pocket mouse | FSC/- | Grasslands and blue oak savannas. Several records from southern San Joaquin Valley; KCVFHCP. |
| *Phrynosoma coronatum frontale* California horned lizard | FCS/CSC | Exposed gravelly, sandy soils with minimal shrubs, riparian woodland clearings, dry chamise chaparral, and annual grasslands with scattered seepweed or saltbush. Known to occur in southern San Joaquin Valley. |
| *Scaphiopus hammondii* Western spadefoot toad | FSC/CSC | Temporary pools in semiarid to arid short grass plains and sandy, gravelly areas such as alkali flats, washes, and river floodplains. Occurs in Central Valley foothills and valley floor. |
| *Sorex ornatus relictus* Buena Vista Lake shrew | E/CSC | Marshlands and riparian areas in the Tulare Basin. Several occurrences reported from the region; KCVFHCP. |
| *Taxidea taxus* American badger | -/CSC | Drier open stages of most shrub, forest, and herbaceous habitats with friable soils. Recently observed in the Maricopa Flat area; KCVFHCP. |

**Table 2. Sensitive Wildlife Species Potentially Occurring in the WRMWSD or the San Joaquin Valley Floor Area**
(page 4 of 4)

| *Scientific Name/ Common Name* | *Regulatory Status Federal/State* | *Habitat and Regional Occurrence* |
|---|---|---|
| *Toxostoma lecontei* Le Conte's thrasher | -/CSC | Open desert wash, desert scrub, alkali desert scrub, and desert succulent scrub, nests in dense, spiny shrub or cactus in desert wash habitat. Several records within the region. |

*Notes*: 1. KCVFHCP denotes species identified in the Kern County Valley Floor Habitat Conservation Plan (Kern County 2001).

*Status*:

Federal:
- E = Listed as Endangered.
- T = Listed as Threatened.
- FSC = Federal Species of Concern.

State:
- E = Listed as Endangered.
- T = Listed as Threatened.
- CSC = California Species of Special Concern.

**Table 3. Sensitive Plants Potentially Occurring in the CLWA Service Area**
(page 1 of 2)

| *Scientific Name / Common Name* | *Regulatory Status Federal/State/CNPS* | *Habitat and Regional Occurrence* |
|---|---|---|
| **State or Federally Listed Species** | | |
| *Astragalus brauntonii* Braunton's milk-vetch | E/-/1B | Recently burned chaparral vegetation, limestone soils; known from Simi Hills, Santa Monica Mountains. |
| *Berberis nevinii* Nevin's barberry | E/E/1B | Coastal scrub and chaparral along sandy washes; scattered occurrences in Transverse Ranges. |
| *Brodiaea filifolia* Thread-leaved brodiaea | T/E/1B | Vernal pools, recently rediscovered in Los Angeles County (1996). |
| *Dodecahema leptoceras* Slender-horned spineflower | E/E/1B | Restricted to alluvial fan sage scrub; known from Santa Clara River tributaries. |
| *Navarretia fossalis* Spreading navarretia | T/-/1B | Chenopod scrub, shallow fresh water marshes, and vernal pools; reported from Cruzan Mesa. |
| *Orcuttia californica* California Orcutt grass | E/E/1B | Vernal pools; historic and recent records from Cruzan Mesa. |
| **Federal Candidate and CNPS Lists 1 and 2 Species that Could Be Eligible for Listing** | | |
| *Calochortus clavatus* var. *gracilis* Slender mariposa lily | -/-/1B | Foothill canyons in chaparral; occurs in San Gabriel Mountains. |
| *Calochortus plummerae* Plummer's mariposa lily | -/-/1B | Chaparral, other habitats, usually on granitic soils; Transverse and Peninsular Ranges. |
| *Chorizanthe parryi* var. *fernandina* San Fernando Valley spineflower | FL/SL[1]/1B | Sandy/gravelly washes in coastal scrub; historically in vicinity of Castaic, Newhall; recently discovered in the Simi Hills. |
| *Deinandra (= Hemizonia) minthornii* Santa Susana tarplant | -/R/1B | Rocky areas in chaparral, coastal scrub; common in Santa Susana Pass. |
| *Dudleya multicaulis* Many-stemmed dudleya | -/-/1B | Grassland and scrub habitats, associated with rock outcrops on clay soils; known from east of Simi Valley . |
| *Galium grande* San Gabriel bedstraw | -/-/1B | Lower montane coniferous forest, south slope of San Gabriel Mountains. |
| *Opuntia basilaris* var. *brachyclada* Short-joint beavertail | -/-/1B | Dry slopes in chaparral (at higher elevations than on project site); known from Santa Susana Pass. |
| **Plants of Limited Distribution** | | |
| *Acanthomintha obovata* ssp. *cordata* Heart-leaved thorn-mint | -/-/4 | Woodland, chaparral, and grassland habitats; known from areas to west in Ventura County. |
| *Androsace elongata* ssp. *acuta* California androsace | -/-/4 | Scrub and woodland habitats; widely distributed but rare; not found recently in Los Angeles County. |
| *Baccharis plummerae* ssp. *plummerae* Plummer's baccharis | -/-/4 | Rocky slopes, scrub and woodland habitats; primarily coastal, known from areas to west. |
| *Calandrinia breweri* Brewer's calandrinia | -/-/4 | Disturbed or burned sites in coastal scrub and chaparral; widespread though uncommon. |

**Table 3. Sensitive Plants Potentially Occurring in the CLWA Service Area**
(page 2 of 2)

| | | |
|---|---|---|
| *Calystegia peirsonii*<br>Peirson's morning glory | -/-/4 | Hillsides, rocky slopes in chaparral, coastal scrub; known from Newhall Ranch, Marple, Mint, and San Francisquito Canyons. |
| *Convolvulus simulans*<br>Small-flowered morning glory | -/-/4 | Wet clay and serpentine ridges; scattered at low to mid-elevations in coastal Southern California. |
| *Galium cliftonsmithii*<br>Santa Barbara bedstraw | -/-/4 | Partially shaded canyon habitats; mostly coastal, known from West Transverse Ranges. |
| *Harpagonella palmeri*<br>Palmer's grapplinghook | -/-/4 | On clay soils in grassland and scrub habitats; historically found near Saugus but unconfirmed in Los Angeles County in recent years. |
| *Juncus acutus* ssp. *leopoldii*<br>Southwestern spiny rush | -/-/4 | Marshes, wet meadows, often in saline habitats; widespread in coastal southern California and deserts. |
| *Lilium humboldtii* ssp. *ocellatum*<br>Ocellated lily | -/-/4 | Canyons, in oak woodland; widely distributed though uncommon in southern California. |
| *Microseris douglasii* ssp. *platycarpha*<br>Small-flowered microseris | -/-/4 | Inland clay soils, often near vernal pools or serpentine; widely distributed though uncommon in coastal central and southern California. |
| *Mucronea californica*<br>California spineflower | -/-/4 | Coastal scrub, chaparral on sandy soils; widespread though uncommon in coastal central and southern California. |
| *Perideridia pringlei*<br>Adobe yampah | -/-/4 | Grassland, scrub, woodland habitats, on serpentine; coastal central California to West Transverse Ranges. |

*Notes*: 1. This species was listed as endangered under the California Endangered Species Act in August of 2001.

*Source*: CDFG (2002b), CNPS (2001), Aspen Environmental Group (1996), Hickman (1993), PCR (2000), and County of Los Angeles (1996)

*Status:*

Federal:
- E = Listed as Endangered.
- T = Listed as Threatened.
- FL = Federal Candidate for Listing.

State:
- E = Listed as Endangered.
- R = Listed as Rare.
- SL = State Candidate for Listing.

CNPS:
- 1B = List 1B - Plants rare and endangered in California and elsewhere
- 4 = List 4 - A watch list, plants of limited distribution

**Table 4. Sensitive Wildlife Species Potentially Occurring in the CLWA Service Area**
(page 1 of 4)

| *Scientific Name / Common Name* | *Regulatory Status Federal/State* | *Habitat and Regional Occurrence* |
|---|---|---|
| **State or Federally Listed or Proposed Species** | | |
| *Bufo californicus* Arroyo toad | E/CSC | Sandy stream terraces with closed canopies and grassy groundcover next to perennial stream. Primarily in Ventura and northern Los Angeles counties; Santa Clara River. |
| *Buteo swainsoni* Swainson's hawk | —/T | Forages over grasslands, savannas, and open areas. Nests in scattered trees near open areas. Nesting rare in Southern California. Possible as brief migrant, not likely to breed. |
| *Catostomus santaanae* Santa Ana sucker | T/CSC | Found in flowing streams with coarse substrate and little modification or pollution. Present in Santa Clara River but may have hybridized with the introduced Owens sucker. |
| *Coccyzus americanus occidentalis* Western yellow-billed cuckoo | —/E | Riverine woodlands, thickets, and farms. Known to occur in the region. |
| *Empidonax trailii extimus* Southwestern willow flycatcher | E/E | Dense willow thickets near slow-moving streams. Nests along Santa Clara River and other large streams. |
| *Falco peregrinus anatum* American peregrine falcon | DM/E | Forages over open areas, especially over water. Nests on cliffs with small caves. |
| *Gasterosteus aculeatus williamsoni* Unarmored threespine stickleback | E/E | Found in streams and pools with flowing water and emergent vegetation. Inhabits Santa Clara River. |
| *Gymnogyps californianus* California condor | E/E | Open savannahs and grassland. Nests on cliffs with small caves. Possibly forages over open areas. |
| *Polioptila californica californica* Coastal California gnatcatcher | T/CSC | Inhabits coastal sage scrub. Scattered observations throughout the area. |
| *Rana aurora draytonii* California red-legged frog | T/CSC | Inhabits unpolluted freshwater streams and marshes with emergent aquatic vegetation such as tules, bulrushes, or cattails. Known from Piru Creek, San Francisquito Creek; possible elsewhere. |
| *Vireo bellii pusillus* Least Bell's vireo | E/E | Extensive, dense willow riparian thicket. Nests along Santa Clara River and other large streams. |
| **Federal Candidate and Federal and State Species of Special Concern** | | |
| *Accipiter cooperii* Cooper's hawk | —/CSC | Heavily wooded, semi-open areas, breeds in riparian and oak woodlands. Known to occur throughout the region. |
| *Accipiter striatus* Sharp-shinned hawk | —/CSC | Uncommon migrant and winter visitor in heavily wooded semi-open areas. Mostly likely during winter, unlikely breeder. |
| *Agelaius tricolor* Tricolored blackbird | FSC/CSC | Freshwater marshes and riparian scrub. Few occurrences in region. |

**Table 4. Sensitive Wildlife Species Potentially Occurring in the CLWA Service Area**
(page 2 of 4)

| *Scientific Name / Common Name* | *Regulatory Status Federal/State* | *Habitat and Regional Occurrence* |
|---|---|---|
| *Aimophila ruficeps canescens* Southern California rufous-crowned sparrow | FSC/CSC | Generally, steep, rocky areas within coastal sage scrub and chaparral, often with scattered bunches of grass; prefers relatively recently burned areas. Observed on Newhall Ranch; locally common. |
| *Amphispiza belli* Bell's sparrow | FSC/CSC | Dense, dry chamise chaparral and coastal slopes of coastal sage scrub. Locally common. |
| *Anniella pulchra pulchra* Silvery legless lizard | FSC/CSC | Several habitats but especially in coastal dune, valley-foothill, chaparral, and coastal scrub habitats; loose sandy soil. Known to occur throughout the region. |
| *Antrozous pallidus* Pallid bat | —/CSC | Forages in open areas; roosts in rock crevices and caves. |
| *Aquila chrysaetos* Golden eagle | —/CSC | Mountains, deserts, and open country. Suitable nest habitat is primarily cliffs and rocky ledges, sometimes trees, and occasionally ground and man-made structures. Occasionally observed in the region. |
| *Asio otus* Long-eared owl | —/CSC | Riparian and live oak woodlands. Known to occur in region. |
| *Athene cunicularia hypugea* Burrowing owl | FSC/CSC | Dry grasslands, desert habitats, open pinyon-juniper, ponderosa pine woodlands below 5,300 feet elevation; berms, ditches, and grasslands adjacent to rivers, agricultural, and scrub areas. Occasional visitor. |
| *Buteo regalis* Ferruginous hawk | --/CSC | Rivers, lakes, and coasts; open tracts of sparse shrubs and grasslands, and agricultural areas during winter. Rare migrant through region. |
| *Circus cyaneus* Northern harrier | —/CSC | Forages in marshes and grassy meadows; uncommon; occasionally forages over open desert and brushlands. |
| *Cnemidophorus tigris multiscutalus* Coastal western whiptail | FSC/— | Arid and semi-arid desert to open woodlands, where vegetation is sparse; loose soils in chaparral and scrub habitats. Known to occur throughout the region. |
| *Dendroica petechia brewsteri* Yellow warbler | —/CSC | Inhabits willow-riparian habitats. Numerous records from region. |
| *Elanus leucurus* White-tailed kite | —/FP | Forages in meadows and open areas. Nests in riparian woodland. Nesting in woodlands along Santa Clara River, Live Oak Springs and Placerita Canyon; near Pico Canyon; common locally. |
| *Eremophila alpestris actia* California horned lark | FSC/CSC | Open grasslands, fields, and agricultural areas. Known to occur throughout the region. |
| *Euderma maculatum* Spotted bat | FSC/CSC | Deserts, scrublands, chaparral, and coniferous woodlands. At least one record from the region. |
| *Eumops perotis californicus* Greater western mastiff-bat | FSC/CSC | Forages over chaparral and grasslands; roosts in rock crevices and old buildings. |

**Table 4. Sensitive Wildlife Species Potentially Occurring in the CLWA Service Area**
(page 3 of 4)

| *Scientific Name / Common Name* | *Regulatory Status Federal/State* | *Habitat and Regional Occurrence* |
|---|---|---|
| *Falco mexicanus* Prairie falcon | —/CSC | Forages in dry open habitat. Nests on cliffs with potholes. Known to breed in area. |
| *Felis concolor* Mountain lion | —/CSC | Rare residents of rugged terrain with dense cover, forages over large area. Tracks observed in Newhall Ranch area and presumed to occasionally forage on site. |
| *Gila orcutti* Arroyo chub | FSC/CSC | Adapted to the warm fluctuating streams of the Los Angeles Plain. Prefers the slowest moving sections of stream where bottom is sand or mud. Inhabits Santa Clara River and Castaic Creek. |
| *Icteria virens* Yellow-breasted chat | —/CSC | Prefer dense willow-riparian habitats. At least one record from San Francisquito Creek. |
| *Ixobrychus exilis hesperis* Western least bittern | —/CSC | Emergent wetlands of cattails and tules. Records from the Santa Clara River. |
| *Lanius ludovicianus* Loggerhead shrike | FSC/CSC | Open grassland, savannas, and chaparral. Fairly common. |
| *Lepus californicus bennettii* San Diego black-tailed jackrabbit | FSC/CSC | Open brushlands and scrub habitats between sea level and 4,000 feet elevation. Known to occur in region. |
| *Macrotus californicus* California leaf-nosed bat | FSC/CSC | Desert riparian, desert wash, desert scrub, desert succulent shrub, alkali desert scrub, and palm oasis. Roosts in tunnels, caves and possible buildings and bridges. Becoming rare locally. |
| *Myotis thysanodes* Fringed myotis | FSC/— | Dry, rocky habitats/caves, crevices in rocks, arid habitats, chaparral. Known to occur in region. |
| *Myotis yumanensis* Yuma myotis | FSC/CSC | Open forests and woodlands with water are optimal but uses a variety of habitats. Known to occur in region. |
| *Neotoma lepida intermedia* San Diego desert woodrat | FSC/CSC | Dense riparian and chaparral. Observed on Newhall Ranch and likely elsewhere. |
| *Phrynosoma coronatum* Coast horned lizard | FSC/CSC | Scrubland, grassland, coniferous forest, broad-leaf woodlands; sandy loose soils in chaparral scrub and washes. Known to occur throughout the region. |
| *Onychomys torridus Ramona* Southern grasshopper mouse | FSC/CSC | Grasslands, desert areas, especially scrub with friable soils. Recorded in Soledad Canyon. |
| *Plecotus townsendii pallescens* Pale Townsend's big-eared bat | FSC/CSC | Forages in forests, woodlands, grasslands, and open areas; roosts in caves and man-made structures. |
| *Piranga rubra* Summer tanager | —/CSC | Cottonwood-willow woodland and riparian scrub. Record from Santa Clara River near Lang. |

**Table 4. Sensitive Wildlife Species Potentially Occurring in the CLWA Service Area**
(page 4 of 4)

| *Scientific Name / Common Name* | *Regulatory Status Federal/State* | *Habitat and Regional Occurrence* |
|---|---|---|
| *Salvadora hexalepis virgultea* Coast patch-nosed snake | FSC/CSC | Found in coastal chaparral, desert scrub, washes, sandy flats, and rocky areas. Barren creosote bush desert flats. Sagebrush semi-deserts; sea level to 7,000 feet. Known to occur throughout the region. |
| *Scaphiopus hammondii* Western spadefoot toad | FSC/CSC | Lowland washes, floodplains, temporary ponds and vernal pools. Observed in Potrero Canyon Pond (Aspen 1996) and likely elsewhere. |
| *Strix occidentalis occidentalis* California spotted owl | —/CSC | Oak and oak-conifer habitats. Reported within the region. |
| *Taxidea taxus* American badger | —/CSC | Open areas with sandy soils. |
| *Thamnophis hammondii* Two-striped garter snake | FSC/CSC | Riparian and freshwater marshes with perennial water. Several records within the region. |

*Source:* Aspen Environmental Group (1996), County of Los Angeles (1996), CDFG (2002a), PCR (2000)

*Status:*

Federal:
- E = Listed as Endangered.
- T = Listed as Threatened.
- FSC = Federal Special of Concern
- DM = Delisted Taxon, Recovered, Being Monitored First 5 Years

State:
- E = Listed as Endangered.
- T = Listed as Threatened.
- FP = Fully Protected Species.
- CSC = California Species of Special Concern.

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# *Appendix C*

**Agricultural Resources**

# Effects on Agricultural Production from Transferring 41,000 Acre-Feet of State Water Project Entitlement from Wheeler Ridge-Maricopa Water Storage District

*DRAFT REPORT*

**Prepared for**

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**May 23, 2003**

# Table of Contents

**Executive Summary** 1

**Introduction** 1

**Existing Conditions** 2

Cropping Patterns ..... 2

Cropping Pattern Changes by Service Area ..... 8

Factors Accounting for Cropping Pattern Changes ..... 10

Water Sources ..... 12

Water Use ..... 14

**Decision-Making by Farmers** 16

Profit Maximization ..... 17

Crop Rotations and Profit Maximization Over Time ..... 17

Effects of Water Costs and Availability ..... 19

**Results** 21

**References** 23

# Executive Summary

- Between 1990 and 1999, permanent crops increased from 30 percent to 38 percent of cropped land in WRMWSD. Between 1999 and 2001, they rose to 48 percent. Vineyards are the single most important permanent crop. Permanent cropped acreage has increased in both surface water and ground water service areas of the district.

- Because of the large capital costs for establishing a vineyard, grove, or orchard, the increase in permanent crop acreage suggests that farmers in the service area are confident that they will be able to consistently obtain the water necessary for their operations. The actions of WRMWSD have increased the reliability of water and helped offset the rising costs of SWP surface water. Growers are able to produce more labor-intensive, higher value crops.

- WRMWSD has diversified its water supply and management portfolio dramatically since the 1980s. The district's SWP entitlement remains an integral component of total supplies, but supplemental sources now provide a substantial drought buffer for the district.

- WRMWSD has invested in ground water recharge storage and recovery systems outside of the WRMWSD service area as well as distribution and pumping infrastructure in order to increase the reliability of water in dry years. Banking surface water when available or conjunctively using ground water in wet and normal years allows WRMWSD to have a more reliable water supply when normal demand exceeds supplies available from the SWP. This banking and reliability more than offsets any of the impacts of the 41,000 AF transfer of SWP surface water.

- The transfer of 41,000 AF of SWP water will have little or no impact on cropping patterns and production in WRMWSD. The district has taken adequate steps to insure that more reliable water supplies from various sources will be available at lower cost to offset the transfer. The transfer and resulting payment for the transferred water reduce the fixed cost burden of the unneeded SWP entitlement and thus reduce the financial

burden to WRMWSD. The district is better able to continue to improve its water infrastructure and supply. Without this infrastructure and reliable supply, more lands will likely be removed from production temporarily or permanently.

- Farmed land in the WRMWSD has varied from a low of 60,370 acres in 1991, a severe drought year, to a high of 94,499 acres in 1998. Crop acreage fluctuated by an average of 11.6 percent each year between 1990 and 2001. The principal factors causing the variations likely have included water availability, crop rotations, and crop prices.

- During the last 12 years, the Wheeler Ridge-Maricopa Water Storage District (WRMWSD) has experienced a significant shift in agricultural cropping patterns, likely due in great part to the reliability and cost of water.

- Annual crop acreage has declined, while acreage in permanent crops has increased. Annual crop acreage fell by 13,376 acres in the WRMWSD surface water service areas from between 1990 and 1999 and by a further 9,068 acres between 1999 and 2001. In the surface water service areas, cotton acreage declined by 15,534 acres between 1990 and 1999 and by a further 1,528 acres between 1999 and 2001. Over the same two periods in the groundwater service areas, annual crop acreage increased by 8,668 and decreased by 5,128, respectively.

- Many economic factors influence cropping decisions and resultant cropping patterns. Changes in crop prices, particularly for cotton, and the total of variable costs (including water prices), as well as strong demands for grapes and citrus, appear to have influenced the decisions of farmers in the WRMWSD regarding crop choices.

- As overall production costs increase, including those for water, cotton growers find it harder and harder to stay in production. Rotation crops such as grain and hays do not even cover variable costs in some years. Growers are better off to fallow lands than to continue production of these crops.

- Fallowing has been a regular part of cropping patterns in WRMWSD. Between 1991 and 1998, the amount of fallowed land decreased by 34,000 acres. Since 1998, fallowed acreage has increased by 11,600 acres.

- During the early 1990s drought period, it became apparent that Department of Water Resources (DWR) announced water shortages could become a reality and that water costs would soar when water was not delivered. Following this period of drought impacts, WRMWSD experienced a significant shift of acreage to higher value crops such as fruits and vegetables and a reduction of acreage in lower value crops such as cotton,

hay, and other field crops. The last two to three years appears to be a period of leveling out of new perennial crop plantings and increased fallowing.

- Fallowing has increased since 1998 even though State Water Project (SWP) deliveries, with the exception of 2001, have been relatively high. The increase is probably due to market conditions, particularly for cotton, as well as other economic and agronomic reasons.

- Total applied agricultural water within WRMWSD averaged about 251,000 acre-feet (AF) annually between 1990 and 1999 and about 259,000 AF annually between 1999 and 2001. Over those two periods, total WRMWSD deliveries from all sources averaged 158,000 AF and 168,000 AF annually, respectively. The remainder was supplied by on-farm ground water pumping, user input, or other water supplies available to farmers in the WRMWSD area.

- Before the 41,000 AF transfer, WRMWSD held a water supply contract for about 238,000 AF of SWP water. After the transfer, the remaining 197,000 AF of contract amount, with supplemental supplies, should leave the district comfortably able to meet demands in normal and wet years. Neither cost nor availability should be adversely affected in those years, and the transfer should not, of itself, cause an increase in fallowing.

The WRMWSD supplemental water supplies were developed primarily to help meet demands during dry years. Those sources will more than make up for any dry year shortfall incurred as a result of the 41,000 AF of water transferred.

# Introduction

Agriculture is the main industry in the Wheeler Ridge-Maricopa Water Storage District (WRMWSD) service area. Agricultural lands in this area are among the most productive in Kern County and the entire state. Water is a key input to agriculture here, and has been instrumental in the production of a variety of crops destined for both domestic and international markets. The cost and availability of various water sources have significant effects on farm profitability and survivability.

Over time, farmers in the service area have changed cropping mixes, adopted different rotations, and used different water sources for their operations. These changes are an outgrowth of the many factors incorporated into the decision-making framework used by farmers, some unique to each farm, others common to all.

This report considers the farm-level impacts of the 41,000 acre-feet (AF) transfer of State Water Project (SWP) entitlement from WRMWSD to Castaic Lake Water Agency (CLWA). The focus of the analysis is on whether the transfer will cause changes in agricultural practices, including additional land fallowing within WRMWSD. The report is presented in three sections. The first is an assessment of pertinent existing conditions within WRMWSD. The discussion includes a review of crop acreages and use of various water sources over time. The second section describes the decision-making framework which farmers seeking specific economic objectives follow in determining which crops to plant and which inputs, including water, to use on these crops. This development follows widely-accepted principles of farm management and agricultural economics. The third section evaluates the effects of the transfer on land fallowing within WRMWSD.

# Existing Conditions

## Cropping Patterns[2]

Crops grown within the WRMWSD service area had a farm-level production value of nearly $283 million in 2001 (see Table 1).[3] Grapes provided the greatest dollar value, at 31 percent of the total, followed by mixed produce and melons at 26 percent, citrus at 25 percent, and cotton at seven percent. Total value in 2001 was 6 percent greater than the comparable value in 1999, and the value in 1999 was 23 percent higher than that in 1990. The allocation of value among crops has also changed a great deal since 1990, when grapes accounted for just 18 percent of the total, mixed produce and melons 36 percent, citrus 11 percent, and cotton 20 percent. Because of the 1987-92 drought that so severely impacted Kern County and the entire San Joaquin Valley, the value of crop production in WRMWSD fell between 1990 and 1992 and then rose to exceed the 1990 value only by 1995.

Since 1990, net farmed land[4] in WRMWSD has varied from a low of 60,370 acres in 1991 to a maximum of 94,499 acres in 1998 (see Table 2). For the 12 years shown, the normal annual variation in net farmed land was 11.6 percent,[5] or about 9,700 acres. As shown in Figure 1, the general trend in net cropped acreage was positive until about 1999.[6] Similarly,

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2 Cropping information for WRMWSD is taken from annual crop reports provided by the district for the years 1990 through 2001.

3 Based on crop acreages reported by WRMWSD and average price and yield data reported for Kern County by the Kern County Department of Agriculture.

4 Measured as total cropped less double-cropped land.

5 Measured as the coefficient of variation, calculated as the standard deviation divided by the mean. See Snedecor and Cochran.

6 A two-period moving average is used to reduce variation typical between years.

the general trend in annual cropped acreage was positive until about 1996, then notably negative. In 1990, annual crops accounted for 70 percent of cropped acres.[7] By 1999, the annual crop share had fallen to 62 percent and by 2001 to 52 percent. Cotton, historically the predominant annual crop in WRMWSD, represented 61 percent of annual cropped land in 1990, but only 36 percent in 1999 and 37 percent in 2001. From its peak in 1996, annual cropped land fell 9,011 acres by 1999 and an additional 14,196 acres by 2001. Cotton accounted for nearly 80 percent of that reduction. Conversely, the acreage shares of mixed produce and melons rose from 31 percent in 1990 to 38 percent in 1999 and fell to 35 percent in 2001. The share of irrigated grains increased from zero in 1990 to 18 percent in 1999 and fell to 14 percent in 2001.

The negative trend for annual crops has been offset almost completely by the increases in permanent crop acreage. In 1990, permanent crops accounted for 30 percent of cropped land, with vineyards comprising 40 percent of the total, deciduous nuts 26 percent, citrus 23 percent, and deciduous fruits eight percent. In 1999, permanent crops accounted for 38 percent of cropped land, with vineyards 43 percent of the total, deciduous nuts 23 percent, citrus 27 percent, and deciduous fruits five percent. By 2001, permanent crops represented 48 percent, with vineyards at 44 percent of the total, deciduous nuts 21 percent, citrus 30 percent, and deciduous fruits five percent.

Table 2 shows fallowed land[8] ranging from a maximum of 51,620 acres in 1991 to a minimum of 17,649 acres in 1998. The spike in fallowed land in 1991 was attributable largely to the ongoing drought in California and sharply-reduced water supplies, together with higher costs of water from virtually all sources. Because of its different water sources, which are even more diversified today, WRMWSD was able to provide some water to farmers in 1991. Subsequently, fallowed acreage declined sharply until 1998 and has risen since then (see Figure 2). About 1,700 acres more land were fallowed in 2001 than in 1990.

Farmers fallow land for many reasons, both agronomic and economic. Agronomic reasons include the use of fallowing as part of crop rotations. Economic reasons include such factors as the market conditions and prices for the crops typically grown on the land and the cost and availability of production inputs, including water.

Without information from individual landowners, it is very difficult to distinguish between land that is fallowed temporarily and land that is removed from production either permanently or for a long term. The California Department of Conservation, which monitors land use with aerial photos taken every two years, reports previously productive, but

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7 Calculated relative to total cropped land because some annual cropland is double cropped.

8 As shown in WRMWSD crop reports. Fallowing generally refers to temporarily removing land from production to conserve moisture or to control pests.

currently idle, land as fallowed for at three monitoring cycles (that is, six years).[9] Ultimately, land may be fallowed for eight years before it is no longer considered to be in active agricultural use. Thus, it is not at all apparent that the increase in fallowed land with the WRMWSD service area since 1998 is attributable to a reduction in SWP entitlements within the district. Rather, the increase appears to be related more closely to crop markets and prices.

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9 Molly Penberth, California Department of Conservation, April 30, 2003, personal communication.

## Table 1
## Farm Level Value of Production, by Crop and Total, WRMWSD

| Crop/Acres | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Cotton | $43,019,069 | $16,689,629 | $27,663,667 | $33,714,831 | $37,911,348 | $34,831,452 | $40,411,911 | $38,485,118 | $19,421,271 | $26,461,166 | $25,490,070 | $18,582,103 |
| Sugar Beets | $751,012 | $672,471 | $840,597 | $862,677 | $373,257 | $466,458 | $152,213 | $0 | $205,582 | $0 | $0 | $0 |
| Grain | $886,863 | $953,001 | $1,384,366 | $2,017,655 | $1,253,304 | $3,138,780 | $5,285,858 | $3,058,269 | $3,995,594 | $4,101,029 | $2,741,375 | $2,808,474 |
| Green Feeds | $1,396,620 | $687,643 | $705,721 | $989,778 | $1,415,864 | $1,345,331 | $1,415,121 | $2,275,038 | $1,968,264 | $2,059,065 | $1,980,664 | $2,539,051 |
| Mixed Produce | $77,196,114 | $73,993,874 | $37,366,098 | $48,444,836 | $41,735,435 | $57,430,236 | $49,788,591 | $59,466,855 | $54,425,094 | $80,285,572 | $72,435,938 | $66,370,246 |
| Melons | $0 | $0 | $15,178,882 | $11,810,000 | $17,527,192 | $13,455,741 | $13,424,661 | $14,715,280 | $13,970,325 | $10,559,005 | $8,968,780 | $8,727,570 |
| Vineyard | $38,927,352 | $31,865,396 | $37,027,240 | $45,790,453 | $45,763,512 | $55,045,475 | $64,192,513 | $80,301,649 | $73,479,669 | $84,173,400 | $84,581,368 | $86,940,385 |
| Deciduous Nuts | $18,754,834 | $14,452,109 | $12,384,408 | $19,367,333 | $16,053,249 | $15,309,727 | $18,210,636 | $16,487,093 | $16,267,367 | $11,491,679 | $13,021,446 | $13,035,331 |
| Deciduous Fruit | $11,206,519 | $11,677,651 | $7,492,311 | $8,957,975 | $7,888,785 | $12,950,470 | $11,608,728 | $9,852,647 | $10,991,313 | $8,961,073 | $14,345,391 | $11,845,011 |
| Citrus | $23,176,485 | $10,233,881 | $14,588,823 | $31,144,607 | $38,931,957 | $39,672,318 | $34,076,041 | $55,669,042 | $58,690,301 | $37,264,234 | $73,962,958 | $71,330,901 |
| Pomegranates | $375,112 | $355,687 | $917,011 | $1,007,081 | $1,324,308 | $1,350,818 | $1,408,974 | $758,959 | $647,472 | $1,227,749 | $454,063 | $704,100 |
| Eucalyptus | $15,437 | $14,637 | $36,576 | $40,168 | $22,638 | $23,091 | $76,269 | $41,083 | $36,396 | $61,876 | $22,884 | $35,485 |
| Jojoba | $997,211 | $120,026 | $519,901 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| **Total Value** | **$216,702,627** | **$161,716,007** | **$156,105,602** | **$204,147,394** | **$210,200,848** | **$235,019,897** | **$240,051,517** | **$281,111,032** | **$254,098,647** | **$266,645,848** | **$298,004,936** | **$282,918,657** |

## Table 2
## WRMWSD Annual and Permanent Crop and Other Acreage

| Crop | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Annual** | | | | | | | | | | | | |
| Cotton | 38,071 | 16,192 | 24,621 | 31,063 | 33,369 | 36,795 | 34,702 | 32,369 | 24,953 | 20,781 | 22,110 | 16,204 |
| Sugar Beets | 723 | 746 | 825 | 689 | 370 | 409 | 151 | 0 | 181 | 0 | 0 | 0 |
| Grain | 2,692 | 3,450 | 9,859 | 8,162 | 3,739 | 9,530 | 11,804 | 8,203 | 15,586 | 0 | 0 | 0 |
| Grain, Irrigated | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10,605 | 7,378 | 6,208 |
| Grain, Dry Farmed | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1,655 | 2,117 | 3,099 |
| Green Feeds | 1,836 | 1,146 | 1,206 | 1,442 | 1,514 | 2,002 | 1,737 | 2,923 | 2,938 | 3,340 | 2,933 | 2,924 |
| Mixed Produce | 19,504 | 17,469 | 12,971 | 12,414 | 13,618 | 13,333 | 14,770 | 16,408 | 14,553 | 17,783 | 16,889 | 13,246 |
| Melons | 0 | 0 | 4,064 | 3,361 | 3,832 | 4,073 | 3,965 | 3,924 | 3,845 | 3,954 | 2,350 | 2,241 |
| Total Annual | 62,826 | 39,003 | 53,546 | 57,131 | 56,442 | 66,142 | 67,129 | 63,827 | 62,056 | 58,118 | 53,777 | 43,922 |
| Surface Water Service Areas | 43,092 | 20,947 | 34,731 | 36,939 | 35,870 | 43,153 | 45,183 | 42,945 | 40,634 | 29,716 | 26,591 | 20,648 |
| Ground Water Service Areas | 19,734 | 18,056 | 18,815 | 20,192 | 20,572 | 22,989 | 21,946 | 20,882 | 21,422 | 28,402 | 27,186 | 23,274 |
| **Permanent** | | | | | | | | | | | | |
| Vineyard | 10,719 | 9,883 | 9,633 | 9,708 | 9,778 | 10,774 | 12,547 | 14,222 | 15,315 | 15,745 | 17,387 | 17,701 |
| Almonds | 0 | 0 | 5,103 | 5,225 | 5,301 | 5,155 | 5,540 | 5,524 | 6,099 | 6,282 | 6,410 | 5,994 |
| Pistachios & Walnuts | 0 | 0 | 1,797 | 1,797 | 2,098 | 2,100 | 2,100 | 2,100 | 2,099 | 2,099 | 2,099 | 2,376 |
| Deciduous Nuts | 6,865 | 6,899 | 6,900 | 7,022 | 7,399 | 7,255 | 7,640 | 7,624 | 8,198 | 8,381 | 8,509 | 8,370 |
| Deciduous Fruit | 2,074 | 2,102 | 2,013 | 2,008 | 2,060 | 2,066 | 2,154 | 2,205 | 2,104 | 1,989 | 2,058 | 1,928 |
| Citrus | 6,212 | 6,233 | 6,675 | 6,932 | 7,241 | 7,471 | 7,870 | 8,482 | 9,011 | 9,737 | 11,123 | 12,029 |
| Pomegranates | 243 | 243 | 351 | 351 | 351 | 351 | 351 | 351 | 338 | 377 | 377 | 377 |
| Eucalyptus | 10 | 10 | 14 | 14 | 6 | 6 | 19 | 19 | 19 | 19 | 19 | 19 |
| Jojoba | 646 | 82 | 199 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total Permanent | 26,769 | 25,452 | 25,785 | 26,035 | 26,835 | 27,923 | 30,581 | 32,903 | 34,985 | 36,248 | 39,473 | 40,424 |
| Surface Water Service Areas | 24,824 | 24,025 | 24,339 | 24,598 | 25,242 | 26,005 | 28,081 | 29,923 | 31,364 | 32,350 | 35,021 | 35,533 |
| Ground Water Service Areas | 1,945 | 1,427 | 1,446 | 1,437 | 1,593 | 1,918 | 2,500 | 2,980 | 3,621 | 3,898 | 4,452 | 4,891 |
| Total Cropped | 89,595 | 64,455 | 79,331 | 83,166 | 83,277 | 94,065 | 97,710 | 96,730 | 97,041 | 94,366 | 93,250 | 84,346 |
| -Double Crop | 5,314 | 4,085 | 3,525 | 4,510 | 4,233 | 4,663 | 5,092 | 5,441 | 2,542 | 3,155 | 2,622 | 1,541 |
| Net Farmed | 84,281 | 60,370 | 75,806 | 78,656 | 79,044 | 89,402 | 92,618 | 91,289 | 94,499 | 91,211 | 90,628 | 82,805 |
| +Fallow Lands | 27,588 | 51,620 | 36,031 | 33,189 | 32,980 | 22,523 | 19,584 | 20,949 | 17,649 | 20,855 | 21,659 | 29,291 |
| Total Cultivated | 111,869 | 111,990 | 111,837 | 111,845 | 112,024 | 111,925 | 112,202 | 112,238 | 112,148 | 112,066 | 112,287 | 112,096 |
| Miscellaneous | 6,840 | 6,847 | 6,839 | 6,843 | 6,849 | 6,841 | 6,859 | 6,860 | 6,856 | 6,850 | 6,864 | 6,852 |
| Deferred Lands | 1,659 | 1,659 | 1,659 | 1,659 | 1,659 | 1,659 | 1,659 | 0 | 0 | 0 | 0 | 0 |
| Other Lands | 668 | 738 | 880 | 968 | 919 | 1,073 | 1,098 | 1,129 | 1,183 | 1,270 | 1,361 | 1,257 |
| Native Vegetation | 25,626 | 25,428 | 25,405 | 25,305 | 25,169 | 25,122 | 24,802 | 26,393 | 26,434 | 26,434 | 26,434 | 26,739 |
| **Total District** | **146,662** | **146,662** | **146,620** | **146,620** | **146,620** | **146,620** | **146,620** | **146,620** | **146,621** | **146,620** | **146,946** | **146,944** |

**Figure 1**
**Annual, Permanent, and Net Crop Acreage, WRMWSD**

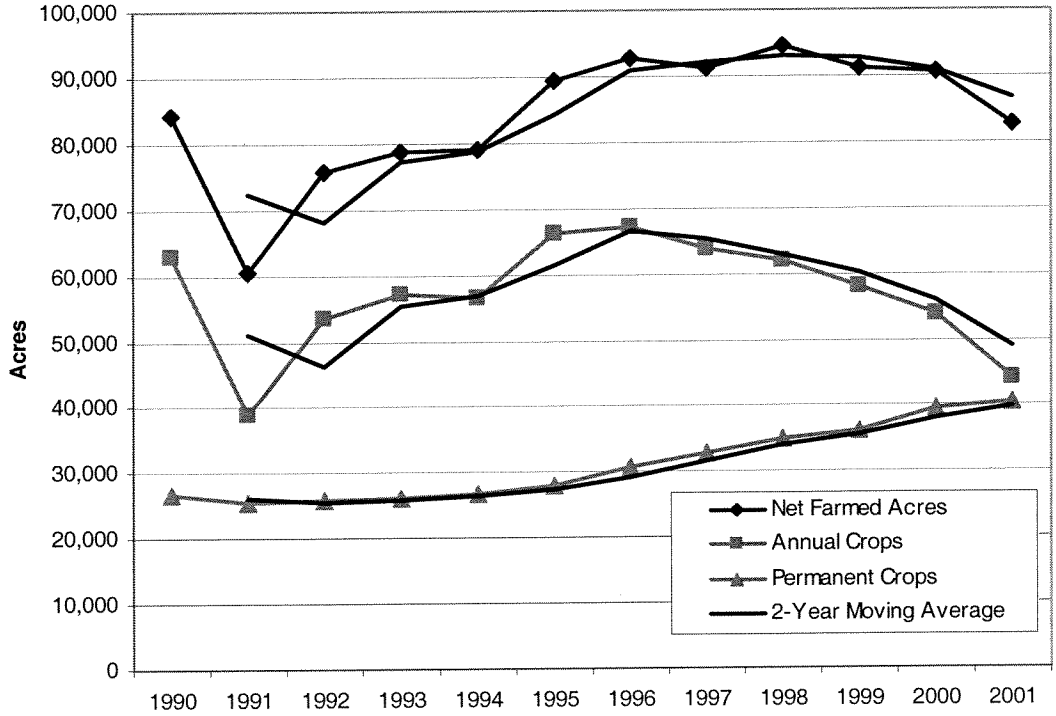
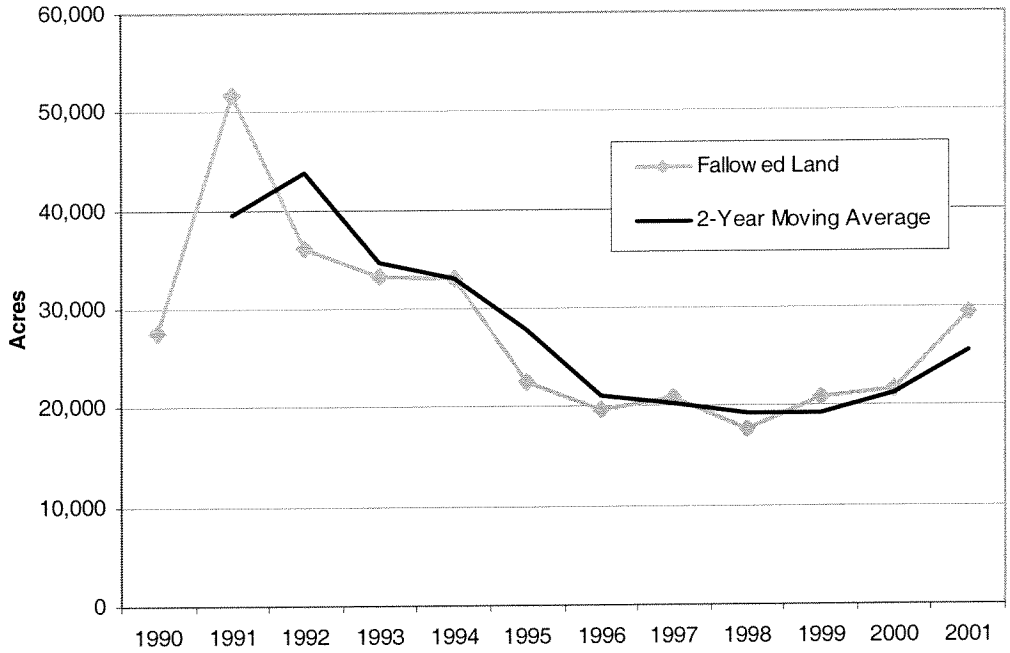



**Figure 2**
**Fallowed Land, WRMWSD**



## Cropping Pattern Changes by Service Area

WRMWSD includes lands served by surface water or ground water or, in some cases, both. Cropped acreage in the surface water service areas (without exclusion of double cropping) fell by 5,850 acres between 1990 and 1999 and a further 5,885 acres between 1999 and 2001. Cropped land in the ground water areas increased 10,621 acres between 1990 and 1999 and fell 4,135 acres between 1999 and 2001.[10] The amount of annual crops in surface water areas fell by 13,376 acres between 1990 and 1999 and a further 9,068 acres between 1999 and 2001. For the two periods in the ground water areas, annual crop land increased by 8,668 acres and fell by 5,128 acres. The acreage of permanent crops rose in both surface water and groundwater service areas (see Figures 3 and 4).

The decline in annual crops and increase in permanent crops in surface water areas relates well to lower prices for some annual crops and higher water prices over the period. As discussed elsewhere in this section, cotton prices have fallen in both nominal and real terms since 1990, and it is no longer feasible to grow cotton in many parts of Kern County. Many cotton producers have been impacted by a "cost-price squeeze" quite common in agriculture.

The shift to permanent crops in the surface water service areas suggests that farmers in those areas are confident that they will be able to obtain water regularly either from within or outside WRMWSD, with or without the 41,000 AF of water under consideration. The capital investment for establishing an orchard, grove, or vineyard can easily exceed $8,000 per acre, excluding land, and farmers will not make those investments unless they are confident that they will be able to obtain adequate water for commercial production or, at minimum, keeping the trees or vines alive. While SWP water certainly remains an important part of the total WRMWSD supply, the SWP component of supply has been supplemented by the development and availability of several sources of supplemental water discussed elsewhere in this section.

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10 Wheeler Ridge-Maricopa Water Storage District, various years, "Crop and Land Use Summary," Bakersfield. The changes also reflect, in part, the reclassification of lands within WRMWSD.

**Figure 3**
**Annual Crop Land in Surface and Ground Water Service Areas, WRMWSD**

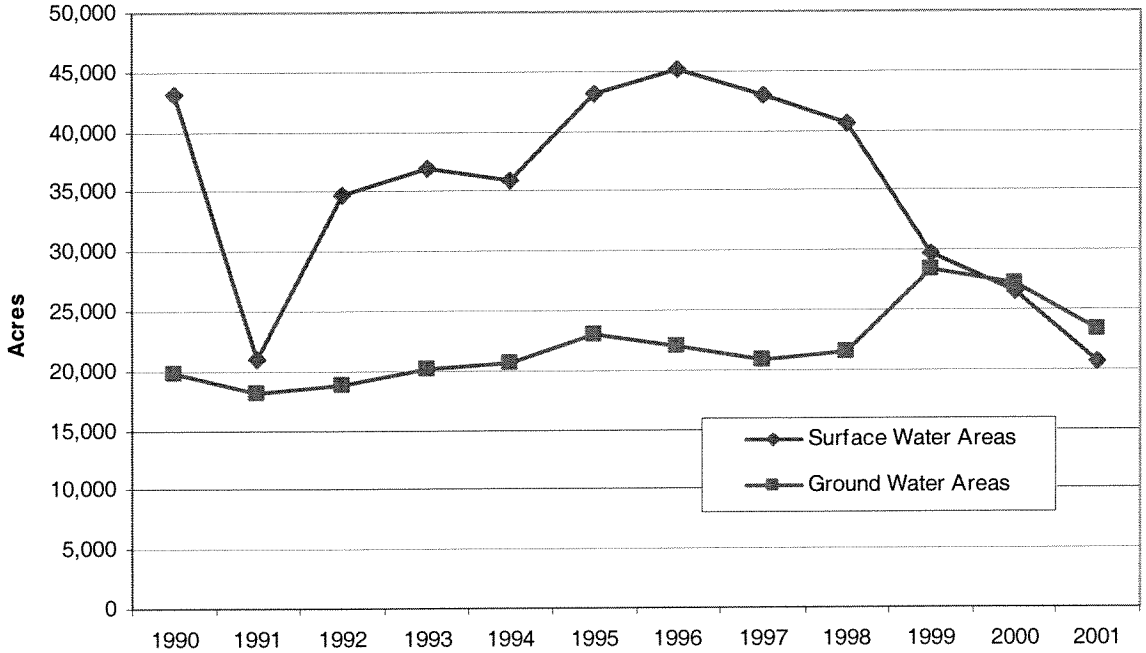
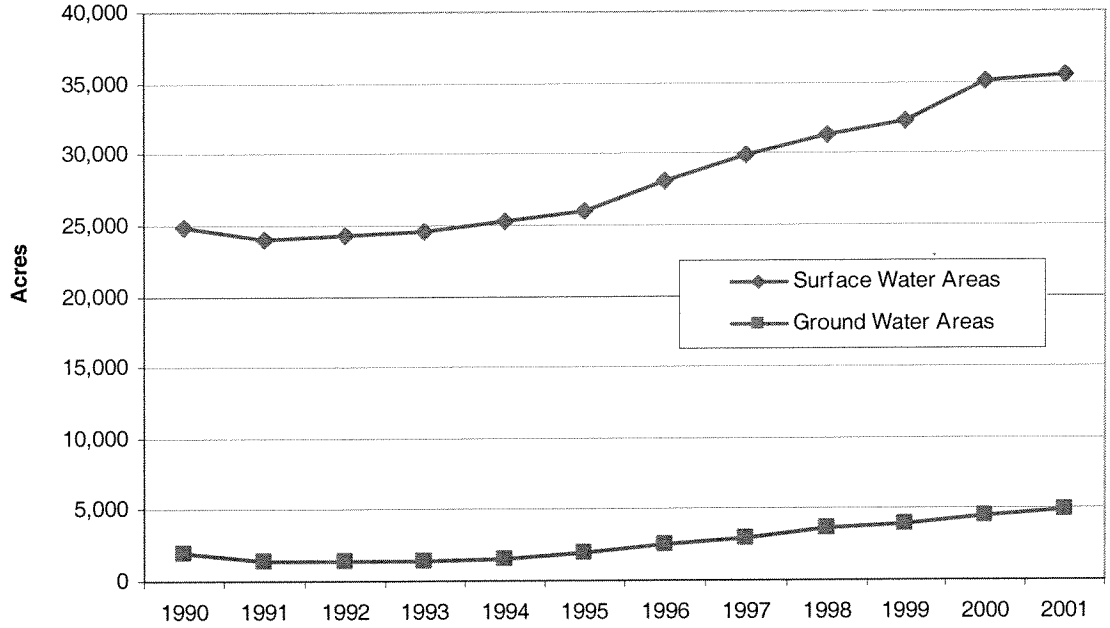



**Figure 4**
**Permanent Crop Land in Surface and Ground Water Areas, WRMWSD**



## Factors Accounting for Cropping Pattern Changes

Changes in cropping patterns, whether from one type of annual crop to another or from annual crops to permanent crops, may be due to several factors. Some of the more important within WRMWSD may include:[11]

- Market conditions and crop prices;
- Input requirements and costs;
- Soil and micro-climate characteristics;
- Crop rotation requirements, including fallowing;
- Water availability and cost;
- Government programs; and
- Contracts with crop processors.

Absent detailed information from each farmer in an area, it is not possible to attribute changes in cropping patterns to any of these or other individual factors. However, changes in prices and production costs for key crops, particularly cotton, grapes, and citrus, and in water costs and availability appear to have played important roles.

Cotton prices have declined in both nominal and real terms since 1990. Acala cotton grown in Kern County[12] sold at an average farm price of $0.77 per pound in 1990. Yield averaged 1,200 pounds per acre, and gross revenue thus averaged $924 per acre.[13] In 2001, the last year for which data are currently available, the average farm price for Acala cotton grown in Kern County was $0.68 per pound. Yield averaged 1,342 pounds per acre, and gross revenue averaged $905 per acre.

While average per-acre gross revenue fell 2.1 percent between 1990 and 2001, costs of production have increased sharply and profitability has declined or disappeared for many growers. In 1995, average total costs to produce cotton in the San Joaquin Valley were estimated at $815 per acre, assuming a yield of 1,250 pounds of lint and application of 2.5

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11 These are discussed in more detail in the section on farm-level decision making.

12 Acala cotton has accounted for 76 to 93 percent of all Kern County cotton since 1990.

13 Kern County Department of Agriculture.

AF of water at $50 per AF.[14] The total cost figure excludes a payment for management or risk. Average gross revenue for cotton that year in Kern County was reported to be $815 per acre.[15] Thus, the average gross revenue for cotton in 1995 would just cover all costs, but not cover a payment to compensate for management and risk. Moreover, WRMWSD delivered water costs that year were between $58 and $193 per AF, depending on the zone of the district to which the water was delivered.[16] Thus, all other factors unchanged, cotton production in WRMWSD that year would have generated losses of between $20 and $483 per acre, disregarding any compensation for risk or management.[17]

Current published costs are $1,002 per acre for Acala cotton, assuming a lint yield of 1,250 pounds per acre and 2.5 AF of water at $60 per AF, but also excluding payments for risk and management.[18] Under these conditions and based on current cotton prices (assumed at $0.70 per pound, including loan deficiency payments), gross revenue would exceed total costs by $61 per acre, but without a return for management or risk. However, WRMWSD delivered water costs ranged from $89 to $230 per AF in 2001 and are expected to range from $101 to $260 per AF for all of 2002.[19] Clearly, cotton production is infeasible in parts of WRMWSD, and the result has been a continued shift from cotton to other, higher-profit crops

While not an exhaustive list, several factors may limit farmers from changing their crop mix. First, the market demands for fruits, nuts, and vegetable crops may signal that additional plantings of those crops would have adverse effects on supply and price. Second, processing capacity and the unavailability of processor contracts may limit the amount of vegetable crops such as tomatoes a farmer chooses to grow. Third, field and grain crops, while sometimes unprofitable in isolation, remain important parts of diversified crop rotations. Fourth, the crop history and risk characteristics of farmers may reduce the attraction of changing established cropping patterns.

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14 University of California Cooperative Extension, 1995.

15 Kern County Department of Agriculture.

16 Robert Kunde, WRMWSD, April 1, 2003, personal communication.

17 It is acknowledged that every farm is unique, characterized by soil type, debt levels, water sources and other factors. Moreover, acreage data show that cotton is clearly still profitable on some farms in WRMWSD. However, the sharp declines in cotton acreage since 1990 indicate that the crop is less profitable or unprofitable in many parts of the district.

18 University of California Cooperative Extension, 2003.

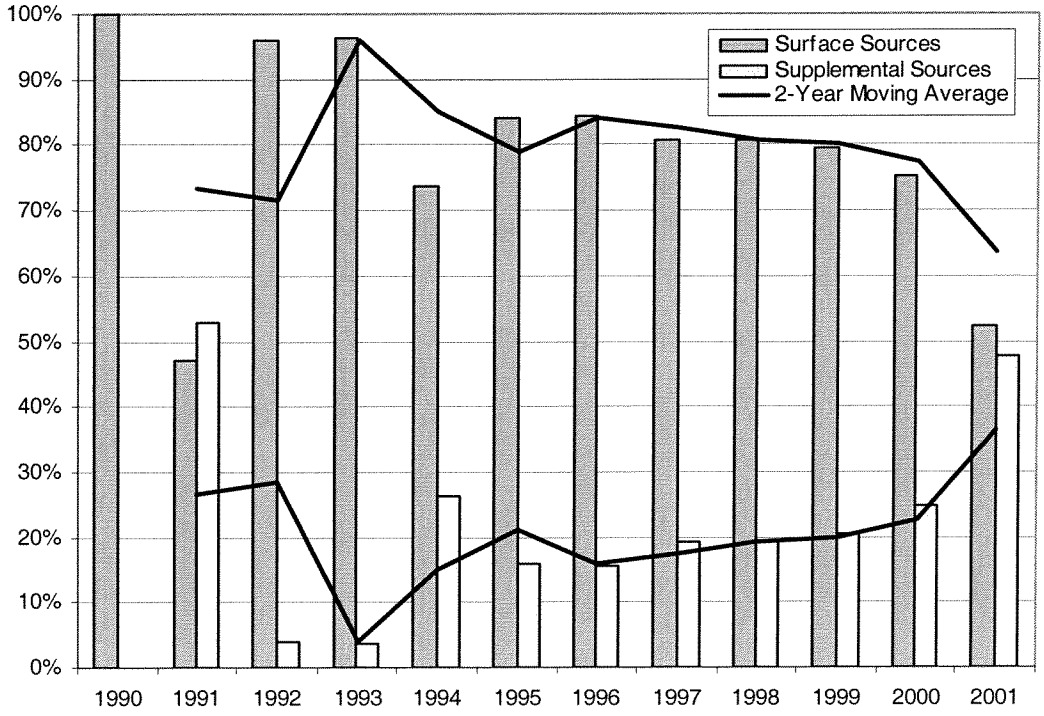
19 Robert Kunde, WRMWSD, April 1, 2003, personal communication.

## Water Sources

WRMWSD has a contract for SWP water through Kern County Water Agency and regularly provides that water to farmers as supplies permit. However, WRMWSD has also developed district wells and has access to other water sources such that its "water portfolio" is much more diversified today than it was in the late 1980s or early 1990s. Much of this diversification was in response to the nearly complete abrogation of the State of California's responsibility to provide a reliable water supply from the State Water Project, aggravated by the effects of the 1987-92 drought.

Several individual sources collectively comprise the "supplemental water." These include district wells, Blanco Rosa Improvement District wells, Kern Water Bank, Pioneer Project, Berrenda Mesa project, and miscellaneous supplies. Figure 5 shows that these alternative sources have become an increasingly-important component of total WRMWSD potential water availability. The two-period moving average trend line is clearly upward sloping, while that for traditional surface sources is declining. It should be noted that the data on which the figure is based include potential surface and supplemental water supplies rather than actual deliveries. Potential surface supplies are calculated as the sum of Article 21 water, carryover, user input, and the product (SWP Entitlement * Percentage of SWP Allocation) for each year.

**Figure 5**
**Surface and Supplemental Water Sources, WRMWSD**



## Water Use

WRMWSD maintains records for all water deliveries it makes each year. It does not obtain information on ground water pumping by individual farmers. Thus, total water use within the district for any given year is not a single number that can be taken from a report. Bookman-Edmonston Engineering developed average applied water requirements for crops grown in WRMWSD.[20] Estimates of total applied water within WRMWSD were developed by using these estimates and multiplying those rates by acreages taken from the annual WRMWSD crop reports. The application rates used are shown in Table 3. The estimated applications, total WRMWSD deliveries, and estimated water applied, but from other sources, are shown in Table 4.

For the period from 1990 through 1999, total annual deliveries by WRMWSD averaged 158,056 AF. From 1999 through 2001, they averaged 168,335 AF. Based on the application rates shown in Table 3 and the crop acreages shown in Table 2, WRMWSD deliveries accounted for about 63 percent of total water applied to crops in the service area from 1990 through 1999 and 65 percent from 1999 through 2001. It should be noted that the estimated applied water figures in Table 4 represent potential applications and assume that farmers were able to obtain all required water in each year. For years in which all water supplies were limited (e.g., 1991), the applied water figures overstate actual applications.

**Table 3**
**Average Applied Water Requirements for Various Crops Grown in WRMWSD**

| Crop | Average Applied Water Requirement (Acre-feet per acre) |
|---|---|
| Cotton | 3.00 |
| Sugar beets | 4.20 |
| Grains | 1.35 |
| Green feeds | 5.00 |
| Mixed produce | 2.20 |
| Melons | 2.20 |
| Vineyards | 2.80 |
| Deciduous nuts | 3.90 |
| Deciduous fruits | 3.90 |
| Citrus | 3.60 |
| Pomegranates | 3.60 |
| Eucalyptus/jojoba | 2.50 |

20 Bookman-Edmonston Engineering.

## Table 4
## Estimated Applied Water, by Crop and Source, WRMWSD Service Area (Acre-Feet)

| Crop | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Cotton | 114,213 | 48,576 | 73,863 | 93,189 | 100,107 | 110,385 | 104,106 | 97,107 | 74,862 | 62,343 | 66,327 | 48,612 |
| Sugar beets | 3,037 | 3,133 | 3,465 | 2,894 | 1,554 | 1,718 | 634 | 0 | 760 | 0 | 0 | 0 |
| Grain | 3,634 | 4,658 | 13,310 | 11,019 | 5,048 | 12,866 | 15,935 | 11,074 | 21,041 | 16,551 | 12,820 | 12,566 |
| Green feeds | 9,180 | 5,730 | 6,030 | 7,210 | 7,570 | 10,010 | 8,685 | 14,615 | 14,685 | 16,700 | 14,665 | 14,620 |
| Mixed produce | 42,909 | 38,432 | 28,536 | 27,311 | 29,960 | 29,333 | 32,494 | 36,098 | 32,017 | 39,123 | 37,158 | 29,141 |
| Melons | 0 | 0 | 8,941 | 7,394 | 8,430 | 8,961 | 8,723 | 8,633 | 8,459 | 8,699 | 5,168 | 4,930 |
| Vineyard | 30,013 | 27,672 | 26,972 | 27,182 | 27,378 | 30,167 | 35,132 | 39,822 | 42,882 | 44,086 | 48,684 | 49,563 |
| Deciduous Nuts | 26,774 | 26,906 | 26,910 | 27,386 | 28,856 | 28,295 | 29,796 | 29,734 | 31,972 | 32,686 | 33,185 | 32,639 |
| Deciduous Fruit | 8,089 | 8,198 | 7,851 | 7,831 | 8,034 | 8,057 | 8,401 | 8,600 | 8,206 | 7,757 | 8,026 | 7,519 |
| Citrus | 22,363 | 22,439 | 24,030 | 24,955 | 26,068 | 26,896 | 28,332 | 30,535 | 32,436 | 35,053 | 40,043 | 43,308 |
| Pomegranates | 875 | 875 | 1,264 | 1,264 | 1,264 | 1,264 | 1,264 | 1,264 | 1,217 | 1,357 | 1,357 | 1,357 |
| Eucalyptus/jojoba | 1,640 | 230 | 533 | 35 | 15 | 15 | 48 | 48 | 48 | 48 | 48 | 48 |
| Total estimated applied water 1/ | 262,726 | 186,848 | 221,704 | 237,670 | 244,283 | 267,965 | 273,549 | 277,527 | 268,584 | 264,402 | 267,480 | 244,303 |
| Total WRMWSD Deliveries | 187,335 | 65,274 | 125,979 | 146,524 | 160,564 | 162,138 | 202,581 | 198,305 | 149,292 | 182,570 | 183,929 | 138,506 |
| WRMWSD Deliveries/Total estimated applied water | 71% | 35% | 57% | 62% | 66% | 61% | 74% | 71% | 56% | 69% | 69% | 57% |
| Estimated Water Applied From Other Sources | 75,391 | 121,574 | 95,725 | 91,146 | 83,720 | 105,827 | 70,968 | 79,222 | 119,292 | 81,832 | 83,551 | 105,797 |

1/ Assumes supplies available regardless of source.

# Decision-Making by Farmers

The data shown in the previous section reflect the combined effects of innumerable decisions made by farmers in the WRMWSD service area each year. Farm-level decision making in WRMWSD and every other agricultural area is a continuous process that adheres to and at times departs from traditional economic theory and models.

Farmers operate, more than most other industries, in an environment closely aligned with the "purely competitive" model of economics.[21] Agriculture includes thousands of producing units all making decisions independent of each other, virtually all are price takers, all have access to good information about markets and prices, and all, or nearly all, are trying to earn as much profit as they can from their operations.

There are extensive domestic and international influences on agriculture. Domestically, the price of natural gas affects fertilizer prices, the price of crude oil affects costs of gasoline and diesel fuel, interest rates affect the cost of operating loans, and economic growth affects consumer demands for all types of products. Agriculture is also subject to many influences from the global economy, evident in the tariffs in the U.S. and other countries on agricultural imports, the increasing production of such crops as cotton and deciduous nuts in Asia, and fluctuating exchange rates.

The decision-making framework which farmers must employ for their operations therefore includes considerations well beyond the farm gate. The results are indicated by decisions such as:

- Crops to plant and when;
- Inputs used and in what combinations;

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21 See Henderson and Quandt.

- When and how to acquire or sell resources;
- When and where to sell harvested crops; and
- When to adopt new technology.

## Profit Maximization

One of the key assumptions in agricultural economics and farm management is that farmers attempt to use resources in a way that will maximize the profit of their operations.[22] An expanded form of that assumption is that farmers, with limited capital, attempt to allocate resources to their land in order to maximize profit across all crops they grow. There are many combinations of inputs which farmers can use in their operations, reflecting opportunities and costs. For example, weeds can be controlled chemically or with manual labor. Seeding and harvesting can be accomplished mechanically or by hand. Land preparation and fertilizing can be undertaken by the farmer or performed by custom operators.

In attempting to maximize profits, farmers weigh the tradeoffs and combine inputs in such a way that, at the margin, the value of product produced with each unit of input is the same for all inputs. All other factors unchanged, so long as the "value of marginal product" is greater for one input than for others, it is rational for the farmer to use at least one more unit of that input because the revenue from the product produced with that unit will exceed the cost of the input.[23] It is reasonable to assume that this framework is applicable not only to such inputs as fertilizer and chemicals, but also to water.

## Crop Rotations and Profit Maximization Over Time

The decision-making framework is somewhat more complicated for the more realistic situation of farming continuously over time rather than in many separate single-year periods. This is particularly true for trees and vines, which take several years to mature and then remain productive for many years. However, for farmers growing several annual crops, a realistic goal would be to maximize profits over a crop rotation. Rotations generally include a sequence which alternates a variety of crops. Rotations may involve several crops and

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22 See, for example, Heady and Kay and Edwards.

23 It is recognized that not all farmers are in business to maximize profits and do not have, at all times, the information possibly relevant to efficient decision making. However, given the unavailability of information on alternative goals, it is usually assumed that farmers are in business to maximize their profits. See Heady.

cover a period of several years. Accordingly, crop rotations may have a direct effect on the cropping pattern data reported for a given area.

The purposes of rotations include rebuilding soil nutrient levels, reducing pest concentrations and disease problems, and enhancing soil organic matter. It has been demonstrated that continuously planting the same crop on land causes the population of soil borne pathogens to increase.[24] Planting crops that are not hosts causes the populations of those pathogens to decline. Plants which belong to the same family or class of plants (e.g., broadleaf) often share similar pest problems. Thus, effective rotations must incorporate crops which are not closely related.

Some of the factors which affect the rotations used by farmers include the following:[25]

- Cropping history;
- Grower experience;
- Input requirements for crops;
- Compatibility of crops with existing equipment complement and with labor;
- Existing array of pests; and
- Value of crop and market conditions.

Cotton has traditionally been the core crop for rotations in many parts of Kern County. Historically, rotations included cotton and small grains, both grown for commercial sale.[26] More recently, however, small grains have not been grown as extensively for commercial sale because of low crop prices. They are still grown for silage. Other crops more typically included in cotton rotations are tomatoes, onions, melons, carrots, and alfalfa. Typical rotations might include:

- Two years of cotton and one year of tomatoes or melons;
- Two years of cotton, one year of tomatoes or melons or onions, and three years of alfalfa; and

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24 See Nunez.

25 University of California Cooperative Extension, 1995.

26 Brian Marsh, University of California Cooperative Extension, Bakersfield, March 26, 2003, personal communication.

- One or two years of cotton, three years of alfalfa, one year of tomatoes or melons or onions or carrots, and one year of small grain.

By incorporating small grain and comparable crops into rotations, farmers sometimes appear to be growing economically-inefficient crops. However, the use of low-return crops such as small grains in rotations often reflects agronomic rather than purely economic considerations. The value from these crops would be reflected in better soil conditions and higher yields for other rotation crops in subsequent years. Thus, because of rotations, profit maximization must be viewed from a multi-year rather than a single-year perspective.

Fallowing may be an integral part of crop rotations. Fallowing, with a cover crop, may offer efficient opportunities to rebuild soil organic matter and conserve soil moisture. In addition, farmers may fallow some of their land in order to divert irrigation water usually used there to other, more productive parts of their farms. Farmers may also fallow land in order to be eligible for provisions of various government farm programs or as a component of reduced-tillage strategies.

## Effects of Water Costs and Availability

As noted previously, changes in measured cropping patterns for an area may be due to a variety of factors, including market conditions, crop prices, government programs, contracts with crop processors, and soil and climate characteristics. For WRMWSD farmers and other farmers throughout the San Joaquin Valley, the availability and cost of water are also critical factors in farmers' decisions on which crops to grow and thus in reported cropping patterns. As water reliability is reduced or water costs increase, economic theory suggests that farmers will adjust their crop and input choices to reflect the greater relative scarcity or cost of the resource.

For SWP water, both factors are likely important. Reliability of SWP water was addressed in a recently-completed report, which projected likely delivery capability of the system through 2021.[27] The key findings were that:

- In 75 percent of the years, the annual water delivery of the SWP is estimated to be at least 66 percent of full Table A deliveries

- In 50 percent of the years, annual water delivery is estimated to be at least 83 percent; and

- In 10 percent of the years, annual water delivery is estimated to be at least 98 percent.

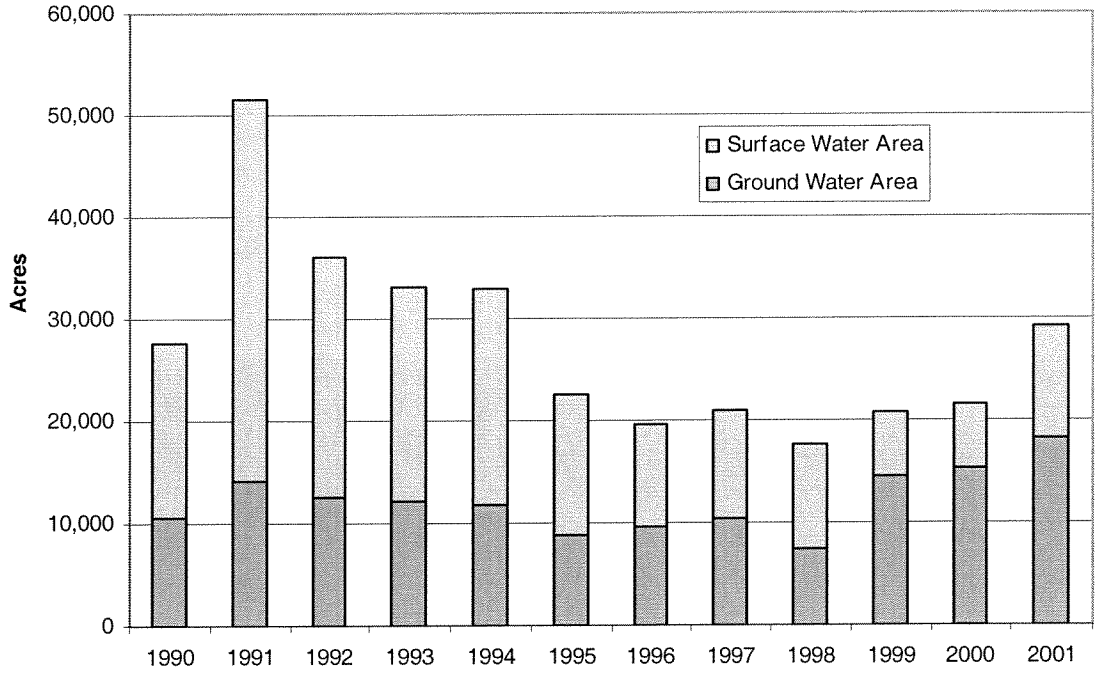
---

[27] California Department of Water Resources, 2002.

Moreover, costs of SWP water and other key inputs have risen, in some cases to the point that uncertainties over water deliveries, crop prices, and other key variables have caused some farmers to change their rotations and crop selection. The shift from annual to permanent crops in WRMWSD likely reflects this behavior. As discussed previously, cotton production is no longer feasible for many farmers. The shift from cotton and other annual crops to permanent crops in the surface water service areas of WRMWSD is evidence of these and other issues. Similar shifts in ground water service areas likely reflect the increased costs of production, including increased costs for energy used in pumping.

District data show that the amount of fallowed land has increased since 1998. Prior to that year, most of the fallowed land in WRMWSD was in the surface water service areas. Since then, an increasing amount of fallowed land has been in ground water service areas (see Figure 6). It is likely that some land has been fallowed for longer periods or idled because of the high costs of production, including water. Between 1992 and 1996, SWP deliveries to WRMWSD rose, and total fallowed land in the district fell. In 1997, about equal amounts of land were fallowed in surface water and ground water service areas. However, while SWP deliveries fell from 1996 to 1998, the amount of fallowed land in surface water areas decreased rather than increased. As deliveries rose by about 36,000 AF between 1998 and 2000, fallowed land in surface water areas declined about 3,700 acres, while that in ground water areas increased about 9,800 acres.

**Figure 6**
**Fallowed Land in Ground Water and Surface Water Service Areas, WRMWSD**



# Results

This section evaluates the expected effects on agricultural practices, including land fallowing, of the 41,000 AF transfer of SWP water from WRMWSD. It draws from the discussion of farm-level decision making and from a review of data presented throughout the report. The approach utilized to estimate the impacts relies on a review of long-term water demands in WRMWSD and of other data previously presented. Discussion includes the expected effects of the transfer during normal and wet years and in dry years on district supplies and costs and on farmer responses.

Table 4 shows that total WRMWSD deliveries of water from all sources since 1990 have varied from a minimum of about 65,000 AF in 1991 to a maximum of nearly 203,000 AF in 1996. Table 4 also shows that estimated total applied water requirements have ranged from about 187,000 AF in 1991 to nearly 278,000 AF in 1997. Estimated total water applied using all water sources fell by 13,125 AF between 1997 and 1999 and by an additional 20,099 AF between 1999 and 2001. From 1990 through 1999, WRMWSD deliveries accounted for an average of 63 percent of total applied water. From 1999 through 2001, they accounted for 65 percent.

Prior to the 41,000 AF transfer, WRMWSD had a water supply contract to Kern County Water Agency for Table A amount of about 238,000 AF of SWP water. In normal or wet years, the 41,000 AF appears to be in excess of district needs. It is therefore reasonable to assume that in those years, the transfer would have no effects or minimal adverse effects on overall water supply. Moreover, it is likely that the transfer would not cause overall water costs to increase in normal or dry years. Therefore, neither quantity nor cost of district water should be affected adversely, and the impacts on land fallowing should be minimal.

In years when the demand for SWP water exceeds supply, the impacts of the transfer on fallowing are more difficult to estimate. Assuming an SWP allocation of 50 percent, the 41,000 AF contract amount would provide 20,500 AF of water, sufficient to irrigate 6,000 to 7,000 acres of land. Cropped acreage within WRMWSD varies by an average of 11.6 percent per year, or about 9,700 acres. That variation is a result not only of water supplies

and costs, but also market conditions and crop prices, changes in government programs, input costs, and other factors. In a series of consecutive 'dry years,' the unavailability of a proportional share of the SWP contract amount may contribute to a mismatch between water supply and demand. However, the effect depends on the annual reliable supply and costs of the water from district wells and the other supplemental sources. If the supplies from the supplemental sources offset the reduced SWP entitlement, there should be a limited effect on water availability. Overall, the water supplies from the supplemental sources more than offset the reduced SWP Entitlement and, when the carrying cost of holding excess SWP Entitlement is considered, at a lower cost.

If overall water costs increase, there may be some farm-level impacts. WRMWSD has used several of its supplemental sources concurrently only in 2001. The variable and fixed costs (excluding capital costs) for that year did not differ substantially from SWP costs over the previous five years. If the costs in 2001 are representative, the incremental impacts of the transfer on delivered water costs to farmers should not be significant. The amount of land fallowed in this dry year scenario, including the transfer, should not be materially different from the normal variation in cropped acreage between years.

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# *Appendix D*

**Technical Data for Hydrologic Analysis**

# TABLE OF CONTENTS


INTRODUCTION ..... D-1

1.0 STATE WATER PROJECT DESCRIPTION ..... D-3
- 1.1 State Water Project Facilities ..... D-3
- 1.2 State Water Project Supply Capability ..... D-13
- 1.3 State Water Project Water Supply Contracts ..... D-14

2.0 DWR MODEL STUDIES ..... D-19
- 2.1 Model Studies Selected for Use ..... D-19
- 2.2 Comparison of DWRSIM to CALSIM II ..... D-19
- 2.3 Model Assumptions ..... D-20
- 2.4 Selected Model Input and Output ..... D-23

3.0 STATE WATER PROJECT SUPPLY ANALYSIS ..... D-33
- 3.1 Analysis Assumptions and Methodology ..... D-33
  - 3.1.1 Overview of Analysis ..... D-33
    - 3.1.1.1 SWP Water Supply Allocation Scenarios ..... D-33
    - 3.1.1.2 Hydrologic Conditions ..... D-33
  - 3.1.2 Common Assumptions and Methodology ..... D-36
  - 3.1.3 Scenario-Specific Assumptions and Methodology ..... D-38
    - 3.1.3.1 Without Monterey Amendment ..... D-38
    - 3.1.3.2 With Article 18(b) Implemented ..... D-39
    - 3.1.3.3 With Monterey Amendment ..... D-44
- 3.2 Analysis Results ..... D-45
  - 3.2.1 Without Monterey Amendment ..... D-45
  - 3.2.2 With Article 18(b) Implemented ..... D-49
  - 3.2.3 With Monterey Amendment ..... D-53

4.0 SAN LUIS RESERVOIR STORAGE ANALYSIS ..... D-57
- 4.1 Analysis Methodology and Assumptions ..... D-57
  - 4.1.1 Background ..... D-57
  - 4.1.2 Overview of Analysis ..... D-57
    - 4.1.2.1 Monthly Delivery Distribution ..... D-58
    - 4.1.2.2 San Luis Reservoir Storage ..... D-59
- 4.2 Analysis Results ..... D-59
  - 4.2.1 Monthly Delivery Distribution ..... D-59
  - 4.2.2 San Luis Reservoir Storage ..... D-60

5.0 CASTAIC LAKE STORAGE ANALYSIS ..... D-67
- 5.1 Analysis Methodology and Assumptions ..... D-67
  - 5.1.1 Background ..... D-67
  - 5.1.2 Overview of Analysis ..... D-67
- 5.2 Analysis Conclusions ..... D-68

6.0 CLWA SUPPLIES FOR ENVIRONMENTAL SETTING ..... D-71
6.1 Assumptions ..... D-71
6.1.1 Common Assumptions ..... D-71
6.1.2 Scenario-Specific Assumptions ..... D-72
6.1.2.1 1998 Environmental Baseline ..... D-72
6.1.2.2 Current Environmental Setting ..... D-72
6.2 Baseline Supplies ..... D-73
6.2.1 1998 Environmental Baseline ..... D-73
6.2.2 Current Environmental Setting ..... D-74
7.0 REFERENCES ..... D-75
8.0 ACRONYMS ..... D-77

## LIST OF TABLES

1-1 Annual SWP Deliveries from Castaic Lake by Contractor, 1990 to 2000 ..... D-12
1-2 SWP Annual A Deliveries, 1990 to 2003 ..... D-13
2-1 Key DWRSIM Study Assumptions ..... D-22
2-2 DWRSIM SWP Demand Input and Delivery Output at Existing SWP Demand Conditions ..... D-26
2-3 DWRSIM SWP Demand Input and Delivery Output at 2020 SWP Demand Conditions ..... D-27
2-4 DWRSIM Output of SWP San Luis Reservoir Storage at Existing SWP Demand Conditions ..... D-29
2-5 DWRSIM Output of SWP San Luis Reservoir Storage at 2020SWP Demand Conditions ..... D-30
2-6 DWRSIM Output of Castaic Lake Storage at Existing SWP Demand Conditions ..... D-31
2-7 DWRSIM Output of Castaic Lake Storage at 2020 SWP Demand Conditions ..... D-32
3-1 Summary of Without Monterey Amendment, With Article 18(b) Implemented and With Monterey Amendment Allocation Scenarios ..... D-35
3-2 SWP Surplus Water Types ..... D-37
3-3 WRMWSD SWP A Supply at Existing and 2020 SWP Demand Conditions, Without Monterey Amendment ..... D-46
3-4 CLWA SWP A Supply at Existing and 2020 SWP Demand Conditions, Without Monterey Amendment ..... D-46
3-5 WRMWSD SWP A and Scheduled Surplus Supply at Existing and 2020 SWP Demand Conditions, With Article 18(b) Implemented ..... D-49
3-6 CLWA SWP A and Scheduled Surplus Supply at Existing and 2020 SWP Demand Conditions, With Article 18(b) Implemented ..... D-51
3-7 WRMWSD SWP A Supply at Existing and 2020 SWP Demand Conditions, With Monterey Amendment ..... D-53
3-8 CLWA SWP A Supply at Existing and 2020 SWP Demand Conditions, With Monterey Amendment ..... D-54
4-1 Average Change in SWP A Deliveries Resulting From the Project at Existing and 2020 SWP Demand Conditions, With Monterey Amendment ..... D-60

4-2 Net Change in SWP A Deliveries Resulting From the Project at Existing SWP Demand Conditions, With Monterey Amendment ..... D-62
4-3 Net Change in SWP A Deliveries Resulting From the Project at 2020 SWP Demand Conditions, With Monterey Amendment ..... D-63
4-4 Net Change in San Luis Reservoir Storage Resulting From the Project at Existing SWP Demand Conditions, With Monterey Amendment ..... D-65
4-5 Net Change in San Luis Reservoir Storage Resulting From the Project at 2020 SWP Demand Conditions, With Monterey Amendment ..... D-66
6-1 1998 Water Supplies for the CLWA Service Area ..... D-74
6-2 Existing Water Supplies for the CLWA Service Area ..... D-74

## LIST OF FIGURES

1-1 Primary SWP Facilities ..... D-4
1-2 SWP Contractor Service Areas ..... D-5
1-3 Water Quality Criteria Applicable to SWP Delta Pumping ..... D-6
1-4 SWP Storage in San Luis Reservoir, 1990 to 2001 ..... D-10
1-5 SWP Storage in San Luis Reservoir, 1990 to 2001 Average End-of-Month Storage ..... D-10
1-6 Castaic Lake Storage, 1990 to 2001 ..... D-11
1-7 Castaic Lake Storage, 1990 to 2001 Average End-of-Month Storage ..... D-12
2-1 Total SWP Table A Deliveries at Existing SWP Demand Conditions ..... D-21
2-2 Total SWP Table A Deliveries at 2020 SWP Demand Conditions ..... D-21
2-3 DWRSIM Total SWP Table A Deliveries ..... D-25
2-4 DWRSIM Total SWP Table A Deliveries, as Percent of Demand and Percent of Table A Amount ..... D-25
2-5 DWRSIM Output of SWP San Luis Reservoir Storage, Average End-of-Month Storage ..... D-28
2-6 DWRSIM Output of Castaic Lake Storage, Average End-of-Month Storage ..... D-28
3-1 Water Supply Analysis Overview ..... D-34
3-2 WRMWSD SWP Table A Supply at Existing SWP Demand Conditions, Without Monterey Amendment ..... D-47
3-3 WRMWSD SWP Table A Supply at 2020 SWP Demand Conditions, Without Monterey Amendment ..... D-47
3-4 CLWA SWP Table A Supply at Existing SWP Demand Conditions, Without Monterey Amendment ..... D-48
3-5 CLWA SWP Table A Amount at 2020 SWP Demand Conditions, Without Monterey Amendment ..... D-48
3-6 WRMWSD SWP Table A and Scheduled Surplus Supply at Existing SWP Demand Conditions, With Article 18(b) Implemented ..... D-50
3-7 WRMWSD SWP Table A and Scheduled Surplus Supply at 2020 SWP Demand Conditions, With Article 18(b) Implemented ..... D-50
3-8 CLWA SWP Table A and Scheduled Surplus Supply at Existing SWP Demand Conditions, With Article 18(b) Implemented ..... D-52
3-9 CLWA SWP Table A and Scheduled Surplus Supply at 2020 SWP Demand Conditions, With Article 18(b) Implemented ..... D-52

3-10 WRMWSD SWP Table A Supply at Existing SWP Demand Conditions, With Monterey Amendment ..... D-54
3-11 WRMWSD SWP Table A Supply at 2020 SWP Demand Conditions, With Monterey Amendment ..... D-54
3-12 CLWA SWP Table A Supply at Existing SWP Demand Conditions, With Monterey Amendment ..... D-55
3-13 CLWA SWP Table A Supply at 2020 SWP Demand Conditions, With Monterey Amendment ..... D-56
4-1 Average Change in SWP Table A Deliveries to WRMWSD and CLWA at Existing SWP Demand Conditions ..... D-61
4-2 Average Change in SWP Table A Deliveries to WRMWSD and CLWA at 2020 SWP Demand Conditions ..... D-61
4-3 Average Monthly Change in SWP San Luis Storage with the Project, With Monterey Amendment ..... D-64
4-4 Average Monthly SWP San Luis Storage With and Without the Project, With Monterey Amendment ..... D-64

# INTRODUCTION

The purpose of this appendix is to provide supporting information for the water analyses conducted for the Environmental Impact Report (EIR) for the Castaic Lake Water Agency's (CLWA's) supplemental State Water Project (SWP) Table A Amount transfer of 41,000 acre-feet (AF). Specifically, the appendix contains supporting information about the analysis of the SWP water supply and San Luis Reservoir and Castaic Lake storage performed for the Project.

The Project is the transfer of an existing 41,000 AF of SWP Table A Amount from the Kern County Water Agency (KCWA), and its member unit, the Wheeler Ridge-Maricopa Water Storage District (WRMWSD), to CLWA. The Project also includes the use of SWP facilities from Northern California to Los Angeles County for the delivery of SWP water to the CLWA service area, and use of this water within the CLWA service area. The Project water is transported from points of origin in the SWP system to the CLWA intake south of Castaic Lake via existing SWP facilities.

The Project currently is being implemented by an amendment to the SWP Water Supply Contracts of CLWA and KCWA. The Project is to authorize CLWA to use the water from the 41,000 AF of SWP Table A Amount for water demands of existing users and some anticipated future water demands.

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# 1.0 STATE WATER PROJECT DESCRIPTION

## 1.1 STATE WATER PROJECT FACILITIES

The SWP is a large water supply, storage, and distribution system authorized by an act of the California State Legislature in 1959. In 1960, California voters approved a $1.75 billion bond issue to begin building SWP facilities. Today, the SWP includes 28 storage facilities, reservoirs and lakes; 20 pumping plants; six pumping-generating plants and hydroelectric power plants; and about 660 miles of aqueducts and pipelines (DWR 2002). Figure 1-1 provides an overview of SWP facilities.

The primary purpose of the SWP is to distribute water to 29 urban and agricultural public water agencies (or "Contractors") in Northern California, the San Francisco Bay Area, the San Joaquin Valley, the Central Coast, and Southern California. The 29 SWP Contractor service areas are shown in Figure 1-2. Of total current SWP deliveries, approximately 50 percent goes to meet the needs of the state's growing urban population, and approximately 50 percent is used to irrigate farmland (DWR 2002). The SWP provides supplemental water to approximately 22 million persons and 600,000 acres of farmland (DWR 2002). In addition to its primary purpose, the SWP is also operated to assist in the control of Feather River floodwaters, provide recreation, generate energy, and enhance fish and wildlife habitats.

The primary water source for the SWP is within the drainage of the Feather River, a tributary of the Sacramento River. This runoff is primarily stored behind Oroville Dam in Butte County. Lake Oroville can hold a maximum of 3.5 million AF, including storage for both water supply and flood control. Water released from Oroville Dam flows down natural channels to the Sacramento-San Joaquin River Delta (Delta) where some of the water is pumped through the North Bay Aqueduct to serve Napa and Solano counties.

In the southern Delta, water is pumped into the 444-mile-long Governor Edmund G. Brown California Aqueduct (California Aqueduct) at the Clifton Court Forebay by the Harvey O. Banks Delta Pumping Plant (Banks Pumping Plant). The Clifton Court Forebay provides storage and regulation capability for the Banks Pumping Plant. Water from the Delta enters the Clifton Court Forebay from the West Canal, a channel of Old River, through an intake structure at the southeastern corner of the forebay. From Clifton Court Forebay, water passes through the John E. Skinner Delta Fish Protective Facility where fish are screened out before the water is pumped into the aqueduct.

SWP water exports for users south of the Delta pumping facilities are currently limited by a series of water quality and operational constraints, governed primarily by the California State Water Resources Control Board's (SWRCB) Water Right Decision 1641, as amended. Decision 1641 is summarized in Figure 1-3. Decision 1641 was adopted by the SWRCB in 1999; prior to that time, SWP water exports from the Delta were limited by the SWRCB's Water Right Decision 1485 (adopted in 1978), Order Water Right (WR) 95-6 (adopted in 1995), and Order WR 98-09 (adopted in 1998).

The Central Valley Project (CVP), a federal water supply project that supplies water to users in Northern California and the San Joaquin Valley, also diverts water from the southern Delta at

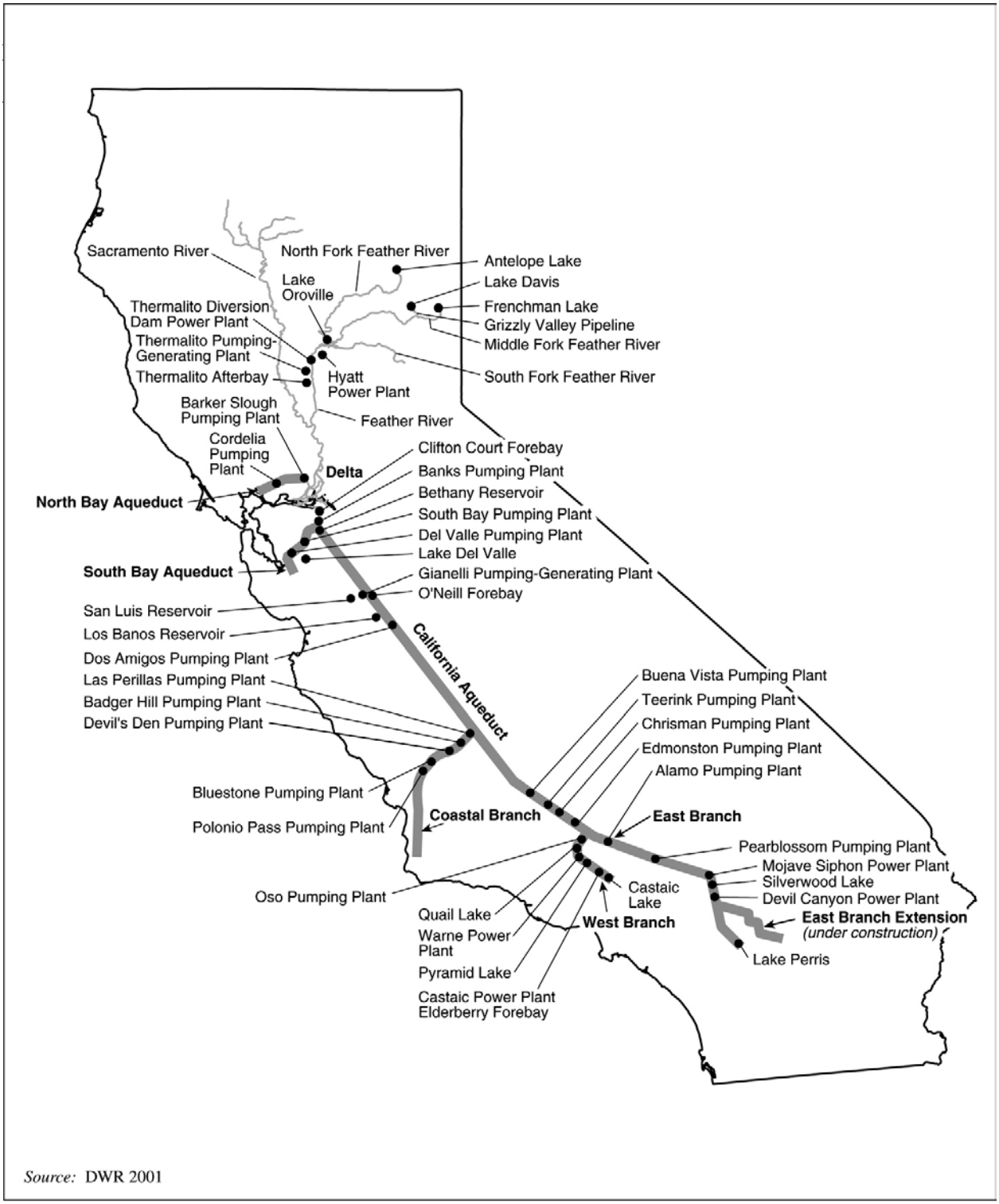
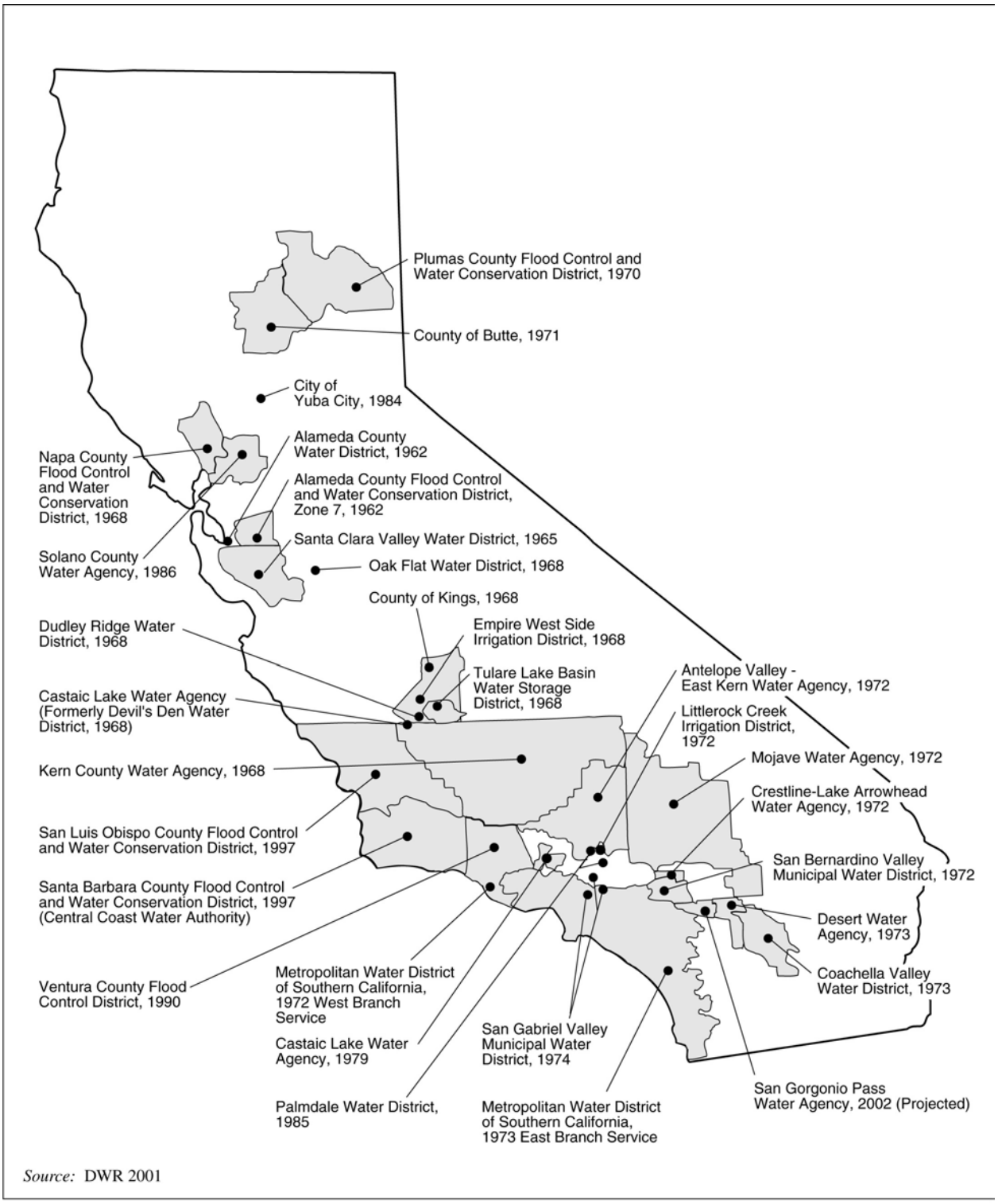



**Figure 1-1. Primary SWP Facilities**




*Source:* DWR 2001

**Figure 1-2. SWP Contractor Service Areas**

Figure

1-3 Water Quality Criteria Applicable to SWP Delta Pumping

page 1 of 3 (landscape)

**Figure 1-3. Water Quality Criteria Applicable to SWP Delta Pumping**
Page 2 of 3

Footnotes:

[1] Maximum 3-day running average of combined export rate (cfs) which includes Tracy Pumping Plant and Clifton Court Forebay inflow less Byron-Bethany.

| Year Type | All |
|---|---|
| Apr. 15<br>May 15* | The greater of 1,500 or 100%<br>of 3-day average Vernalis flow |

*This time period may need to be adjusted to coincide with fish migration. Maximum export rate may be varied by CalFed Op's group.

[2] The maximum percentage of average Delta inflow (use 3-day average for balanced conditions with storage withdrawal, otherwise use 14-day average) diverted at Clifton Court Forebay (excluding Byron-Bethany pumping) and Tracy Pumping Plant using a 3-day average. (These percentages may be adjusted.)

[3] The maximum percent Delta inflow diverted for Feb may vary depending on the January 8RI.

| Jan 8RI | Feb exp. Limit |
|---|---|
| ≤ 1.0 MAF | 45% |
| between 1.0 & 1.5 MAF | 35% - 45% |
| > 1.5 MAF | 35% |

[4] Minimum monthly average Delta outflow (cfs). If monthly standard ≤ 5,000 cfs, then the 7-day average must be within 1,000 cfs of standard; if monthly standard > 5,000 cfs, then the 7-day average must be > 80% of standard.

| Year Type | All | W | AN | BN | D | C |
|---|---|---|---|---|---|---|
| Jan | 4,500* | | | | | |
| Jul | | 8,000 | 8,000 | 6,500 | 5,000 | 4,000 |
| Aug | | 4,000 | 4,000 | 4,000 | 3,500 | 3,000 |
| Sep | 3,000 | | | | | |
| Oct | | 4,000 | 4,000 | 4,000 | 4,000 | 3,000 |
| Nov-Dec | | 4,500 | 4,500 | 4,500 | 4,500 | 3,500 |

*Increase to 6,000 if the Dec 8RI is greater than 800,000 AF.

[5] Minimum 3-day running average of daily Delta outflow of 7,100 cfs OR: either the daily average or 14-day running average EC at Collinsville is less than 2.64 mmhos/cm (This standard for March may be relaxed if the Feb 8RI is less than 500 KAF. The standard does not apply in May and June if the May estimate of the SRI is < 8.1 MAF at the 90% exceedance level in which case a minimum 14-day running average flow of 4,000 cfs is required.) For additional Delta outflow objectives, see TABLE A.

[6] February starting salinity: If Jan 8RI > 900 KAF, then the daily or 14-day running average EC at Collinsville must be < 2.64 mmhos/cm for at least one day between Feb 1-14. If Jan 8RI is between 650 KAF and 900 KAF, then the CalFed Op's group will determine if this requirement must be met.

[7] Rio Vista minimum monthly average flow rate in cfs (the 7-day running average shall not be less than 1,000 below the monthly objective.

| Year Type | All | W | AN | BN | D | C |
|---|---|---|---|---|---|---|
| Sep | 3,000 | | | | | |
| Oct | | 4,000 | 4,000 | 4,000 | 4,000 | 3,000 |
| Nov-Dec | | 4,500 | 4,500 | 4,500 | 4,500 | 3,500 |

[8] BASE Vernalis minimum monthly average flow rate in cfs (the 7-day running average shall not be less than 20% below the objective). Take the higher objective if X2 is required to be west of Chipps Island.

| Year Type | All | W | AN | BN | D | C |
|---|---|---|---|---|---|---|
| Feb-Apr 14 and<br>May 16 - Jun | | 2,130 or<br>3,420 | 2,130 or<br>3,420 | 1,420 or<br>2,280 | 1,420 or<br>2,280 | 710 or 1,140 |

[9] PULSE Vernalis minimum monthly average flow rate in cfs. Take the higher objective if X2 is required to be west of Chipps Island.

| Year Type | All | W | AN | BN | D | C |
|---|---|---|---|---|---|---|
| Apr 15 - May 15 | | 7,330 or<br>8,620 | 5,730 or<br>7,020 | 4,620 or<br>5,480 | 4,020 or<br>4,880 | 3,110 or<br>3,540 |
| Oct | 1,000 | | | | | |

* Up to an additional 28 KAF pulse/attraction flow to bring flows up to a monthly average of 2,000 cfs except for a critical year following a critical year. Time period based on real-time monitoring and determined by CalFed Op's group.

[10] For the Nov-Jan period, Delta Cross Channel gates may be closed for up to a total of 45 days.

[11] For the May 21-June 15 period, close Delta Cross Channel gates for a total of 14 days per CALFED Op's group. During the period the Delta cross channel gates may close 4 consecutive days each week, excluding weekends.

[12] Minimum # of days that the mean daily chlorides ≤ 150 mg/l must be provided in intervals of not less than 2 weeks duration. Standard applies at Contra Costa Canal Intake or Antioch Water Works Intake.

| Year Type | W | AN | BN | D | C |
|---|---|---|---|---|---|
| # Days | 240 | 190 | 175 | 165 | 155 |

[13] The maximum 14-day running average of mean daily EC (mmhos/cm) depends on water year type.

| | WESTERN DELTA | | | | INTERIOR DELTA | | | |
|---|---|---|---|---|---|---|---|---|
| | Sac River @ Emmaton | | SJR @ Jersey Point | | Mokelumne R @ Terminous | | SJR @ San Andreas | |
| **Year Type** | 0.45 EC from April 1 to date shown | EC value from date shown to Aug 15* | 0.45 EC from April 1 to date shown | EC value from date shown to Aug 15* | 0.45 EC from April 1 to date shown | EC value from date shown to Aug 15* | 0.45 EC from April 1 to date shown | EC value from date shown to Aug 15* |
| **W** | 15-Aug | | 15-Aug | | 15-Aug | | 15-Aug | |
| **AN** | 1-Jul | 0.63 | 15-Aug | | 15-Aug | | 15-Aug | |
| **BN** | 20-Jun | 1.14 | 20-Jun | 0.74 | 15-Aug | | 15-Aug | |
| **D** | 15-Jun | 1.67 | 15-Jun | 1.35 | 15-Aug | | 25-Jun | 0.58 |
| **C** | | 2.78 | | 2.2 | | 0.54 | | 0.87 |

* When no date is shown, EC limit continues from April 1.

**Figure 1-3. Water Quality Criteria Applicable to SWP Delta Pumping**

Page 3 of 3

[14] As per D-1641, for San Joaquin River at Vernalis: however, the April through August maximum 30-day running average EC for San Joaquin River at Brandt Dridge, Old River near Middle River, and Old River at Tracy Road Bridge shall be 1.0 EC until April 1, 2005 when the value will be 0.7 EC.

[15] Compliance will be determined between Jersey Point & Prisoners Point. Does not apply in critical years or in May when the May 90% forecast of SRI < 8.1 MAF.

[16] & [17] During deficiency period, the maximum monthly average mhtEC at Western Suisun Marsh stations as per SMPA is:

| Month | mhtEC |
|---|---|
| Oct | 19.0 |
| Nov | 16.5 |
| Dec-Mar | 15.6 |
| Apr | 14.0 |
| May | 12.5 |

In November, maximum monthly average mhtEC = 16.5 for Western Marsh stations and maximum monthly average mgtEC = 15.5 for Eastern Marsh stations in all periods types.

**TABLE A** **Number of Days When Max. Daily Average Electrical Conductivity of 2.64 mmhos/cm Must Be Maintained**

(This can also be met with a maximum 14-day running average EC of 2.64 mmhos/cm, or 3-day running average Delta outflows of 11,400 cfs and 29,200 cfs, respectively.) Port Chicago Standard is triggered only when the 14-day average EC for the last day of the previous month is 2.64 mmhos/cm or less. PMI is previous month's 8RI. If salinity/flow objectives are met for a greater number of days than required for any month, the excess days shall be applied towards the following month's requirement. The number od day's for values of the PMI between those specified below shall be determined by linear interpolation.

| PMI (TAF) | Chipps Island (Chipps Island Station D10) | | | | |
|---|---|---|---|---|---|
| | FEB | MAR | APR | MAY | JUN |
| ≤ 500 | 0 | 0 | 0 | 0 | 0 |
| 750 | 0 | 0 | 0 | 0 | 0 |
| 1000 | 28* | 12 | 2 | 0 | 0 |
| 1250 | 28 | 31 | 6 | 0 | 0 |
| 1500 | 28 | 31 | 13 | 0 | 0 |
| 1750 | 28 | 31 | 20 | 0 | 0 |
| 2000 | 28 | 31 | 25 | 1 | 0 |
| 2250 | 28 | 31 | 27 | 3 | 0 |
| 2500 | 28 | 31 | 29 | 11 | 1 |
| 2750 | 28 | 31 | 29 | 20 | 2 |
| 3000 | 28 | 31 | 29 | 27 | 4 |
| 3250 | 28 | 31 | 29 | 29 | 8 |
| 3500 | 28 | 31 | 29 | 30 | 13 |
| 3750 | 28 | 31 | 29 | 31 | 18 |
| 4000 | 28 | 31 | 29 | 31 | 23 |
| 4250 | 28 | 31 | 29 | 31 | 25 |
| 4500 | 28 | 31 | 29 | 31 | 27 |
| 4750 | 28 | 31 | 29 | 31 | 28 |
| 5000 | 28 | 31 | 29 | 31 | 29 |
| 5250 | 28 | 31 | 29 | 31 | 29 |
| ≥5500 | 28 | 31 | 29 | 31 | 30 |

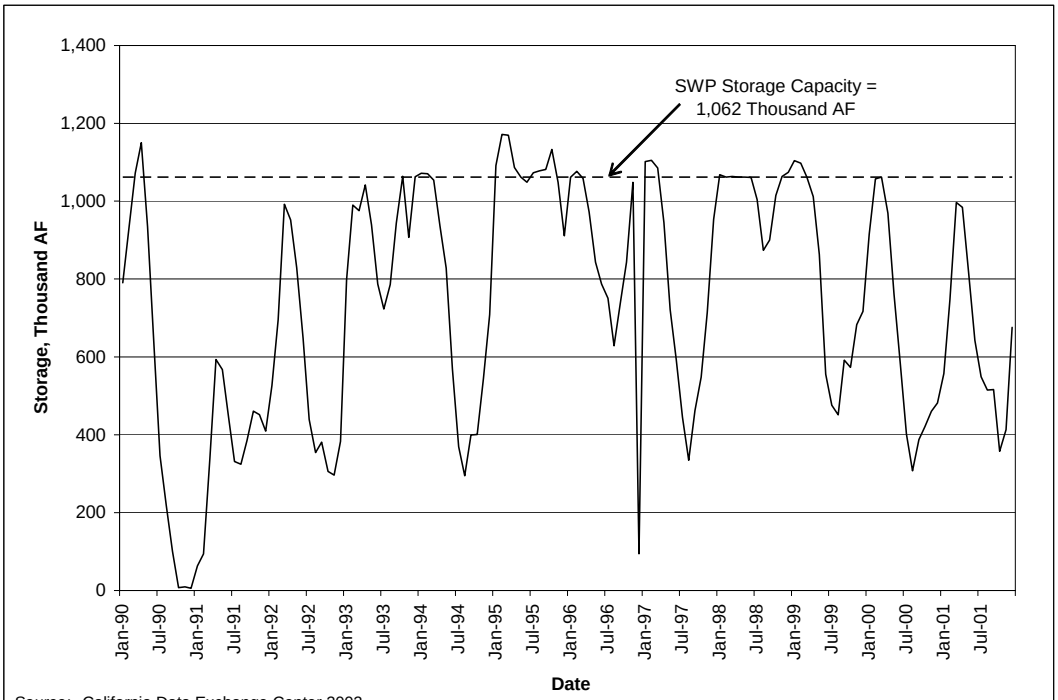
| PMI (TAF) | Port Chicago (continuous recorder at Port Chicago) | | | | |
|---|---|---|---|---|---|
| | FEB | MAR | APR | MAY | JUN |
| 0 | 0 | 0 | 0 | 0 | 0 |
| 250 | 1 | 0 | 0 | 0 | 0 |
| 500 | 4 | 1 | 0 | 0 | 0 |
| 750 | 8 | 2 | 0 | 0 | 0 |
| 1000 | 12 | 4 | 0 | 0 | 0 |
| 1250 | 15 | 6 | 1 | 0 | 0 |
| 1500 | 18 | 9 | 1 | 0 | 0 |
| 1750 | 20 | 12 | 2 | 0 | 0 |
| 2000 | 21 | 15 | 4 | 0 | 0 |
| 2250 | 22 | 17 | 5 | 1 | 0 |
| 2500 | 23 | 19 | 8 | 1 | 0 |
| 2750 | 24 | 21 | 10 | 2 | 0 |
| 3000 | 25 | 23 | 12 | 4 | 0 |
| 3250 | 25 | 24 | 14 | 6 | 0 |
| 3500 | 25 | 25 | 16 | 9 | 0 |
| 3750 | 26 | 26 | 18 | 12 | 0 |
| 4000 | 26 | 27 | 20 | 15 | 0 |
| 4250 | 26 | 27 | 21 | 18 | 1 |
| 4500 | 26 | 28 | 23 | 21 | 2 |
| 4750 | 27 | 28 | 24 | 23 | 3 |
| 5000 | 27 | 28 | 25 | 25 | 4 |
| 5250 | 27 | 29 | 25 | 26 | 6 |
| 5500 | 27 | 29 | 26 | 28 | 9 |
| 5750 | 27 | 29 | 27 | 28 | 13 |
| 6000 | 27 | 29 | 27 | 29 | 16 |
| 6250 | 27 | 30 | 27 | 29 | 19 |
| 6500 | 27 | 30 | 28 | 30 | 22 |
| 6750 | 27 | 30 | 28 | 30 | 24 |
| 7000 | 27 | 30 | 28 | 30 | 26 |
| 7250 | 27 | 30 | 28 | 30 | 27 |
| 7500 | 27 | 30 | 29 | 30 | 28 |
| 7750 | 27 | 30 | 29 | 31 | 28 |
| 8000 | 27 | 30 | 29 | 31 | 29 |
| 8250 | 28 | 30 | 29 | 31 | 29 |
| 8500 | 28 | 30 | 29 | 31 | 29 |
| 8750 | 28 | 30 | 29 | 31 | 30 |
| 9000 | 28 | 30 | 29 | 31 | 30 |
| 9250 | 28 | 30 | 29 | 31 | 30 |
| 9500 | 28 | 31 | 29 | 31 | 30 |
| 9750 | 28 | 31 | 29 | 31 | 30 |
| 10000 | 28 | 31 | 30 | 31 | 30 |
| >10000 | 28 | 31 | 30 | 31 | 30 |

the CVP's Tracy Pumping Plant. The SWP and CVP include facilities south of the Delta that were specifically designed for joint use by both projects, including San Luis Reservoir and a section of the California Aqueduct south of San Luis Reservoir. In addition, the SWRCB in the 1999 Water Rights Decision 1641, authorized the SWP and CVP to use their separate pumping plants as joint points of diversion, allowing each project to use excess pumping capacity at the other project's pumping plant.

From the southern Delta facilities, water in the California Aqueduct travels along the west side of the San Joaquin Valley and is either delivered directly to Contractors or is stored in San Luis Reservoir, the SWP's main storage facility south of the Delta. San Luis Reservoir, located approximately 60 miles south of the Banks Pumping Plant, is an off-stream storage reservoir with a total capacity of more than 2 million AF (of which, approximately 1,062,000 AF is allocated to the SWP and the remainder is allocated to the CVP [DWR 2002]). The SWP's California Aqueduct and the CVP's Delta Mendota Canal join at the O'Neill Forebay. Water is lifted by a pump-generating plant from O'Neill Forebay into the San Luis Reservoir. Water is released from San Luis Reservoir back through the pump-turbines to the forebay and energy is reclaimed.

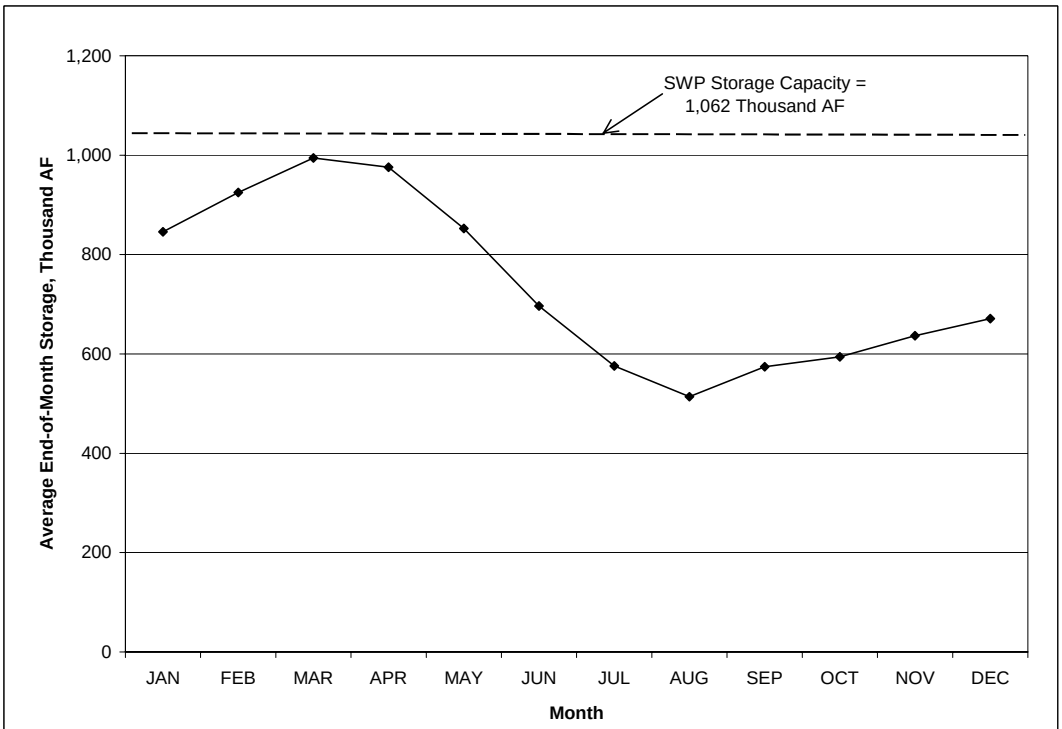
In general, the SWP is operated to fill storage reservoirs during the high runoff months of the winter and early spring. In addition to hydrology, regulatory requirements for the Delta and associated operational constraints also affect the timing and ability to fill reservoirs south of the Delta. Under current operating conditions, including Decision 1641, SWP diversions from the Delta are significantly reduced as of April 15 of each year (see Figure 1-3). As a result, the SWP is operated to store as much water as possible in San Luis Reservoir prior to April 15. The stored water is then released to meet Contractor demands during the high-demand summer and fall months to supplement the more limited pumping from the Delta during those months. Figure 1-4 shows the volume of SWP water stored in San Luis Reservoir for the period of 1990 to 2001. Figure 1-5 shows the average end-of-month SWP storage in San Luis Reservoir from 1990 to 2001. As is shown in these figures, San Luis Reservoir SWP storage levels vary considerably, both during the year and from year to year. From 1990 to 2001, SWP storage in the reservoir has ranged from approximately zero to more than 1.1 million AF (see Figure 1-4).

Water is conveyed southward from San Luis Reservoir via the California Aqueduct to the primarily agricultural users in the San Joaquin Valley and the primarily urban regions of the Central Coast and Southern California. Water is diverted from the aqueduct and delivered directly to SWP Contractors, including KCWA, in the central and southern San Joaquin Valley at various locations along the aqueduct. Near Kettleman City, SWP water is diverted from the California Aqueduct into the Coastal Branch, which carries water to San Luis Obispo and Santa Barbara counties. Most of the flow in the California Aqueduct continues southward, traversing the west side of the San Joaquin Valley through a series of four pumping plants (Dos Amigos, Buena Vista, Teerink and Chrisman) before reaching the Edmonston Pumping Plant. The capacity of these reaches of the California Aqueduct ranges from 10,000 cfs at the northern end to approximately 4,400 cfs at the Edmonston Pumping Plant. The Edmonston Pumping Plant pumps water over the Tehachapi Mountain Range, the California Aqueduct then divides into the East Branch and the West Branch. Water intended for use by CLWA is conveyed through the West Branch through Quail and Pyramid lakes and then to Castaic Lake, the terminus for the West Branch.




*Source:* California Data Exchange Center 2002.
Note: SWP storage can exceed its capacity when it borrows unused capacity from the CVP.
Total San Luis Reservoir storage capacity is 2,028 thousand AF.

**Figure 1-4. SWP Storage in San Luis Reservoir, 1990 to 2001**




*Source:* California Data Exchange Center 2002.

**Figure 1-5. SWP Storage in San Luis Reservoir, 1990 to 2001 Average End-of-Month Storage**

Quail and Pyramid lakes are located between the KWCA turnouts for deliveries to WRMWSD and the CLWA turnout on the West Branch of the California Aqueduct. Because of Quail Lake's limited storage capacity (approximately 7,800 AF) the lake is primarily used for re-regulation of aqueduct flows. Pyramid Lake, which has a storage capacity of approximately 171,200 AF, is used to provide an emergency water supply, in the case of a major supply system outage, to the SWP Contractors that receive deliveries from the West Branch; and is used in the pump/generation operation of the Castaic Power Plant, located between Pyramid and Castaic lakes.

Castaic Lake has a storage volume of approximately 323,700 AF. As shown on Figure 1-6, from 1990 to 2001, storage has ranged from a minimum of approximately 150,000 AF to a maximum of approximately 320,000 AF. The average end-of-month storage from 1990 to 2001 in Castaic Lake is shown on Figure 1-7. The reservoir is operated to provide regulatory storage to meet peak deliveries during the summer months for the three Contractors that receive water from Castaic Lake (CLWA, the Metropolitan Water District of Southern California [MWD], and the Ventura County Flood Control District [VCFCD]), and to provide an emergency water supply in the case of a major supply system outage. As part of the Monterey Amendment, these three SWP Contractors have access to 160,000 AF of the storage from Castaic Lake as "flexible storage," which they may withdraw in addition to their allocated SWP supplies and which they must replace within five years of any withdrawal. Local runoff captured in Castaic Lake is managed in compliance with an agreement between DWR and the holders of prior water rights.

SWP deliveries from Castaic Lake to each SWP Contractor that received water from the lake from 1990 to 2000 are provided in Table 1-1. From 1990 to 2000, CLWA's deliveries from Castaic Lake averaged approximately 19,200 AF, or approximately 6 percent of total annual SWP deliveries from the lake.

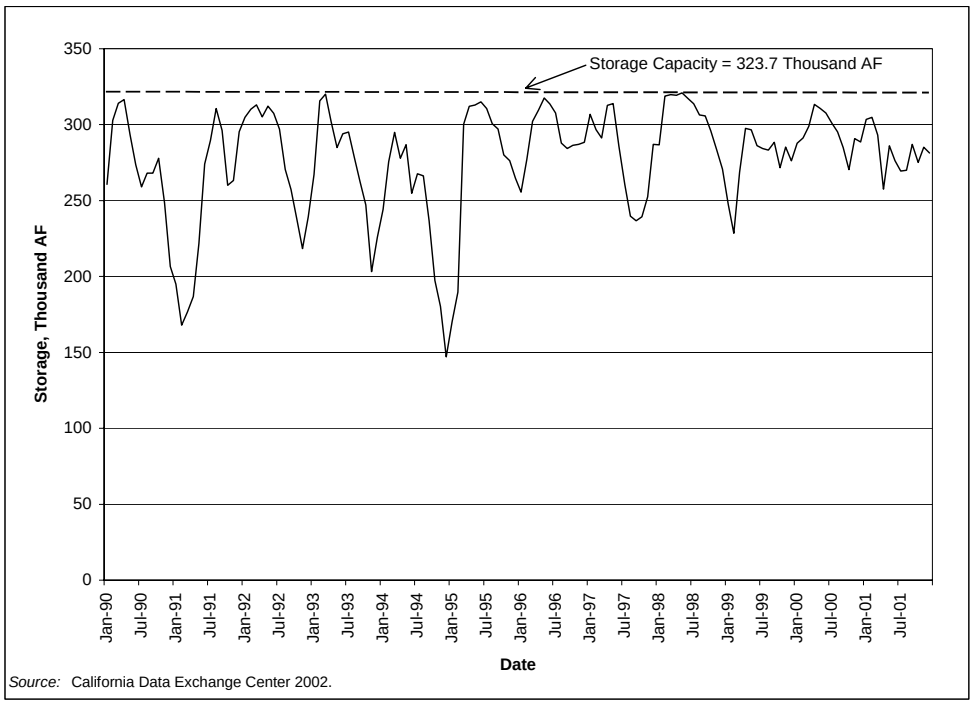
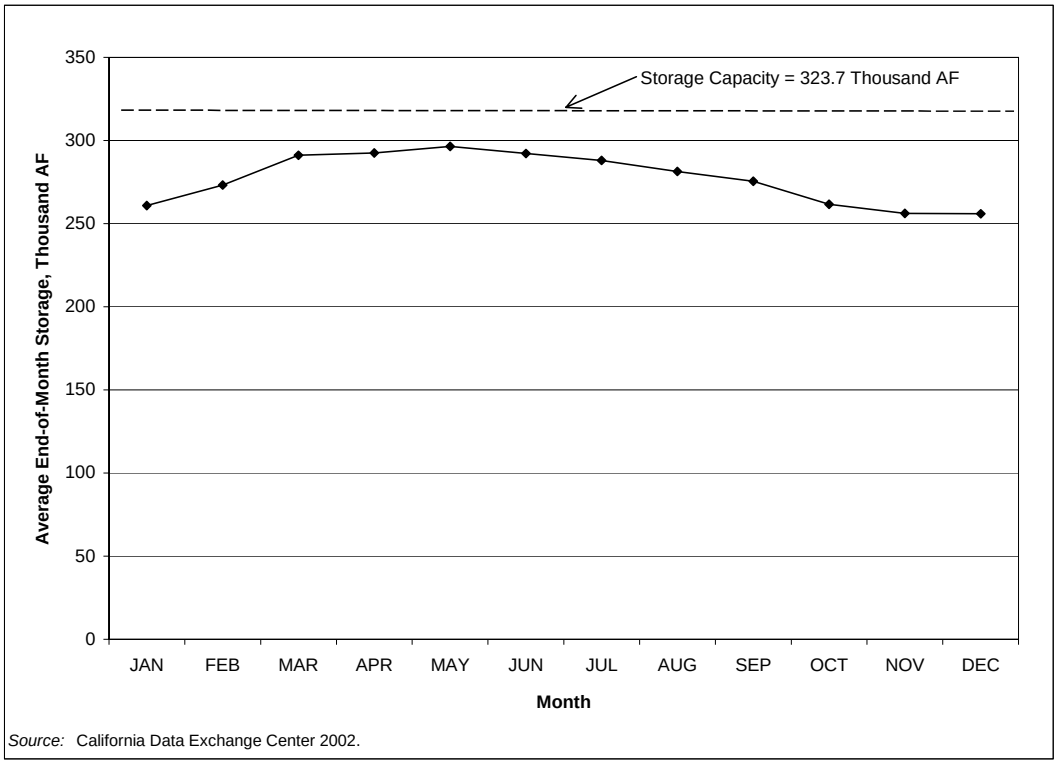



**Figure 1-6. Castaic Lake Storage, 1990 to 2001**




*Source:* California Data Exchange Center 2002.

**Figure 1-7. Castaic Lake Storage, 1990 to 2001 Average End-of-Month Storage**

**Table 1-1. Annual SWP Deliveries from Castaic Lake by Contractor, 1990 to 2000**

| | *CLWA* | *MWD* | *VCFCD* | *Other*[1] | *Total* | *CLWA as a % of Total* |
|---|---|---|---|---|---|---|
| 1990 | 22,139 | 764,380 | 0 | 0 | 786,519 | 2.81 |
| 1991 | 3,846 | 257,835 | 0 | 1,240 | 262,921 | 1.46 |
| 1992 | 14,812 | 420,849 | 0 | 0 | 435,661 | 3.40 |
| 1993 | 13,787 | 437,470 | 0 | 0 | 451,257 | 3.06 |
| 1994 | 14,919 | 475,900 | 0 | 0 | 490,819 | 3.04 |
| 1995 | 17,747 | 139,882 | 0 | 0 | 157,629 | 11.26 |
| 1996 | 18,448 | 267,618 | 0 | 0 | 286,066 | 6.45 |
| 1997 | 22,842 | 271,379 | 1,850 | 27,130 | 323,201 | 7.07 |
| 1998 | 19,782 | 187,277 | 1,850 | 0 | 208,909 | 9.47 |
| 1999 | 28,813 | 327,001 | 1,850 | 0 | 357,664 | 8.06 |
| 2000 | 33,674 | 632,993 | 1,848 | 0 | 668,515 | 5.04 |
| Average | 19,164 | 380,235 | 673 | 2,579 | 402,651 | 5.56 |

Source: DWR 2002.

1. Includes deliveries from Castaic Lake via exchange. These deliveries were made by the Santa Barbara County Flood Control and Water Conservation District in 1991 via exchange with VCFCD, and by the Coachella Valley Water District and Desert Water Agency in 1997 via exchange with MWD.

## 1.2 STATE WATER PROJECT SUPPLY CAPABILITY

As originally planned, the annual delivery capability of the SWP was to eventually reach approximately 4.2 million AF. DWR entered into individual Water Supply Contracts with public water agencies (referred to as "Contractors") for water delivery, and the sum of the maximum delivery amounts of all Contractors totaled this same 4.2 million AF. The initial SWP facilities were designed to meet Contractors' water demands in the early years of the project, with the construction of additional facilities planned as Contractor demands increased. Water deliveries to Contractors began as initial SWP facilities were completed in the late 1960s and early 1970s. CLWA received its initial delivery of SWP water in 1980. Initial deliveries of SWP water from the California Aqueduct to KCWA in the area of its member unit WRMWSD occurred in 1971 and 1972.

The original plans for the SWP were to construct additional water storage facilities as Contractor demands increased. However, essentially no additional SWP storage facilities have been constructed since the initial SWP facilities were completed. In the meantime, increasing environmental concerns related to several fish species have resulted in increasingly stringent regulatory constraints in the Delta, reducing the reliability of SWP supplies from existing facilities. This situation makes the amount of SWP supply available for delivery in any given year even more dependent on the hydrology of that particular year and the amount of water in SWP storage at the beginning of that year.

At the same time, Contractor demands have been increasing. While some Contractors are not yet requesting the maximum amounts allowable under their Water Supply Contracts, even at current demands, the SWP cannot meet all water delivery requests in some years. The availability of SWP water in any given year is dependent on that year's hydrologic conditions and the amount of water in storage in the SWP system. The amount of water actually delivered in that year is also dependent on the Contractors' requests for SWP supplies, which can vary from year to year based on Contractors' local conditions and their other supplies. The actual annual deliveries of SWP Table A supplies to Contractors are provided in Table 1-2 for 1990 to 2003. Over this period, total SWP deliveries have ranged from approximately 550,000 AF in the critical drought year of 1991 to approximately 3.7 million AF in 2003. Many Contractors did not request delivery of their full Table A Amount during this period.

In 1998, DWR estimated that annual deliveries to SWP Contractors would average approximately 3.1 million AF (based on estimates of then-existing levels of Contractor demands and land and water use upstream of the Banks Pumping Plant[1], with existing facilities operated under the constraints of Order WR 95-6 [DWR 1998]). This estimate is generally consistent with DWR's recent SWP Delivery Reliability Report (DWR 2003). In the SWP Delivery Reliability Report, DWR estimated that the SWP currently can be expected to deliver an average annual supply of approximately 2.96 million AF, based on a 2001 level of Contractor demand and upstream land and water use, with existing facilities operated under existing constraints (DWR 2003). As part of the SWP Delivery Reliability Report, DWR also estimated that in the future the

1 Land and water use upstream of the Banks Pumping Plant affects the amount of water flowing into the Delta. In general, increases in the amount of water flowing into the Delta can increase SWP supplies, while decreases in the amount of water flowing into the Delta (due to increased water use upstream or a variety of other factors) can decrease SWP supplies.

SWP can be expected to deliver an average annual supply of approximately 3.1 million AF based on 2021 level of Contractor demand and upstream consumptive use, with existing facilities operated under existing constraints (DWR 2003b). Contractor demands are expected to increase in the 2021 level evaluation as urban Contractor demands increase up to their Table A Amounts. The increase in average deliveries for 2021 is the result of the SWP being able to meet the increased Contractor demands in wetter years. However, limited SWP supplies in drier years, allocated over an increased demand for that limited supply, will result in a decrease in the reliability of dry-year supplies.

**Table 1-2. SWP Annual Table A Deliveries, 1990 to 2003**

| | *Agricultural Contract Holders* | | *M&I Contract Holders* | | *Total Table A Deliveries (AF)* |
|---|---|---|---|---|---|
| | *Table A Deliveries (AF)* | *Allocation Percentage (%)* | *Table A Deliveries (AF)* | *Allocation Percentage (%)* | |
| 1990 | 706,080 | 50 | 1,876,070 | 100 | 2,582,150 |
| 1991 | 12,440 | 0 | 536,670 | 30 | 549,110 |
| 1992 | 509,810 | 45 | 961,650 | 45 | 1,471,460 |
| 1993 | 1,250,370 | 100 | 1,064,870 | 100 | 2,315,240 |
| 1994 | 614,360 | 53 | 1,134,990 | 53 | 1,749,350 |
| 1995 | 1,165,520 | 100 | 801,570 | 100 | 1,967,090 |
| 1996 | 1,369,190 | 100 | 1,145,640 | 100 | 2,514,830 |
| 1997 | 1,067,320 | 100 | 1,258,460 | 100 | 2,325,780 |
| 1998 | 860,720 | 100 | 864,800 | 100 | 1,725,520 |
| 1999 | 1,333,590 | 100 | 1,405,300 | 100 | 2,738,890 |
| 2000 | 1,177,200 | 90 | 2,022,700 | 90 | 3,199,900 |
| 2001 | 383,840 | 39 | 1,162,900 | 39 | 1,546,740 |
| 2002 | 827,128 | 70 | 2,059,886 | 70 | 2,887,014 |
| 2003 | 1,064,267 | 90 | 2,649,966 | 90 | 3,714,230 |

*Source:* For 1990 to 2000, DWR 2002. For 2001, DWR 2004a. For 2002, DWR 2003c. For 2003, DWR 2004b.

## 1.3 STATE WATER PROJECT WATER SUPPLY CONTRACTS

As discussed above, in 1960 DWR began executing individual Water Supply Contracts with public agencies throughout the State of California for financing and constructing SWP facilities designed to deliver water to each public agency. The Water Supply Contracts specified Contractor obligations for repayment of SWP capital, operation, and maintenance costs, including bondholder obligations and repayment of funds loaned from the California Water Fund.

Each Water Supply Contract sets forth, in Table A, a schedule identifying an upper bound on the Contractor's annual request for delivery of SWP water, referred to as "Table A Amount" (formerly referred to as "entitlement"). The Table A Amount is specified as either agricultural or municipal and industrial (M&I). Table A in each Water Supply Contract contains an annual buildup in Table A Amounts of SWP water, from the first year of the Water Supply Contract through a specific year, based on growth projections made before the Water Supply Contract

was executed. For most Contractors, the maximum annual Table A Amount was reached in 1990. The total of all Contractors' maximum Table A Amounts is currently about 4.17 million AF.

Each Contractor annually submits a request to DWR for water delivery in the following year, in any amount up to the Contractor's Table A Amount. The Water Supply Contracts provide that in a year when DWR is unable to deliver total Contractor requests, deliveries to all Contractors will be reduced, in accordance with specified water allocation rules, so that total deliveries equal total available supply for that year. Some Contractors have never requested delivery of their full Table A Amount as a result of factors such as less-than-planned water demand, availability of other water supplies, and water conservation efforts that have held demand below initial contract projections. Other Contractors order their full Table A Amount nearly every year.

Under the original Water Supply Contracts, the Agricultural Contractors agreed in years of shortage (i.e., when SWP supplies were insufficient to meet Contractors' requests) to accept a certain amount of reduction in deliveries (the "initial agricultural reduction"), with any remaining shortage shared proportionately among the Agricultural and M&I Contractors. In exchange, the Agricultural Contractors received, among other favorable terms, a priority for "surplus" SWP supplies (i.e., SWP supplies that could be delivered in excess of Table A requests, generally available in wetter hydrologic years and/or in the early years of the SWP when demands were still low). Under the original plan for the SWP, which involved the construction of additional water storage facilities as Contractor demands increased, shortages in SWP supplies were anticipated to occur relatively infrequently and in small enough magnitudes that only Agricultural Contractors were expected to incur shortages. In the early 1990s, however, a multi-year drought coupled with increased SWP operational constraints and environmental water requirements due to the listing of several fish species as endangered or threatened, resulted in several years when SWP supplies fell below Contractors' requests for deliveries. The initial agricultural reduction provision in the Water Supply Contracts resulted in Agricultural Contractors receiving only half their requested supply in 1990 and no water in 1991, while the M&I Contractors received all of their requested supply in 1990 and less than half their requests in 1991. Because Contractors pay their proportionate share of fixed project costs regardless of how much water is delivered, plus variable costs based on the amount of water delivered, Agricultural Contractors underwent severe delivery reductions but received little financial relief from their fixed project cost obligations. This situation led to increasing disagreements between DWR, the Agricultural Contractors, and the M&I Contractors about how available supplies should be allocated.

**Monterey Amendment**

The SWP Contractors and DWR agreed to negotiate a settlement of their differences and develop a new approach to managing SWP resources through a major overhaul of the Water Supply Contracts. After a series of exhaustive negotiating sessions, an agreement was reached in December 1994 in Monterey, California on a set of principles, known as the "Monterey Agreement." The Monterey Agreement principles were implemented through an amendment to the Water Supply Contracts between DWR and the SWP Contractors, which became known as the "Monterey Amendment." The Monterey Amendment was approved in 1995 and went

into effect in August 1996. A summary of the provisions of the Monterey Amendment is provided below.

***Allocation of SWP Water Supplies***

- New method for allocation of all water supplies in proportion to each Contractor's contract amount (Table A Amounts).
- Elimination of the initial supply reduction to Agricultural Contractors in years of shortage (modification of Article 18(a) of the Water Supply Contracts).
- Replacement of certain categories of water with a single category of Article 21 water allocated on the basis of Table A Amounts and delivered at the same power rate as Table A Amounts.
- Elimination of the permanent shortage provision (Article 18(b) of the Water Supply Contracts).

***Transfer of Table A Amounts and Land***

- Transfer to DWR for permanent retirement 45,000 AF of agricultural Table A Amounts.
- Make 130,000 AF of agricultural Table A Amounts available for permanent sale to M&I Contractors[2].
- Transfer of the Kern Fan Element property to local control.

***Water Management Provisions***

- Enable voluntary water marketing, groundwater banking, and more effective use of existing SWP facilities.
- Explicitly provide for groundwater or surface storage of SWP water outside Contractor's service area for later use within its service area.
- Expand Contractor rights to store water in San Luis Reservoir when storage space is available.
- Specify Contractor rights to flexible storage in terminal reservoir facilities.
- Clarify terms for transport of non-SWP water in SWP facilities for Contractors.
- Create a Turnback Pool for the annual sale to interested Contractors of SWP supplies allocated to other Contractors but unneeded by them.

***Financial Restructuring***

- Use SWP funds to establish an SWP operating reserve.

2 The 41,000 AF transfer associated with the Project represents a portion of the 130,000 AF transfer that the Agricultural Contractors agreed to make available for permanent transfer in the Monterey Amendment.

- Establish a program of water rate management which, when SWP cash flow permits, provides for a credit in charges to M&I Contractors, as well as Agricultural Contractor trust funds for rte management.

A Program EIR analyzing the environmental impacts of the Monterey Amendment was prepared and certified by the Central Coast Water Authority (CCWA) in 1995. In late 1995, a lawsuit was filed by the Planning and Conservation League (PCL), Plumas County Water Conservation and Flood Control District (Plumas County), and Citizens Planning Association of Santa Barbara County (collectively referred to as the "plaintiffs") challenging the EIR. The plaintiffs argued that the environmental impact analysis prepared was inadequate because CCWA was not the proper lead agency and the EIR analysis did not reflect the inability of the SWP to deliver full Contract amounts to Contractors, even though they held contractual "entitlements" to those supplies. In 2000, the California State Court of Appeal (Third District) found that a new EIR must be prepared. That litigation is referred to as the PCL Litigation in this EIR.[3]

Discussions to mediate a settlement began in 2001 and were finalized in May 2003[4]. All parties to the litigation have signed the Settlement Agreement. The Settlement Agreement calls for DWR to prepare a new EIR pursuant to the California Environmental Quality Act (a Notice of Preparation [NOP] was issued by DWR on January 24, 2003),[5] while the Monterey Amendment's provisions remain in operation. Pursuant to the Settlement Agreement, the parties are now administering the preparation of a new EIR, which is anticipated to be completed in approximately two years. The new EIR will evaluate the potential environmental impacts of changes to SWP operations incorporated in the Monterey Amendment and the Settlement Agreement. The Settlement Agreement also calls for DWR to produce a biennial SWP Delivery Reliability Report. The *State Water Project Delivery Reliability Report - 2002* was issued in May 2003 (DWR 2003). A summary of the Settlement Agreement is provided below. The Settlement Agreement did not change the substance of the Monterey Amendment, but addressed the process by which the new Monterey Amendment EIR will be prepared.

***Settlement Agreement***

- Continue operation under Monterey Amendment provisions.
- Establish a watershed forum for Plumas County to pursue watershed restoration and provide for amending Plumas County's Water Supply Contract regarding shortages.
- Impose additional restrictions on use of the Kern Water Bank lands.
- Amend and clarify SWP Water Supply Contracts to substitute in certain instances "Table A Amount" for "entitlement."
- Implement new procedures for disclosure of SWP delivery capabilities.

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3 *Planning and Conservation League, et al. v. Department of Water Resources* (2000) 83 Cal. App. 4th 892.

4 In May 2003, the settlement agreement among the plaintiffs, DWR, and the SWP Contractors (referred to herein as the "Settlement Agreement") was executed and approved by the State Attorney General's office. On May 20, 2003 the Settlement Agreement was approved by the Sacramento Superior Court.

5 The NOP is entitled *Notice of Preparation of Environmental Impact Report for the Monterey Amendment to the State Water Project Contracts (Including Kern Water Bank Transfer) and Other Contract Amendments and Associated Actions as part of a Proposed Settlement Agreement in Planning and Conservation League v. Department of Water Resources.*

- Issue guidelines on permanent Table A Amount transfers.
- Establish procedures for public participation in certain Water Supply Contract amendment negotiations.
- Provide certain funding to the plaintiffs for multiple purposes, including watershed restoration.

**Monterey Amendment Effect on Water Deliveries**

The Monterey Amendment did not change of the total amount of SWP supply available for delivery in any year. It did, however, change how that available supply is allocated among the Contractors. Under the allocation methodology used prior to the Monterey Amendment, in a year when total available SWP supplies were less than Contractor requests, Agricultural Contractors received an initial supply reduction of up to 50 percent in any one year and up to a cumulative total of 100 percent in any seven consecutive years. Any shortages remaining in the year after the initial agricultural reduction were shared among all Contractors proportionately. The result of this allocation provision was that, due to the initial agricultural reductions, agricultural Table A Amounts were less reliable than M&I Table A Amounts.

Under the provisions of the Monterey Amendment, all SWP supplies are allocated among Contractors in proportion to their Table A Amounts. The result of this change in allocation is that the reliability of all SWP Table A Amounts is now the same. This means that in a shortage year, with the elimination of the initial agricultural reduction, a portion of the supply that would previously have been allocated to M&I Contractors would now be allocated to Agricultural Contractors; and when additional SWP supplies are available, with the elimination of the agricultural priority to surplus water, a portion of the supply that might previously have been delivered to Agricultural Contractors would now be available to M&I Contractors.

**Transfers of Table A Amounts**

SWP Table A Amounts could be transferred under the original terms of the Water Supply Contracts (under Article 41). The Monterey Amendment provided an additional opportunity for transfers of Table A Amounts (under Article 53). Under the Monterey Amendment, the Agricultural Contractors agreed to make available up to 130,000 AF of Table A Amount for permanent sale and transfer to M&I Contractors. Transfers of more than half of this 130,000 AF of Table A Amount have already been completed by various M&I Contractors. The transfer evaluated in this EIR (the Project) could be completed under either of these Water Supply Contract provisions, although Article 53 was the vehicle utilized to execute the transfer.

# 2.0 DWR MODEL STUDIES

## 2.1 MODEL STUDIES SELECTED FOR USE

The amount of SWP water supply that would be available for use by CLWA given the transfer of the Project's 41,000 AF of Table A Amount was evaluated using results from DWR model studies of SWP and CVP operations. The model studies that were used in analyses for this EIR were studies previously conducted by DWR (i.e., no new model studies were run for this EIR). Results from these DWR model studies were used as a starting point for the water resources analyses conducted for this EIR.

The model studies used in this analysis were two studies conducted by DWR for the CALFED Bay-Delta Program EIS/EIR (CALFED 2000). These model studies were conducted in 1998 using DWR's planning model DWRSIM. These model studies provide the best estimates of SWP supply reliability that were available in 1998, and are consistent with the pre-project 1998 environmental baseline used in this EIR. Therefore, these model studies were used as the basis for the water resources environmental impact analyses conducted for this EIR.

DWRSIM is a monthly planning model that simulates operations of the SWP and CVP. One of the model's inputs is a time series of monthly runoff based on historic hydrologic data from 1922 through 1994 (73 years), with that hydrologic data adjusted to reflect a current or future level of upstream land and water use. DWRSIM estimates the amount of water the SWP could deliver to Contractors in each month over the 73 years of operation, for a given set of facilities and operating constraints and for a given level of Contractor demand. The results are interpreted as the capability of the SWP to meet the assumed SWP demand, over a range of hydrologic conditions, for that assumed set of physical facilities and operating constraints.

The two DWRSIM studies used in this EIR both assume the use of SWP facilities and operating constraints that were present in 1998. One study uses 1998 estimates of then-existing Contractor demands and upstream land and water use, and the other uses projections for 2020 of both Contractor demands and upstream land and water use (DWRSIM model studies 1995D06E-CALFED-771 and 2020D09C-CALFED-786, respectively)[6].

## 2.2 COMPARISON OF DWRSIM TO CALSIM II

Since these studies were conducted, the modeling tool DWR uses to simulate operations has evolved (first to CALSIM I, and more recently to CALSIM II). However, while the modeling tool itself has changed, the criteria used in the models to simulate SWP operations have not significantly changed. While DWR has completed a more recent assessment of SWP reliability in its SWP Delivery Reliability Report (DWR 2003) using CALSIM II, the results of these new studies are generally comparable to the results of the DWRSIM studies used in this EIR. The results of these new studies were used as the basis for determining CLWA SWP supplies for the current environmental setting, as is described below in section 6.0.

6 In the CALFED Bay-Delta Program EIS/EIR, these two studies represent the Existing Condition, and the No Action Alternative with a 2020 level of Contractor demand, respectively.

Figures 2-1 and 2-2 show a comparison of DWRSIM and CALSIM II model study results of total SWP Table A deliveries. Figure 2-1 shows this comparison at "existing" demand conditions, while Figure 2-2 shows this same comparison at 2020 demand conditions. In these figures, deliveries over the hydrologic period are shown in the form of probability of exceedance curves (see the sidebar for an explanation of how to interpret this kind of graph).

The "existing" demand in the DWRSIM study used in this EIR is based on 1998 DWR estimates of then-existing SWP demands, while the "existing" demand in the CALSIM II study in DWR's SWP Delivery Reliability Report is based on 2001 estimates of then-existing SWP demands. The 2001 total SWP demand is higher than the 1998 total SWP demand due to increased M&I Contractor demands. Since the models only deliver supplies up to Contractor demands, the deliveries shown in the wetter years, when adequate supply is usually available, are limited by demands. Therefore, the DWRSIM study shows lower deliveries than the CALSIM II study in the wetter years (see Figure 2-1), not because supplies are not available, but because the lower demands in the DWRSIM study limit deliveries. The lower demand can also result in more water being delivered in some dry years, if more water was left in storage at the end of the year preceding the dry year. This explains a portion of the higher DWRSIM deliveries shown on Figure 2-1 in drier years. Any differences in SWP deliveries due to factors other than demands can be seen on Figure 2-2, since the demands used in the 2020 level DWRSIM study and 2021 level CALSIM II study are the same. Other differences in SWP deliveries between the two model studies could result from factors such as changes in assumptions for regulatory standards and operating criteria, and differences in certain algorithms used in the models.

> ***Interpreting Probability of Exceedance Graphs***
>
> The graphs of supplies available over DWRSIM's entire hydrologic record are presented as probability of exceedance curves. These curves show the probability of supplies being greater than or equal to specific quantities. For example, Figure 2-1 would be interpreted, based on the DWRSIM run, as showing that about 80 percent of the time, total SWP supplies would be expected to be 2,500 or more thousand AF; and about 20 percent of the time, supplies would be expected to be less than 2,500 thousand AF.

## 2.3 MODEL ASSUMPTIONS

In order to simulate operation of the SWP and CVP with DWRSIM, certain information and assumptions are required as model input. The most significant categories of input affecting the model results used in the analyses for this EIR include:

- Water system facilities and their physical characteristics.
- Regulatory, operational, and institutional requirements and constraints.
- Hydrology (as adjusted for upstream land and water use).
- Level of SWP demand.

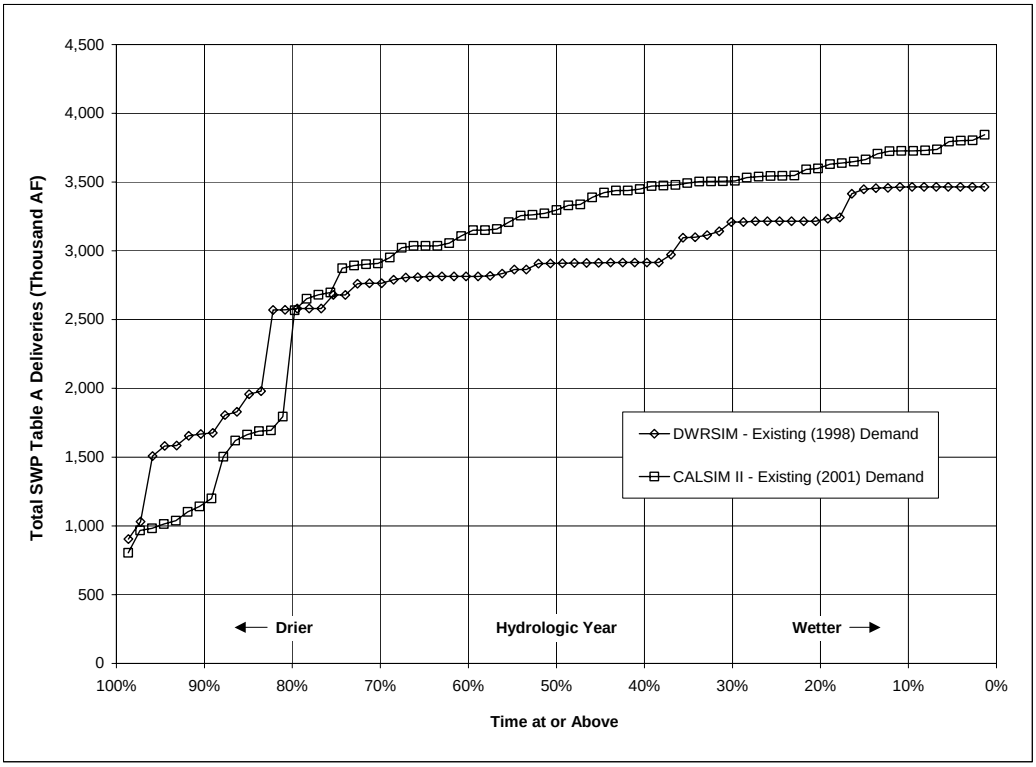



**Figure 2-1. Total SWP Table A Deliveries at Existing SWP Demand Conditions**

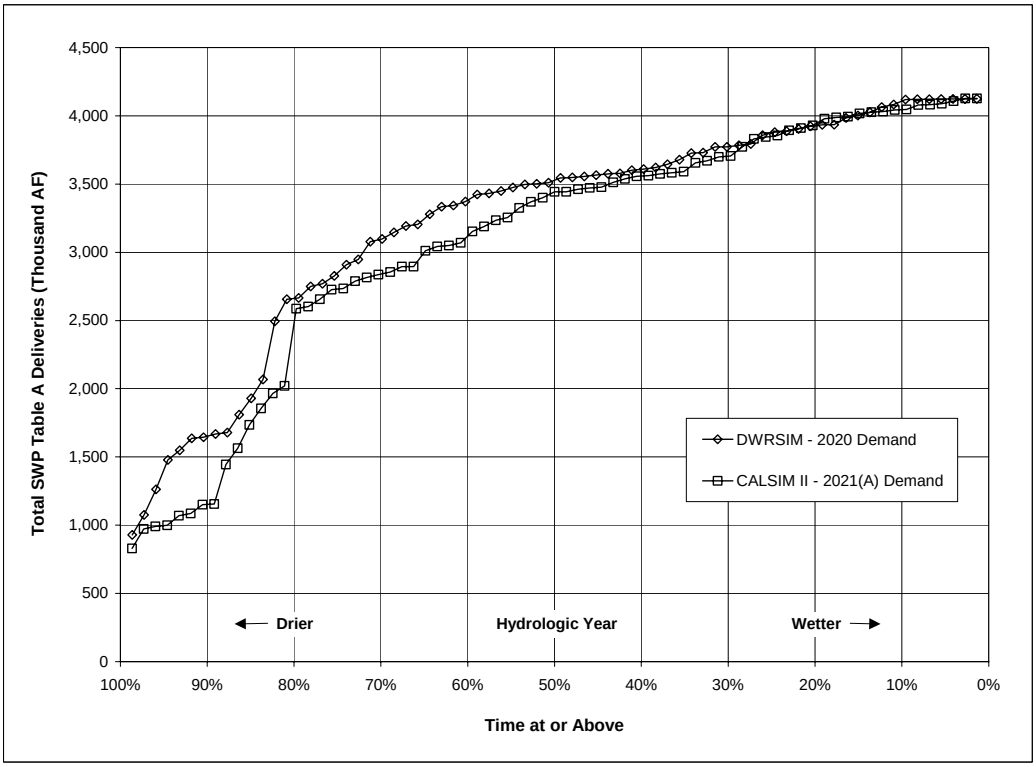



**Figure 2-2. Total SWP Table A Deliveries at 2020 SWP Demand Conditions**

In the two DWRSIM model studies used in this EIR analysis, the assumptions for the first two of these categories of input are the same. The hydrology and level of SWP demand, however, differ between the two studies. A summary of key model assumptions used in these two model runs, including both study-specific assumptions and common assumptions, is provided in Table 2-1.

The SWP demands used as input to these two DWRSIM model studies are particularly important for the water supply analyses conducted for this EIR. These demands, along with Contractor Table A Amounts, are used in allocating total available SWP supplies among Contractors, and ultimately in determining how much of that available SWP supply is associated with the 41,000 AF of the Project, as is described in more detail in section 3.1 below.

Both of these DWRSIM studies use a demand that varies from year to year during the 73-year study period, based on local wetness indices. The purpose of this variable demand is to account for the real situation where a Contractor's demand changes from one year to the next due to how wet or dry it is in its service area, with higher demand in drier years and lower demand in wetter years. For the demands used in these studies, Agricultural Contractor demands are reduced in wetter years using a Kern River flow index, and MWD demands are reduced in wetter years using a southern California precipitation index. The demands of the other M&I Contractors are not adjusted for wetness and are fixed at maximum Table A Amounts in all years of the study. The specific SWP demands used as input to these studies are provided in section 2.4.

**Table 2-1. Key DWRSIM Study Assumptions**

| | ***Existing Conditions*** *(1995D06E-CALFED-771)* | ***2020 Conditions*** *(2020D09C-CALFED-786)* |
|---|---|---|
| | **Study-Specific Assumptions** | |
| Hydrology | 1995 Level hydrology (based on DWR Bulletin 160-98 land use projections) | 2020 Level hydrology (based on DWR Bulletin 160-98 land use projections) |
| SWP Demand (includes south of Delta and North Bay Aqueduct) | 2.6 – 3.5 million AF/year (varies based on local wetness indices) | 3.3 – 4.1 million AF/year (varies based on local wetness indices) |
| | **Common Assumptions** | |
| SWP Facilities | Existing | |
| Delta Regulatory Standards | 1995 Delta Water Quality Control Plan standards, with select Anadromous Fish Restoration Plan (AFRP) CVPIA(b)(2) Delta Actions (from Actions in Nov 20, 1997 AFRP Document) | |
| Operations Criteria | Banks Pumping Plant export limit at 6,680 cfs with certain exemptions | |
| | SWP operation coordinated with CVP per 1986 Coordinated Operations Agreement | |

*Source:* DWR 1999, CALFED 2000.

## 2.4 SELECTED MODEL INPUT AND OUTPUT

Certain input to the two DWRSIM studies and certain results (or output) from the model studies were used as a starting point for the analyses conducted for this EIR. The model input used in the EIR analyses was annual SWP Contractor demands, with demands for each year of the model study, aggregated for the following three broad Contractor groups: Agricultural Contractors, MWD, and Other M&I Contractors (i.e., all M&I Contractors except MWD). The model output used in the EIR analyses includes total annual SWP deliveries, output related to San Luis Reservoir operations (i.e., reservoir storage, diversions to and releases from storage, and aqueduct flows upstream and downstream of the reservoir), and Castaic Lake storage.

The DWRSIM model operates on a water year (October through September) basis, starting with hydrology from October 1921 and running for 73 water years, through September 1994. However, the water supply analyses for this EIR had to be conducted on a calendar year basis, since SWP supplies are allocated, both in real practice and within the model, based on calendar years. Therefore, any monthly DWRSIM data used was arranged based on calendar years and any annual totals used were calendar-year totals. Since the first and last calendar years of the model run (1921 and 1994) contain only three and nine months of data, respectively, the annual totals for these years are not meaningful. As a result, any analyses that started with annual totals, such as the water supply analysis, excluded data for the partial years of 1921 and 1994.

Specific data used from the DWRSIM model studies are shown on Figures 2-3 to 2-6, and Tables 2-2 to 2-7. Figure 2-3 shows a probability of exceedance graph of total SWP Table A deliveries over the entire hydrologic period, for existing and 2020 demand conditions. Tables 2-2 and 2-3 provide the DWRSIM input of annual demands for the three Contractor groups and the DWRSIM output of total annual SWP deliveries, for each year over the hydrologic period, for the existing conditions study and 2020 conditions study, respectively.

To more clearly show the impact of the demands used as input in these model studies on the model's output, the total SWP Table A deliveries shown on Figure 2-3 are shown again on Figure 2-4, presented both as a percent of total Contractor demand and as a percent of total Table A Amounts. The differences in potential interpretation are particularly apparent for the existing conditions study, which used a lower total SWP demand as input. As was discussed previously, since DWRSIM deliveries are limited to demand, in the existing conditions study the lower deliveries in the wetter years occur not because supplies are not available, but because the lower demand limits deliveries. At the existing demand level, model results indicate that the SWP could meet full Contractor demands about two thirds of the time. Note that for this same study, because the maximum total demand is less than total Table A Amounts, these same deliveries presented as a percent of Table A Amount never exceed about 86 percent (i.e., it appears Contractors would never receive a 100 percent SWP supply allocation, giving the appearance that Contractor demands are never fully met). This interpretation is clearly a mischaracterization of the model results, and highlights the importance of considering the demands used in these studies in interpreting study results. For the 2020 conditions study, since total Contractor demands in many years are equal to total Table A Amounts, the output supplies shown in the graph as a percent of demand begin to converge with those same supplies shown as a percent of Table A Amount.

Figure 2-5 shows a graph of average monthly storage at San Luis Reservoir, with the monthly data for the hydrologic period provided in Tables 2-4 and 2-5, for existing and 2020 demand conditions, respectively.

Figure 2-6 shows a graph of average monthly storage at Castaic Lake, with the monthly data for the hydrologic period provided in Tables 2-6 and 2-7, for existing and 2020 demand conditions, respectively. It should be noted that DWRSIM only models operation of Castaic Lake in meeting Contractor deliveries, and does not model Contractor use of flexible storage. Since Contractors can use flexible storage for any number of reasons, including for their own operations unrelated to the SWP, use of flexible storage cannot effectively be modeled. Therefore, the DWRSIM output shown reflects only normal Castaic Lake operations to meet Contractor deliveries.

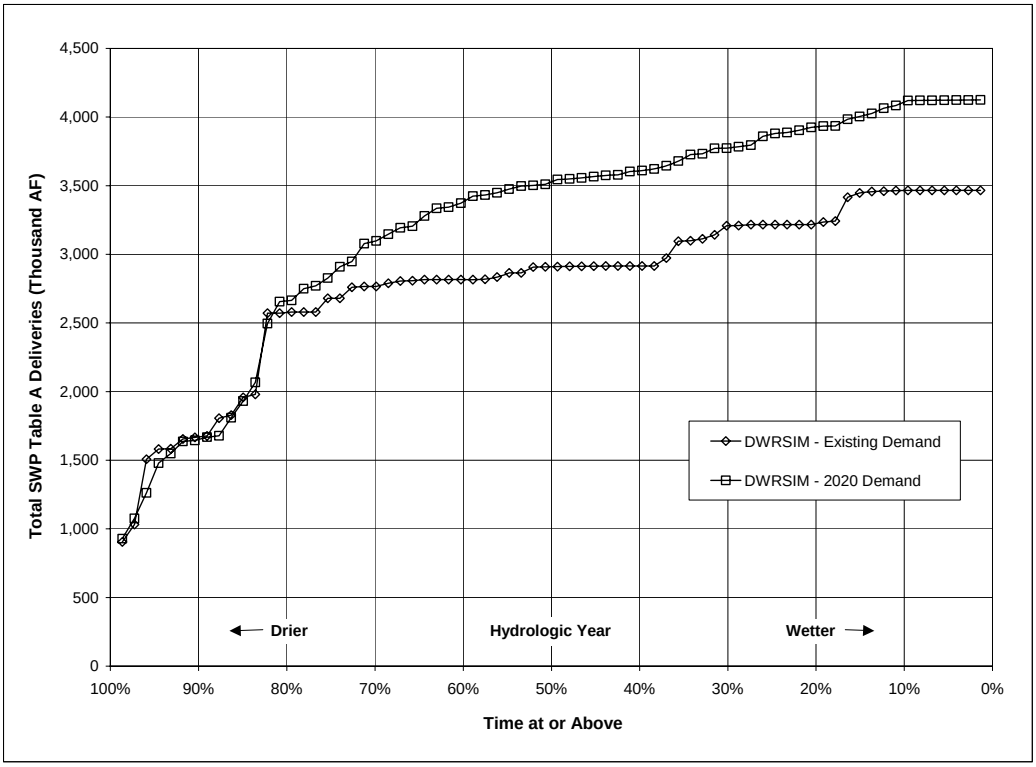



**Figure 2-3. DWRSIM Total SWP Table A Deliveries**

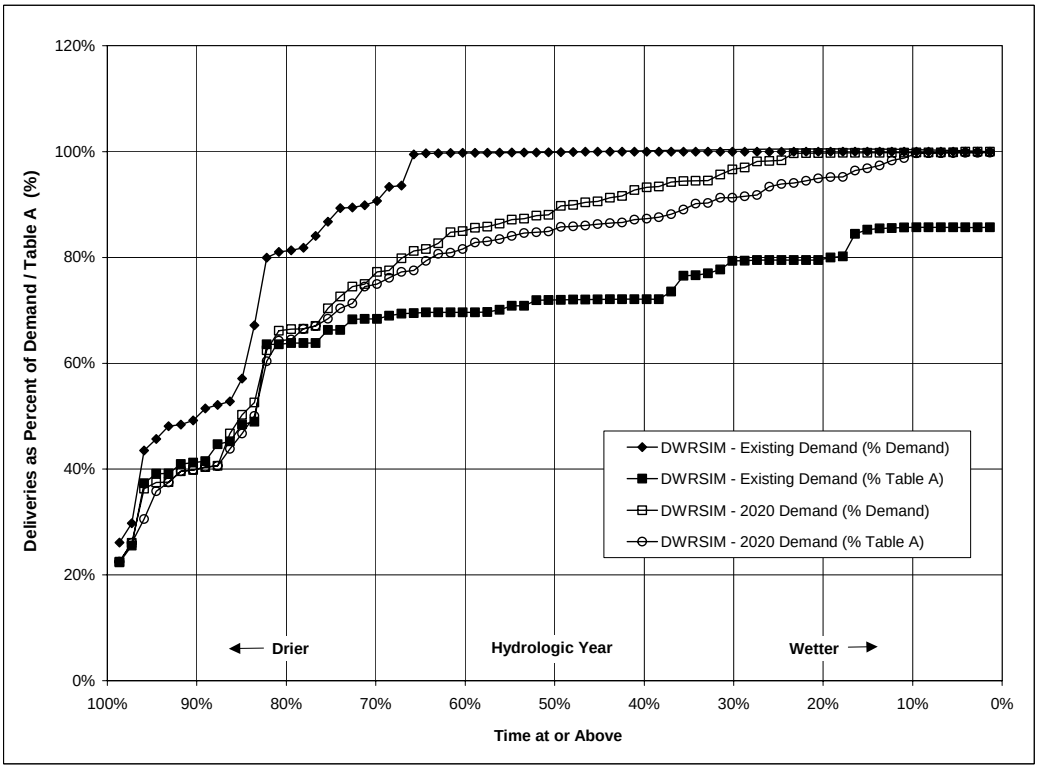



**Figure 2-4. DWRSIM Total SWP Table A Deliveries, as Percent of Demand and Percent of Table A Amount**

## Table 2-2. DWRSIM SWP Demand Input and Delivery Output at Existing SWP Demand Conditions

(DWRSIM study 1995D06E-CALFED-771; Calendar year data, in thousands of AF)

| Hydrologic Year | DWRSIM INPUT: DEMANDS | | | | DWRSIM OUTPUT |
|---|---|---|---|---|---|
| | Ag Contractrs | MWD | Other M&I Contractrs | Total SWP Demand | Total SWP Delivery |
| Table A Amount | 1175.4 | 2011.5 | 856.8 | 4043.7 | N/A |
| 1922 | 1175.4 | 883.0 | 856.8 | 2915.2 | 2913.2 |
| 1923 | 1175.4 | 1183.0 | 856.8 | 3215.2 | 3215.4 |
| 1924 | 1175.4 | 1433.0 | 856.8 | 3465.2 | 1979.4 |
| 1925 | 1175.4 | 1433.0 | 856.8 | 3465.2 | 1806.3 |
| 1926 | 1175.4 | 1183.0 | 856.8 | 3215.2 | 2789.3 |
| 1927 | 1175.4 | 883.0 | 856.8 | 2915.2 | 2910.2 |
| 1928 | 1175.4 | 1183.0 | 856.8 | 3215.2 | 3215.4 |
| 1929 | 1175.4 | 1433.0 | 856.8 | 3465.2 | 1829.2 |
| 1930 | 1175.4 | 1433.0 | 856.8 | 3465.2 | 2808.4 |
| 1931 | 1175.4 | 1433.0 | 856.8 | 3465.2 | 1583.6 |
| 1932 | 1175.4 | 883.0 | 856.8 | 2915.2 | 1958.0 |
| 1933 | 1175.4 | 1183.0 | 856.8 | 3215.2 | 1654.9 |
| 1934 | 1175.4 | 1433.0 | 856.8 | 3465.2 | 1676.9 |
| 1935 | 1175.4 | 883.0 | 856.8 | 2915.2 | 2907.2 |
| 1936 | 1175.4 | 883.0 | 856.8 | 2915.2 | 2908.0 |
| 1937 | 1125.0 | 783.0 | 856.8 | 2764.8 | 2760.6 |
| 1938 | 1125.0 | 783.0 | 856.8 | 2764.8 | 2764.7 |
| 1939 | 1175.4 | 783.0 | 856.8 | 2815.2 | 2815.1 |
| 1940 | 1175.4 | 1183.0 | 856.8 | 3215.2 | 3208.7 |
| 1941 | 940.0 | 783.0 | 856.8 | 2579.8 | 2579.8 |
| 1942 | 1175.4 | 783.0 | 856.8 | 2815.2 | 2815.1 |
| 1943 | 1125.0 | 883.0 | 856.8 | 2864.8 | 2864.8 |
| 1944 | 1175.4 | 783.0 | 856.8 | 2815.2 | 2815.1 |
| 1945 | 1175.4 | 883.0 | 856.8 | 2915.2 | 2912.0 |
| 1946 | 1175.4 | 1183.0 | 856.8 | 3215.2 | 3215.4 |
| 1947 | 1175.4 | 1433.0 | 856.8 | 3465.2 | 3458.8 |
| 1948 | 1175.4 | 1433.0 | 856.8 | 3465.2 | 3141.6 |
| 1949 | 1175.4 | 1433.0 | 856.8 | 3465.2 | 2817.8 |
| 1950 | 1175.4 | 1433.0 | 856.8 | 3465.2 | 3098.6 |
| 1951 | 1175.4 | 1433.0 | 856.8 | 3465.2 | 3465.4 |
| 1952 | 940.0 | 883.0 | 856.8 | 2679.8 | 2679.7 |
| 1953 | 1175.4 | 883.0 | 856.8 | 2915.2 | 2915.2 |
| 1954 | 1175.4 | 1433.0 | 856.8 | 3465.2 | 3465.4 |
| 1955 | 1175.4 | 1183.0 | 856.8 | 3215.2 | 2570.5 |
| 1956 | 1175.4 | 1433.0 | 856.8 | 3465.2 | 3464.5 |
| 1957 | 1175.4 | 1433.0 | 856.8 | 3465.2 | 3465.4 |
| 1958 | 1125.0 | 883.0 | 856.8 | 2864.8 | 2864.8 |
| 1959 | 1175.4 | 883.0 | 856.8 | 2915.2 | 2915.2 |
| 1960 | 1175.4 | 1433.0 | 856.8 | 3465.2 | 3113.4 |
| 1961 | 1175.4 | 1433.0 | 856.8 | 3465.2 | 2834.7 |
| 1962 | 1175.4 | 1433.0 | 856.8 | 3465.2 | 3456.7 |
| 1963 | 1175.4 | 1183.0 | 856.8 | 3215.2 | 3215.4 |
| 1964 | 1175.4 | 1433.0 | 856.8 | 3465.2 | 3465.4 |
| 1965 | 1175.4 | 1433.0 | 856.8 | 3465.2 | 3234.8 |
| 1966 | 1175.4 | 1183.0 | 856.8 | 3215.2 | 3215.4 |
| 1967 | 1125.0 | 783.0 | 856.8 | 2764.8 | 2764.7 |
| 1968 | 1175.4 | 883.0 | 856.8 | 2915.2 | 2915.2 |
| 1969 | 940.0 | 883.0 | 856.8 | 2679.8 | 2679.7 |
| 1970 | 1175.4 | 883.0 | 856.8 | 2915.2 | 2915.2 |
| 1971 | 1175.4 | 1433.0 | 856.8 | 3465.2 | 3465.4 |
| 1972 | 1175.4 | 1433.0 | 856.8 | 3465.2 | 3447.4 |
| 1973 | 1175.4 | 1183.0 | 856.8 | 3215.2 | 3209.4 |
| 1974 | 1175.4 | 1183.0 | 856.8 | 3215.2 | 3215.4 |
| 1975 | 1175.4 | 1433.0 | 856.8 | 3465.2 | 3465.4 |
| 1976 | 1175.4 | 1433.0 | 856.8 | 3465.2 | 3242.6 |
| 1977 | 1175.4 | 1433.0 | 856.8 | 3465.2 | 904.4 |
| 1978 | 940.0 | 783.0 | 856.8 | 2579.8 | 2571.1 |
| 1979 | 1175.4 | 783.0 | 856.8 | 2815.2 | 2815.1 |
| 1980 | 940.0 | 783.0 | 856.8 | 2579.8 | 2579.8 |
| 1981 | 1175.4 | 883.0 | 856.8 | 2915.2 | 2915.2 |
| 1982 | 1125.0 | 1433.0 | 856.8 | 3414.8 | 3415.1 |
| 1983 | 940.0 | 783.0 | 856.8 | 2579.8 | 2579.8 |
| 1984 | 1175.4 | 783.0 | 856.8 | 2815.2 | 2815.1 |
| 1985 | 1175.4 | 1433.0 | 856.8 | 3465.2 | 3465.4 |
| 1986 | 940.0 | 1183.0 | 856.8 | 2979.8 | 2972.8 |
| 1987 | 1175.4 | 1433.0 | 856.8 | 3465.2 | 3095.0 |
| 1988 | 1175.4 | 1433.0 | 856.8 | 3465.2 | 1507.9 |
| 1989 | 1175.4 | 1433.0 | 856.8 | 3465.2 | 2912.7 |
| 1990 | 1175.4 | 1433.0 | 856.8 | 3465.2 | 1667.3 |
| 1991 | 1175.4 | 1433.0 | 856.8 | 3465.2 | 1031.8 |
| 1992 | 1175.4 | 1183.0 | 856.8 | 3215.2 | 1581.8 |
| 1993 | 1175.4 | 783.0 | 856.8 | 2815.2 | 2805.6 |
| AVG | 1148.3 | 1155.9 | 856.8 | 3161.0 | 2787.8 |
| MIN | 940.0 | 783.0 | 856.8 | 2579.8 | 904.4 |
| MAX | 1175.4 | 1433.0 | 856.8 | 3465.2 | 3465.4 |

**Table 2-3. DWRSIM SWP Demand Input and Delivery Output at 2020 SWP Demand Conditions**

(DWRSIM study 2020D09C-CALFED-786; Calendar year data, in thousands of AF)

| Hydrologic Year | DWRSIM INPUT: DEMANDS | | | | DWRSIM OUTPUT |
|---|---|---|---|---|---|
| | Ag Contractrs | MWD | Other M&I Contractrs | Total SWP Demand | Total SWP Delivery |
| Table A Amount | 1175.5 | 2011.5 | 946.1 | 4133.1 | N/A |
| 1922 | 1175.5 | 2011.5 | 946.0 | 4133.0 | 4123.4 |
| 1923 | 1175.5 | 2011.5 | 946.0 | 4133.0 | 4119.4 |
| 1924 | 1175.5 | 1358.0 | 946.0 | 3479.5 | 1262.6 |
| 1925 | 1175.5 | 2011.5 | 946.0 | 4133.0 | 1930.4 |
| 1926 | 1175.5 | 2011.5 | 946.0 | 4133.0 | 2749.1 |
| 1927 | 1175.5 | 2011.5 | 946.0 | 4133.0 | 4122.6 |
| 1928 | 1175.5 | 2011.5 | 946.0 | 4133.0 | 3372.7 |
| 1929 | 1175.5 | 1322.0 | 946.0 | 3443.5 | 1810.2 |
| 1930 | 1175.5 | 2011.5 | 946.0 | 4133.0 | 2769.9 |
| 1931 | 1175.5 | 2011.5 | 946.0 | 4133.0 | 1645.0 |
| 1932 | 1175.5 | 1994.0 | 946.0 | 4115.5 | 2068.0 |
| 1933 | 1175.5 | 2011.5 | 946.0 | 4133.0 | 1668.5 |
| 1934 | 1175.5 | 2011.5 | 946.0 | 4133.0 | 1678.3 |
| 1935 | 1175.5 | 1785.0 | 946.0 | 3906.5 | 3578.4 |
| 1936 | 1175.5 | 2011.5 | 946.0 | 4133.0 | 3601.9 |
| 1937 | 1175.5 | 2011.5 | 946.0 | 4133.0 | 3192.7 |
| 1938 | 1175.5 | 2011.5 | 946.0 | 4133.0 | 4123.2 |
| 1939 | 1175.5 | 1826.0 | 946.0 | 3947.5 | 3549.4 |
| 1940 | 1175.5 | 2011.5 | 946.0 | 4133.0 | 3904.3 |
| 1941 | 940.0 | 1595.0 | 946.0 | 3481.0 | 3474.0 |
| 1942 | 1175.5 | 1759.0 | 946.0 | 3880.5 | 3880.3 |
| 1943 | 1175.5 | 1998.0 | 946.0 | 4119.5 | 3621.0 |
| 1944 | 1175.5 | 1589.0 | 946.0 | 3710.5 | 3645.3 |
| 1945 | 1175.5 | 1826.0 | 946.0 | 3947.5 | 3727.1 |
| 1946 | 1175.5 | 1847.0 | 946.0 | 3968.5 | 3679.3 |
| 1947 | 1175.5 | 1821.0 | 946.0 | 3942.5 | 3146.7 |
| 1948 | 1175.5 | 2011.5 | 946.0 | 4133.0 | 3077.6 |
| 1949 | 1175.5 | 1874.0 | 946.0 | 3995.5 | 2655.4 |
| 1950 | 1175.5 | 2011.5 | 946.0 | 4133.0 | 3098.0 |
| 1951 | 1175.5 | 1972.0 | 946.0 | 4093.5 | 3858.4 |
| 1952 | 940.0 | 1624.0 | 946.0 | 3510.0 | 3509.7 |
| 1953 | 1175.5 | 1941.0 | 946.0 | 4062.5 | 3794.5 |
| 1954 | 1175.5 | 2011.5 | 946.0 | 4133.0 | 3772.4 |
| 1955 | 1175.5 | 1873.0 | 946.0 | 3994.5 | 2494.8 |
| 1956 | 1175.5 | 2011.5 | 946.0 | 4133.0 | 4121.3 |
| 1957 | 1175.5 | 1907.0 | 946.0 | 4028.5 | 3448.7 |
| 1958 | 1175.5 | 1820.0 | 946.0 | 3941.5 | 3935.0 |
| 1959 | 1175.5 | 2011.5 | 946.0 | 4133.0 | 3609.7 |
| 1960 | 1175.5 | 1908.0 | 946.0 | 4029.5 | 2665.5 |
| 1961 | 1175.5 | 1772.0 | 946.0 | 3893.5 | 2826.7 |
| 1962 | 1175.5 | 1811.0 | 946.0 | 3932.5 | 3555.5 |
| 1963 | 1175.5 | 2011.5 | 946.0 | 4133.0 | 4064.8 |
| 1964 | 1175.5 | 1908.0 | 946.0 | 4029.5 | 3423.6 |
| 1965 | 1175.5 | 1844.0 | 946.0 | 3965.5 | 3278.7 |
| 1966 | 1175.5 | 1924.0 | 946.0 | 4045.5 | 3924.4 |
| 1967 | 1175.5 | 1911.0 | 946.0 | 4032.5 | 4025.4 |
| 1968 | 1175.5 | 2006.0 | 946.0 | 4127.5 | 3565.7 |
| 1969 | 940.0 | 1697.0 | 946.0 | 3583.0 | 3574.9 |
| 1970 | 1175.5 | 1882.0 | 946.0 | 4003.5 | 3783.6 |
| 1971 | 1175.5 | 2011.5 | 946.0 | 4133.0 | 4124.3 |
| 1972 | 1175.5 | 2011.5 | 946.0 | 4133.0 | 3204.3 |
| 1973 | 1175.5 | 1997.0 | 946.0 | 4118.5 | 3731.2 |
| 1974 | 1175.5 | 1968.0 | 946.0 | 4089.5 | 4083.3 |
| 1975 | 1175.5 | 1991.0 | 946.0 | 4112.5 | 3933.9 |
| 1976 | 1175.5 | 1594.0 | 946.0 | 3715.5 | 3334.8 |
| 1977 | 1175.5 | 2011.5 | 946.0 | 4133.0 | 929.2 |
| 1978 | 940.0 | 2011.5 | 946.0 | 3897.5 | 3887.8 |
| 1979 | 1175.5 | 2011.5 | 946.0 | 4133.0 | 3545.4 |
| 1980 | 940.0 | 1865.0 | 946.0 | 3751.0 | 3496.9 |
| 1981 | 1175.5 | 2011.5 | 946.0 | 4133.0 | 3502.5 |
| 1982 | 1175.5 | 1887.0 | 946.0 | 4008.5 | 4002.4 |
| 1983 | 940.0 | 1457.0 | 946.0 | 3343.0 | 3342.7 |
| 1984 | 1175.5 | 1939.0 | 946.0 | 4060.5 | 3984.4 |
| 1985 | 1175.5 | 1783.0 | 946.0 | 3904.5 | 3772.6 |
| 1986 | 940.0 | 2011.5 | 946.0 | 3897.5 | 3431.7 |
| 1987 | 1175.5 | 1507.0 | 946.0 | 3628.5 | 2947.5 |
| 1988 | 1175.5 | 1821.0 | 946.0 | 3942.5 | 1479.1 |
| 1989 | 1175.5 | 2011.5 | 946.0 | 4133.0 | 2908.5 |
| 1990 | 1175.5 | 2011.5 | 946.0 | 4133.0 | 1636.3 |
| 1991 | 1175.5 | 2011.5 | 946.0 | 4133.0 | 1075.9 |
| 1992 | 1175.5 | 2011.5 | 946.0 | 4133.0 | 1548.6 |
| 1993 | 1175.5 | 2011.5 | 946.0 | 4133.0 | 4121.3 |
| AVG | 1152.6 | 1896.8 | 946.0 | 3995.4 | 3229.6 |
| MIN | 940.0 | 1322.0 | 946.0 | 3343.0 | 929.2 |
| MAX | 1175.5 | 2011.5 | 946.0 | 4133.0 | 4124.3 |

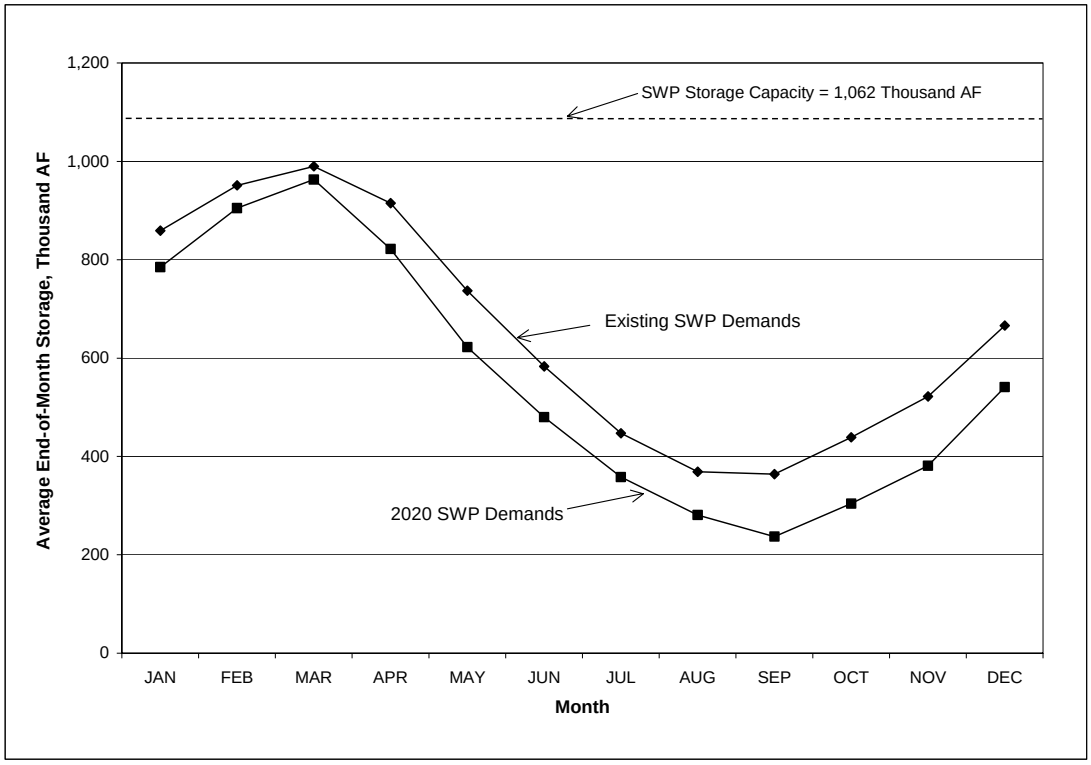



**Figure 2-5. DWRSIM Output of SWP San Luis Reservoir Storage, Average End-of-Month Storage**

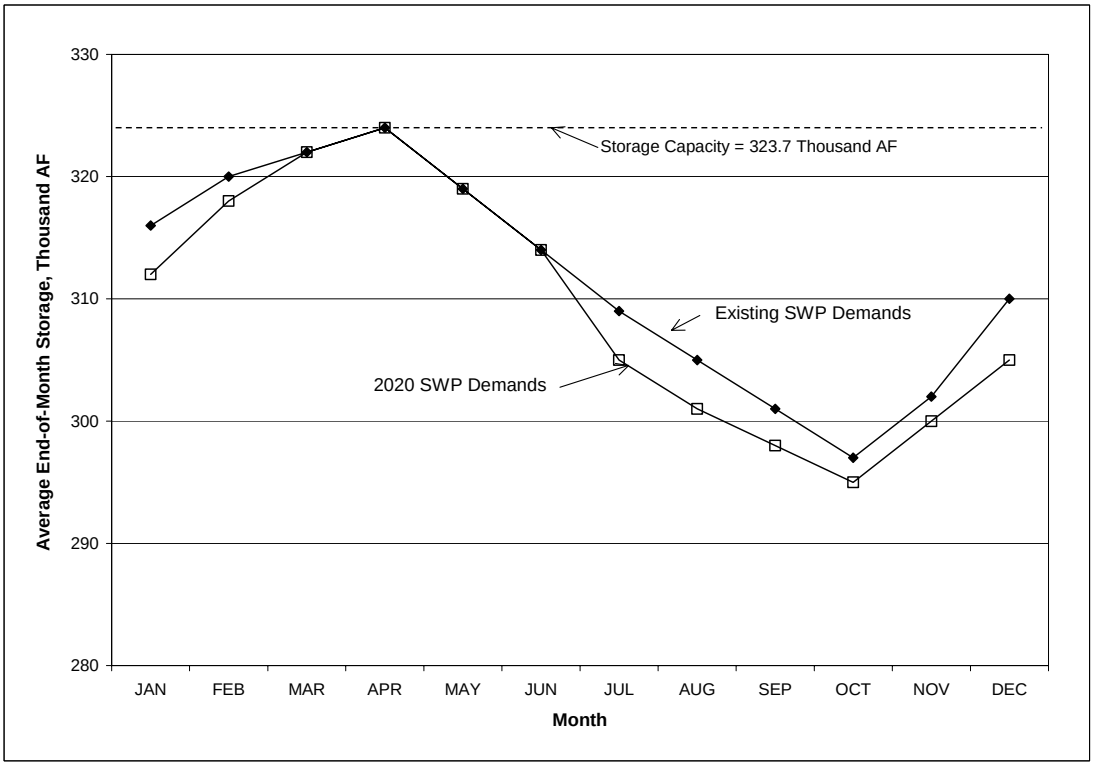



**Figure 2-6. DWRSIM Output of Castaic Lake Storage, Average End-of-Month Storage**

**Table 2-4. DWRSIM Output of SWP San Luis Reservoir Storage at Existing SWP Demand Conditions**

(DWRSIM study 1995D06E-CALFED-771)

(End-of-Month Storage, in thousands of AF)

| YEAR | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1921 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 225 | 247 | 491 |
| 1922 | 818 | 1067 | 1067 | 1017 | 847 | 850 | 594 | 517 | 549 | 783 | 996 | 1067 |
| 1923 | 1067 | 1067 | 1067 | 1004 | 805 | 599 | 571 | 326 | 332 | 344 | 344 | 500 |
| 1924 | 806 | 948 | 948 | 851 | 755 | 602 | 410 | 162 | 42 | 42 | 77 | 270 |
| 1925 | 376 | 715 | 715 | 716 | 613 | 380 | 155 | 42 | 93 | 117 | 117 | 300 |
| 1926 | 660 | 954 | 963 | 890 | 668 | 449 | 226 | 253 | 66 | 127 | 328 | 573 |
| 1927 | 900 | 1067 | 1067 | 1016 | 839 | 669 | 597 | 402 | 441 | 675 | 886 | 1067 |
| 1928 | 1067 | 1067 | 1067 | 1009 | 794 | 557 | 424 | 326 | 187 | 187 | 307 | 504 |
| 1929 | 829 | 1009 | 1009 | 929 | 766 | 537 | 298 | 69 | 42 | 42 | 42 | 337 |
| 1930 | 691 | 796 | 1060 | 927 | 705 | 489 | 269 | 305 | 162 | 162 | 140 | 371 |
| 1931 | 625 | 625 | 625 | 568 | 415 | 215 | 42 | 42 | 42 | 42 | 42 | 371 |
| 1932 | 773 | 952 | 952 | 898 | 787 | 617 | 414 | 183 | 88 | 88 | 88 | 88 |
| 1933 | 399 | 494 | 667 | 667 | 555 | 341 | 119 | 42 | 42 | 42 | 42 | 293 |
| 1934 | 651 | 730 | 730 | 684 | 520 | 308 | 88 | 42 | 42 | 42 | 157 | 230 |
| 1935 | 632 | 722 | 1012 | 970 | 815 | 671 | 625 | 316 | 231 | 301 | 295 | 295 |
| 1936 | 675 | 1003 | 1067 | 1031 | 857 | 684 | 611 | 305 | 335 | 335 | 315 | 480 |
| 1937 | 838 | 1067 | 1067 | 1051 | 900 | 832 | 581 | 287 | 298 | 445 | 663 | 961 |
| 1938 | 1067 | 1067 | 1067 | 1067 | 975 | 1027 | 1016 | 1052 | 1067 | 1067 | 1067 | 1067 |
| 1939 | 1067 | 1067 | 1067 | 954 | 754 | 552 | 350 | 286 | 85 | 85 | 52 | 52 |
| 1940 | 477 | 818 | 1066 | 997 | 793 | 563 | 517 | 341 | 307 | 324 | 424 | 672 |
| 1941 | 1046 | 1067 | 1067 | 1042 | 936 | 1021 | 829 | 896 | 1048 | 1067 | 1067 | 1067 |
| 1942 | 1067 | 1067 | 1067 | 1048 | 921 | 935 | 769 | 797 | 928 | 1067 | 1067 | 1067 |
| 1943 | 1067 | 1067 | 1067 | 1021 | 874 | 716 | 585 | 442 | 498 | 691 | 802 | 1022 |
| 1944 | 1067 | 1067 | 1067 | 966 | 788 | 621 | 574 | 286 | 132 | 132 | 354 | 618 |
| 1945 | 918 | 1067 | 1067 | 972 | 762 | 615 | 590 | 296 | 231 | 382 | 594 | 888 |
| 1946 | 1067 | 1067 | 1067 | 954 | 751 | 565 | 537 | 326 | 284 | 288 | 422 | 665 |
| 1947 | 943 | 1067 | 1067 | 898 | 612 | 313 | 42 | 42 | 42 | 42 | 42 | 42 |
| 1948 | 402 | 402 | 526 | 518 | 283 | 86 | 42 | 42 | 42 | 94 | 141 | 333 |
| 1949 | 616 | 706 | 997 | 865 | 646 | 493 | 511 | 307 | 249 | 249 | 249 | 249 |
| 1950 | 619 | 920 | 1049 | 925 | 678 | 489 | 458 | 340 | 379 | 468 | 647 | 910 |
| 1951 | 1067 | 1067 | 1067 | 944 | 728 | 476 | 374 | 335 | 370 | 474 | 644 | 873 |
| 1952 | 1067 | 1067 | 1067 | 1067 | 986 | 1060 | 1067 | 1067 | 1067 | 1067 | 1067 | 1067 |
| 1953 | 1067 | 1067 | 1067 | 979 | 819 | 740 | 591 | 609 | 731 | 965 | 1067 | 1067 |
| 1954 | 1067 | 1067 | 1067 | 980 | 743 | 481 | 386 | 347 | 297 | 390 | 560 | 774 |
| 1955 | 1067 | 1067 | 1067 | 955 | 772 | 651 | 523 | 267 | 225 | 225 | 302 | 602 |
| 1956 | 952 | 1067 | 1067 | 962 | 741 | 675 | 620 | 580 | 646 | 832 | 910 | 1067 |
| 1957 | 1067 | 1067 | 1067 | 954 | 720 | 497 | 442 | 351 | 370 | 557 | 726 | 942 |
| 1958 | 1067 | 1067 | 1067 | 1021 | 856 | 898 | 911 | 936 | 1061 | 1067 | 1067 | 1067 |
| 1959 | 1067 | 1067 | 1067 | 925 | 708 | 478 | 240 | 261 | 261 | 261 | 249 | 451 |
| 1960 | 754 | 1050 | 1067 | 912 | 658 | 402 | 148 | 134 | 50 | 132 | 272 | 485 |
| 1961 | 819 | 1067 | 1067 | 936 | 717 | 503 | 280 | 307 | 184 | 184 | 184 | 414 |
| 1962 | 595 | 980 | 1067 | 901 | 626 | 354 | 212 | 141 | 69 | 240 | 391 | 585 |
| 1963 | 872 | 1067 | 1067 | 1021 | 857 | 675 | 641 | 614 | 703 | 888 | 1067 | 1067 |
| 1964 | 1067 | 1067 | 1067 | 872 | 598 | 308 | 42 | 42 | 42 | 42 | 175 | 406 |
| 1965 | 768 | 1038 | 1067 | 1022 | 848 | 632 | 610 | 604 | 664 | 798 | 980 | 1067 |
| 1966 | 1067 | 1067 | 1067 | 928 | 704 | 445 | 196 | 186 | 109 | 109 | 299 | 588 |
| 1967 | 925 | 1067 | 1067 | 1052 | 960 | 1012 | 1035 | 1067 | 1067 | 1067 | 1067 | 1067 |
| 1968 | 1067 | 1067 | 1067 | 961 | 760 | 527 | 289 | 296 | 231 | 319 | 506 | 763 |
| 1969 | 1067 | 1067 | 1067 | 1067 | 967 | 1056 | 1067 | 1067 | 1067 | 1067 | 1067 | 1067 |
| 1970 | 1067 | 1067 | 1067 | 984 | 808 | 592 | 428 | 296 | 277 | 381 | 594 | 856 |
| 1971 | 1067 | 1067 | 1067 | 964 | 760 | 589 | 533 | 494 | 561 | 747 | 878 | 1067 |
| 1972 | 1067 | 1067 | 1067 | 897 | 635 | 362 | 109 | 75 | 42 | 130 | 297 | 504 |
| 1973 | 822 | 1067 | 1067 | 1000 | 807 | 699 | 643 | 449 | 539 | 746 | 933 | 1067 |
| 1974 | 1067 | 1067 | 1067 | 997 | 799 | 699 | 671 | 657 | 749 | 957 | 1067 | 1067 |
| 1975 | 1067 | 1067 | 1067 | 1004 | 817 | 762 | 678 | 638 | 704 | 890 | 1059 | 1067 |
| 1976 | 1067 | 1067 | 1067 | 902 | 647 | 411 | 220 | 217 | 61 | 144 | 124 | 124 |
| 1977 | 196 | 196 | 196 | 188 | 118 | 42 | 42 | 42 | 58 | 42 | 61 | 329 |
| 1978 | 738 | 1067 | 1067 | 1067 | 1023 | 952 | 633 | 603 | 750 | 995 | 1067 | 1067 |
| 1979 | 1067 | 1067 | 1067 | 1016 | 850 | 746 | 579 | 286 | 309 | 495 | 716 | 981 |
| 1980 | 1067 | 1067 | 1067 | 1067 | 945 | 845 | 606 | 674 | 827 | 1067 | 1067 | 1067 |
| 1981 | 1067 | 1067 | 1067 | 978 | 776 | 548 | 317 | 296 | 198 | 252 | 465 | 720 |
| 1982 | 1067 | 1067 | 1067 | 991 | 779 | 734 | 687 | 655 | 726 | 913 | 1067 | 1067 |
| 1983 | 1067 | 1067 | 1067 | 1067 | 1055 | 1067 | 1067 | 1067 | 1067 | 1067 | 1067 | 1067 |
| 1984 | 1067 | 1067 | 1067 | 975 | 780 | 628 | 575 | 441 | 548 | 731 | 952 | 1067 |
| 1985 | 1067 | 1067 | 1067 | 905 | 637 | 350 | 53 | 42 | 42 | 46 | 90 | 299 |
| 1986 | 653 | 987 | 1067 | 1017 | 813 | 650 | 615 | 316 | 421 | 605 | 605 | 825 |
| 1987 | 1067 | 1067 | 1067 | 925 | 682 | 459 | 241 | 253 | 72 | 72 | 42 | 196 |
| 1988 | 548 | 548 | 548 | 494 | 354 | 204 | 42 | 42 | 42 | 42 | 127 | 239 |
| 1989 | 495 | 495 | 831 | 733 | 490 | 236 | 42 | 42 | 42 | 42 | 42 | 141 |
| 1990 | 456 | 484 | 526 | 478 | 373 | 209 | 42 | 42 | 42 | 42 | 42 | 42 |
| 1991 | 64 | 42 | 396 | 416 | 362 | 231 | 94 | 42 | 42 | 42 | 42 | 50 |
| 1992 | 245 | 583 | 894 | 847 | 695 | 517 | 323 | 118 | 42 | 42 | 42 | 345 |
| 1993 | 782 | 1065 | 1067 | 1032 | 884 | 893 | 588 | 611 | 693 | 932 | 1052 | 1067 |
| 1994 | 1067 | 1067 | 1067 | 917 | 698 | 491 | 278 | 286 | 237 | ---- | ---- | ---- |
| AVG: | 859 | 951 | 990 | 915 | 737 | 583 | 447 | 369 | 364 | 439 | 522 | 666 |
| MIN: | 64 | 42 | 196 | 188 | 118 | 42 | 42 | 42 | 42 | 42 | 42 | 42 |
| MAX: | 1067 | 1067 | 1067 | 1067 | 1055 | 1067 | 1067 | 1067 | 1067 | 1067 | 1067 | 1067 |

**Table 2-5. DWRSIM Output of SWP San Luis Reservoir Storage at 2020SWP Demand Conditions**

(DWRSIM study 2020D09C-CALFED-786)

(End-of-Month Storage, in thousands of AF)

| YEAR | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1921 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 270 | 257 | 430 |
| 1922 | 723 | 983 | 1067 | 877 | 611 | 546 | 465 | 398 | 271 | 366 | 479 | 658 |
| 1923 | 923 | 908 | 823 | 658 | 405 | 176 | 97 | 42 | 42 | 94 | 42 | 156 |
| 1924 | 475 | 687 | 687 | 625 | 510 | 372 | 211 | 56 | 42 | 61 | 156 | 432 |
| 1925 | 628 | 955 | 955 | 936 | 847 | 631 | 414 | 216 | 232 | 239 | 239 | 249 |
| 1926 | 597 | 866 | 862 | 764 | 566 | 413 | 221 | 270 | 101 | 137 | 345 | 582 |
| 1927 | 868 | 1067 | 1067 | 875 | 604 | 358 | 277 | 211 | 114 | 209 | 317 | 480 |
| 1928 | 747 | 931 | 1067 | 965 | 761 | 578 | 462 | 318 | 158 | 158 | 290 | 464 |
| 1929 | 777 | 988 | 988 | 887 | 728 | 532 | 305 | 83 | 42 | 42 | 42 | 344 |
| 1930 | 686 | 779 | 1005 | 842 | 645 | 486 | 290 | 278 | 141 | 141 | 148 | 379 |
| 1931 | 641 | 641 | 641 | 560 | 412 | 233 | 42 | 42 | 42 | 42 | 42 | 374 |
| 1932 | 761 | 952 | 952 | 868 | 760 | 615 | 412 | 180 | 106 | 106 | 106 | 106 |
| 1933 | 437 | 512 | 658 | 658 | 551 | 366 | 151 | 42 | 42 | 42 | 42 | 320 |
| 1934 | 665 | 727 | 727 | 662 | 510 | 327 | 119 | 42 | 42 | 42 | 180 | 274 |
| 1935 | 664 | 739 | 1012 | 931 | 713 | 529 | 455 | 384 | 153 | 153 | 82 | 82 |
| 1936 | 460 | 793 | 959 | 812 | 585 | 423 | 357 | 304 | 220 | 220 | 140 | 225 |
| 1937 | 601 | 948 | 1067 | 969 | 782 | 762 | 647 | 329 | 211 | 265 | 439 | 669 |
| 1938 | 973 | 1067 | 1067 | 944 | 751 | 723 | 645 | 584 | 555 | 662 | 794 | 962 |
| 1939 | 1067 | 1067 | 1067 | 869 | 630 | 422 | 170 | 148 | 50 | 50 | 42 | 42 |
| 1940 | 444 | 792 | 957 | 778 | 523 | 275 | 197 | 133 | 42 | 86 | 149 | 307 |
| 1941 | 625 | 857 | 1047 | 912 | 746 | 791 | 642 | 496 | 514 | 691 | 863 | 1067 |
| 1942 | 1067 | 1067 | 1067 | 938 | 739 | 704 | 626 | 547 | 533 | 691 | 848 | 1047 |
| 1943 | 1067 | 1067 | 1067 | 937 | 751 | 590 | 553 | 335 | 339 | 474 | 554 | 735 |
| 1944 | 1001 | 1067 | 1067 | 873 | 638 | 438 | 342 | 292 | 69 | 130 | 300 | 501 |
| 1945 | 791 | 1067 | 1067 | 863 | 587 | 408 | 337 | 281 | 83 | 175 | 325 | 536 |
| 1946 | 798 | 798 | 834 | 648 | 427 | 264 | 216 | 176 | 70 | 159 | 288 | 487 |
| 1947 | 772 | 988 | 1066 | 870 | 633 | 434 | 187 | 188 | 50 | 50 | 50 | 50 |
| 1948 | 402 | 402 | 519 | 491 | 279 | 148 | 104 | 69 | 58 | 158 | 233 | 416 |
| 1949 | 709 | 796 | 1067 | 915 | 730 | 645 | 540 | 271 | 225 | 225 | 225 | 225 |
| 1950 | 582 | 867 | 990 | 826 | 600 | 471 | 460 | 319 | 351 | 452 | 639 | 889 |
| 1951 | 1067 | 1067 | 1067 | 879 | 655 | 435 | 321 | 265 | 246 | 340 | 496 | 692 |
| 1952 | 992 | 1067 | 1067 | 1007 | 874 | 919 | 892 | 874 | 960 | 1067 | 1067 | 1067 |
| 1953 | 1067 | 1067 | 1067 | 885 | 674 | 573 | 513 | 461 | 489 | 589 | 750 | 931 |
| 1954 | 1067 | 1067 | 1067 | 929 | 705 | 479 | 377 | 324 | 249 | 301 | 459 | 640 |
| 1955 | 941 | 974 | 954 | 812 | 655 | 591 | 475 | 240 | 212 | 212 | 295 | 599 |
| 1956 | 902 | 1067 | 1067 | 871 | 615 | 547 | 468 | 403 | 360 | 469 | 509 | 638 |
| 1957 | 868 | 1049 | 1067 | 922 | 719 | 570 | 551 | 323 | 318 | 503 | 684 | 890 |
| 1958 | 1067 | 1067 | 1067 | 901 | 655 | 637 | 556 | 488 | 500 | 648 | 750 | 914 |
| 1959 | 1067 | 1067 | 1067 | 829 | 574 | 344 | 63 | 42 | 42 | 84 | 42 | 42 |
| 1960 | 379 | 690 | 793 | 623 | 429 | 280 | 98 | 151 | 57 | 57 | 251 | 481 |
| 1961 | 798 | 1042 | 1067 | 901 | 701 | 539 | 333 | 284 | 163 | 163 | 163 | 390 |
| 1962 | 569 | 940 | 1067 | 844 | 578 | 364 | 240 | 183 | 79 | 229 | 375 | 545 |
| 1963 | 781 | 993 | 1067 | 945 | 715 | 499 | 419 | 352 | 314 | 411 | 534 | 693 |
| 1964 | 924 | 867 | 797 | 570 | 323 | 103 | 42 | 42 | 42 | 42 | 174 | 391 |
| 1965 | 714 | 944 | 1067 | 986 | 833 | 700 | 614 | 547 | 639 | 773 | 963 | 1067 |
| 1966 | 1067 | 1067 | 1067 | 841 | 580 | 318 | 42 | 42 | 42 | 42 | 154 | 352 |
| 1967 | 661 | 860 | 1067 | 910 | 720 | 694 | 614 | 549 | 548 | 661 | 763 | 931 |
| 1968 | 1067 | 1067 | 1067 | 875 | 628 | 403 | 132 | 112 | 50 | 177 | 352 | 556 |
| 1969 | 902 | 1067 | 1067 | 972 | 811 | 862 | 869 | 838 | 915 | 1067 | 1067 | 1067 |
| 1970 | 1067 | 1067 | 1067 | 888 | 659 | 424 | 192 | 141 | 50 | 156 | 317 | 508 |
| 1971 | 718 | 750 | 890 | 685 | 447 | 266 | 187 | 124 | 125 | 232 | 332 | 495 |
| 1972 | 734 | 840 | 1013 | 821 | 608 | 436 | 246 | 266 | 181 | 314 | 510 | 730 |
| 1973 | 1011 | 1067 | 1067 | 925 | 708 | 616 | 552 | 361 | 384 | 544 | 701 | 900 |
| 1974 | 1067 | 1067 | 1067 | 894 | 644 | 551 | 471 | 406 | 409 | 539 | 661 | 831 |
| 1975 | 1058 | 1067 | 1067 | 927 | 719 | 679 | 604 | 544 | 554 | 701 | 846 | 1019 |
| 1976 | 1067 | 1067 | 1067 | 861 | 623 | 437 | 274 | 277 | 133 | 177 | 164 | 164 |
| 1977 | 239 | 239 | 239 | 220 | 162 | 86 | 42 | 42 | 68 | 42 | 67 | 388 |
| 1978 | 798 | 1067 | 1067 | 919 | 758 | 585 | 528 | 396 | 364 | 364 | 364 | 460 |
| 1979 | 784 | 1036 | 1067 | 924 | 712 | 599 | 557 | 340 | 256 | 381 | 549 | 748 |
| 1980 | 1067 | 1067 | 1067 | 984 | 801 | 669 | 652 | 565 | 650 | 814 | 795 | 993 |
| 1981 | 1067 | 1067 | 1067 | 904 | 675 | 457 | 193 | 176 | 50 | 144 | 321 | 524 |
| 1982 | 801 | 1004 | 1067 | 909 | 669 | 625 | 545 | 479 | 494 | 642 | 788 | 1011 |
| 1983 | 1067 | 1067 | 1067 | 1022 | 962 | 1067 | 1067 | 1067 | 1067 | 1067 | 1067 | 1067 |
| 1984 | 1067 | 1067 | 1067 | 867 | 610 | 410 | 336 | 275 | 225 | 329 | 477 | 654 |
| 1985 | 884 | 980 | 1015 | 773 | 492 | 225 | 42 | 42 | 42 | 42 | 61 | 213 |
| 1986 | 558 | 872 | 1056 | 909 | 680 | 525 | 483 | 343 | 406 | 542 | 494 | 684 |
| 1987 | 966 | 1067 | 1067 | 902 | 691 | 539 | 356 | 287 | 139 | 139 | 64 | 290 |
| 1988 | 632 | 632 | 632 | 564 | 438 | 316 | 136 | 42 | 42 | 42 | 154 | 272 |
| 1989 | 520 | 520 | 839 | 694 | 468 | 269 | 42 | 44 | 42 | 47 | 42 | 159 |
| 1990 | 485 | 508 | 525 | 461 | 370 | 240 | 60 | 42 | 42 | 42 | 42 | 42 |
| 1991 | 53 | 42 | 384 | 387 | 328 | 208 | 69 | 42 | 42 | 42 | 42 | 64 |
| 1992 | 273 | 603 | 896 | 832 | 702 | 558 | 375 | 183 | 108 | 108 | 108 | 423 |
| 1993 | 796 | 1025 | 1067 | 896 | 661 | 591 | 511 | 402 | 282 | 320 | 337 | 485 |
| 1994 | 709 | 882 | 813 | 584 | 328 | 118 | 42 | 42 | 42 | ---- | ---- | ---- |
| AVG: | 785 | 905 | 963 | 822 | 622 | 480 | 358 | 281 | 237 | 304 | 381 | 541 |
| MIN: | 53 | 42 | 239 | 220 | 162 | 86 | 42 | 42 | 42 | 42 | 42 | 42 |
| MAX: | 1067 | 1067 | 1067 | 1022 | 962 | 1067 | 1067 | 1067 | 1067 | 1067 | 1067 | 1067 |

**Table 2-6. DWRSIM Output of Castaic Lake Storage at Existing SWP Demand Conditions**

(DWRSIM study 1995D06E-CALFED-771)

(End-of-Month Storage, in thousands of AF)

| YEAR | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1921 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 294 | 299 | 304 |
| 1922 | 309 | 324 | 324 | 324 | 319 | 314 | 309 | 304 | 299 | 294 | 299 | 324 |
| 1923 | 324 | 314 | 319 | 324 | 319 | 314 | 309 | 304 | 299 | 294 | 299 | 304 |
| 1924 | 309 | 314 | 319 | 324 | 319 | 314 | 309 | 304 | 299 | 294 | 299 | 304 |
| 1925 | 309 | 314 | 319 | 324 | 319 | 314 | 309 | 304 | 299 | 294 | 299 | 304 |
| 1926 | 309 | 314 | 319 | 324 | 319 | 314 | 309 | 304 | 299 | 294 | 299 | 304 |
| 1927 | 309 | 324 | 324 | 324 | 319 | 314 | 309 | 304 | 299 | 294 | 299 | 324 |
| 1928 | 324 | 324 | 324 | 324 | 319 | 314 | 309 | 304 | 299 | 294 | 299 | 304 |
| 1929 | 309 | 314 | 319 | 324 | 319 | 314 | 309 | 304 | 299 | 294 | 299 | 304 |
| 1930 | 309 | 314 | 319 | 324 | 319 | 314 | 309 | 304 | 299 | 294 | 299 | 304 |
| 1931 | 309 | 314 | 319 | 324 | 319 | 314 | 309 | 304 | 299 | 294 | 299 | 304 |
| 1932 | 309 | 314 | 319 | 324 | 319 | 314 | 309 | 304 | 299 | 294 | 299 | 304 |
| 1933 | 309 | 314 | 319 | 324 | 319 | 314 | 309 | 304 | 299 | 294 | 299 | 304 |
| 1934 | 309 | 314 | 319 | 324 | 319 | 314 | 309 | 304 | 299 | 294 | 299 | 304 |
| 1935 | 309 | 314 | 319 | 324 | 319 | 314 | 309 | 304 | 299 | 294 | 299 | 304 |
| 1936 | 309 | 314 | 324 | 324 | 319 | 314 | 309 | 304 | 299 | 294 | 299 | 304 |
| 1937 | 309 | 324 | 324 | 324 | 319 | 314 | 309 | 304 | 299 | 294 | 299 | 304 |
| 1938 | 324 | 324 | 324 | 324 | 319 | 314 | 309 | 304 | 324 | 324 | 324 | 324 |
| 1939 | 324 | 324 | 324 | 324 | 319 | 314 | 309 | 304 | 299 | 294 | 299 | 304 |
| 1940 | 309 | 314 | 319 | 324 | 319 | 314 | 309 | 304 | 299 | 294 | 299 | 304 |
| 1941 | 309 | 324 | 324 | 324 | 319 | 314 | 309 | 304 | 299 | 324 | 324 | 324 |
| 1942 | 324 | 324 | 324 | 324 | 319 | 314 | 309 | 304 | 299 | 324 | 324 | 324 |
| 1943 | 324 | 324 | 324 | 324 | 319 | 314 | 309 | 304 | 299 | 294 | 299 | 304 |
| 1944 | 324 | 324 | 324 | 324 | 319 | 314 | 309 | 304 | 299 | 294 | 299 | 304 |
| 1945 | 309 | 324 | 324 | 324 | 319 | 314 | 309 | 304 | 299 | 294 | 299 | 304 |
| 1946 | 324 | 324 | 324 | 324 | 319 | 314 | 309 | 304 | 299 | 294 | 299 | 304 |
| 1947 | 309 | 324 | 324 | 324 | 319 | 314 | 309 | 299 | 294 | 294 | 299 | 304 |
| 1948 | 309 | 314 | 319 | 324 | 319 | 314 | 301 | 294 | 294 | 294 | 299 | 304 |
| 1949 | 309 | 314 | 319 | 324 | 319 | 314 | 309 | 304 | 299 | 294 | 299 | 304 |
| 1950 | 309 | 314 | 319 | 324 | 319 | 314 | 309 | 304 | 299 | 294 | 299 | 304 |
| 1951 | 324 | 324 | 324 | 324 | 319 | 314 | 309 | 304 | 299 | 294 | 299 | 304 |
| 1952 | 324 | 324 | 324 | 324 | 319 | 314 | 323 | 324 | 324 | 324 | 324 | 324 |
| 1953 | 324 | 324 | 324 | 324 | 319 | 314 | 309 | 304 | 299 | 294 | 324 | 324 |
| 1954 | 324 | 324 | 324 | 324 | 319 | 314 | 309 | 304 | 299 | 294 | 299 | 304 |
| 1955 | 309 | 324 | 324 | 324 | 319 | 314 | 309 | 304 | 299 | 294 | 299 | 304 |
| 1956 | 309 | 324 | 324 | 324 | 319 | 314 | 309 | 304 | 299 | 294 | 299 | 304 |
| 1957 | 324 | 324 | 324 | 324 | 319 | 314 | 309 | 304 | 299 | 294 | 299 | 304 |
| 1958 | 324 | 324 | 324 | 324 | 319 | 314 | 309 | 304 | 299 | 324 | 324 | 324 |
| 1959 | 324 | 324 | 324 | 324 | 319 | 314 | 309 | 304 | 299 | 294 | 299 | 304 |
| 1960 | 309 | 314 | 324 | 324 | 319 | 314 | 309 | 304 | 299 | 294 | 299 | 304 |
| 1961 | 309 | 314 | 324 | 324 | 319 | 314 | 309 | 304 | 299 | 294 | 299 | 304 |
| 1962 | 309 | 314 | 324 | 324 | 319 | 313 | 302 | 299 | 299 | 294 | 299 | 304 |
| 1963 | 309 | 324 | 324 | 324 | 319 | 314 | 309 | 304 | 299 | 294 | 299 | 324 |
| 1964 | 324 | 324 | 319 | 324 | 319 | 314 | 309 | 304 | 294 | 294 | 299 | 304 |
| 1965 | 309 | 314 | 324 | 324 | 319 | 314 | 309 | 304 | 299 | 294 | 299 | 324 |
| 1966 | 324 | 324 | 324 | 324 | 319 | 314 | 309 | 304 | 299 | 294 | 299 | 304 |
| 1967 | 309 | 324 | 324 | 324 | 319 | 314 | 309 | 304 | 324 | 324 | 324 | 324 |
| 1968 | 324 | 324 | 324 | 324 | 319 | 314 | 309 | 304 | 299 | 294 | 299 | 304 |
| 1969 | 324 | 324 | 324 | 324 | 319 | 314 | 324 | 324 | 324 | 324 | 324 | 324 |
| 1970 | 324 | 324 | 324 | 324 | 319 | 314 | 309 | 304 | 299 | 294 | 299 | 304 |
| 1971 | 324 | 324 | 324 | 324 | 319 | 314 | 309 | 304 | 299 | 294 | 299 | 304 |
| 1972 | 324 | 324 | 324 | 324 | 319 | 314 | 309 | 304 | 299 | 294 | 299 | 304 |
| 1973 | 309 | 324 | 324 | 324 | 319 | 314 | 309 | 304 | 299 | 294 | 299 | 324 |
| 1974 | 324 | 324 | 324 | 324 | 319 | 314 | 309 | 304 | 299 | 294 | 303 | 324 |
| 1975 | 324 | 324 | 324 | 324 | 319 | 314 | 309 | 304 | 299 | 294 | 299 | 324 |
| 1976 | 324 | 324 | 324 | 324 | 319 | 314 | 309 | 304 | 299 | 294 | 299 | 304 |
| 1977 | 309 | 314 | 319 | 324 | 319 | 314 | 309 | 304 | 299 | 294 | 299 | 304 |
| 1978 | 309 | 314 | 324 | 324 | 319 | 314 | 309 | 304 | 299 | 294 | 314 | 324 |
| 1979 | 324 | 324 | 324 | 324 | 319 | 314 | 309 | 304 | 299 | 294 | 299 | 304 |
| 1980 | 324 | 324 | 324 | 324 | 319 | 314 | 309 | 304 | 299 | 294 | 299 | 324 |
| 1981 | 324 | 324 | 324 | 324 | 319 | 314 | 309 | 304 | 299 | 294 | 299 | 304 |
| 1982 | 309 | 324 | 324 | 324 | 319 | 314 | 309 | 304 | 299 | 294 | 299 | 324 |
| 1983 | 324 | 324 | 324 | 324 | 319 | 324 | 324 | 324 | 324 | 324 | 324 | 324 |
| 1984 | 324 | 324 | 324 | 324 | 319 | 314 | 309 | 304 | 299 | 294 | 299 | 324 |
| 1985 | 324 | 324 | 324 | 324 | 319 | 314 | 309 | 304 | 299 | 294 | 299 | 304 |
| 1986 | 309 | 314 | 324 | 324 | 319 | 314 | 309 | 304 | 299 | 294 | 299 | 304 |
| 1987 | 324 | 324 | 324 | 324 | 319 | 314 | 309 | 304 | 299 | 294 | 299 | 301 |
| 1988 | 309 | 314 | 319 | 324 | 319 | 314 | 309 | 304 | 299 | 294 | 299 | 304 |
| 1989 | 309 | 314 | 319 | 324 | 319 | 314 | 309 | 304 | 299 | 294 | 294 | 294 |
| 1990 | 309 | 314 | 319 | 324 | 319 | 314 | 309 | 304 | 299 | 294 | 299 | 304 |
| 1991 | 309 | 314 | 319 | 324 | 319 | 314 | 309 | 304 | 299 | 294 | 299 | 304 |
| 1992 | 309 | 314 | 319 | 324 | 319 | 314 | 309 | 304 | 299 | 294 | 299 | 304 |
| 1993 | 309 | 314 | 324 | 324 | 319 | 314 | 309 | 304 | 299 | 294 | 299 | 324 |
| 1994 | 324 | 324 | 319 | 324 | 319 | 314 | 309 | 304 | 299 | ---- | ---- | ---- |
| AVG: | 316 | 320 | 322 | 324 | 319 | 314 | 309 | 305 | 301 | 297 | 302 | 310 |
| MIN: | 309 | 314 | 319 | 324 | 319 | 313 | 301 | 294 | 294 | 294 | 294 | 294 |
| MAX: | 324 | 324 | 324 | 324 | 319 | 324 | 324 | 324 | 324 | 324 | 324 | 324 |

**Table 2-7. DWRSIM Output of Castaic Lake Storage at 2020 SWP Demand Conditions**

(DWRSIM study 2020D09C-CALFED-786)

(End-of-Month Storage, in thousands of AF)

| YEAR | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1921 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 294 | 299 | 304 |
| 1922 | 309 | 314 | 324 | 324 | 319 | 314 | 294 | 294 | 294 | 294 | 299 | 304 |
| 1923 | 309 | 314 | 319 | 324 | 319 | 314 | 294 | 294 | 294 | 294 | 299 | 303 |
| 1924 | 309 | 314 | 319 | 324 | 319 | 314 | 309 | 304 | 299 | 294 | 299 | 304 |
| 1925 | 309 | 314 | 319 | 324 | 319 | 314 | 309 | 304 | 299 | 294 | 299 | 304 |
| 1926 | 309 | 314 | 319 | 324 | 319 | 314 | 309 | 304 | 299 | 294 | 299 | 304 |
| 1927 | 309 | 324 | 324 | 324 | 319 | 314 | 294 | 294 | 294 | 294 | 299 | 304 |
| 1928 | 309 | 314 | 324 | 324 | 319 | 314 | 309 | 304 | 299 | 294 | 299 | 304 |
| 1929 | 309 | 314 | 319 | 324 | 319 | 314 | 309 | 304 | 299 | 294 | 299 | 304 |
| 1930 | 309 | 314 | 319 | 324 | 319 | 314 | 309 | 304 | 299 | 294 | 299 | 304 |
| 1931 | 309 | 314 | 319 | 324 | 319 | 314 | 309 | 304 | 299 | 294 | 299 | 304 |
| 1932 | 309 | 314 | 319 | 324 | 319 | 314 | 309 | 304 | 299 | 294 | 299 | 304 |
| 1933 | 309 | 314 | 319 | 324 | 319 | 314 | 309 | 304 | 299 | 294 | 299 | 304 |
| 1934 | 309 | 314 | 319 | 324 | 319 | 314 | 309 | 304 | 299 | 294 | 299 | 304 |
| 1935 | 309 | 314 | 319 | 324 | 319 | 314 | 294 | 294 | 294 | 294 | 299 | 304 |
| 1936 | 309 | 314 | 319 | 324 | 319 | 314 | 303 | 294 | 299 | 294 | 299 | 304 |
| 1937 | 309 | 314 | 324 | 324 | 319 | 314 | 309 | 304 | 299 | 294 | 299 | 304 |
| 1938 | 309 | 324 | 324 | 324 | 319 | 314 | 294 | 294 | 294 | 294 | 299 | 304 |
| 1939 | 324 | 324 | 324 | 324 | 319 | 314 | 309 | 304 | 299 | 294 | 299 | 299 |
| 1940 | 309 | 314 | 319 | 324 | 319 | 314 | 294 | 294 | 294 | 294 | 299 | 304 |
| 1941 | 309 | 314 | 319 | 324 | 319 | 314 | 309 | 304 | 299 | 294 | 299 | 304 |
| 1942 | 324 | 324 | 324 | 324 | 319 | 314 | 309 | 299 | 299 | 294 | 299 | 304 |
| 1943 | 324 | 324 | 324 | 324 | 319 | 314 | 309 | 304 | 299 | 294 | 299 | 304 |
| 1944 | 309 | 324 | 324 | 324 | 319 | 314 | 309 | 304 | 299 | 294 | 299 | 304 |
| 1945 | 309 | 319 | 324 | 324 | 319 | 314 | 302 | 294 | 299 | 294 | 299 | 304 |
| 1946 | 309 | 314 | 319 | 324 | 319 | 314 | 309 | 304 | 299 | 294 | 299 | 304 |
| 1947 | 309 | 314 | 319 | 324 | 319 | 314 | 309 | 304 | 299 | 294 | 299 | 304 |
| 1948 | 309 | 314 | 319 | 324 | 319 | 314 | 309 | 304 | 299 | 294 | 299 | 304 |
| 1949 | 309 | 314 | 319 | 324 | 319 | 314 | 309 | 304 | 299 | 294 | 299 | 304 |
| 1950 | 309 | 314 | 319 | 324 | 319 | 314 | 309 | 304 | 299 | 294 | 299 | 304 |
| 1951 | 324 | 324 | 324 | 324 | 319 | 314 | 309 | 300 | 299 | 294 | 299 | 304 |
| 1952 | 309 | 324 | 324 | 324 | 319 | 314 | 309 | 304 | 299 | 310 | 324 | 324 |
| 1953 | 324 | 324 | 324 | 324 | 319 | 314 | 309 | 304 | 299 | 294 | 299 | 304 |
| 1954 | 324 | 324 | 324 | 324 | 319 | 314 | 309 | 302 | 299 | 294 | 299 | 304 |
| 1955 | 309 | 314 | 319 | 324 | 319 | 314 | 309 | 304 | 299 | 294 | 299 | 304 |
| 1956 | 309 | 324 | 324 | 324 | 319 | 314 | 294 | 294 | 294 | 294 | 299 | 304 |
| 1957 | 309 | 314 | 324 | 324 | 319 | 314 | 309 | 304 | 299 | 294 | 299 | 304 |
| 1958 | 324 | 324 | 324 | 324 | 319 | 314 | 297 | 294 | 299 | 294 | 299 | 304 |
| 1959 | 324 | 324 | 319 | 324 | 319 | 314 | 309 | 304 | 299 | 294 | 299 | 304 |
| 1960 | 309 | 314 | 319 | 324 | 319 | 314 | 309 | 304 | 299 | 294 | 299 | 304 |
| 1961 | 309 | 314 | 324 | 324 | 319 | 314 | 309 | 304 | 299 | 294 | 299 | 304 |
| 1962 | 309 | 314 | 324 | 324 | 319 | 314 | 298 | 294 | 299 | 294 | 299 | 304 |
| 1963 | 309 | 314 | 324 | 324 | 319 | 314 | 294 | 294 | 294 | 294 | 299 | 304 |
| 1964 | 309 | 314 | 319 | 324 | 319 | 314 | 309 | 304 | 294 | 294 | 299 | 304 |
| 1965 | 309 | 314 | 324 | 324 | 319 | 314 | 309 | 304 | 299 | 294 | 299 | 324 |
| 1966 | 324 | 324 | 324 | 324 | 319 | 314 | 303 | 294 | 294 | 294 | 299 | 304 |
| 1967 | 309 | 314 | 322 | 324 | 319 | 314 | 294 | 294 | 294 | 294 | 299 | 304 |
| 1968 | 324 | 324 | 324 | 324 | 319 | 314 | 309 | 304 | 299 | 294 | 299 | 304 |
| 1969 | 309 | 324 | 324 | 324 | 319 | 314 | 309 | 304 | 299 | 294 | 324 | 324 |
| 1970 | 324 | 324 | 324 | 324 | 319 | 314 | 309 | 304 | 299 | 294 | 299 | 304 |
| 1971 | 309 | 314 | 319 | 324 | 319 | 314 | 294 | 294 | 294 | 294 | 299 | 304 |
| 1972 | 309 | 314 | 319 | 324 | 319 | 314 | 309 | 304 | 299 | 294 | 299 | 304 |
| 1973 | 309 | 324 | 324 | 324 | 319 | 314 | 309 | 302 | 299 | 294 | 299 | 304 |
| 1974 | 324 | 324 | 324 | 324 | 319 | 314 | 294 | 294 | 294 | 294 | 299 | 304 |
| 1975 | 309 | 324 | 324 | 324 | 319 | 314 | 295 | 294 | 299 | 294 | 299 | 304 |
| 1976 | 324 | 324 | 324 | 324 | 319 | 314 | 309 | 304 | 299 | 294 | 299 | 304 |
| 1977 | 309 | 314 | 319 | 324 | 319 | 314 | 309 | 304 | 299 | 294 | 299 | 304 |
| 1978 | 309 | 318 | 324 | 324 | 319 | 314 | 294 | 294 | 294 | 294 | 299 | 304 |
| 1979 | 309 | 314 | 324 | 324 | 319 | 314 | 309 | 304 | 299 | 294 | 299 | 304 |
| 1980 | 309 | 324 | 324 | 324 | 319 | 314 | 309 | 304 | 299 | 294 | 299 | 304 |
| 1981 | 324 | 324 | 324 | 324 | 319 | 314 | 309 | 304 | 299 | 294 | 299 | 304 |
| 1982 | 309 | 314 | 324 | 324 | 319 | 314 | 297 | 294 | 299 | 294 | 299 | 304 |
| 1983 | 324 | 324 | 324 | 324 | 319 | 324 | 324 | 313 | 324 | 324 | 324 | 324 |
| 1984 | 324 | 324 | 324 | 324 | 319 | 314 | 300 | 294 | 299 | 294 | 299 | 304 |
| 1985 | 309 | 314 | 319 | 324 | 319 | 314 | 309 | 294 | 294 | 294 | 299 | 304 |
| 1986 | 309 | 314 | 319 | 324 | 319 | 314 | 309 | 304 | 299 | 294 | 299 | 304 |
| 1987 | 309 | 324 | 324 | 324 | 319 | 314 | 309 | 304 | 299 | 294 | 299 | 304 |
| 1988 | 309 | 314 | 319 | 324 | 319 | 314 | 309 | 304 | 299 | 294 | 299 | 304 |
| 1989 | 309 | 314 | 319 | 324 | 319 | 314 | 309 | 304 | 299 | 294 | 299 | 299 |
| 1990 | 309 | 314 | 319 | 324 | 319 | 314 | 309 | 304 | 299 | 294 | 299 | 304 |
| 1991 | 309 | 314 | 319 | 324 | 319 | 314 | 309 | 304 | 299 | 294 | 299 | 304 |
| 1992 | 309 | 314 | 319 | 324 | 319 | 314 | 309 | 304 | 299 | 294 | 299 | 304 |
| 1993 | 309 | 314 | 323 | 324 | 319 | 314 | 294 | 294 | 294 | 294 | 299 | 304 |
| 1994 | 309 | 314 | 319 | 324 | 319 | 314 | 309 | 303 | 294 | ---- | ---- | ---- |
| AVG: | 312 | 318 | 322 | 324 | 319 | 314 | 305 | 301 | 298 | 295 | 300 | 305 |
| MIN: | 309 | 314 | 319 | 324 | 319 | 314 | 294 | 294 | 294 | 294 | 299 | 299 |
| MAX: | 324 | 324 | 324 | 324 | 319 | 324 | 324 | 313 | 324 | 324 | 324 | 324 |

# 3.0 STATE WATER PROJECT SUPPLY ANALYSIS

## 3.1 ANALYSIS ASSUMPTIONS AND METHODOLOGY

### 3.1.1 Overview of Analysis

The water supply analysis included in this EIR shows the potential impacts resulting from implementation of the Project to both WRMWSD SWP supplies and CLWA SWP supplies. Figure 3-1 provides an overview of the water supply analysis. The first two components shown in this figure, Primary Model Tool and Analysis Timeframe, are described in section 2.1. The remaining two components in the figure, SWP Water Supply Allocation Scenarios and Hydrologic Conditions, are described directly below. Following these discussions is a description of both the assumptions and the general methodology followed in these analyses that are common to all three allocation scenarios.

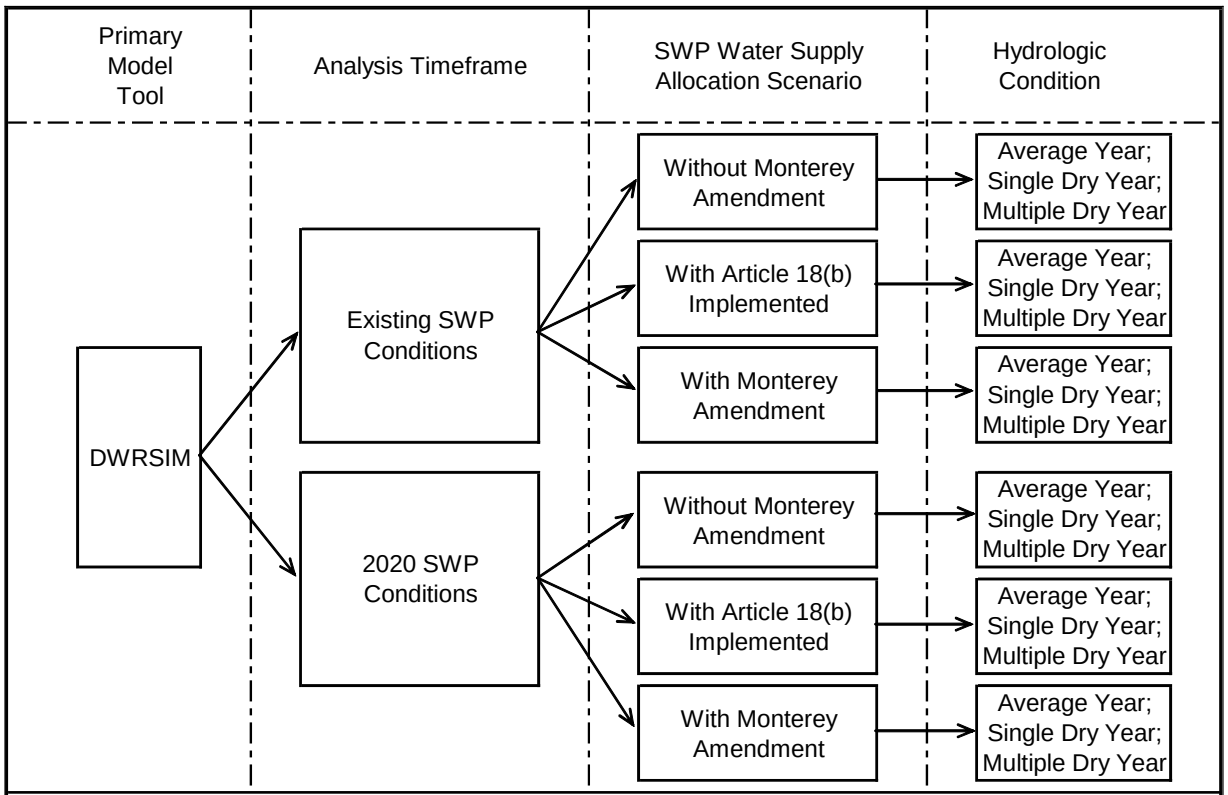
#### *3.1.1.1 SWP Water Supply Allocation Scenarios*

As was discussed in section 1.3, DWR is in the process of preparing a new EIR for the Monterey Amendment. Since the Monterey Amendment changes the way SWP supplies are allocated among Contractors, this EIR provides three separate analyses of the Project's potential impacts to SWP water supplies available to WRMWSD and CLWA. The three analyses represent three possible scenarios for allocating available SWP supplies among Contractors, and provide an evaluation of the amount of SWP supply that would be associated with the 41,000 AF of Table A Amount under each of the allocation scenarios. The three analyses are governed by specific terms in the Water Supply Contracts, and are referred to in this EIR as: "SWP Allocation without the Monterey Amendment" (Without Monterey Amendment); "SWP Allocation without the Monterey Amendment and with Implementation of Article 18(b) Permanent Shortage Provision" (With Article 18(b) Implemented); and, "SWP Allocation with the Monterey Amendment" (With Monterey Amendment). DWR is currently allocating SWP supplies in accordance with the Water Supply Contract as amended by the Monterey Amendment (i.e., the With Monterey Amendment scenario). The SWP supply allocation scenarios that form the basis of the three analyses are summarized in Table 3-1. These allocation scenarios are further described, along with analysis methodology and assumptions that are specific to each scenario, in sections 3.1.3.1 through 3.1.3.3 below.

It is important to note that the total amount of SWP supply available in any given year is independent of the allocation scenario. The total amount of SWP supply available in a given year is determined by that year's hydrology, the amount of storage in SWP reservoirs at the beginning of the year, and the regulatory and operational constraints that govern Delta and SWP facility operations. The different allocation scenarios determine only how that available SWP supply is allocated among the Contractors.

#### *3.1.1.2 Hydrologic Conditions*

Because SWP water supplies vary from year to year depending on a variety of factors, the supply analyses for this EIR were conducted for each year in the period of hydrologic record included in the DWRSIM model studies. The results of the water supply analysis are presented




**Definitions:**

DWRSIM - DWR's SWP operations model. DWRSIM calculates the amount of water the SWP could deliver to Contractors in each month over a 73-year period of hydrologic record, based on a given set of facilities and operating constraints and for a given level of Contractor demand. (DWRSIM studies used were conducted by DWR in 1998 for CALFED Bay-Delta Program EIS/EIR [CALFED 2000].)

Existing SWP Conditions - A timeframe for anlaysis in the DWRSIM study. The existing condition study assumes the use of then-existing (1998) SWP facilities and operating constraints, along with then-current estimates of Contractor demands and upstream land and water use. (DWRSIM study 1995D06E-CALFED-771)

2020 SWP Conditions - A timeframe for analysis in the DWRSIM study. The 2020 condition study assumes the use of then-existing (1998) SWP facilities and operating constrains, along with estimated future (2020) Contractor demands upstream land and water use. (DWRSIM study 2020D09C-CALFED-786)

Without Monterey Amendment (Initial agricultural reduction in allocations) - Allocation of available SWP supplies based on the original terms of the Water Supply Contracts.

With Article 18(b) Implemented (Proportionate reduction in Table A Amounts) - Proportionate reduction in Contractor's Table A Amounts and allocation of available SWP supplies based on the original terms of the Water Supply Contracts, assuming DWR implemented Article 18(b) (i.e., the permanent shortage provision).

With Monterey Amendment (Proportionate reduction in allocations) - Allocation of available SWP supplies based on the terms of the Monterey Amendment to the Water Supply Contracts.

Average Year - The average quantity of supply available, based on the 73 years of DWRSIM model results.

Single Dry Year - Supply available in the single year with the lowest total SWP deliveries, based on the DWRSIM model results (1977). The single dry year supply is considered to be the worst-case scenario, with a probability of occurrence of once in 73 years, or about 1.4 percent of the time.

Multiple Dry Year - Average supply available over the four consecutive drought years of 1988 through 1991, based on the DWRSIM model results.

**Figure 3-1. Water Supply Analysis Overview**

**Table 3.1. Summary of SWP Water Supply Contract Without Monterey Amendment, With Article 18(b) Implemented and With Monterey Amendment Allocation Scenarios**

| | *Without Monterey Amendment* | *With Article 18(b) Implemented* | *With Monterey Amendment* |
|---|---|---|---|
| SWP Supplies Allocated Based on: | Original terms of Water Supply Contracts. | Original terms of Water Supply Contracts, assuming DWR implemented Article 18(b), (i.e., if it determined SWP was in "permanent shortage" situation).<br>All Contractors' Table A Amounts proportionately reduced until they total new "minimum project yield," as determined by DWR. | Terms of Monterey Amendment to Water Supply Contracts. |
| Table A Water Shortage Allocation | Agricultural Contractors receive initial supply reduction (up to 50% of Table A Amount in one year, and up to 100% in any consecutive seven years).<br>Any remaining shortage allocated proportionately among all Contractors. | Same as Without Monterey Amendment[1]. | Shortages allocated in proportion to Contractors' Table A Amounts; no agricultural and M&I allocation differential. |
| Surplus Water Allocation | First priority given to Agricultural Contractors. Two categories of surplus water:<br>• Scheduled surplus.<br>• Unscheduled surplus. | Same as Without Monterey Amendment[2]. | Surplus allocated in proportion to Contractors' Table A Amounts.<br>Scheduled surplus water eliminated.<br>Unscheduled surplus water renamed; referred to as Article 21 water. |
| Results for Contractors | Agricultural Contractors have:<br>• Less reliable Table A supply than M&I Contractors (due to initial agricultural reductions), but,<br>• More access to surplus water. | Supplies shift from M&I Contractors to Agricultural Contractors, due to:<br>• Smaller and less frequent initial agricultural reductions, and,<br>• More of available supply classified as surplus water (with agricultural priority). | Reliability of both Table A supply and surplus supply is same for Agricultural Contractors and M&I Contractors. |

1. Same allocation rules apply, but because Table A Amounts are reduced, initial agricultural reductions are smaller and less frequent.
2. Same allocation rules apply, but because Table A Amounts are reduced, surplus supplies are available more frequently.

in section 3.2 below, both in graphical form over the entire period of record and in tabular form for three selected hydrologic conditions, as follows:

1. Graph of supplies available over DWRSIM's entire 73-year period of hydrologic record, presented as probability of exceedance curves (i.e., the probability of supplies being greater than or equal to specific quantities).
2. Table of supply results for selected hydrologic conditions, defined as:
   - Average Year - The average supply available, based on the 73 years of DWRSIM model results.
   - Single Dry Year - The supply available in the single year with the lowest total SWP deliveries, based on the DWRSIM model results, which occurred in the critical drought year of 1977. The single dry year supply is considered to be the worst-case scenario, with a probability of occurrence of once in 73 years, or about 1.4 percent of the time.
   - Multiple Dry Year Period – The average supply available over the four consecutive drought years of 1988 to 1991, based on the DWRSIM model results.

### 3.1.2 Common Assumptions and Methodology

***Assumptions***

The general assumptions made in determining the amount of SWP water supply available to WRMWSD and CLWA that are common to all three water allocation scenarios are described below.

***Classification of Table A Amounts*** - In the SWP supply analyses conducted for this EIR, the classifications of Table A Amounts either as agricultural or as M&I were maintained throughout all allocation scenarios. These classifications were determined as part of the original Water Supply Contracts based on the anticipated use of the water at the time the original contracts went into effect, and these classifications have not changed as Table A Amounts have been transferred. Therefore, any agricultural Table A Amounts that have been transferred to M&I Contractors were treated in the allocation scenarios as agricultural Table A amounts. For purposes of allocating supplies among the three broad Contractor groups, all transferred agricultural Table A Amounts were initially included with the remaining agricultural Table A Amounts of the Agricultural Contractors to determine the total supply allocated to total agricultural Table A Amounts, based on the allocation rules appropriate for that Table A Amount classification. Agricultural Table A Amounts transferred to M&I Contractors, which are all still treated as agricultural in this supply analysis, consist of the following:

- A 1991 transfer to CLWA of 12,700 AF (the remaining 41,500 AF of CLWA's 54,200 AF total Table A Amount without the Project is classified as M&I),
- All transfers as part of the 130,000 AF of Table A Amount made available to M&I Contractors by Agricultural Contractors under Article 53 of the Monterey Amendment that have already completed by other M&I Contractors, and
- The Project's 41,000 AF (also part of the 130,000 AF).

***Surplus Water*** - In addition to Table A supplies, CLWA and WRMWSD can also receive deliveries of surplus water (see Table 3-2 for descriptions of types of surplus water).

- Scheduled surplus water is not assumed to be available under the Without Monterey Amendment and With Monterey Amendment allocation scenarios. Scheduled surplus water was generally available only during the early years of the SWP, when total Contractor demands were low. Due primarily to increasing Contractor demands for Table A supplies, scheduled surplus water has not been available since the mid-1980s. Further, this type of surplus water was eliminated as part of the Monterey Amendment. In the water supply analyses here, scheduled surplus water is only included in the allocation scenario With Article 18(b) Implemented, since under that scenario scheduled deliveries of water in excess of a reduced minimum project yield (i.e., scheduled surplus water) would once again be available on a scheduled basis similar to Table A supplies.
- Unscheduled surplus water/Article 21 water is not included in the water supply analysis for any of the three water allocation scenarios. This is because it is not available on a routine or predictable basis, and is generally only available for short periods of time during low demand months, when most Contractors have a limited ability to use it.

**Table 3-2. SWP Surplus Water Types**

| **Surplus water**: SWP water that can be made available to Contractors when water and capacity are available in excess of SWP storage needs and Table A supplies. See below for terminology for and descriptions of specific types of surplus water. Note that surplus water terminology changed with implementation of the Monterey Amendment. | |
|---|---|
| Without Monterey Amendment | With Monterey Amendment |
| **Scheduled surplus water**: Water that DWR determined to be available, in addition to Table A supplies, which was scheduled for delivery throughout the year (in the same manner as Table A supplies). This water was generally available only during the early years of the SWP (when Contractor demands were low). | Category deleted as part of the Monterey Amendment. Given increased Contractor demands, this water was physically no longer available. |
| **Unscheduled surplus water**: Water that DWR made available when water and capacity were available in excess of SWP storage needs and Table A supplies. This water is only available for limited time periods, generally only in the winter or early spring when Contractors demands are low, and only under specific conditions that do not occur on an annual basis. | **Article 21 water**: Same as unscheduled surplus water. (Was defined under the Monterey Amendment as "interruptible water," but is more commonly referred to as "Article 21 water." |

***Deliveries to CLWA*** - For the purposes of estimating the maximum potential impact, the impact analyses assume that CLWA will take delivery of the entire amount of water made available from the 41,000 AF Table A Amount transferred. This assumption conservatively provides the largest effect on SWP operations, even though CLWA may not currently have the local demand for this entire amount of water in average and wetter hydrologic years.

***Methodology***

The general methodology to determine the amount of SWP water supply available to WRMWSD and CLWA that is common to all three water allocation scenarios is as follows:

1. Data from the two DWRSIM model studies described in section 2.1 were used as a starting point for the analysis. The specific model data used as this starting point consisted of: (a) input of annual Contractor demands, including demands totaled for the three broad Contractor groups of Agricultural Contractors, MWD, and Other M&I Contractors, for each hydrologic year; and (b) output of total annual SWP Table A deliveries to Contractors, for each hydrologic year.

2. The DWRSIM output of total annual SWP deliveries was allocated, for each year over the model's hydrologic period, among the three broad Contractor groups in accordance with the specific allocation rules for each of the three SWP water allocation scenarios described above (Without Monterey Amendment, With Article 18(b) Implemented, and With Monterey Amendment). In this allocation process, the supply for each year was allocated among each broad Contractor group, up to that group's demand; and any remaining SWP supply was then allocated among the remaining Contractor group(s) with unmet demand that year.

3. The annual SWP supplies available to WRMWSD and CLWA were then calculated by multiplying the supplies for each year from step 2 for the Agricultural Contractors and Other M&I Contractors by the proportionate shares of WRMWSD's and CLWA's specific Table A Amounts to the total Table A Amounts within those broad Contractor groups.

### 3.1.3 Scenario-Specific Assumptions and Methodology

#### *3.1.3.1 Without Monterey Amendment*

***Allocation Description***

Under the original terms of the Water Supply Contracts, water supply shortages, as well as any surplus water that might be available, were allocated differently among Contractors depending on whether Contractors' Table A Amounts were classified as agricultural or M&I. Under the original SWP contract terms, in a year with a water supply shortage (i.e., a year when total available SWP supplies were less than Contractor requests), available water supplies were allocated such that Agricultural Contractors received initial reductions in their deliveries of up to 50 percent in any one year, and up to a cumulative total of 100 percent in any seven consecutive years. Any shortages remaining in a year after the initial agricultural reduction were then allocated proportionately among all Contractors. When surplus water was available, priority to this water was given to agricultural use and groundwater replenishment. This priority to surplus water was given to both scheduled surplus water and unscheduled surplus water.

Since WRMWSD's Table A Amount is classified as agricultural, the Table A Amount transferred to CLWA would be considered agricultural. Therefore, in this allocation scenario, under

shortage conditions the 41,000 AF of Table A Amount would be subject to the initial agricultural reductions. Similarly, under surplus water conditions the 41,000 AF of Table A Amount would have the agricultural priority to surplus water.

***Assumptions***

- Since the Project's 41,000 AF of Table A Amount is classified as agricultural, this Table A Amount would be subject to the initial agricultural reductions under shortage conditions.

- Scheduled surplus water was assumed to be unavailable.

***Methodology***

The DWRSIM output of total annual SWP deliveries of Table A water was allocated, for each year over the model's hydrologic period, among the three broad Contractor groups. In years when there was no shortage (i.e., when available SWP supplies met Contractor demands), all three Contractor groups were allocated supplies equal to their demands. In shortage years (i.e., when supplies were less than demands), the total available SWP supply that year was allocated among the three Contractor groups according to the following methodology:

1. Agricultural Contractors received initial reductions of up to 50 percent of their demand in any one year, and up to a cumulative total of 100 percent in any seven consecutive years.

2. Any remaining shortage in a year was allocated proportionately among all Contractor groups.

3. The resulting supplies for each Contractor group were compared to that group's demands. If supplies for any Contractor group exceeded its demand, its supply was reduced to its demand.

4. Any remaining available supplies were allocated among Contractor group(s) with unmet demands.

5. Steps 3 and 4 were repeated until all available supplies for that year were allocated.

#### *3.1.3.2 With Article 18(b) Implemented*

***Allocation Description***

Under the original terms of the Water Supply Contracts, DWR could invoke Article 18(b) of the Water Supply Contracts if it determined that the SWP was in a "permanent shortage" situation. With implementation of Article 18(b), DWR would determine a new "minimum project yield"

for the SWP, and reduce Contractors' Table A Amounts proportionately until they totaled this reduced minimum project yield[7,8].

There is a great deal of controversy and uncertainty regarding this allocation scenario and how it might have been implemented by DWR. More specifically, there are several different legal and contractual interpretations, particularly between Agricultural and M&I Contractors, primarily regarding whether DWR could have validly invoked Article 18(b), and assuming that it could have done so, how it would have allocated water under Article 18(b). In general, the water allocation rules that would apply under this allocation scenario are similar to the allocation rules described for the Without Monterey Amendment scenario described above, with Agricultural Contractors receiving initial reductions in shortage years and priority to surplus when it was available. However, with all Contractor Table A Amounts reduced, shortages (i.e., supplies insufficient to meet Contractor requests for Table A water) would occur much less frequently (because the SWP could deliver the smaller Table A Amounts more regularly), and the initial agricultural reduction would be applied to a smaller Table A Amount (i.e., the reductions would be smaller). And with Table A Amounts reduced, SWP supplies in excess of the reduced minimum project yield would be available for scheduled delivery in most years. Unscheduled surplus water would be available under the same conditions, in the same amounts, and allocated in the same way as in the Without Monterey Amendment scenario.

There are two primary uncertainties under this allocation scenario. The first unknown is what value of minimum project yield DWR would have used in reducing Table A Amounts. A specific value for minimum project yield had not been calculated in the several years leading up to the Monterey Amendment, but was commonly thought at the time to be in the range of 2.0 to 2.5 million AF. The second uncertainty is how any water supply above minimum project yield would have been allocated. This is an area of controversy, with some Contractors contending it should be allocated as surplus water with Agricultural Contractors receiving a priority, and others contending it should be allocated in proportion to Table A Amounts.

Given these uncertainties, two separate Article 18(b) allocation scenarios that bound the various assumptions and interpretations described above were analyzed for this EIR. Scenario 1 assumes minimum project yield is reduced to 2.0 million AF, and scheduled surplus water is allocated with priority given to Agricultural Contractors. The second scenario assumes

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7 Without the Monterey Amendment, Article 18(b) of the Water Supply Contracts stated "In the event that the State is unable to construct sufficient additional conservation facilities to prevent a reduction in the minimum project yield, or if for any other reason there is a reduction in the minimum project yield, which, notwithstanding preventive or remedial measures taken or to be taken by the State, threatens a permanent shortage in the supply of project water to be made available to the contactors: (1) The annual entitlements and the maximum annual entitlements of all contractors, except to the extent such entitlements may reflect established rights under the area of origin statutes, shall, by amendment of Table A of this contract, be reduced proportionately by the State to the extent necessary so that the sum of the revised maximum annual entitlements of all contractors will then equal such reduced minimum project yield…".

8 Without the Monterey Amendment, Minimum Project Yield was defined in the Water Supply Contracts as "the dependable annual supply of project water to be made available, estimated to be 4,230,000 AF per year, said amount to be determined by the State on the basis of coordinated operation studies of initial project conservation facilities and additional conservation facilities, which studies shall be based upon: (1) the estimated relative proportion of deliveries for agricultural use to deliveries for municipal use for the year 1990, and the characteristic distributions of demands for these two uses throughout the year; (2) an allowable reduction in the agricultural use portion of the minimum project yield, due to drought, of not to exceed fifty percent (50%) in any one year, nor a total of one hundred percent (100%) of one year's supply in any series of seven consecutive years; and (3) agreements now in effect or as hereafter amended or supplemented between the State and the United States and others regarding the diversion or utilization of waters of the Delta or streams tributary thereto."

minimum project yield is reduced to 2.5 million AF, and deliveries above this amount are allocated in proportion to Table A Amounts. Both scenarios are discussed further and their results are presented below.

Note that in this EIR (outside of this appendix), to keep the number of allocation scenarios presented to a more manageable number, only one of these two Article 18(b) scenarios is presented. Scenario 1 would result in more water being allocated to Agricultural Contractors than Scenario 2, and, therefore, would result in more water associated with the Project's 41,000 AF of Agricultural Table A Amount. Since Scenario 1 would result in the worst case for purposes of analysis of potential growth impacts, only the results of Scenario 1 are presented in the EIR outside this appendix.

***Assumptions***

As was noted above, there are several different legal and contractual interpretations regarding how DWR would have allocated water under implementation of Article 18(b). The following assumptions regarding the Water Supply Contract provisions, made solely for the purpose of this EIR, are considered a reasonable interpretation.

***SWP Supply Availability*** - DWR would maintain its existing reservoir operations and delivery criteria in determining how much water is available for delivery in a given year. DWR would deliver the same total amount of water in any given year that it would have delivered without Article 18(b) implementation. The only change is the label on the water delivered, with a portion labeled as Table A water and a portion labeled as scheduled surplus water.

***Reductions in Table A Amounts*** - Total SWP Table A Amounts would be reduced to a new minimum project yield, and each Contractor's Table A Amount would be reduced proportionately from its current Table A Amount. In the analysis for this EIR, the minimum project yield is reduced from 4.2 million AF to an assumed value of 2.0 million AF for Scenario 1 and 2.5 million AF for Scenario 2.

Note that the specific value of a reduced minimum project yield is quite speculative. Had Article 18(b) been invoked, minimum project yield could have been determined based on a calculation, in accordance with the minimum project yield definition, or perhaps more likely, would have been reached through a negotiation or litigation process. Even if a calculated value would have been used, differing values could have been determined based on which specific methodology was used and how strictly the criteria in the definition was followed. Commonly referenced estimates of minimum project yield in the early 1990s were 2.0 to 2.5 million AF. However, these estimates were from the early 1990s, prior to D-1641 and its added restrictions on SWP operations, and so might be considered high. On the other hand, the calculation described in the minimum project yield definition can be interpreted to include yield from future SWP facilities or supply improvement programs. Given the wide range in potential values of minimum project yield and the speculative nature of how such a value might have been settled upon, two values were selected for use in this analysis. The values of 2.0 and 2.5 million AF are considered a reasonable range that would likely bound the potential value of minimum project yield that might have been settled upon.

***Contractor Water Demands*** - A Contractor's total demand for water would not change. Its demand for Table A water would be up to its reduced Table A Amount, and its demand for scheduled surplus water would be any demand in excess of its reduced Table A Amount.

***Scheduled Surplus Water Demands*** - A Contractor's demand for scheduled surplus water would be any demand in excess of its reduced Table A Amount, limited to the amount that would allow total scheduled deliveries up to its pre-reduction Table A Amount. Since surplus water priorities are based on both agricultural use and groundwater replenishment, M&I Contractor demands were split into demands for groundwater replenishment and demands for all other uses. M&I Contractor demands for groundwater replenishment were assumed in this analysis to be ten percent of their total demands.

***Table A Water Deliveries*** - In any year when total SWP deliveries are less than the reduced minimum project yield, shortages would be allocated under the Without Monterey Amendment provisions, with initial cuts to Agricultural Contractors of up to 50 percent of their reduced Table A Amount in any one year and up to a cumulative 100 percent of their reduced Table A Amount in any consecutive seven years. Any remaining shortage would be shared among all Contractors in proportion to their reduced Table A Amounts.

***Total Scheduled Surplus Water Deliveries*** - The total amount of scheduled surplus water available for delivery would be that portion of the total available SWP supply that is in excess of the reduced minimum project yield.

***Surplus Water Allocation Criteria*** - Under Scenario 1, any scheduled surplus water available would be allocated among Contractors in accordance with the Without Monterey Amendment surplus provisions. These provisions specify that if surplus supplies are less than surplus water demands for agricultural and groundwater replenishment uses, surplus water is allocated first among Contractors upstream and downstream of Dos Amigos Pumping Plant, in proportion to their demands for those uses. The portion of the supply allocated for Contractors downstream of Dos Amigos is further apportioned, in proportion to and up to the demands for those uses, as follows: 69 percent to the San Joaquin service area, 29 percent to the Southern California service area, and 2 percent to the Central Coast service area. If surplus supplies are greater than demands for agricultural and groundwater replenishment uses but less than total surplus demands, the surplus supply in excess of agricultural and groundwater replenishment demands is allocated in proportion to the surplus demand for other uses.

Under Scenario 2, any scheduled surplus water available would be allocated among Contractors in proportion to Table A Amounts. The amount allocated to a Contractor would be limited to the amount that would allow total scheduled deliveries to that Contractor (including Table A water and scheduled surplus water) to equal its pre-reduction Table A Amount

***Methodology***

The DWRSIM output of total annual SWP deliveries of Table A water was allocated, for each year over the model's hydrologic period, among the three broad Contractor groups according to the following methodology:

1. The Table A Amounts of the three Contractor groups were proportionately reduced until they totaled the reduced minimum project yield.

2. In years when there was no shortage (i.e., when available SWP supplies met Contractor demands), all three Contractor groups were allocated supplies equal to their demands.

3. In shortage years (i.e., when supplies were less than demands), the total available SWP supply that year was allocated among the three Contractor groups as follows:

   a. First, Table A water was allocated. If the available SWP supply exceeded the total reduced minimum project yield, each Contractor group was allocated Table A water equal to its reduced Table A Amount. If the available SWP supply was less than the total reduced minimum project yield, the supply available was allocated among the three Contractor groups as follows:

      i. Agricultural Contractors received initial reductions of up to 50 percent of their reduced Table A Amount in any one year, and up to a cumulative total of 100 percent in any seven consecutive years.

      ii. Any remaining shortage in a year was allocated proportionately among all Contractor groups.

   b. Next, scheduled surplus water was allocated. Contractor demands for scheduled surplus water were determined to be that portion of their total demand for SWP water unmet by Table A water deliveries. The manner is which the scheduled surplus water was allocated differed between Scenarios 1 and 2, as follows:

      **Scenario 1:** For each Contractor group, this demand for scheduled surplus water was separated into: demand for agricultural and groundwater replenishment use, and demand for all other uses. These demands were further split into four geographic SWP areas (upstream of Dos Amigos Pumping Plant, San Joaquin service area, Southern California service area, and Central Coast service area).

      i. If scheduled surplus water supplies were less than scheduled surplus water demands for agricultural and groundwater replenishment uses, scheduled surplus water was allocated first among Contractors upstream and downstream of Dos Amigos Pumping Plant, in proportion to their demands for those uses. The portion of the supply allocated for Contractors downstream of Dos Amigos was further apportioned, up to the demands for those uses, as follows: 69 percent to the San Joaquin service area, 29 percent to the Southern California service area, and 2 percent to the Central Coast service area.

      ii. If scheduled surplus water supplies were greater than demands for agricultural and groundwater replenishment uses but less than total scheduled surplus demands: (1) scheduled surplus supply for agricultural and groundwater replenishment uses was allocated up to the demands for those uses; and (2) the scheduled surplus supply in excess of agricultural and groundwater

replenishment demands was allocated in proportion to the scheduled surplus demand for other uses, up to the demands for those uses.

iii. These various uses and locations of use were then aggregated to get total scheduled surplus supplies for each of the three Contractor groups.

**Scenario 2:**

i. The scheduled surplus water supply was allocated among all Contractor groups in proportion to each group's total Table A Amount.

ii. The resulting scheduled surplus water supply for each Contractor group was compared to that group's demand for scheduled surplus water. If scheduled surplus water supplies for any Contractor group exceeded its scheduled surplus water demand, its scheduled surplus water supply was reduced to its scheduled surplus water demand.

iii. Any remaining available scheduled surplus water supplies were allocated among Contractor group(s) with unmet scheduled surplus water demands.

c. The allocated Table A supplies and allocated scheduled surplus water supplies were then added to get total SWP supplies for each Contractor group.

#### *3.1.3.3 With Monterey Amendment*

***Allocation Description***

Under the terms of the Water Supply Contracts as amended by the Monterey Amendment, all SWP water supplies are shared among all Contractors in proportion to their Table A Amounts. Therefore, the 41,000 AF of Table A Amount transferred to CLWA from WRMWSD would be subject to the same shortages as all other Table A Amounts (i.e., it would not be subject to an initial agricultural reduction), and would have access to the same proportionate share of any available surplus water as all other Table A Amounts. As part of the Monterey Amendment, the category of scheduled surplus water was eliminated since it was no longer available, the category of unscheduled surplus water was retained but is now referred to as Article 21 water, and Article 18(b) was deleted.

***Assumptions***

- The surplus water category of scheduled surplus water was deleted as part of the Monterey Amendment and so was not considered.

***Methodology***

The DWRSIM output of total annual SWP deliveries of Table A water was allocated, for each year over the model's hydrologic period, among the three broad Contractor groups. In years when there was no shortage (i.e., when available SWP supplies met Contractor demands), all three Contractor groups were allocated supplies equal to their demands. In shortage years (i.e.,

when supplies were less than demands), the total available SWP supply that year was allocated among the three Contractor groups according to the following methodology:

1. The total supply was allocated among all Contractor groups in proportion to each group's total Table A Amount.

2. The resulting supplies for each Contractor group were compared to that group's demands. If supplies for any Contractor group exceeded its demand, its supply was reduced to its demand.

3. Any remaining available supplies were allocated among Contractor group(s) with unmet demands.

4. Steps 2 and 3 were repeated until all available supplies for that year were allocated.

## 3.2 ANALYSIS RESULTS

As was discussed above in section 3.1.1, the supply analyses for this EIR were conducted for each year in DWRSIM's period of hydrologic record because SWP water supplies vary from year to year. The results of the water supply analyses are presented below both in graphical form over the entire period of record (see Figures 3-2 through 3-13 in the subsequent sections), and in tabular form showing SWP supplies under selected hydrologic conditions (see Tables 3-3 through 3-8 in the subsequent sections). The selected hydrologic conditions are: average year, single dry year, and multiple dry year (for further definitions, see section 3.1.1.2, Hydrologic Conditions).

The graph of supplies available over DWRSIM's entire hydrologic record are presented as probability of exceedance curves. These curves show the probability of supplies being greater than or equal to specific quantities. For an explanation of how to interpret these graphs, refer to the sidebar in section 2.2.

### 3.2.1 Without Monterey Amendment

***Wheeler Ridge-Maricopa Water Storage District***

Table 3-3 provides the results of the analysis of WRMWSD's SWP Table A supply for the Without Monterey Amendment allocation scenario, under selected hydrologic conditions, and based on both the existing and 2020 conditions DWRSIM model runs.

Figure 3-2 presents the results of the analysis of WRMWSD's SWP Table A supply under the Without Monterey Amendment allocation scenario, based on the existing conditions DWRSIM model run. Figure 3-3 presents the results of this same analysis, based on the 2020 conditions DWRSIM run.

**Table 3-3. WRMWSD SWP Table A Supply at Existing and 2020 SWP Demand Conditions, Without Monterey Amendment**
(all values in AF)

| | | *Table A Amount* | *Average Year* | *Single Dry Year* | *Multiple Dry Year*[3] |
|---|---|---|---|---|---|
| **Existing SWP Demand Conditions**[1] | Without the Project | 238,088 | 189,700 | 0 | 79,700 |
| | With the Project | 197,088 | 157,000 | 0 | 65,900 |
| | ***Difference***[4] | ***41,000*** | ***32,700*** | ***0*** | ***13,700*** |
| **2020 SWP Demand Conditions**[2] | Without the Project | 238,088 | 165,300 | 42,200 | 98,100 |
| | With the Project | 197,088 | 136,900 | 35,000 | 81,200 |
| | ***Difference***[4] | ***41,000*** | ***28,500*** | ***7,300*** | ***16,900*** |

*Note:* Supplies are rounded to the nearest 100 AF. Numbers may not add due to rounding.
1. Based on water deliveries from DWRSIM study 1995D06E-CALFED-771.
2. Based on water deliveries from DWRSIM study 2020D09C-CALFED-786.
3. Multiple dry year period supplies shown are average annual supplies over the four-year period.
4. Supplies shown are the amount of water attributable to the 41,000 AF of Table A Amount.

### *Castaic Lake Water Agency*

Table 3-4 provides the results of the analysis of CLWA's SWP Table A supply for the Without Monterey Amendment allocation scenario, under selected hydrologic conditions, and based on both the existing and 2020 conditions DWRSIM model runs.

Figure 3-4 presents the results of the analysis of CLWA's SWP Table A supply under the Without Monterey Amendment allocation scenario, based on the existing conditions DWRSIM model run. Figure 3-5 presents the results of this same analysis, based on the 2020 conditions DWRSIM run.

**Table 3-4. CLWA SWP Table A Supply at Existing and 2020 SWP Demand Conditions, Without Monterey Amendment**
(all values in AF)

| | | *Table A Amount* | *Average Year* | *Single Dry Year* | *Multiple Dry Year*[3] |
|---|---|---|---|---|---|
| **Existing SWP Demand Conditions**[1] | Without the Project | 54,200 | 47,400 | 13,100 | 25,200 |
| | With the Project | 95,200 | 80,100 | 13,100 | 38,900 |
| | ***Difference***[4] | ***41,000*** | ***32,700*** | ***0*** | ***13,700*** |
| **2020 SWP Demand Conditions**[2] | Without the Project | 54,200 | 43,500 | 12,400 | 23,300 |
| | With the Project | 95,200 | 72,000 | 19,600 | 40,200 |
| | ***Difference***[4] | ***41,000*** | ***28,500*** | ***7,300*** | ***16,900*** |

*Note:* Supplies are rounded to the nearest 100 AF. Numbers may not add due to rounding.
1. Based on water deliveries from DWRSIM study 1995D06E-CALFED-771.
2. Based on water deliveries from DWRSIM study 2020D09C-CALFED-786.
3. Multiple dry year period supplies shown are average annual supplies over the four-year period.
4. Supplies shown are the amount of water attributable to the 41,000 AF of Table A Amount.

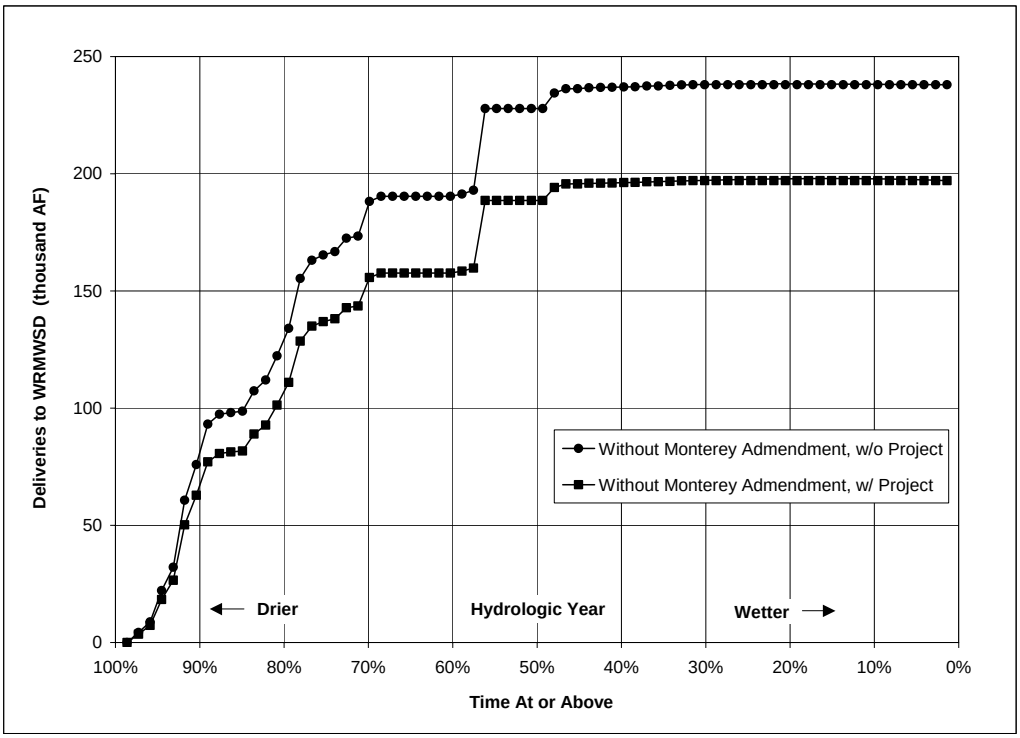


**Figure 3-2. WRMWSD SWP Table A Supply at Existing SWP Demand Conditions, Without Monterey Amendment**

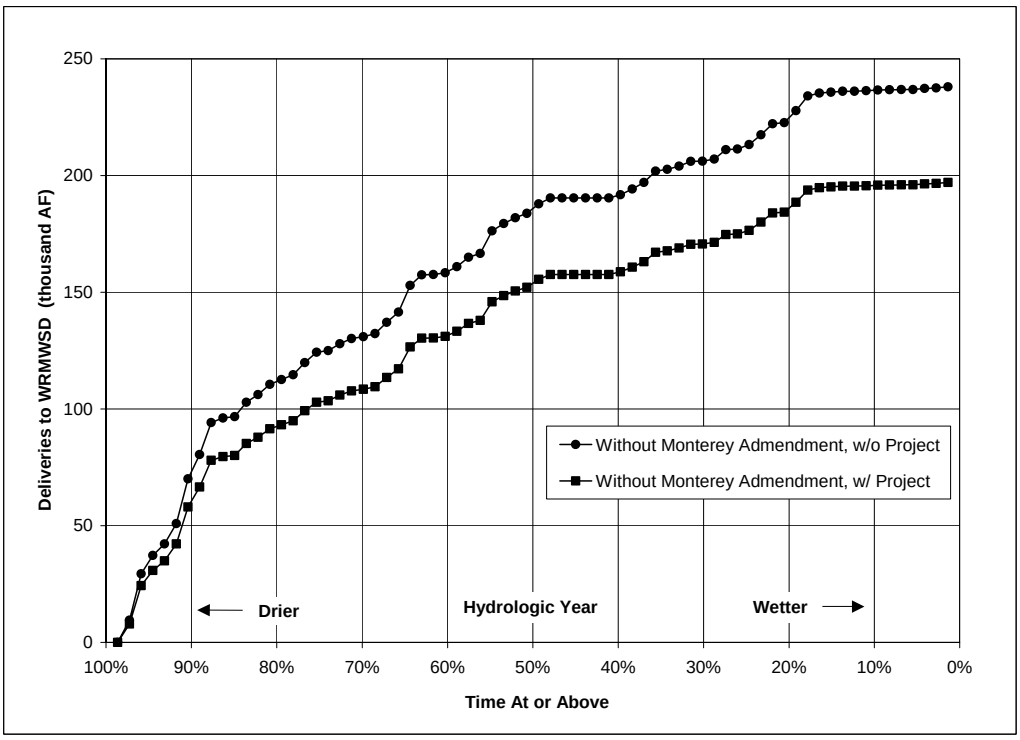


**Figure 3-3. WRMWSD SWP Table A Supply at 2020 SWP Demand Conditions, Without Monterey Amendment**

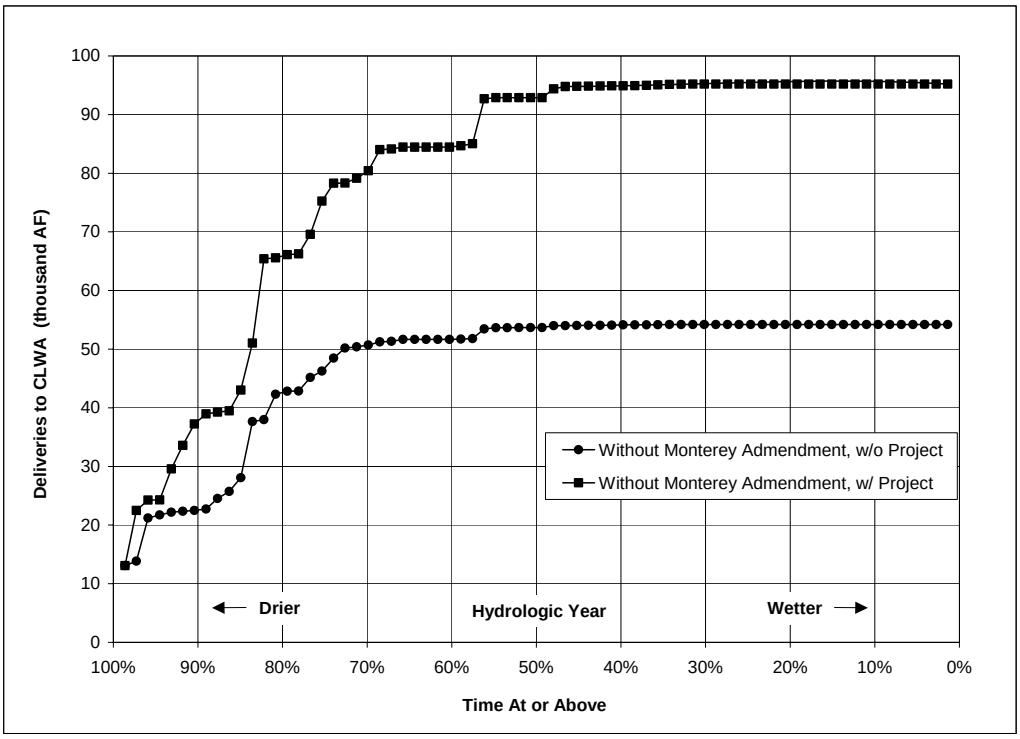


**Figure 3-4. CLWA SWP Table A Supply at Existing SWP Demand Conditions, Without Monterey Amendment**

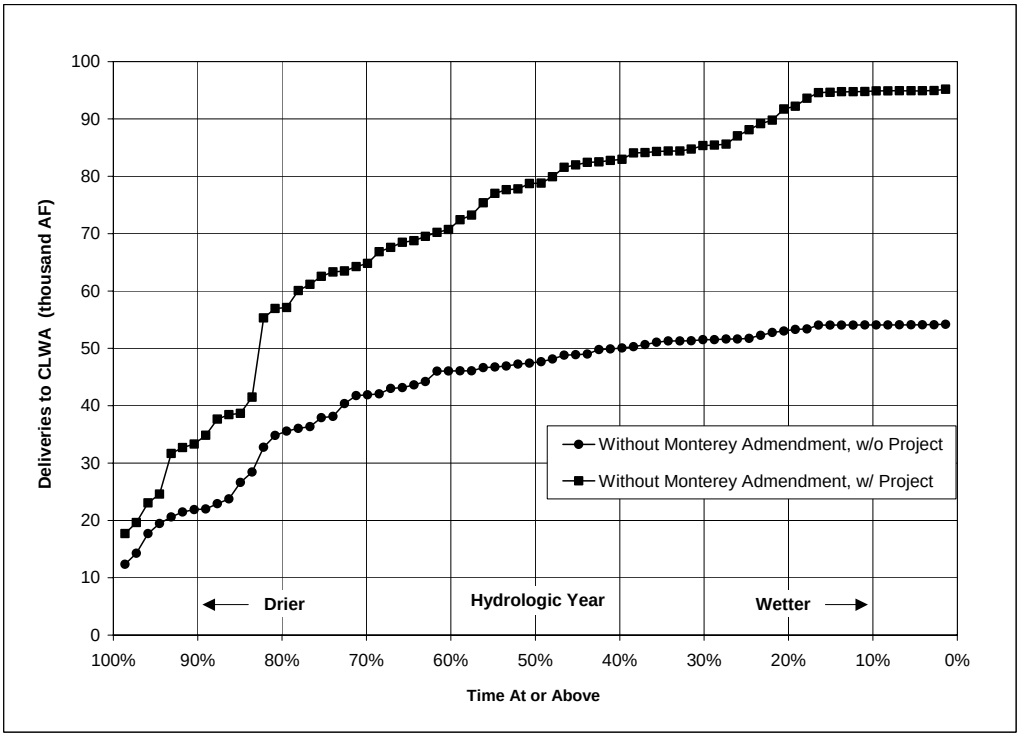


**Figure 3-5. CLWA SWP Table A Amount at 2020 SWP Demand Conditions, Without Monterey Amendment**

### 3.2.2 With Article 18(b) Implemented

***Wheeler Ridge-Maricopa Water Storage District***

Table 3-5 provides the results of the analysis of WRMWSD's SWP Table A supply for the With Article 18(b) Implemented allocation scenarios 1 and 2, under selected hydrologic conditions, and based on both the existing and 2020 conditions DWRSIM model runs.

Figure 3-6 presents the results of the analysis of WRMWSD's SWP Table A supply under the With Article 18(b) Implemented allocation scenarios 1 and 2, based on the existing conditions DWRSIM model run. Figure 3-7 presents the results of this same analysis, based on the 2020 conditions DWRSIM run.

Note that under the With Article 18(b) Implemented allocation scenarios, the supplies shown in the figures and table are the total of both Table A supplies and scheduled surplus water supplies.

**Table 3-5. WRMWSD SWP Table A and Scheduled Surplus Supply at Existing and 2020 SWP Demand Conditions, With Article 18(b) Implemented**

(all values in AF)

| | | *Table A Amount[5]* | *Average Year* | *Single Dry Year* | *Multiple Dry Year[6]* |
|---|---|---|---|---|---|
| | | **Scenario 1[1]** | | | |
| **Existing SWP Demand Conditions[3]** | Without the Project | 113,800 | 204,800 | 11,500 | 100,600 |
| | With the Project | 94,200 | 169,500 | 9,500 | 83,200 |
| | ***Difference[7]*** | ***19,600*** | ***35,300*** | ***2,000*** | ***17,300*** |
| **2020 SWP Demand Conditions[4]** | Without the Project | 113,800 | 202,900 | 12,300 | 99,300 |
| | With the Project | 94,200 | 168,000 | 10,200 | 82,200 |
| | ***Difference[7]*** | ***19,600*** | ***34,900*** | ***2,100*** | ***17,100*** |
| | | **Scenario 2[2]** | | | |
| **Existing SWP Demand Conditions[3]** | Without the Project | 142,200 | 195,200 | 1,000 | 79,200 |
| | With the Project | 117,700 | 161,600 | 900 | 65,500 |
| | ***Difference[7]*** | ***24,500*** | ***33,600*** | ***200*** | ***13,600*** |
| **2020 SWP Demand Conditions[4]** | Without the Project | 142,200 | 180,700 | 2,000 | 76,500 |
| | With the Project | 117,700 | 149,600 | 1,700 | 63,300 |
| | ***Difference[7]*** | ***24,500*** | ***31,100*** | ***300*** | ***13,200*** |

*Note:* Supplies are rounded to the nearest 100 AF. Numbers may not add due to rounding.

1. Scenario 1 assumptions: SWP reduced minimum project yield is 2.0 million AF, and scheduled deliveries above reduced minim project yield are allocated based on priority for agricultural use and groundwater replenishment.
2. Scenario 2 assumptions: SWP reduced minimum project yield is 2.5 million AF, and scheduled deliveries above reduced minimum project yield are allocated in proportion to Table A Amounts.
3. Based on water deliveries from DWRSIM study 1995D06E-CALFED-771.
4. Based on water deliveries from DWRSIM study 2020D09C-CALFED-786.
5. The Table A Amounts shown are estimates of WRMWSD's reduced Table A Amount, based on its proportionate share of the reduced minimum project yield.
6. Multiple dry year period supplies shown are average annual supplies over the four-year period.
7. Supplies shown are the amount of water attributable to the 41,000 AF of Table A Amount.

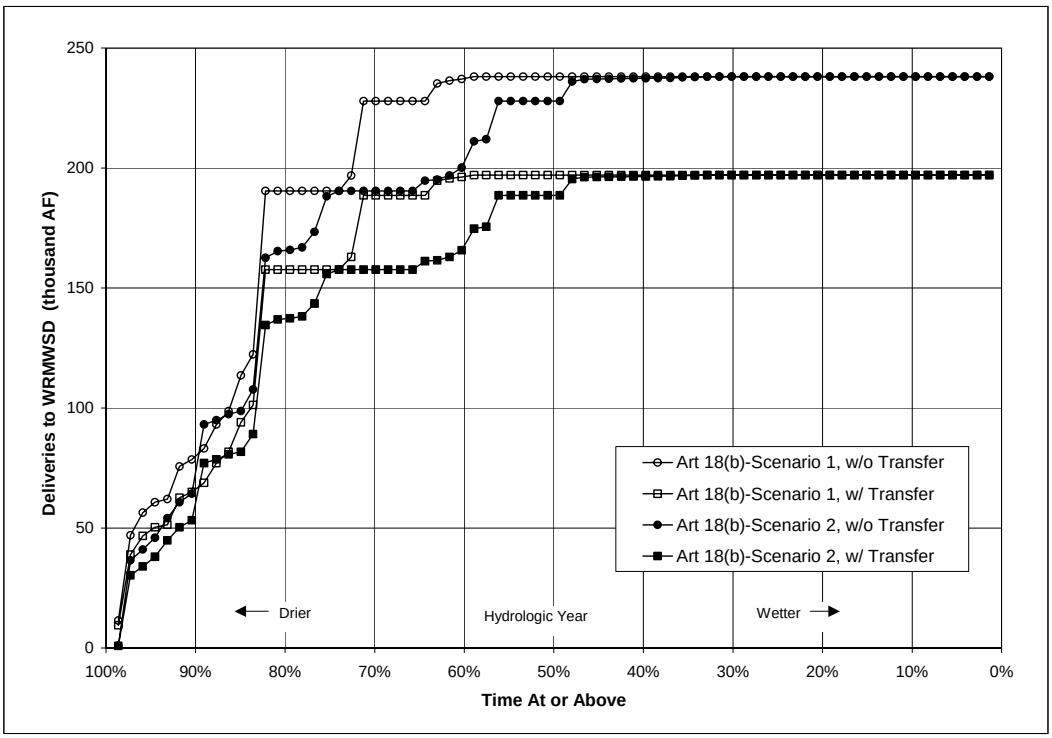


**Figure 3-6. WRMWSD SWP Table A and Scheduled Surplus Supply at Existing SWP Demand Conditions, With Article 18(b) Implemented**

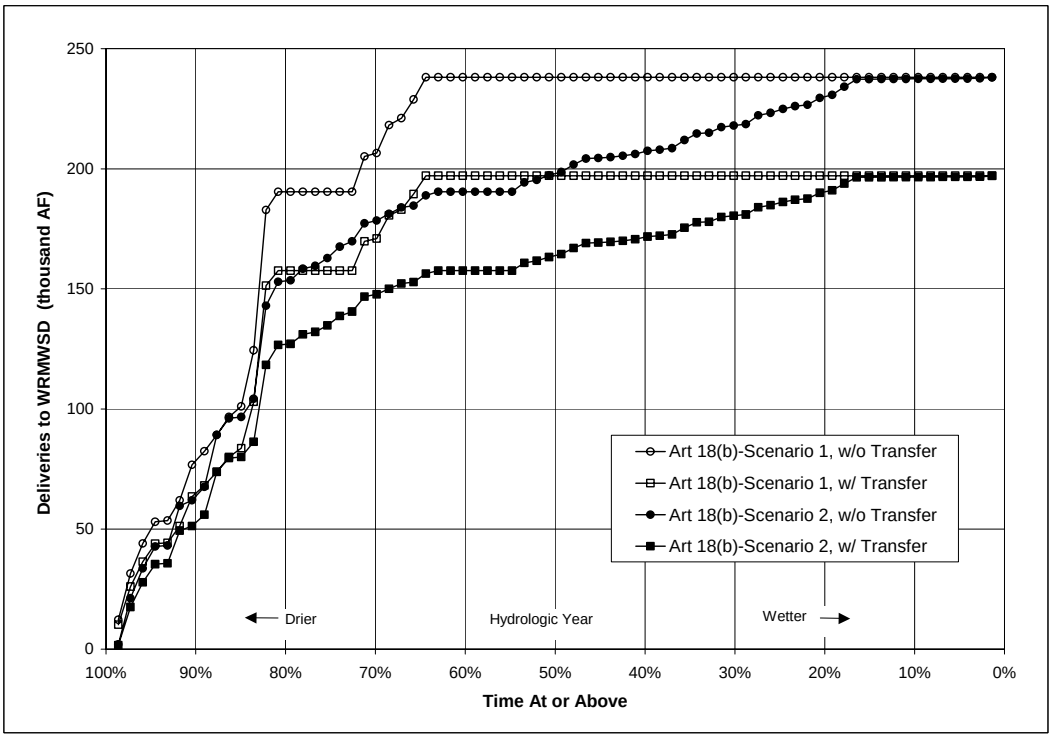


**Figure 3-7. WRMWSD SWP Table A and Scheduled Surplus Supply at 2020 SWP Demand Conditions, With Article 18(b) Implemented**

***Castaic Lake Water Agency***

Table 3-6 provides the results of the analysis of CLWA's SWP Table A supply for the With Article 18(b) Implemented allocation scenarios 1 and 2, under selected hydrologic conditions, and based on both the existing and 2020 conditions DWRSIM model runs.

Figure 3-8 presents the results of the analysis of CLWA's SWP Table A supply under the With Article 18(b) Implemented allocation scenarios 1 and 2, based on the existing conditions DWRSIM model run. Figure 3-9 presents the results of this same analysis, based on the 2020 conditions DWRSIM run.

Note that under the With Article 18(b) Implemented allocation scenarios, the supplies shown in the figures and table are the total of both Table A supplies and scheduled surplus water supplies.

**Table 3-6. CLWA SWP Table A and Scheduled Surplus Supply at Existing and 2020 SWP Demand Conditions, With Article 18(b) Implemented**

(all values in AF)

| | | *Table A Amount*[5] | *Average Year* | *Single Dry Year* | *Multiple Dry Year*[6] |
|---|---|---|---|---|---|
| | | **Scenario 1**[1] | | | |
| **Existing SWP Demand Conditions**[3] | Without the Project | 25,900 | 46,400 | 12,900 | 24,400 |
| | With the Project | 45,500 | 81,700 | 14,900 | 41,700 |
| | ***Difference***[7] | ***19,600*** | ***35,300*** | ***2,000*** | ***17,300*** |
| **2020 SWP Demand Conditions**[4] | Without the Project | 25,900 | 43,000 | 12,800 | 23,300 |
| | With the Project | 45,500 | 78,000 | 15,000 | 40,400 |
| | ***Difference***[7] | ***19,600*** | ***34,900*** | ***2,100*** | ***17,100*** |
| | | **Scenario 2**[2] | | | |
| **Existing SWP Demand Conditions**[3] | Without the Project | 32,400 | 46,600 | 13,100 | 24,400 |
| | With the Project | 56,900 | 80,200 | 13,200 | 38,100 |
| | ***Difference***[7] | ***24,500*** | ***33,600*** | ***200*** | ***13,600*** |
| **2020 SWP Demand Conditions**[4] | Without the Project | 32,400 | 43,000 | 13,000 | 23,700 |
| | With the Project | 56,900 | 74,100 | 13,300 | 36,900 |
| | ***Difference***[7] | ***24,500*** | ***31,100*** | ***300*** | ***13,200*** |

*Note:* Supplies are rounded to the nearest 100 AF. Numbers may not add due to rounding.

1. Scenario 1 assumptions: SWP reduced minimum project yield is 2.0 million AF, and scheduled deliveries above reduced minim project yield are allocated based on priority for agricultural use and groundwater replenishment.
2. Scenario 2 assumptions: SWP reduced minimum project yield is 2.5 million AF, and scheduled deliveries above reduced minimum project yield are allocated in proportion to Table A Amounts.
3. Based on water deliveries from DWRSIM study 1995D06E-CALFED-771.
4. Based on water deliveries from DWRSIM study 2020D09C-CALFED-786.
5. The Table A Amounts shown are estimates of CLWA's reduced Table A Amount, based on its proportionate share of the reduced minimum project yield.
6. Multiple dry year period supplies shown are average annual supplies over the four-year period.
7. Supplies shown are the amount of water attributable to the 41,000 AF of Table A Amount.

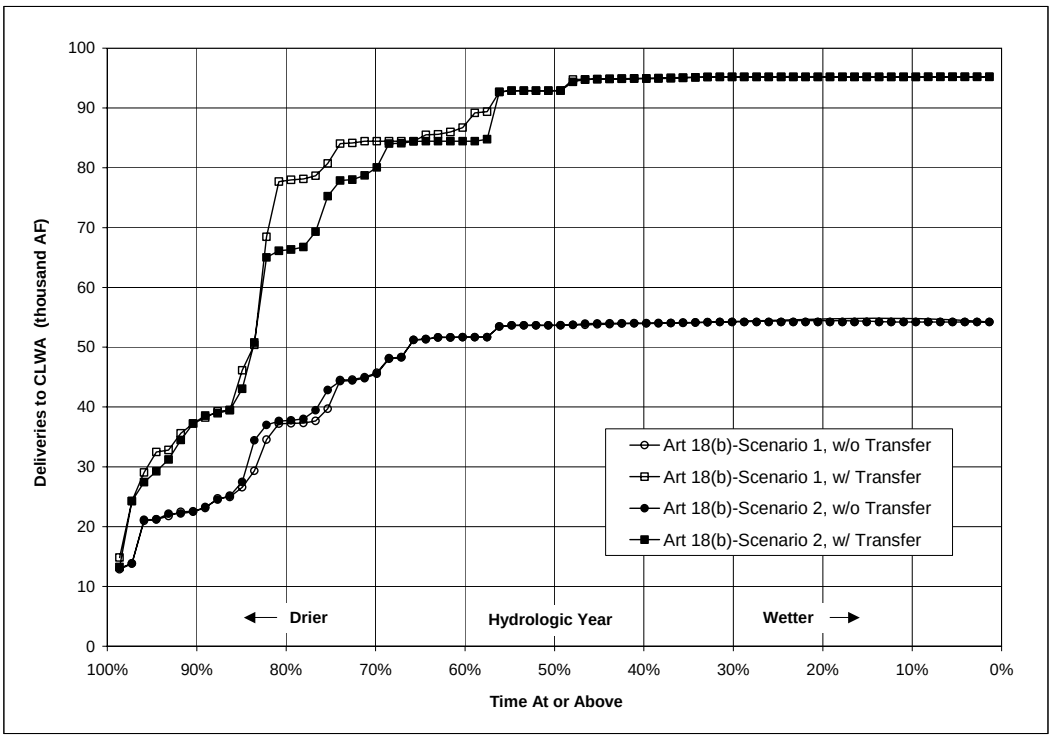


**Figure 3-8. CLWA SWP Table A and Scheduled Surplus Supply at Existing SWP Demand Conditions, With Article 18(b) Implemented**

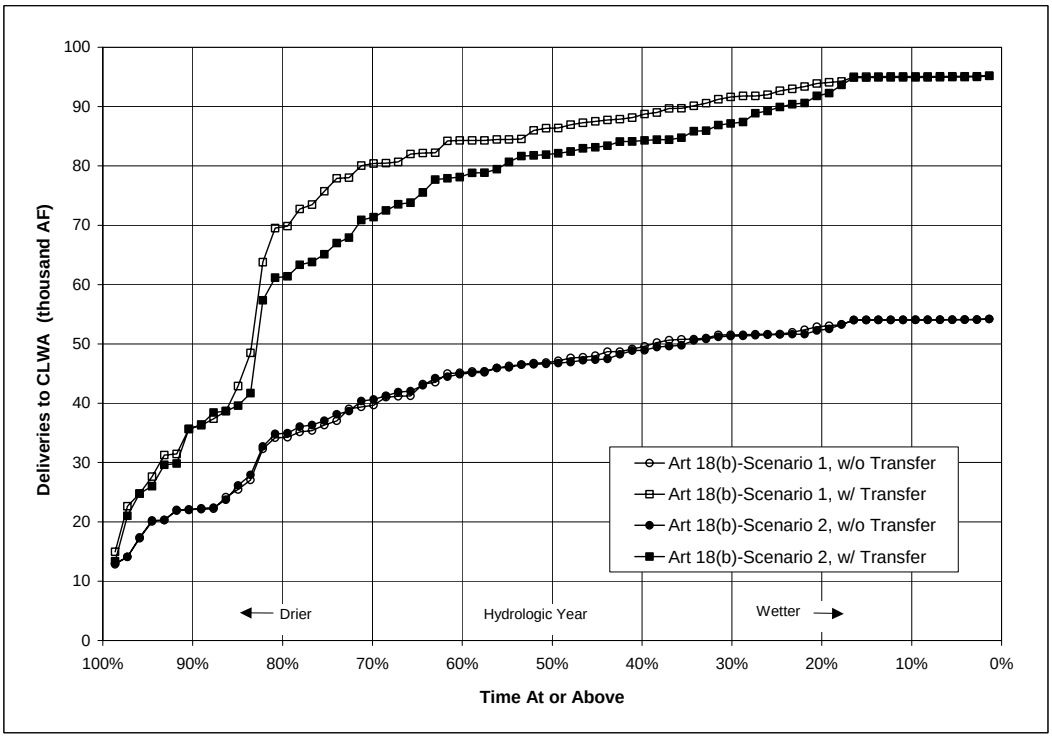


**Figure 3-9. CLWA SWP Table A and Scheduled Surplus Supply at 2020 SWP Demand Conditions, With Article 18(b) Implemented**

### 3.2.3 With Monterey Amendment

*Wheeler Ridge-Maricopa Water Storage District*

Table 3-7 provides the results of the analysis of WRMWSD's SWP Table A supply for the With Monterey Amendment allocation scenario, under selected hydrologic conditions, and based on both the existing and 2020 conditions DWRSIM model runs.

Figure 3-10 presents the results of the analysis of WRMWSD's SWP Table A supply under the With Monterey Amendment allocation scenario, based on the existing conditions DWRSIM model run. Figure 3-11 presents the results of this same analysis, based on the 2020 conditions DWRSIM run.

**Table 3-7. WRMWSD SWP Table A Supply at Existing and 2020 SWP Demand Conditions, With Monterey Amendment**
(all values in AF)

| | | *Table A Amount* | *Average Year* | *Single Dry Year* | *Multiple Dry Year*[3] |
|---|---|---|---|---|---|
| **Existing SWP Demand Conditions**[1] | Without the Project | 238,088 | 199,900 | 53,300 | 105,300 |
| | With the Project | 197,088 | 165,500 | 44,100 | 87,100 |
| | ***Difference***[4] | ***41,000*** | ***34,400*** | ***9,200*** | ***18,100*** |
| **2020 SWP Demand Conditions**[2] | Without the Project | 238,088 | 185,700 | 53,500 | 102,200 |
| | With the Project | 197,088 | 153,800 | 44,300 | 84,600 |
| | ***Difference***[4] | ***41,000*** | ***32,000*** | ***9,200*** | ***17,600*** |

*Note:* Supplies are rounded to the nearest 100 AF. Numbers may not add due to rounding.
1. Based on water deliveries from DWRSIM study 1995D06E-CALFED-771.
2. Based on water deliveries from DWRSIM study 2020D09C-CALFED-786.
3. Multiple dry year period supplies shown are average annual supplies over the four-year period.
4. Supplies shown are the amount of water attributable to the 41,000 AF of Table A Amount.

*Castaic Lake Water Agency*

Table 3-8 provides the results of the analysis of CLWA's SWP Table A supply for the With Monterey Amendment allocation scenario, under selected hydrologic conditions, and based on both the existing and 2020 conditions DWRSIM model runs.

Figure 3-12 presents the results of the analysis of CLWA's SWP Table A supply under the With Monterey Amendment allocation scenario, based on the existing conditions DWRSIM model run. Figure 3-13 presents the results of this same analysis, based on the 2020 conditions DWRSIM run.

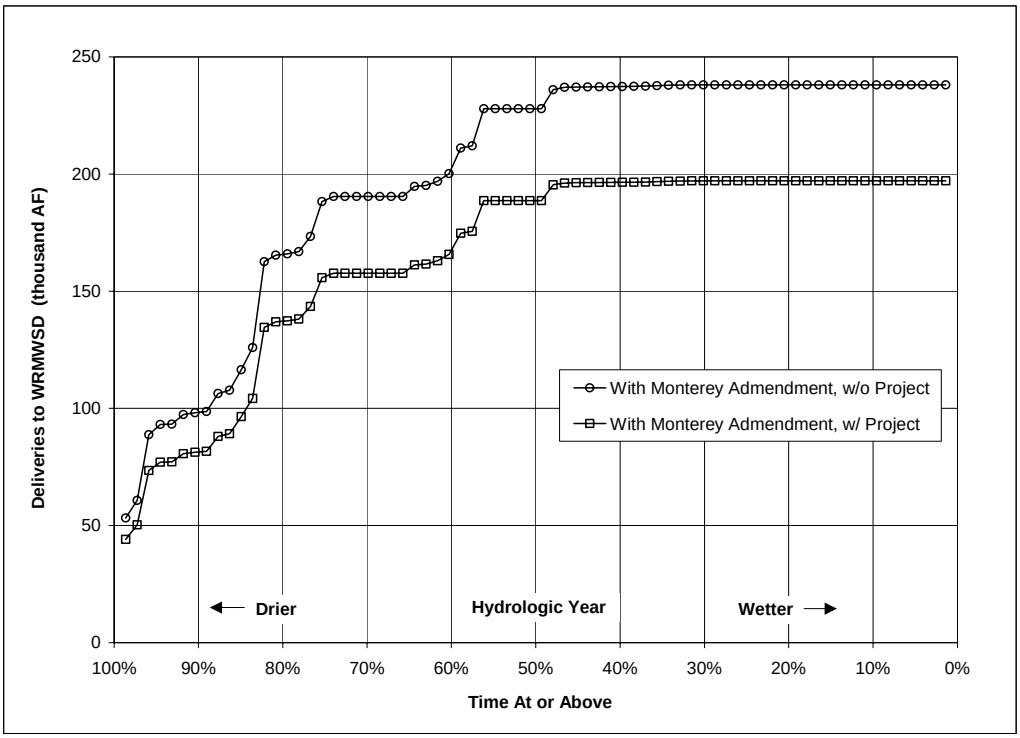


**Figure 3-10. WRMWSD SWP Table A Supply at Existing SWP Demand Conditions, With Monterey Amendment**

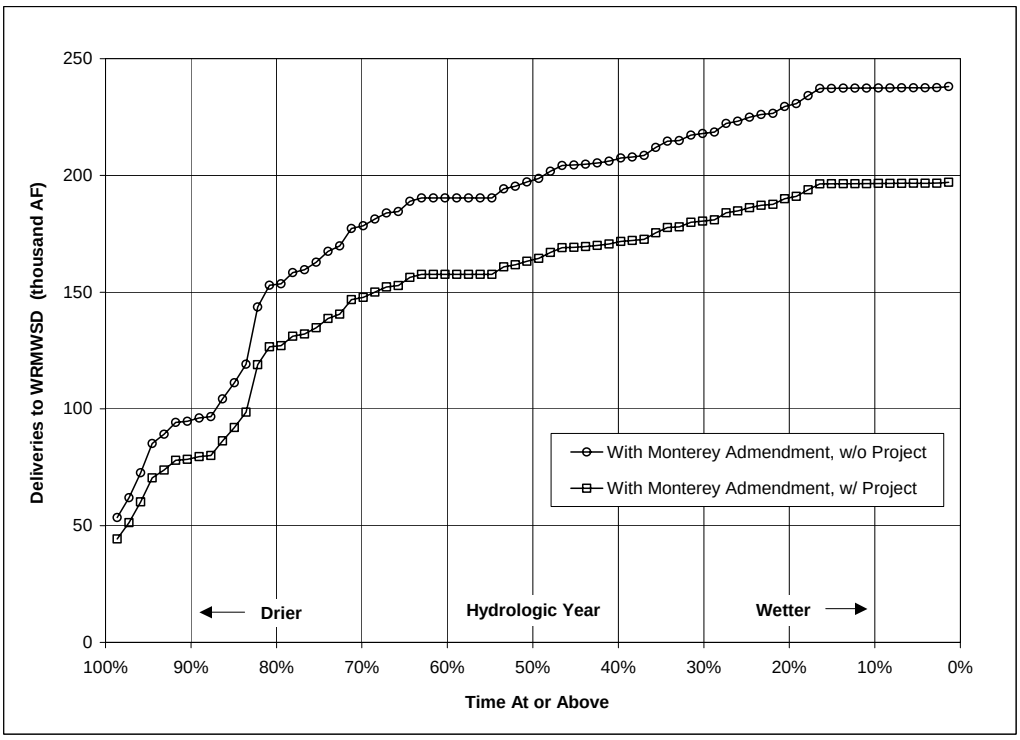


**Figure 3-11. WRMWSD SWP Table A Supply at 2020 SWP Demand Conditions, With Monterey Amendment**

**Table 3-8. CLWA SWP Table A Supply at Existing and 2020 SWP Demand Conditions, With Monterey Amendment**
(all values in AF)

| | | *Table A Amount* | *Average Year* | *Single Dry Year* | *Multiple Dry Year*[3] |
|---|---|---|---|---|---|
| **Existing SWP Demand Conditions**[1] | Without the Project | 54,200 | 46,500 | 12,100 | 24,000 |
| | With the Project | 95,200 | 80,900 | 21,300 | 42,100 |
| | ***Difference***[4] | ***41,000*** | ***34,400*** | ***9,200*** | ***18,100*** |
| **2020 SWP Demand Conditions**[2] | Without the Project | 54,200 | 42,900 | 12,200 | 23,300 |
| | With the Project | 95,200 | 74,900 | 21,400 | 40,900 |
| | ***Difference***[4] | ***41,000*** | ***32,000*** | ***9,200*** | ***17,600*** |

*Note:* Supplies are rounded to the nearest 100 AF. Numbers may not add due to rounding.
1. Based on water deliveries from DWRSIM study 1995D06E-CALFED-771.
2. Based on water deliveries from DWRSIM study 2020D09C-CALFED-786.
3. Multiple dry year period supplies shown are average annual supplies over the four-year period.
4. Supplies shown are the amount of water attributable to the 41,000 AF of Table A Amount.

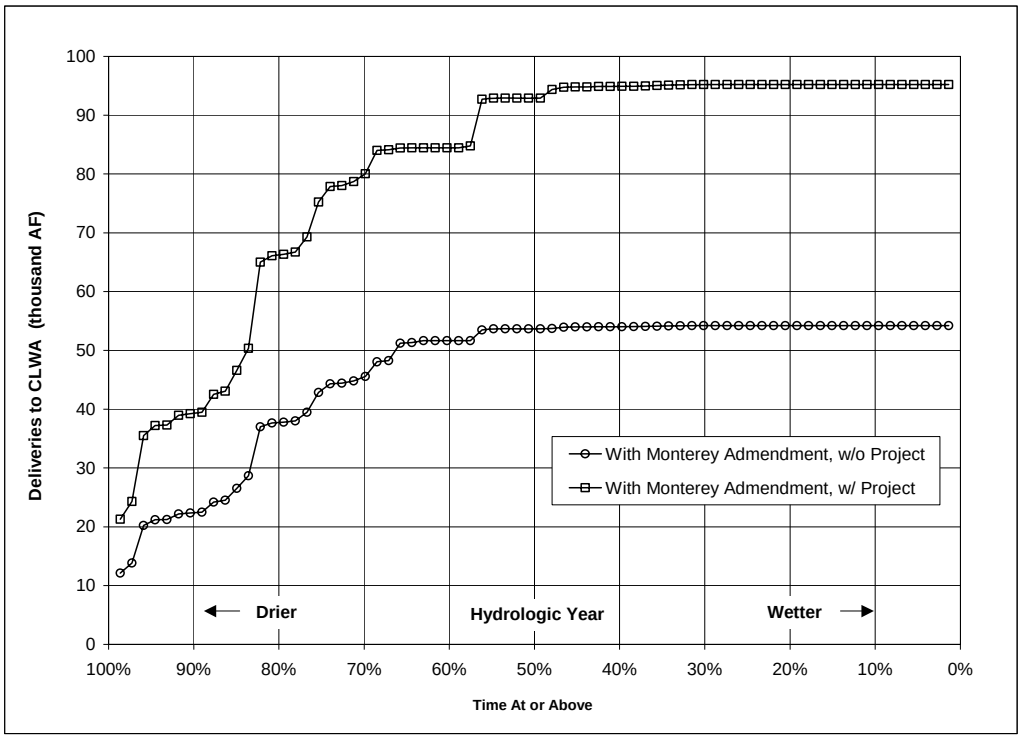


**Figure 3-12. CLWA SWP Table A Supply at Existing SWP Demand Conditions, With Monterey Amendment**

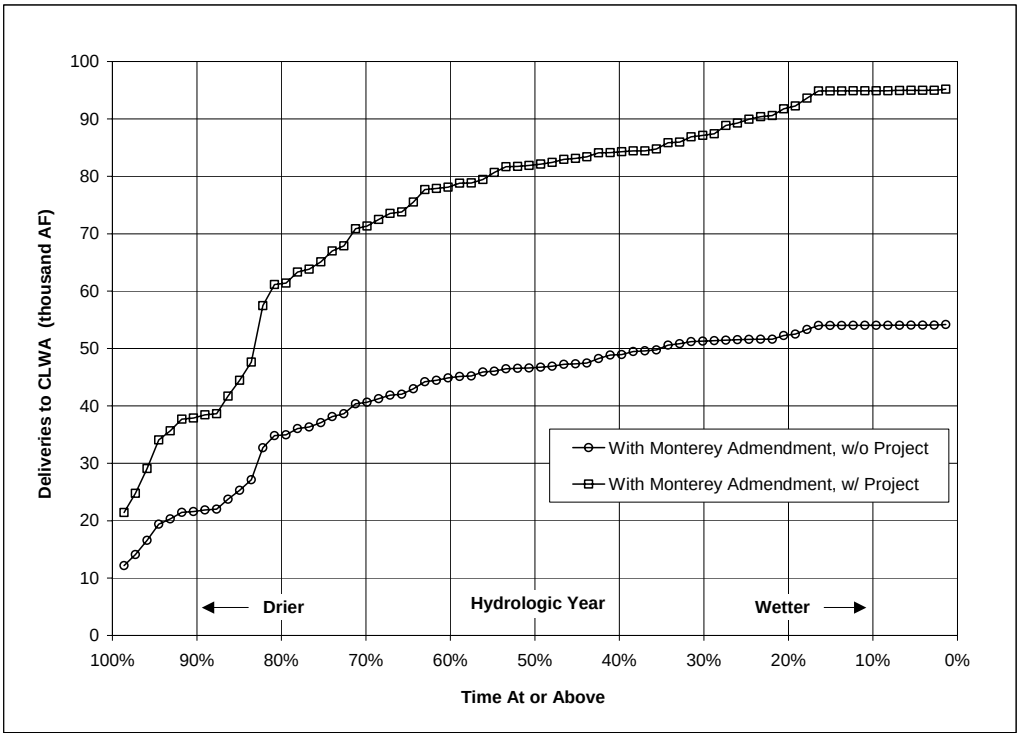


**Figure 3-13. CLWA SWP Table A Supply at 2020 SWP Demand Conditions, With Monterey Amendment**

# 4.0 SAN LUIS RESERVOIR STORAGE ANALYSIS

## 4.1 ANALYSIS METHODOLOGY AND ASSUMPTIONS

The San Luis Reservoir storage analysis shows the potential impacts resulting from implementation of the Project to SWP storage in San Luis Reservoir.

### 4.1.1 Background

As was noted previously, the total amount of SWP supply available in a given year is determined by that year's hydrology, the amount of storage in SWP reservoirs at the beginning of the year, and the regulatory and operational constraints that govern Delta and SWP facility operations. Since the location of use of SWP water south of the Delta is not a factor in determining the amount of SWP supply available, the Project would not result in a change in the total amount of SWP supply available for delivery to SWP Contractors. Therefore, there would be no change in the total amount of water diverted from the Delta.

The Project would, however, result in a change in the end use of the water associated with the 41,000 AF of Table A Amount from agricultural use to M&I use. Typically, agricultural water users use proportionately more of their annual water supply during the heavy irrigation months of the late spring and summer than do urban water users, and proportionately less of their supply than urban users during the remainder of the year. In the case of WRMWSD and CLWA, this difference in delivery during the year would result in a net reduction in deliveries of water associated with the 41,000 AF Table A Amount in May through September, and a net increase in deliveries during the remaining months of the year (October through April).

This net change in the timing of deliveries would require a slight change in SWP operations south of the Delta. Generally, the SWP operates to divert as much water from the Delta as is available under prevailing hydrologic conditions, within the water quality standards and operational constraints that govern Delta operations. This is true regardless of the timing of deliveries south of the Delta since when Delta diversions exceed downstream deliveries, that excess is stored in San Luis Reservoir for delivery later in the year. The general operation at San Luis Reservoir is to try to fill the reservoir during the high runoff months of the winter and early spring, and then release the stored water in meeting Contractor demands during the higher-demand summer and fall months to supplement the more limited diversions from the Delta during that period. Since Delta diversions are generally limited by either water availability or operational/ regulatory constraints, the change in the timing of deliveries of the 41,000 AF of Table A due to the Project would primarily result in changes in San Luis Reservoir storage.

### 4.1.2 Overview of Analysis

The analysis of the potential impact of the Project on storage in San Luis Reservoir consisted of a two-part analysis:

1. ***Monthly Delivery Distribution*** - The first part of the analysis was an assessment of the difference in monthly SWP deliveries to WRMWSD and CLWA. This analysis was

conducted using the annual supplies to WRMWSD and CLWA calculated in the water supply analysis described in section 3.0, and using the monthly distributions of deliveries to WRMWSD and CLWA for each year from the two DWRSIM model studies described in section 2.1.

2. ***San Luis Reservoir Storage*** - The second part of the analysis was an estimate of the potential impacts of the Project on storage at San Luis Reservoir. This analysis was conducted using the difference in monthly deliveries to WRMWSD and CLWA calculated in the first part of the analysis, and using San Luis Reservoir storage and aqueduct flow data from the two DWRSIM model studies.

This analysis was conducted only for water supplies allocated under the With Monterey Amendment allocation scenario. Since the amount of the water supply associated with the Project's 41,000 AF of Table A Amount is not significantly different among the three allocation scenarios, and the relative timing of deliveries would not change among the allocation scenarios, it was concluded that the storage changes under the Without Monterey Amendment and With Article 18(b) Implemented scenarios would be similar in magnitude and timing to those analyzed in the With Monterey Amendment scenario. Given this, as well as the small (less than two percent) changes in San Luis Reservoir storage determined in the analysis conducted, analysis of the other two allocation scenarios was deemed unnecessary.

Specific methodology and assumptions regarding this two-part analysis are described in sections 4.1.2.1 and 4.1.2.2 below.

#### *4.1.2.1 Monthly Delivery Distribution*

*Methodology*

1. Model output of monthly deliveries to WRMWSD and CLWA were taken from the two DWRSIM studies described in section 2.1, for each of the 73 hydrologic years. From this data, the monthly percent distribution of annual deliveries for both WRMWSD and CLWA was calculated for each of the 73 hydrologic years. For CLWA, the distribution calculated was for its M&I Table A delivered from Castaic Lake.

2. Monthly deliveries to WRMWSD and CLWA were then calculated for each hydrologic year by multiplying the monthly distribution percentages from step 1 by the annual deliveries calculated for WRMWSD and CLWA in the SWP water supply analysis described in section 3.0 above, for water supplies allocated under the With Monterey Amendment allocation scenario.

3. From the 73 years of monthly deliveries in step 2, the average and the expected range of deliveries to WRMWSD and CLWA were determined by month.

*Assumptions*

1. The distribution of deliveries to WRMWSD and CLWA in any year would not change with the Project (i.e., the reduction/increase in annual deliveries in any year would proportionately reduce/increase monthly deliveries in that year).

#### *4.1.2.2 San Luis Reservoir Storage*

*Methodology*

1. Model output of monthly San Luis Reservoir-related data for the 73 years of hydrologic data were taken from the two DWRSIM runs, including: SWP San Luis Reservoir storage, aqueduct flows just upstream and downstream of San Luis Reservoir, and diversions to and releases from San Luis Reservoir.

2. San Luis Reservoir was re-operated each month of the 73 hydrologic years, based on the output in step 1 and the change in deliveries to WRMWSD and CLWA resulting from the Project.

3. From the 73 years of monthly storage from step 2, the average storage and the expected range of the change in storage were determined by month.

*Assumptions*

1. Exports from the Delta (and therefore, the flow in the aqueduct upstream of San Luis Reservoir) will not change with the transfer.

2. Demands downstream of San Luis Reservoir (to meet Contractor deliveries and operational requirements such as aqueduct losses and terminal reservoir refilling) change with the transfer only by the difference in deliveries to WRMWSD and CLWA.

3. Water is diverted from the aqueduct into San Luis Reservoir when exports from the Delta exceed the demand downstream of San Luis, and water is released from San Luis when Delta exports are less than demand downstream of San Luis.

4. Losses at San Luis Reservoir will not change with the slight change in storage resulting from the transfer.

## 4.2 ANALYSIS RESULTS

As was described previously in section 4.1, the San Luis Reservoir storage analysis was conducted only for water supplies allocated under the With Monterey Amendment allocation scenario. While the results presented below are specifically for that allocation scenario, they are considered indicative of results that would occur under the Without Monterey Amendment and With Article 18(b) Implemented scenarios.

### 4.2.1 Monthly Delivery Distribution

The results of the monthly delivery distribution analysis are shown on Figures 4-1 and Figure 4-2, and in Tables 4-1 through 4-3. The average monthly changes in SWP Table A deliveries that would result from the Project, due to the difference in the timing of deliveries during the year between WRMWSD and CLWA, are shown on Figure 4-1 for existing SWP demand conditions, and on Figure 4-2 for 2020 demand conditions. These results are summarized in Table 4-1. More detailed results showing the net changes in monthly SWP Table A deliveries for the entire

hydrologic period are provided in Table 4-2 for existing SWP demand conditions, and in Table 4-3 for 2020 SWP demand conditions.

**Table 4-1. Average Change in SWP Table A Deliveries Resulting From the Project at Existing and 2020 SWP Demand Conditions, With Monterey Amendment**
(all values in thousand AF, unless otherwise noted)

| | *Jan* | *Feb* | *Mar* | *Apr* | *May* | *Jun* | *Jul* | *Aug* | *Sep* | *Oct* | *Nov* | *Dec* | *Total* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Existing SWP Demand Conditions** | | | | | | | | | | | | | |
| WRMWSD | -0.4 | -1.0 | -1.5 | -2.7 | -4.0 | -6.3 | -5.9 | -6.3 | -3.7 | -0.8 | -0.7 | -1.0 | -34.4 |
| CLWA | 1.7 | 1.9 | 2.3 | 2.8 | 3.5 | 3.9 | 3.9 | 3.9 | 3.5 | 2.8 | 2.1 | 2.1 | 34.4 |
| ***Net Change*** | ***1.2*** | ***0.8*** | ***0.8*** | ***0.1*** | ***-0.5*** | ***-2.4*** | ***-2.1*** | ***-2.5*** | ***-0.1*** | ***2.0*** | ***1.4*** | ***1.1*** | ***0.0*** |
| ***Net Change (cfs)*** | ***20*** | ***15*** | ***14*** | ***2*** | ***-8*** | ***-41*** | ***-34*** | ***-40*** | ***-2*** | ***33*** | ***23*** | ***18*** | ***0*** |
| **2020 SWP Demand Conditions** | | | | | | | | | | | | | |
| WRMWSD | -0.4 | -0.9 | -1.3 | -2.5 | -3.8 | -5.9 | -5.5 | -5.9 | -3.4 | -0.7 | -0.7 | -0.9 | -32.0 |
| CLWA | 1.4 | 1.7 | 2.1 | 2.6 | 3.3 | 3.6 | 3.6 | 3.6 | 3.3 | 2.6 | 2.0 | 2.0 | 32.0 |
| ***Net Change*** | ***1.1*** | ***0.8*** | ***0.8*** | ***0.1*** | ***-0.5*** | ***-2.3*** | ***-1.9*** | ***-2.3*** | ***-0.1*** | ***1.9*** | ***1.3*** | ***1.1*** | ***0.0*** |
| ***Net Change (cfs)*** | ***18*** | ***14*** | ***12*** | ***2*** | ***-7*** | ***-38*** | ***-31*** | ***-37*** | ***-2*** | ***31*** | ***22*** | ***18*** | ***0*** |

*Note:* Supplies are rounded to the nearest 0.1 thousand AF. Number may note add due to rounding.

### 4.2.2 San Luis Reservoir Storage

The results of the storage analysis are presented on Figures 4-3 and 4-4. The existing San Luis Reservoir operation, in combination with the net change in the timing of deliveries during the year between WRMWSD and CLWA, would result in an increase in storage at San Luis Reservoir from July through November, and a decrease in storage during the remainder of the year. As shown on Figure 4-3, the magnitude of the storage increase would be greatest in August and September, averaging approximately 4,500 AF at existing SWP demand conditions and approximately 4,200 AF at 2020 SWP demand conditions. The magnitude of the reduction in storage would be greatest in March and April, averaging approximately 3,000 AF at existing SWP demand conditions and approximately 2,700 AF at 2020 SWP demand conditions. As shown on Figure 4-4, the change in storage at San Luis Reservoir resulting from the Project would represent a small portion of the total average storage in the SWP share of San Luis Reservoir (SWP capacity is over one million AF), reflecting storage changes of less than 0.5 percent of average storage in most months and not more than two percent in any month.

More detailed results showing the net changes in monthly San Luis Reservoir storage for the entire hydrologic period are provided in Table 4-4 for existing SWP demand conditions, and in Table 4-5 for 2020 SWP demand conditions.

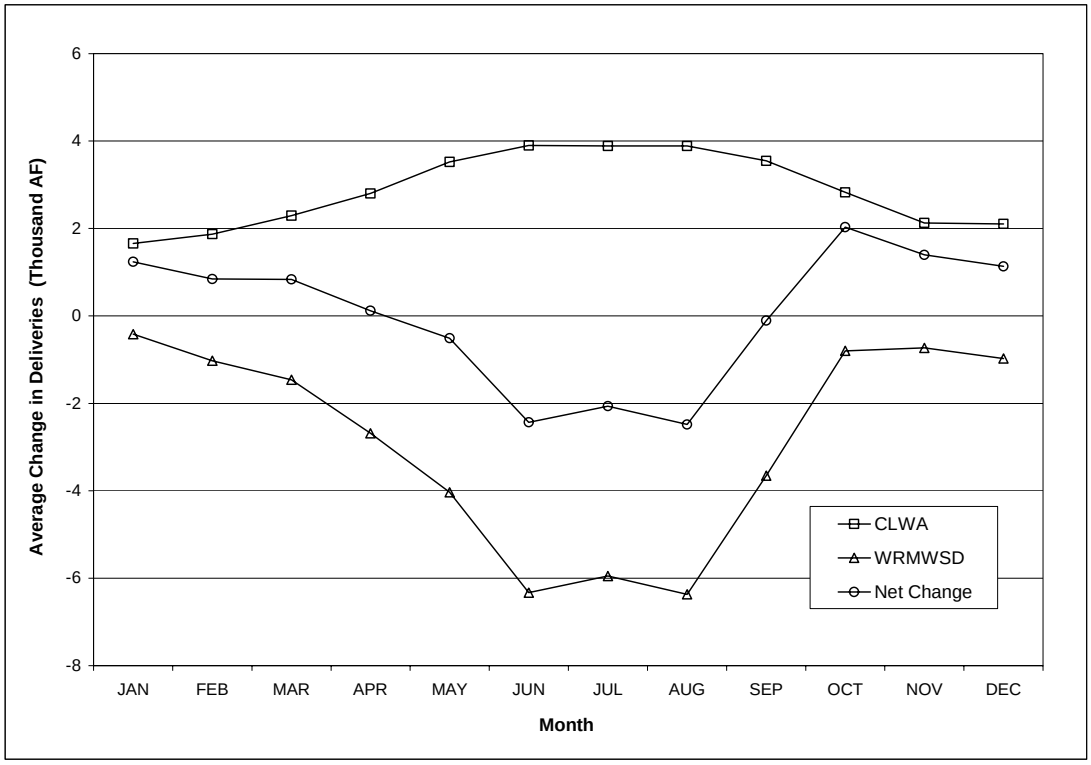


**Figure 4-1. Average Change in SWP Table A Deliveries to WRMWSD and CLWA at Existing SWP Demand Conditions**

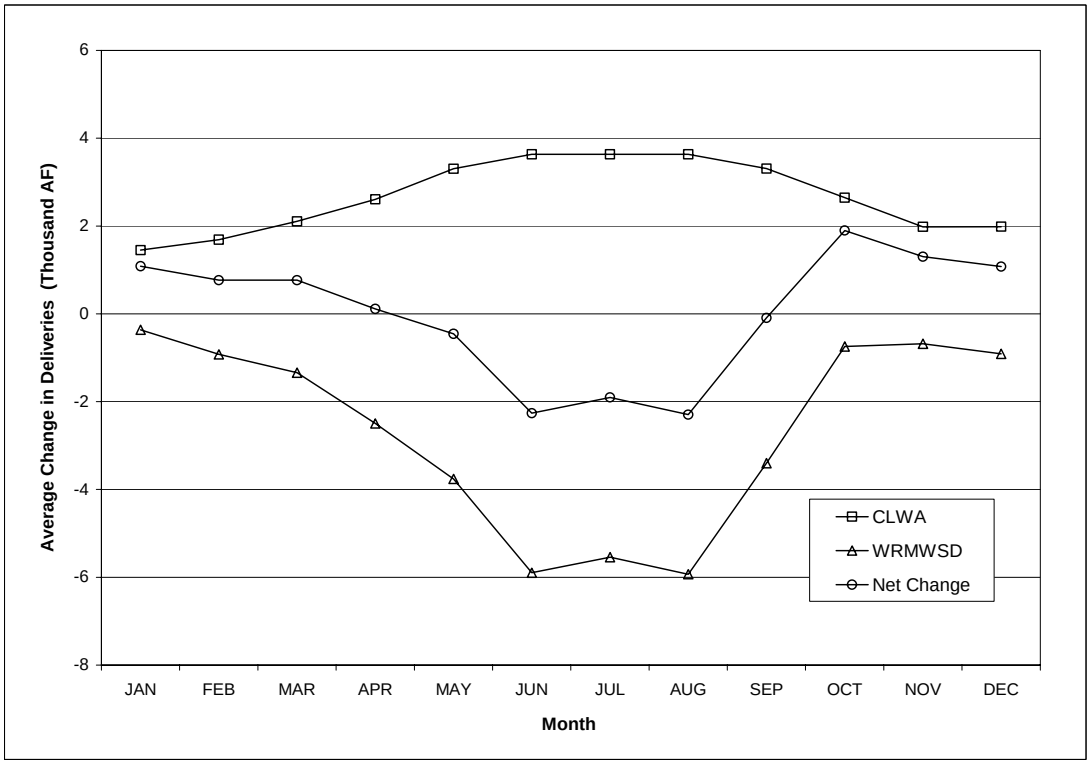


**Figure 4-2. Average Change in SWP Table A Deliveries to WRMWSD and CLWA at 2020 SWP Demand Conditions**

**Table 4-2. Net Change in SWP Table A Deliveries Resulting From the Project at Existing SWP Demand Conditions, With Monterey Amendment**

(all values in thousand AF)

| YEAR | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1922 | 1.8 | 1.1 | 1.0 | 0.1 | -0.7 | -2.9 | -2.5 | -3.0 | -0.2 | 2.3 | 1.6 | 1.3 | 0.0 |
| 1923 | 1.8 | 1.1 | 1.0 | 0.1 | -0.7 | -2.9 | -2.5 | -3.0 | -0.2 | 2.3 | 1.6 | 1.3 | 0.0 |
| 1924 | 0.7 | 0.5 | 0.5 | 0.1 | -0.3 | -1.4 | -1.2 | -1.4 | -0.1 | 1.2 | 0.8 | 0.7 | 0.0 |
| 1925 | 0.5 | 0.3 | 0.5 | 0.1 | -0.3 | -1.3 | -1.0 | -1.3 | -0.1 | 1.1 | 0.7 | 0.7 | 0.0 |
| 1926 | 0.5 | 0.5 | 0.8 | 0.2 | -0.4 | -2.3 | -1.9 | -2.3 | 0.0 | 2.1 | 1.4 | 1.2 | 0.0 |
| 1927 | 1.2 | 1.1 | 1.1 | 0.1 | -0.6 | -2.9 | -2.4 | -2.9 | -0.1 | 2.4 | 1.6 | 1.4 | 0.0 |
| 1928 | 1.8 | 1.1 | 1.0 | 0.1 | -0.7 | -2.9 | -2.5 | -3.0 | -0.2 | 2.3 | 1.6 | 1.3 | 0.0 |
| 1929 | 0.6 | 0.5 | 0.5 | 0.1 | -0.3 | -1.3 | -1.1 | -1.3 | -0.1 | 1.1 | 0.7 | 0.6 | 0.0 |
| 1930 | 0.6 | 0.6 | 0.7 | 0.2 | -0.4 | -2.0 | -1.7 | -2.0 | 0.0 | 1.8 | 1.2 | 1.0 | 0.0 |
| 1931 | 0.6 | 0.4 | 0.4 | 0.0 | -0.2 | -1.1 | -0.9 | -1.1 | 0.0 | 0.9 | 0.7 | 0.5 | 0.0 |
| 1932 | 0.6 | 0.6 | 0.6 | 0.1 | -0.3 | -1.5 | -1.3 | -1.6 | 0.0 | 1.3 | 0.9 | 0.7 | 0.0 |
| 1933 | 0.5 | 0.4 | 0.3 | 0.1 | -0.2 | -1.2 | -1.0 | -1.2 | 0.0 | 1.0 | 0.7 | 0.6 | 0.0 |
| 1934 | 0.5 | 0.4 | 0.5 | 0.1 | -0.2 | -1.2 | -1.0 | -1.2 | 0.0 | 1.0 | 0.7 | 0.6 | 0.0 |
| 1935 | 0.5 | 0.5 | 0.6 | 0.3 | -0.4 | -2.8 | -2.3 | -2.8 | 0.1 | 2.7 | 1.9 | 1.6 | 0.0 |
| 1936 | 0.6 | 0.9 | 1.2 | 0.2 | -0.5 | -2.8 | -2.3 | -2.8 | 0.0 | 2.5 | 1.7 | 1.4 | 0.0 |
| 1937 | 0.9 | 0.8 | 1.1 | 0.2 | -0.5 | -2.7 | -2.3 | -2.8 | -0.1 | 2.4 | 1.6 | 1.4 | 0.0 |
| 1938 | 1.7 | 1.1 | 1.0 | 0.1 | -0.6 | -2.8 | -2.4 | -2.9 | -0.2 | 2.2 | 1.5 | 1.2 | 0.0 |
| 1939 | 1.8 | 1.1 | 1.0 | 0.1 | -0.7 | -2.9 | -2.5 | -3.0 | -0.2 | 2.3 | 1.6 | 1.3 | 0.0 |
| 1940 | 0.5 | 0.6 | 1.2 | 0.2 | -0.4 | -2.7 | -2.3 | -2.8 | 0.0 | 2.6 | 1.7 | 1.5 | 0.0 |
| 1941 | 1.5 | 0.9 | 0.8 | 0.1 | -0.5 | -2.3 | -2.0 | -2.4 | -0.1 | 1.9 | 1.3 | 1.0 | 0.0 |
| 1942 | 1.8 | 1.1 | 1.0 | 0.1 | -0.7 | -2.9 | -2.5 | -3.0 | -0.2 | 2.3 | 1.6 | 1.3 | 0.0 |
| 1943 | 1.7 | 1.1 | 1.0 | 0.1 | -0.6 | -2.8 | -2.4 | -2.9 | -0.2 | 2.2 | 1.5 | 1.2 | 0.0 |
| 1944 | 1.8 | 1.1 | 1.0 | 0.1 | -0.7 | -2.9 | -2.5 | -3.0 | -0.2 | 2.3 | 1.6 | 1.3 | 0.0 |
| 1945 | 1.7 | 1.1 | 1.0 | 0.1 | -0.7 | -2.9 | -2.5 | -3.0 | -0.2 | 2.4 | 1.6 | 1.3 | 0.0 |
| 1946 | 1.8 | 1.1 | 1.0 | 0.1 | -0.7 | -2.9 | -2.5 | -3.0 | -0.2 | 2.3 | 1.6 | 1.3 | 0.0 |
| 1947 | 1.2 | 0.7 | 0.8 | 0.2 | -0.5 | -2.8 | -2.4 | -2.9 | 0.0 | 2.5 | 1.7 | 1.5 | 0.0 |
| 1948 | 0.5 | 0.4 | 0.3 | 0.1 | -0.3 | -2.4 | -1.9 | -2.4 | 0.1 | 2.5 | 1.7 | 1.4 | 0.0 |
| 1949 | 0.8 | 0.5 | 0.6 | 0.1 | -0.4 | -2.0 | -1.7 | -2.0 | -0.1 | 1.8 | 1.2 | 1.0 | 0.0 |
| 1950 | 0.5 | 0.5 | 0.7 | 0.3 | -0.3 | -2.3 | -1.9 | -2.3 | 0.0 | 2.2 | 1.5 | 1.2 | 0.0 |
| 1951 | 1.8 | 1.1 | 1.0 | 0.1 | -0.7 | -2.9 | -2.5 | -3.0 | -0.2 | 2.3 | 1.6 | 1.3 | 0.0 |
| 1952 | 1.5 | 0.9 | 0.8 | 0.1 | -0.5 | -2.3 | -2.0 | -2.4 | -0.1 | 1.9 | 1.3 | 1.0 | 0.0 |
| 1953 | 1.8 | 1.1 | 1.0 | 0.1 | -0.7 | -2.9 | -2.5 | -3.0 | -0.2 | 2.3 | 1.6 | 1.3 | 0.0 |
| 1954 | 1.8 | 1.1 | 1.0 | 0.1 | -0.7 | -2.9 | -2.5 | -3.0 | -0.2 | 2.3 | 1.6 | 1.3 | 0.0 |
| 1955 | 1.1 | 0.8 | 0.7 | 0.0 | -0.5 | -2.0 | -1.7 | -2.0 | -0.1 | 1.6 | 1.1 | 0.9 | 0.0 |
| 1956 | 1.8 | 1.1 | 1.0 | 0.1 | -0.7 | -2.9 | -2.5 | -3.0 | -0.2 | 2.3 | 1.6 | 1.3 | 0.0 |
| 1957 | 1.8 | 1.1 | 1.0 | 0.1 | -0.7 | -2.9 | -2.5 | -3.0 | -0.2 | 2.3 | 1.6 | 1.3 | 0.0 |
| 1958 | 1.7 | 1.1 | 1.0 | 0.1 | -0.6 | -2.8 | -2.4 | -2.9 | -0.2 | 2.2 | 1.5 | 1.2 | 0.0 |
| 1959 | 1.8 | 1.1 | 1.0 | 0.1 | -0.7 | -2.9 | -2.5 | -3.0 | -0.2 | 2.3 | 1.6 | 1.3 | 0.0 |
| 1960 | 0.5 | 0.5 | 0.7 | 0.2 | -0.3 | -2.3 | -1.9 | -2.3 | 0.1 | 2.2 | 1.5 | 1.2 | 0.0 |
| 1961 | 0.8 | 0.6 | 0.6 | 0.1 | -0.3 | -2.0 | -1.7 | -2.0 | -0.1 | 1.8 | 1.2 | 1.0 | 0.0 |
| 1962 | 0.5 | 0.4 | 0.9 | 0.3 | -0.4 | -2.8 | -2.3 | -2.8 | 0.1 | 2.7 | 1.9 | 1.5 | 0.0 |
| 1963 | 1.8 | 1.1 | 1.0 | 0.1 | -0.7 | -2.9 | -2.5 | -3.0 | -0.2 | 2.3 | 1.6 | 1.3 | 0.0 |
| 1964 | 1.8 | 1.1 | 1.0 | 0.1 | -0.7 | -2.9 | -2.5 | -3.0 | -0.2 | 2.3 | 1.6 | 1.3 | 0.0 |
| 1965 | 1.4 | 1.1 | 0.9 | 0.1 | -0.6 | -2.6 | -2.2 | -2.6 | -0.2 | 2.1 | 1.4 | 1.2 | 0.0 |
| 1966 | 1.8 | 1.1 | 1.0 | 0.1 | -0.7 | -2.9 | -2.5 | -3.0 | -0.2 | 2.3 | 1.6 | 1.3 | 0.0 |
| 1967 | 1.7 | 1.1 | 1.0 | 0.1 | -0.6 | -2.8 | -2.4 | -2.9 | -0.2 | 2.2 | 1.5 | 1.2 | 0.0 |
| 1968 | 1.8 | 1.1 | 1.0 | 0.1 | -0.7 | -2.9 | -2.5 | -3.0 | -0.2 | 2.3 | 1.6 | 1.3 | 0.0 |
| 1969 | 1.5 | 0.9 | 0.8 | 0.1 | -0.5 | -2.3 | -2.0 | -2.4 | -0.1 | 1.9 | 1.3 | 1.0 | 0.0 |
| 1970 | 1.8 | 1.1 | 1.0 | 0.1 | -0.7 | -2.9 | -2.5 | -3.0 | -0.2 | 2.3 | 1.6 | 1.3 | 0.0 |
| 1971 | 1.8 | 1.1 | 1.0 | 0.1 | -0.7 | -2.9 | -2.5 | -3.0 | -0.2 | 2.3 | 1.6 | 1.3 | 0.0 |
| 1972 | 1.8 | 1.1 | 1.0 | 0.1 | -0.6 | -2.9 | -2.4 | -2.9 | -0.2 | 2.3 | 1.6 | 1.3 | 0.0 |
| 1973 | 1.1 | 1.2 | 1.1 | 0.2 | -0.6 | -2.9 | -2.4 | -2.9 | -0.1 | 2.4 | 1.7 | 1.3 | 0.0 |
| 1974 | 1.8 | 1.1 | 1.0 | 0.1 | -0.7 | -2.9 | -2.5 | -3.0 | -0.2 | 2.3 | 1.6 | 1.3 | 0.0 |
| 1975 | 1.8 | 1.1 | 1.0 | 0.1 | -0.7 | -2.9 | -2.5 | -3.0 | -0.2 | 2.3 | 1.6 | 1.3 | 0.0 |
| 1976 | 1.8 | 1.0 | 0.9 | 0.0 | -0.6 | -2.7 | -2.2 | -2.7 | -0.2 | 2.1 | 1.4 | 1.2 | 0.0 |
| 1977 | 0.4 | 0.2 | 0.2 | 0.0 | -0.1 | -0.6 | -0.6 | -0.7 | -0.1 | 0.5 | 0.4 | 0.3 | 0.0 |
| 1978 | 0.3 | 0.5 | 1.0 | 0.2 | -0.3 | -2.2 | -1.8 | -2.2 | 0.0 | 2.0 | 1.4 | 1.2 | 0.0 |
| 1979 | 1.8 | 1.1 | 1.0 | 0.1 | -0.7 | -2.9 | -2.5 | -3.0 | -0.2 | 2.3 | 1.6 | 1.3 | 0.0 |
| 1980 | 1.5 | 0.9 | 0.8 | 0.1 | -0.5 | -2.3 | -2.0 | -2.4 | -0.1 | 1.9 | 1.3 | 1.0 | 0.0 |
| 1981 | 1.8 | 1.1 | 1.0 | 0.1 | -0.7 | -2.9 | -2.5 | -3.0 | -0.2 | 2.3 | 1.6 | 1.3 | 0.0 |
| 1982 | 1.7 | 1.1 | 1.0 | 0.1 | -0.6 | -2.8 | -2.4 | -2.9 | -0.2 | 2.2 | 1.5 | 1.2 | 0.0 |
| 1983 | 1.5 | 0.9 | 0.8 | 0.1 | -0.5 | -2.3 | -2.0 | -2.4 | -0.1 | 1.9 | 1.3 | 1.0 | 0.0 |
| 1984 | 1.8 | 1.1 | 1.0 | 0.1 | -0.7 | -2.9 | -2.5 | -3.0 | -0.2 | 2.3 | 1.6 | 1.3 | 0.0 |
| 1985 | 1.8 | 1.1 | 1.0 | 0.1 | -0.7 | -2.9 | -2.5 | -3.0 | -0.2 | 2.3 | 1.6 | 1.3 | 0.0 |
| 1986 | 0.5 | 0.4 | 1.0 | 0.2 | -0.4 | -2.2 | -1.9 | -2.3 | 0.0 | 2.1 | 1.4 | 1.2 | 0.0 |
| 1987 | 1.3 | 0.8 | 0.8 | 0.1 | -0.5 | -2.4 | -2.0 | -2.4 | -0.1 | 2.0 | 1.4 | 1.1 | 0.0 |
| 1988 | 0.5 | 0.5 | 0.4 | 0.0 | -0.3 | -1.1 | -0.9 | -1.1 | -0.1 | 0.9 | 0.6 | 0.5 | 0.0 |
| 1989 | 0.5 | 0.4 | 0.3 | 0.2 | -0.3 | -2.0 | -1.7 | -2.1 | 0.1 | 2.0 | 1.4 | 1.2 | 0.0 |
| 1990 | 0.5 | 0.4 | 0.4 | 0.1 | -0.2 | -1.2 | -1.0 | -1.2 | -0.1 | 1.0 | 0.7 | 0.6 | 0.0 |
| 1991 | 0.4 | 0.2 | 0.3 | 0.0 | -0.2 | -0.7 | -0.6 | -0.8 | 0.0 | 0.6 | 0.4 | 0.3 | 0.0 |
| 1992 | 0.4 | 0.3 | 0.3 | 0.1 | -0.2 | -1.1 | -0.9 | -1.1 | 0.0 | 1.0 | 0.7 | 0.6 | 0.0 |
| 1993 | 0.6 | 1.2 | 1.1 | 0.2 | -0.5 | -2.8 | -2.4 | -2.9 | 0.0 | 2.4 | 1.7 | 1.4 | 0.0 |
| AVG | 1.2 | 0.8 | 0.8 | 0.1 | -0.5 | -2.4 | -2.1 | -2.5 | -0.1 | 2.0 | 1.4 | 1.1 | 0.0 |
| MIN | 0.3 | 0.2 | 0.2 | 0.0 | -0.7 | -2.9 | -2.5 | -3.0 | -0.2 | 0.5 | 0.4 | 0.3 | 0.0 |
| MAX | 1.8 | 1.2 | 1.2 | 0.3 | -0.1 | -0.6 | -0.6 | -0.7 | 0.1 | 2.7 | 1.9 | 1.6 | 0.0 |

**Table 4-3. Net Change in SWP Table A Deliveries Resulting From the Project at 2020 SWP Demand Conditions, With Monterey Amendment**

(all values in thousand AF)

| YEAR | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1922 | 1.2 | 0.8 | 1.1 | 0.2 | -0.6 | -2.9 | -2.4 | -2.9 | -0.1 | 2.5 | 1.7 | 1.4 | 0.0 |
| 1923 | 1.7 | 1.1 | 1.0 | 0.1 | -0.6 | -2.9 | -2.5 | -3.0 | -0.2 | 2.3 | 1.6 | 1.3 | 0.0 |
| 1924 | 0.5 | 0.3 | 0.3 | 0.0 | -0.2 | -0.9 | -0.8 | -0.9 | 0.0 | 0.7 | 0.5 | 0.4 | 0.0 |
| 1925 | 0.5 | 0.3 | 0.5 | 0.1 | -0.2 | -1.3 | -1.1 | -1.4 | 0.0 | 1.2 | 0.8 | 0.7 | 0.0 |
| 1926 | 0.6 | 0.5 | 0.7 | 0.1 | -0.3 | -1.9 | -1.6 | -1.9 | -0.1 | 1.7 | 1.2 | 1.0 | 0.0 |
| 1927 | 1.1 | 0.9 | 1.1 | 0.2 | -0.5 | -2.9 | -2.4 | -2.9 | -0.1 | 2.5 | 1.7 | 1.4 | 0.0 |
| 1928 | 1.3 | 0.9 | 0.9 | 0.1 | -0.5 | -2.4 | -2.0 | -2.4 | -0.2 | 1.9 | 1.3 | 1.1 | 0.0 |
| 1929 | 0.7 | 0.5 | 0.5 | 0.1 | -0.3 | -1.3 | -1.1 | -1.3 | -0.1 | 1.0 | 0.7 | 0.6 | 0.0 |
| 1930 | 0.6 | 0.7 | 0.7 | 0.1 | -0.4 | -1.9 | -1.6 | -1.9 | 0.0 | 1.7 | 1.1 | 0.9 | 0.0 |
| 1931 | 0.6 | 0.5 | 0.4 | 0.1 | -0.3 | -1.2 | -1.0 | -1.2 | -0.1 | 1.0 | 0.7 | 0.5 | 0.0 |
| 1932 | 0.5 | 0.5 | 0.5 | 0.0 | -0.3 | -1.4 | -1.2 | -1.4 | 0.0 | 1.2 | 0.8 | 0.7 | 0.0 |
| 1933 | 0.5 | 0.4 | 0.4 | 0.0 | -0.2 | -1.2 | -1.0 | -1.2 | -0.1 | 1.0 | 0.7 | 0.6 | 0.0 |
| 1934 | 0.6 | 0.4 | 0.5 | 0.1 | -0.2 | -1.2 | -1.0 | -1.2 | -0.1 | 1.0 | 0.6 | 0.6 | 0.0 |
| 1935 | 0.5 | 0.5 | 0.5 | 0.2 | -0.3 | -2.4 | -2.0 | -2.5 | 0.1 | 2.4 | 1.7 | 1.4 | 0.0 |
| 1936 | 0.5 | 0.5 | 1.0 | 0.2 | -0.4 | -2.5 | -2.0 | -2.5 | 0.0 | 2.2 | 1.6 | 1.3 | 0.0 |
| 1937 | 0.5 | 0.4 | 0.7 | 0.2 | -0.4 | -2.2 | -1.8 | -2.2 | 0.0 | 2.0 | 1.4 | 1.2 | 0.0 |
| 1938 | 1.5 | 1.1 | 1.1 | 0.1 | -0.6 | -2.9 | -2.5 | -2.9 | -0.2 | 2.3 | 1.6 | 1.4 | 0.0 |
| 1939 | 1.6 | 0.9 | 0.9 | 0.1 | -0.6 | -2.5 | -2.1 | -2.6 | -0.2 | 2.0 | 1.4 | 1.1 | 0.0 |
| 1940 | 0.4 | 0.4 | 1.0 | 0.3 | -0.4 | -2.6 | -2.2 | -2.7 | 0.1 | 2.5 | 1.7 | 1.5 | 0.0 |
| 1941 | 0.9 | 0.9 | 0.9 | 0.1 | -0.5 | -2.3 | -1.9 | -2.3 | -0.1 | 1.9 | 1.3 | 1.1 | 0.0 |
| 1942 | 1.8 | 1.1 | 1.0 | 0.1 | -0.7 | -2.9 | -2.5 | -3.0 | -0.2 | 2.3 | 1.6 | 1.3 | 0.0 |
| 1943 | 1.6 | 1.1 | 0.9 | 0.0 | -0.6 | -2.6 | -2.2 | -2.7 | -0.2 | 2.0 | 1.4 | 1.1 | 0.0 |
| 1944 | 1.3 | 1.0 | 1.0 | 0.1 | -0.6 | -2.8 | -2.4 | -2.8 | -0.1 | 2.4 | 1.6 | 1.3 | 0.0 |
| 1945 | 1.1 | 0.7 | 1.0 | 0.2 | -0.5 | -2.6 | -2.2 | -2.6 | -0.1 | 2.3 | 1.5 | 1.3 | 0.0 |
| 1946 | 1.7 | 1.0 | 0.9 | 0.1 | -0.6 | -2.6 | -2.2 | -2.7 | -0.2 | 2.1 | 1.4 | 1.2 | 0.0 |
| 1947 | 0.9 | 0.6 | 0.6 | 0.2 | -0.4 | -2.2 | -1.8 | -2.2 | 0.0 | 1.9 | 1.3 | 1.1 | 0.0 |
| 1948 | 0.5 | 0.4 | 0.3 | 0.1 | -0.3 | -2.1 | -1.7 | -2.1 | 0.1 | 2.1 | 1.5 | 1.2 | 0.0 |
| 1949 | 0.7 | 0.5 | 0.5 | 0.1 | -0.3 | -1.9 | -1.5 | -1.8 | 0.0 | 1.6 | 1.2 | 1.0 | 0.0 |
| 1950 | 0.5 | 0.5 | 0.7 | 0.2 | -0.3 | -2.1 | -1.8 | -2.1 | 0.0 | 2.0 | 1.4 | 1.1 | 0.0 |
| 1951 | 1.6 | 1.1 | 1.0 | 0.1 | -0.6 | -2.7 | -2.3 | -2.8 | -0.2 | 2.2 | 1.5 | 1.2 | 0.0 |
| 1952 | 1.5 | 0.9 | 0.8 | 0.1 | -0.5 | -2.3 | -2.0 | -2.4 | -0.1 | 1.9 | 1.3 | 1.0 | 0.0 |
| 1953 | 1.8 | 1.1 | 0.9 | 0.1 | -0.6 | -2.7 | -2.3 | -2.8 | -0.2 | 2.1 | 1.4 | 1.2 | 0.0 |
| 1954 | 1.5 | 1.0 | 0.9 | 0.1 | -0.6 | -2.7 | -2.3 | -2.7 | -0.2 | 2.2 | 1.5 | 1.2 | 0.0 |
| 1955 | 1.0 | 0.7 | 0.6 | 0.1 | -0.4 | -1.8 | -1.5 | -1.8 | -0.1 | 1.4 | 1.0 | 0.8 | 0.0 |
| 1956 | 1.6 | 1.1 | 1.1 | 0.1 | -0.6 | -2.9 | -2.4 | -2.9 | -0.2 | 2.3 | 1.6 | 1.3 | 0.0 |
| 1957 | 1.5 | 1.0 | 0.8 | 0.1 | -0.6 | -2.5 | -2.1 | -2.5 | -0.2 | 1.9 | 1.3 | 1.1 | 0.0 |
| 1958 | 1.3 | 1.0 | 0.9 | 0.1 | -0.6 | -2.9 | -2.5 | -2.9 | -0.1 | 2.5 | 1.7 | 1.4 | 0.0 |
| 1959 | 1.6 | 1.0 | 0.9 | 0.1 | -0.6 | -2.6 | -2.2 | -2.6 | -0.2 | 2.0 | 1.4 | 1.1 | 0.0 |
| 1960 | 0.4 | 0.3 | 0.5 | 0.2 | -0.2 | -1.8 | -1.5 | -1.8 | 0.0 | 1.7 | 1.2 | 1.0 | 0.0 |
| 1961 | 0.7 | 0.6 | 0.6 | 0.1 | -0.3 | -2.0 | -1.7 | -2.0 | 0.0 | 1.7 | 1.2 | 1.0 | 0.0 |
| 1962 | 0.5 | 0.3 | 0.9 | 0.2 | -0.4 | -2.4 | -2.0 | -2.4 | 0.1 | 2.3 | 1.6 | 1.3 | 0.0 |
| 1963 | 1.5 | 1.0 | 0.9 | 0.1 | -0.6 | -2.9 | -2.4 | -2.9 | -0.1 | 2.4 | 1.7 | 1.3 | 0.0 |
| 1964 | 1.5 | 1.0 | 0.8 | 0.1 | -0.6 | -2.4 | -2.1 | -2.5 | -0.2 | 1.9 | 1.3 | 1.1 | 0.0 |
| 1965 | 1.4 | 0.9 | 0.8 | 0.1 | -0.5 | -2.3 | -2.0 | -2.4 | -0.2 | 1.9 | 1.3 | 1.0 | 0.0 |
| 1966 | 1.8 | 1.1 | 1.0 | 0.1 | -0.6 | -2.8 | -2.4 | -2.8 | -0.2 | 2.2 | 1.5 | 1.2 | 0.0 |
| 1967 | 1.1 | 1.2 | 0.9 | 0.1 | -0.6 | -2.8 | -2.4 | -2.9 | -0.1 | 2.4 | 1.7 | 1.4 | 0.0 |
| 1968 | 1.6 | 1.1 | 0.8 | 0.1 | -0.6 | -2.5 | -2.2 | -2.6 | -0.2 | 2.0 | 1.4 | 1.1 | 0.0 |
| 1969 | 0.9 | 0.9 | 0.9 | 0.1 | -0.5 | -2.3 | -1.9 | -2.3 | -0.1 | 1.9 | 1.3 | 1.1 | 0.0 |
| 1970 | 1.7 | 1.1 | 0.9 | 0.1 | -0.6 | -2.7 | -2.3 | -2.7 | -0.2 | 2.1 | 1.4 | 1.2 | 0.0 |
| 1971 | 1.8 | 1.1 | 0.9 | 0.1 | -0.6 | -2.9 | -2.5 | -3.0 | -0.2 | 2.3 | 1.6 | 1.3 | 0.0 |
| 1972 | 1.5 | 0.9 | 0.8 | 0.1 | -0.5 | -2.3 | -2.0 | -2.3 | -0.1 | 1.8 | 1.2 | 1.0 | 0.0 |
| 1973 | 1.2 | 1.0 | 0.9 | 0.1 | -0.5 | -2.6 | -2.2 | -2.7 | -0.1 | 2.2 | 1.5 | 1.2 | 0.0 |
| 1974 | 1.8 | 1.1 | 0.9 | 0.1 | -0.6 | -2.9 | -2.5 | -3.0 | -0.2 | 2.3 | 1.6 | 1.3 | 0.0 |
| 1975 | 1.6 | 1.0 | 0.9 | 0.1 | -0.6 | -2.8 | -2.3 | -2.8 | -0.2 | 2.3 | 1.5 | 1.3 | 0.0 |
| 1976 | 1.7 | 0.9 | 0.8 | 0.1 | -0.6 | -2.4 | -2.1 | -2.5 | -0.2 | 1.9 | 1.3 | 1.0 | 0.0 |
| 1977 | 0.4 | 0.2 | 0.3 | 0.0 | -0.2 | -0.7 | -0.5 | -0.7 | 0.0 | 0.5 | 0.3 | 0.3 | 0.0 |
| 1978 | 0.3 | 0.4 | 0.4 | 0.3 | -0.3 | -2.1 | -1.8 | -2.2 | 0.1 | 2.1 | 1.5 | 1.2 | 0.0 |
| 1979 | 1.2 | 0.9 | 0.9 | 0.1 | -0.5 | -2.5 | -2.1 | -2.5 | -0.1 | 2.1 | 1.4 | 1.1 | 0.0 |
| 1980 | 1.1 | 0.8 | 0.8 | 0.1 | -0.5 | -2.3 | -2.0 | -2.3 | -0.1 | 1.9 | 1.3 | 1.1 | 0.0 |
| 1981 | 1.5 | 1.0 | 0.9 | 0.1 | -0.6 | -2.5 | -2.1 | -2.5 | -0.2 | 2.0 | 1.4 | 1.1 | 0.0 |
| 1982 | 1.8 | 1.1 | 1.0 | 0.1 | -0.6 | -2.9 | -2.5 | -3.0 | -0.2 | 2.3 | 1.6 | 1.3 | 0.0 |
| 1983 | 1.5 | 0.9 | 0.8 | 0.1 | -0.5 | -2.3 | -2.0 | -2.4 | -0.1 | 1.9 | 1.3 | 1.0 | 0.0 |
| 1984 | 1.8 | 1.1 | 1.0 | 0.1 | -0.6 | -2.8 | -2.4 | -2.9 | -0.2 | 2.3 | 1.5 | 1.3 | 0.0 |
| 1985 | 1.5 | 0.9 | 0.9 | 0.1 | -0.6 | -2.7 | -2.3 | -2.7 | -0.1 | 2.3 | 1.5 | 1.3 | 0.0 |
| 1986 | 0.5 | 0.5 | 0.9 | 0.2 | -0.4 | -2.3 | -1.9 | -2.3 | 0.0 | 2.0 | 1.4 | 1.2 | 0.0 |
| 1987 | 1.1 | 0.7 | 0.7 | 0.1 | -0.4 | -2.1 | -1.8 | -2.1 | -0.1 | 1.7 | 1.2 | 1.0 | 0.0 |
| 1988 | 0.6 | 0.5 | 0.4 | 0.0 | -0.2 | -1.1 | -0.9 | -1.1 | -0.1 | 0.8 | 0.6 | 0.4 | 0.0 |
| 1989 | 0.5 | 0.3 | 0.3 | 0.2 | -0.3 | -2.0 | -1.6 | -2.0 | 0.1 | 2.0 | 1.3 | 1.1 | 0.0 |
| 1990 | 0.5 | 0.4 | 0.4 | 0.0 | -0.2 | -1.1 | -1.0 | -1.1 | -0.1 | 1.0 | 0.7 | 0.5 | 0.0 |
| 1991 | 0.4 | 0.2 | 0.3 | 0.0 | -0.2 | -0.8 | -0.6 | -0.8 | 0.0 | 0.6 | 0.4 | 0.4 | 0.0 |
| 1992 | 0.4 | 0.2 | 0.3 | 0.1 | -0.2 | -1.1 | -0.9 | -1.1 | 0.0 | 1.0 | 0.7 | 0.5 | 0.0 |
| 1993 | 0.6 | 1.0 | 1.1 | 0.2 | -0.5 | -2.8 | -2.4 | -2.9 | 0.0 | 2.5 | 1.7 | 1.4 | 0.0 |
| AVG | 1.1 | 0.8 | 0.8 | 0.1 | -0.5 | -2.3 | -1.9 | -2.3 | -0.1 | 1.9 | 1.3 | 1.1 | 0.0 |
| MIN | 0.3 | 0.2 | 0.3 | 0.0 | -0.7 | -2.9 | -2.5 | -3.0 | -0.2 | 0.5 | 0.3 | 0.3 | 0.0 |
| MAX | 1.8 | 1.2 | 1.1 | 0.3 | -0.2 | -0.7 | -0.5 | -0.7 | 0.1 | 2.5 | 1.7 | 1.5 | 0.0 |

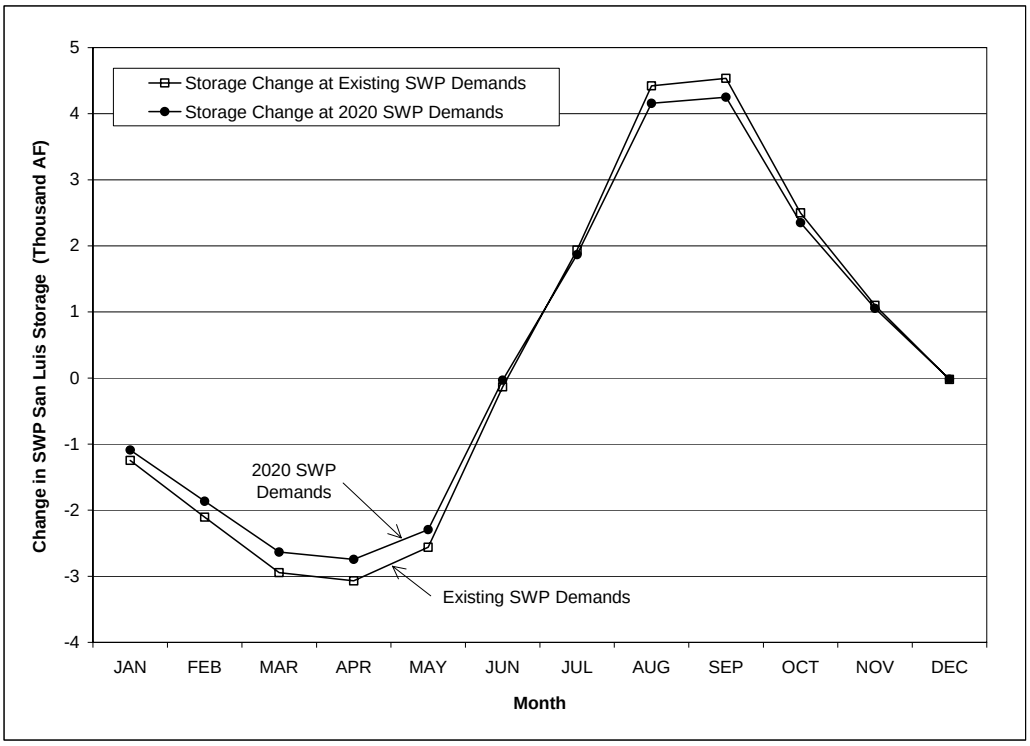


**Figure 4-3. Average Monthly Change in SWP San Luis Storage with the Project, With Monterey Amendment**

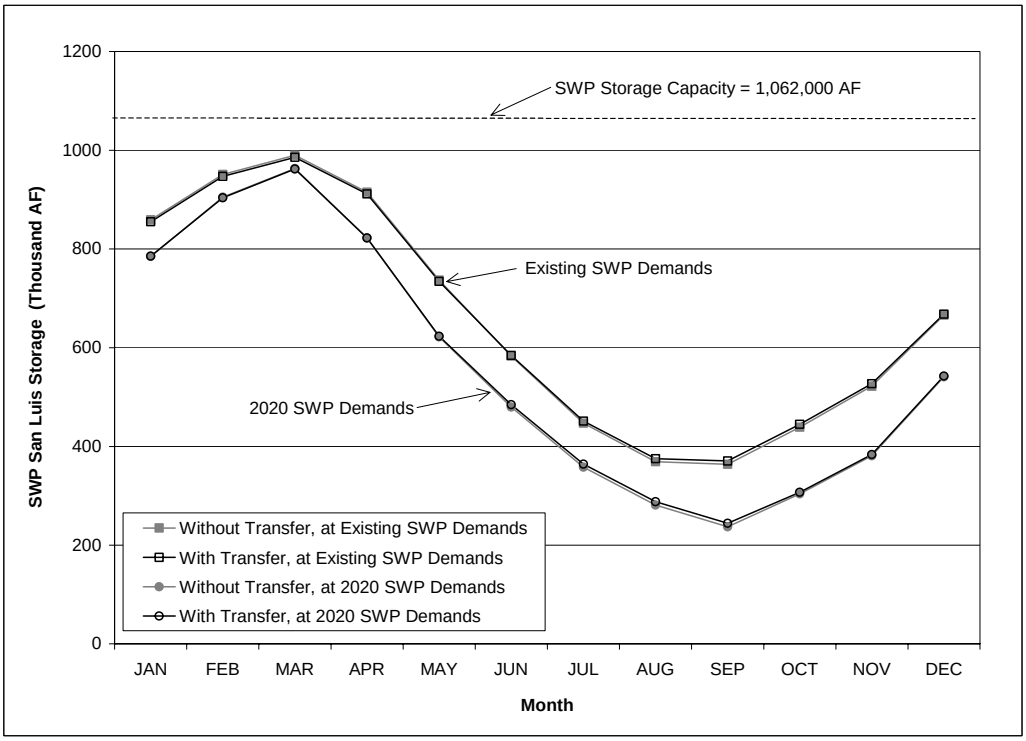


**Figure 4-4. Average Monthly SWP San Luis Storage With and Without the Project, With Monterey Amendment**

**Table 4-4. Net Change in San Luis Reservoir Storage Resulting From the Project at Existing SWP Demand Conditions, With Monterey Amendment**

(all values in thousand AF)

| YEAR | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1922 | -1.8 | -2.9 | -3.9 | -4.0 | -3.4 | -0.5 | 2.1 | 5.1 | 5.2 | 2.9 | 1.3 | -0.1 |
| 1923 | -1.8 | -2.9 | -4.0 | -4.1 | -3.4 | -0.5 | 2.0 | 5.0 | 5.2 | 2.8 | 1.2 | -0.1 |
| 1924 | -0.8 | -1.3 | -1.8 | -1.9 | -1.5 | -0.2 | 1.0 | 2.5 | 2.6 | 1.4 | 0.6 | -0.1 |
| 1925 | -0.5 | -0.8 | -1.4 | -1.4 | -1.2 | 0.1 | 1.1 | 2.4 | 2.4 | 1.3 | 0.6 | -0.1 |
| 1926 | -0.6 | -1.0 | -1.8 | -2.0 | -1.6 | 0.6 | 2.5 | 4.7 | 4.7 | 2.7 | 1.2 | 0.0 |
| 1927 | -1.3 | -2.4 | -3.5 | -3.6 | -3.0 | -0.1 | 2.3 | 5.3 | 5.3 | 2.9 | 1.3 | -0.1 |
| 1928 | -1.8 | -3.0 | -4.0 | -4.1 | -3.4 | -0.5 | 2.1 | 5.1 | 5.4 | 3.0 | 1.3 | 0.1 |
| 1929 | -0.6 | -1.1 | -1.7 | -1.7 | -1.5 | -0.1 | 1.0 | 2.3 | 2.4 | 1.3 | 0.6 | 0.0 |
| 1930 | -0.6 | -1.2 | -1.9 | -2.0 | -1.6 | 0.4 | 2.1 | 4.0 | 4.0 | 2.3 | 1.0 | -0.1 |
| 1931 | -0.6 | -1.0 | -1.4 | -1.4 | -1.2 | -0.1 | 0.9 | 2.0 | 2.0 | 1.1 | 0.5 | -0.1 |
| 1932 | -0.6 | -1.1 | -1.7 | -1.9 | -1.5 | 0.0 | 1.2 | 2.8 | 2.8 | 1.6 | 0.6 | -0.1 |
| 1933 | -0.5 | -0.9 | -1.2 | -1.3 | -1.1 | 0.1 | 1.1 | 2.3 | 2.3 | 1.3 | 0.6 | 0.0 |
| 1934 | -0.4 | -0.8 | -1.3 | -1.4 | -1.2 | 0.0 | 1.1 | 2.3 | 2.3 | 1.3 | 0.7 | 0.1 |
| 1935 | -0.5 | -1.0 | -1.6 | -1.9 | -1.5 | 1.3 | 3.5 | 6.4 | 6.3 | 3.5 | 1.6 | 0.1 |
| 1936 | -0.6 | -1.4 | -2.7 | -2.8 | -2.4 | 0.3 | 2.7 | 5.6 | 5.6 | 3.0 | 1.3 | -0.1 |
| 1937 | -0.9 | -1.7 | -2.7 | -2.9 | -2.4 | 0.3 | 2.6 | 5.3 | 5.4 | 3.0 | 1.4 | 0.0 |
| 1938 | -1.7 | -2.9 | -3.8 | -4.0 | -3.3 | -0.5 | 1.9 | 4.8 | 5.0 | 2.7 | 1.2 | 0.0 |
| 1939 | -1.9 | -3.1 | -4.1 | -4.2 | -3.5 | -0.5 | 2.0 | 5.0 | 5.2 | 2.8 | 1.2 | -0.1 |
| 1940 | -0.5 | -1.0 | -2.2 | -2.4 | -2.1 | 0.7 | 3.0 | 5.9 | 5.9 | 3.2 | 1.5 | 0.0 |
| 1941 | -1.5 | -2.4 | -3.2 | -3.3 | -2.8 | -0.4 | 1.6 | 4.0 | 4.1 | 2.3 | 0.9 | -0.1 |
| 1942 | -1.9 | -3.1 | -4.1 | -4.2 | -3.5 | -0.6 | 1.9 | 4.9 | 5.1 | 2.8 | 1.2 | 0.0 |
| 1943 | -1.7 | -2.8 | -3.8 | -3.9 | -3.2 | -0.4 | 2.0 | 4.8 | 5.0 | 2.7 | 1.1 | -0.1 |
| 1944 | -1.8 | -3.0 | -4.0 | -4.1 | -3.4 | -0.5 | 2.1 | 5.1 | 5.2 | 3.0 | 1.3 | 0.1 |
| 1945 | -1.7 | -2.9 | -3.9 | -4.1 | -3.4 | -0.6 | 1.9 | 4.9 | 5.1 | 2.7 | 1.1 | -0.1 |
| 1946 | -1.9 | -3.0 | -4.0 | -4.1 | -3.5 | -0.5 | 2.0 | 5.0 | 5.2 | 2.8 | 1.3 | 0.0 |
| 1947 | -1.2 | -1.9 | -2.7 | -2.9 | -2.3 | 0.4 | 2.8 | 5.7 | 5.7 | 3.2 | 1.5 | -0.1 |
| 1948 | -0.5 | -0.9 | -1.2 | -1.3 | -1.0 | 1.4 | 3.3 | 5.7 | 5.6 | 3.1 | 1.4 | -0.1 |
| 1949 | -0.8 | -1.4 | -2.0 | -2.1 | -1.8 | 0.2 | 1.8 | 3.8 | 3.8 | 2.1 | 0.8 | -0.2 |
| 1950 | -0.5 | -1.0 | -1.7 | -1.9 | -1.5 | 0.8 | 2.7 | 5.0 | 5.0 | 2.7 | 1.2 | 0.0 |
| 1951 | -1.8 | -3.0 | -4.0 | -4.2 | -3.5 | -0.6 | 1.9 | 5.0 | 5.1 | 2.8 | 1.2 | -0.1 |
| 1952 | -1.4 | -2.3 | -3.1 | -3.2 | -2.6 | -0.3 | 1.7 | 4.1 | 4.3 | 2.4 | 1.1 | 0.1 |
| 1953 | -1.8 | -2.9 | -4.0 | -4.1 | -3.4 | -0.6 | 1.9 | 4.9 | 5.1 | 2.8 | 1.1 | -0.2 |
| 1954 | -1.8 | -3.0 | -4.0 | -4.1 | -3.4 | -0.5 | 2.0 | 5.1 | 5.2 | 2.8 | 1.2 | -0.1 |
| 1955 | -1.1 | -1.9 | -2.6 | -2.6 | -2.2 | -0.2 | 1.5 | 3.5 | 3.6 | 2.0 | 0.9 | -0.1 |
| 1956 | -1.8 | -2.9 | -4.0 | -4.1 | -3.5 | -0.6 | 1.9 | 5.0 | 5.1 | 2.8 | 1.2 | -0.1 |
| 1957 | -1.8 | -3.0 | -4.0 | -4.1 | -3.4 | -0.5 | 2.0 | 5.0 | 5.1 | 2.8 | 1.2 | -0.1 |
| 1958 | -1.8 | -2.9 | -3.8 | -3.9 | -3.3 | -0.5 | 1.9 | 4.7 | 5.0 | 2.7 | 1.2 | 0.0 |
| 1959 | -1.8 | -2.9 | -4.0 | -4.1 | -3.5 | -0.6 | 2.0 | 5.0 | 5.2 | 2.8 | 1.2 | 0.0 |
| 1960 | -0.6 | -1.0 | -1.7 | -2.0 | -1.6 | 0.7 | 2.6 | 4.9 | 4.9 | 2.8 | 1.2 | 0.0 |
| 1961 | -0.7 | -1.3 | -1.9 | -2.1 | -1.7 | 0.3 | 2.1 | 4.1 | 4.1 | 2.4 | 1.1 | 0.1 |
| 1962 | -0.5 | -0.9 | -1.7 | -2.1 | -1.7 | 1.1 | 3.4 | 6.3 | 6.2 | 3.5 | 1.7 | 0.1 |
| 1963 | -1.8 | -2.9 | -4.0 | -4.0 | -3.4 | -0.4 | 2.2 | 5.1 | 5.4 | 2.9 | 1.3 | 0.1 |
| 1964 | -1.8 | -2.9 | -4.0 | -4.1 | -3.4 | -0.5 | 2.0 | 5.1 | 5.2 | 3.0 | 1.3 | 0.1 |
| 1965 | -1.4 | -2.5 | -3.4 | -3.5 | -2.9 | -0.3 | 1.9 | 4.5 | 4.7 | 2.6 | 1.2 | 0.1 |
| 1966 | -1.8 | -3.0 | -4.0 | -4.1 | -3.4 | -0.5 | 2.0 | 5.1 | 5.3 | 3.0 | 1.3 | 0.0 |
| 1967 | -1.7 | -2.8 | -3.8 | -3.9 | -3.2 | -0.4 | 2.0 | 4.8 | 5.0 | 2.8 | 1.2 | 0.1 |
| 1968 | -1.8 | -2.9 | -4.0 | -4.1 | -3.4 | -0.5 | 2.0 | 5.1 | 5.2 | 2.9 | 1.2 | 0.0 |
| 1969 | -1.5 | -2.4 | -3.2 | -3.2 | -2.7 | -0.4 | 1.6 | 4.0 | 4.2 | 2.3 | 1.0 | 0.0 |
| 1970 | -1.8 | -2.9 | -4.0 | -4.1 | -3.4 | -0.5 | 2.0 | 5.0 | 5.2 | 2.8 | 1.2 | 0.0 |
| 1971 | -1.8 | -2.9 | -4.0 | -4.1 | -3.4 | -0.5 | 2.0 | 5.1 | 5.2 | 2.8 | 1.2 | -0.1 |
| 1972 | -1.8 | -3.0 | -4.0 | -4.1 | -3.4 | -0.5 | 1.9 | 4.9 | 5.0 | 2.7 | 1.2 | -0.1 |
| 1973 | -1.1 | -2.2 | -3.3 | -3.5 | -2.9 | -0.1 | 2.4 | 5.3 | 5.4 | 3.0 | 1.3 | 0.0 |
| 1974 | -1.8 | -3.0 | -4.0 | -4.1 | -3.4 | -0.4 | 2.1 | 5.1 | 5.3 | 3.0 | 1.3 | 0.1 |
| 1975 | -1.8 | -3.0 | -4.0 | -4.1 | -3.4 | -0.6 | 1.9 | 5.0 | 5.1 | 2.8 | 1.2 | -0.1 |
| 1976 | -1.9 | -2.8 | -3.8 | -3.8 | -3.2 | -0.5 | 1.7 | 4.4 | 4.6 | 2.6 | 1.1 | 0.0 |
| 1977 | -0.5 | -0.7 | -0.9 | -1.0 | -0.9 | -0.3 | 0.3 | 1.0 | 1.0 | 0.5 | 0.1 | -0.1 |
| 1978 | -0.3 | -0.8 | -1.8 | -2.0 | -1.7 | 0.5 | 2.4 | 4.5 | 4.5 | 2.5 | 1.1 | 0.0 |
| 1979 | -1.9 | -3.1 | -4.1 | -4.2 | -3.5 | -0.5 | 2.0 | 5.1 | 5.3 | 3.0 | 1.4 | 0.1 |
| 1980 | -1.5 | -2.4 | -3.3 | -3.4 | -2.9 | -0.5 | 1.5 | 3.9 | 4.0 | 2.1 | 0.8 | -0.2 |
| 1981 | -1.8 | -2.9 | -4.0 | -4.1 | -3.4 | -0.5 | 2.0 | 5.1 | 5.2 | 2.8 | 1.2 | 0.0 |
| 1982 | -1.7 | -2.9 | -3.8 | -3.9 | -3.3 | -0.5 | 1.9 | 4.7 | 4.9 | 2.7 | 1.1 | -0.1 |
| 1983 | -1.5 | -2.4 | -3.2 | -3.2 | -2.7 | -0.4 | 1.6 | 4.0 | 4.1 | 2.3 | 1.0 | -0.1 |
| 1984 | -1.9 | -3.0 | -4.0 | -4.2 | -3.5 | -0.5 | 2.0 | 5.0 | 5.2 | 2.9 | 1.3 | 0.0 |
| 1985 | -1.8 | -3.0 | -4.0 | -4.1 | -3.4 | -0.5 | 2.1 | 5.1 | 5.3 | 3.0 | 1.3 | 0.1 |
| 1986 | -0.6 | -0.9 | -1.9 | -2.1 | -1.7 | 0.5 | 2.4 | 4.6 | 4.6 | 2.5 | 1.1 | -0.1 |
| 1987 | -1.3 | -2.1 | -2.9 | -3.0 | -2.5 | -0.1 | 1.9 | 4.4 | 4.4 | 2.4 | 1.1 | 0.0 |
| 1988 | -0.5 | -1.1 | -1.5 | -1.6 | -1.3 | -0.3 | 0.7 | 1.7 | 1.8 | 1.0 | 0.4 | 0.0 |
| 1989 | -0.5 | -0.8 | -1.2 | -1.5 | -1.2 | 0.8 | 2.5 | 4.5 | 4.4 | 2.4 | 1.0 | -0.1 |
| 1990 | -0.5 | -0.9 | -1.4 | -1.5 | -1.3 | 0.0 | 1.0 | 2.2 | 2.4 | 1.3 | 0.6 | 0.1 |
| 1991 | -0.4 | -0.7 | -0.9 | -0.9 | -0.8 | 0.0 | 0.6 | 1.4 | 1.5 | 0.9 | 0.4 | 0.1 |
| 1992 | -0.4 | -0.7 | -1.0 | -1.1 | -0.9 | 0.2 | 1.1 | 2.2 | 2.2 | 1.3 | 0.6 | 0.1 |
| 1993 | -0.6 | -1.8 | -2.9 | -3.1 | -2.6 | 0.2 | 2.6 | 5.4 | 5.5 | 3.1 | 1.4 | -0.1 |
| AVG | -1.2 | -2.1 | -2.9 | -3.1 | -2.6 | -0.1 | 1.9 | 4.4 | 4.5 | 2.5 | 1.1 | 0.0 |
| MIN | -1.9 | -3.1 | -4.1 | -4.2 | -3.5 | -0.6 | 0.3 | 1.0 | 1.0 | 0.5 | 0.1 | -0.2 |
| MAX | -0.3 | -0.7 | -0.9 | -0.9 | -0.8 | 1.4 | 3.5 | 6.4 | 6.3 | 3.5 | 1.7 | 0.1 |

**Table 4-5. Net Change in San Luis Reservoir Storage Resulting From the Project at 2020 SWP Demand Conditions, With Monterey Amendment**

(all values in thousand AF)

| YEAR | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1922 | -1.2 | -2.0 | -3.1 | -3.3 | -2.7 | 0.2 | 2.7 | 5.6 | 5.6 | 3.2 | 1.6 | 0.2 |
| 1923 | -1.7 | -2.9 | -4.0 | -4.1 | -3.5 | -0.5 | 1.9 | 4.9 | 5.1 | 2.8 | 1.2 | -0.2 |
| 1924 | -0.5 | -0.8 | -1.1 | -1.1 | -0.9 | 0.0 | 0.7 | 1.6 | 1.7 | 0.9 | 0.5 | 0.1 |
| 1925 | -0.5 | -0.8 | -1.3 | -1.4 | -1.2 | 0.2 | 1.3 | 2.6 | 2.6 | 1.5 | 0.7 | -0.1 |
| 1926 | -0.6 | -1.2 | -1.9 | -2.1 | -1.8 | 0.2 | 1.7 | 3.6 | 3.7 | 2.0 | 0.8 | -0.2 |
| 1927 | -1.1 | -2.0 | -3.1 | -3.2 | -2.7 | 0.2 | 2.6 | 5.5 | 5.7 | 3.2 | 1.5 | 0.1 |
| 1928 | -1.3 | -2.3 | -3.2 | -3.3 | -2.7 | -0.3 | 1.7 | 4.1 | 4.2 | 2.4 | 1.1 | -0.1 |
| 1929 | -0.7 | -1.2 | -1.6 | -1.7 | -1.4 | -0.1 | 0.9 | 2.2 | 2.3 | 1.3 | 0.5 | -0.1 |
| 1930 | -0.6 | -1.3 | -1.9 | -2.1 | -1.8 | 0.1 | 1.7 | 3.6 | 3.6 | 1.9 | 0.9 | -0.1 |
| 1931 | -0.5 | -1.0 | -1.4 | -1.5 | -1.2 | -0.1 | 0.9 | 2.1 | 2.1 | 1.2 | 0.5 | 0.1 |
| 1932 | -0.5 | -1.0 | -1.5 | -1.6 | -1.2 | 0.2 | 1.3 | 2.8 | 2.8 | 1.5 | 0.7 | 0.0 |
| 1933 | -0.6 | -1.0 | -1.4 | -1.4 | -1.2 | 0.0 | 1.0 | 2.2 | 2.3 | 1.3 | 0.6 | 0.1 |
| 1934 | -0.6 | -1.0 | -1.4 | -1.5 | -1.3 | -0.1 | 0.9 | 2.1 | 2.2 | 1.2 | 0.5 | -0.1 |
| 1935 | -0.4 | -1.0 | -1.5 | -1.7 | -1.4 | 1.1 | 3.1 | 5.6 | 5.5 | 3.1 | 1.4 | 0.0 |
| 1936 | -0.5 | -0.9 | -2.0 | -2.2 | -1.8 | 0.6 | 2.7 | 5.1 | 5.1 | 2.9 | 1.4 | 0.1 |
| 1937 | -0.5 | -1.0 | -1.7 | -1.9 | -1.6 | 0.6 | 2.4 | 4.6 | 4.6 | 2.6 | 1.2 | 0.0 |
| 1938 | -1.5 | -2.6 | -3.7 | -3.7 | -3.1 | -0.2 | 2.3 | 5.2 | 5.4 | 3.1 | 1.5 | 0.1 |
| 1939 | -1.6 | -2.6 | -3.5 | -3.7 | -3.0 | -0.5 | 1.6 | 4.2 | 4.3 | 2.3 | 1.0 | -0.2 |
| 1940 | -0.4 | -0.8 | -1.9 | -2.1 | -1.7 | 0.9 | 3.1 | 5.8 | 5.7 | 3.2 | 1.5 | 0.1 |
| 1941 | -0.9 | -1.8 | -2.6 | -2.8 | -2.3 | 0.0 | 1.9 | 4.3 | 4.4 | 2.4 | 1.1 | -0.1 |
| 1942 | -1.8 | -2.9 | -4.0 | -4.1 | -3.4 | -0.5 | 2.0 | 5.0 | 5.2 | 2.8 | 1.3 | -0.1 |
| 1943 | -1.6 | -2.8 | -3.7 | -3.7 | -3.2 | -0.7 | 1.6 | 4.3 | 4.5 | 2.4 | 1.1 | -0.1 |
| 1944 | -1.3 | -2.3 | -3.3 | -3.3 | -2.8 | 0.1 | 2.3 | 5.2 | 5.3 | 3.0 | 1.3 | 0.0 |
| 1945 | -1.1 | -1.7 | -2.7 | -2.9 | -2.4 | 0.1 | 2.2 | 4.9 | 4.9 | 2.7 | 1.1 | -0.1 |
| 1946 | -1.7 | -2.7 | -3.5 | -3.6 | -3.0 | -0.3 | 1.9 | 4.6 | 4.8 | 2.7 | 1.4 | 0.2 |
| 1947 | -1.0 | -1.6 | -2.2 | -2.4 | -1.9 | 0.2 | 2.0 | 4.1 | 4.2 | 2.3 | 1.0 | -0.1 |
| 1948 | -0.5 | -0.8 | -1.2 | -1.3 | -1.1 | 1.0 | 2.7 | 4.9 | 4.8 | 2.6 | 1.1 | -0.1 |
| 1949 | -0.7 | -1.2 | -1.8 | -1.9 | -1.6 | 0.3 | 1.8 | 3.6 | 3.6 | 1.9 | 0.7 | -0.2 |
| 1950 | -0.5 | -1.0 | -1.6 | -1.8 | -1.5 | 0.6 | 2.4 | 4.5 | 4.5 | 2.5 | 1.1 | 0.0 |
| 1951 | -1.7 | -2.9 | -3.8 | -3.8 | -3.2 | -0.5 | 1.8 | 4.6 | 4.8 | 2.6 | 1.2 | 0.0 |
| 1952 | -1.5 | -2.4 | -3.2 | -3.3 | -2.8 | -0.4 | 1.6 | 4.0 | 4.1 | 2.3 | 1.0 | -0.1 |
| 1953 | -1.8 | -3.0 | -3.8 | -3.9 | -3.4 | -0.6 | 1.7 | 4.5 | 4.7 | 2.6 | 1.1 | -0.1 |
| 1954 | -1.5 | -2.6 | -3.5 | -3.6 | -3.0 | -0.4 | 1.9 | 4.6 | 4.8 | 2.6 | 1.1 | -0.1 |
| 1955 | -1.0 | -1.7 | -2.4 | -2.5 | -2.2 | -0.3 | 1.3 | 3.1 | 3.1 | 1.8 | 0.9 | 0.0 |
| 1956 | -1.6 | -2.7 | -3.8 | -3.9 | -3.2 | -0.3 | 2.1 | 5.1 | 5.3 | 2.9 | 1.3 | 0.0 |
| 1957 | -1.5 | -2.5 | -3.3 | -3.4 | -2.8 | -0.4 | 1.7 | 4.2 | 4.3 | 2.3 | 0.9 | -0.1 |
| 1958 | -1.3 | -2.3 | -3.3 | -3.4 | -2.8 | 0.1 | 2.5 | 5.5 | 5.5 | 3.1 | 1.4 | 0.0 |
| 1959 | -1.6 | -2.6 | -3.5 | -3.5 | -3.0 | -0.5 | 1.7 | 4.3 | 4.5 | 2.5 | 1.1 | -0.1 |
| 1960 | -0.4 | -0.7 | -1.3 | -1.4 | -1.2 | 0.6 | 2.1 | 3.9 | 3.9 | 2.2 | 1.0 | 0.1 |
| 1961 | -0.8 | -1.4 | -2.0 | -2.2 | -1.8 | 0.1 | 1.7 | 3.7 | 3.8 | 2.0 | 0.8 | -0.1 |
| 1962 | -0.6 | -0.9 | -1.7 | -2.0 | -1.6 | 0.8 | 2.8 | 5.2 | 5.1 | 2.8 | 1.3 | 0.0 |
| 1963 | -1.5 | -2.5 | -3.4 | -3.6 | -3.0 | -0.1 | 2.3 | 5.2 | 5.3 | 2.9 | 1.2 | -0.1 |
| 1964 | -1.5 | -2.5 | -3.3 | -3.4 | -2.8 | -0.3 | 1.7 | 4.1 | 4.3 | 2.4 | 1.1 | 0.1 |
| 1965 | -1.4 | -2.3 | -3.1 | -3.2 | -2.7 | -0.4 | 1.5 | 4.0 | 4.1 | 2.2 | 0.9 | -0.1 |
| 1966 | -1.8 | -3.0 | -3.9 | -3.9 | -3.3 | -0.4 | 1.9 | 4.8 | 5.0 | 2.9 | 1.3 | 0.1 |
| 1967 | -1.1 | -2.3 | -3.3 | -3.4 | -2.9 | 0.0 | 2.4 | 5.4 | 5.4 | 3.1 | 1.4 | 0.1 |
| 1968 | -1.6 | -2.8 | -3.6 | -3.7 | -3.1 | -0.6 | 1.6 | 4.3 | 4.5 | 2.5 | 1.2 | 0.1 |
| 1969 | -0.9 | -1.8 | -2.7 | -2.8 | -2.3 | -0.1 | 2.0 | 4.3 | 4.4 | 2.4 | 1.0 | -0.1 |
| 1970 | -1.7 | -2.9 | -3.7 | -3.8 | -3.2 | -0.5 | 1.9 | 4.6 | 4.7 | 2.6 | 1.3 | 0.1 |
| 1971 | -1.8 | -2.9 | -3.7 | -3.8 | -3.2 | -0.2 | 2.2 | 5.2 | 5.4 | 3.0 | 1.4 | 0.0 |
| 1972 | -1.5 | -2.3 | -3.1 | -3.1 | -2.6 | -0.4 | 1.6 | 3.9 | 4.0 | 2.2 | 1.0 | 0.0 |
| 1973 | -1.1 | -2.2 | -3.1 | -3.3 | -2.8 | -0.2 | 2.1 | 4.7 | 4.8 | 2.6 | 1.2 | -0.1 |
| 1974 | -1.8 | -2.9 | -3.9 | -3.9 | -3.3 | -0.3 | 2.2 | 5.2 | 5.3 | 2.9 | 1.4 | 0.1 |
| 1975 | -1.6 | -2.6 | -3.5 | -3.6 | -3.0 | -0.2 | 2.1 | 4.9 | 5.1 | 2.8 | 1.3 | 0.0 |
| 1976 | -1.7 | -2.7 | -3.5 | -3.6 | -3.0 | -0.6 | 1.5 | 4.0 | 4.2 | 2.3 | 1.0 | -0.1 |
| 1977 | -0.3 | -0.6 | -0.8 | -0.9 | -0.7 | 0.0 | 0.5 | 1.2 | 1.2 | 0.7 | 0.3 | 0.1 |
| 1978 | -0.3 | -0.6 | -1.1 | -1.4 | -1.1 | 1.0 | 2.7 | 4.8 | 4.7 | 2.6 | 1.1 | -0.1 |
| 1979 | -1.2 | -2.0 | -3.0 | -3.1 | -2.7 | -0.2 | 1.9 | 4.5 | 4.6 | 2.5 | 1.0 | -0.1 |
| 1980 | -1.1 | -2.0 | -2.8 | -2.9 | -2.5 | -0.2 | 1.8 | 4.0 | 4.2 | 2.3 | 1.0 | -0.1 |
| 1981 | -1.5 | -2.5 | -3.5 | -3.5 | -3.0 | -0.5 | 1.7 | 4.2 | 4.4 | 2.4 | 1.0 | -0.1 |
| 1982 | -1.8 | -2.9 | -3.9 | -4.0 | -3.3 | -0.4 | 2.0 | 5.0 | 5.2 | 3.0 | 1.3 | 0.0 |
| 1983 | -1.4 | -2.3 | -3.1 | -3.2 | -2.7 | -0.4 | 1.6 | 4.0 | 4.2 | 2.3 | 1.0 | 0.1 |
| 1984 | -1.9 | -3.0 | -4.0 | -4.0 | -3.4 | -0.6 | 1.8 | 4.7 | 4.9 | 2.7 | 1.1 | -0.1 |
| 1985 | -1.5 | -2.4 | -3.2 | -3.3 | -2.8 | 0.0 | 2.2 | 5.0 | 5.2 | 2.9 | 1.4 | 0.1 |
| 1986 | -0.5 | -1.1 | -2.0 | -2.2 | -1.9 | 0.4 | 2.2 | 4.5 | 4.5 | 2.4 | 1.0 | -0.1 |
| 1987 | -1.1 | -1.8 | -2.4 | -2.6 | -2.1 | 0.0 | 1.7 | 3.8 | 3.9 | 2.2 | 1.0 | 0.0 |
| 1988 | -0.6 | -1.1 | -1.5 | -1.5 | -1.3 | -0.2 | 0.7 | 1.8 | 1.9 | 1.1 | 0.5 | 0.1 |
| 1989 | -0.6 | -1.0 | -1.3 | -1.5 | -1.2 | 0.7 | 2.4 | 4.4 | 4.3 | 2.3 | 1.0 | -0.1 |
| 1990 | -0.6 | -1.0 | -1.3 | -1.4 | -1.1 | 0.0 | 1.0 | 2.1 | 2.2 | 1.2 | 0.6 | 0.0 |
| 1991 | -0.4 | -0.6 | -0.9 | -0.9 | -0.8 | 0.0 | 0.6 | 1.4 | 1.4 | 0.8 | 0.4 | 0.0 |
| 1992 | -0.4 | -0.6 | -1.0 | -1.0 | -0.8 | 0.3 | 1.1 | 2.2 | 2.2 | 1.3 | 0.5 | 0.0 |
| 1993 | -0.6 | -1.6 | -2.7 | -2.9 | -2.4 | 0.4 | 2.8 | 5.7 | 5.8 | 3.3 | 1.5 | 0.1 |
| AVG | -1.1 | -1.9 | -2.6 | -2.7 | -2.3 | 0.0 | 1.9 | 4.2 | 4.2 | 2.4 | 1.1 | 0.0 |
| MIN | -1.9 | -3.0 | -4.0 | -4.1 | -3.5 | -0.7 | 0.5 | 1.2 | 1.2 | 0.7 | 0.3 | -0.2 |
| MAX | -0.3 | -0.6 | -0.8 | -0.9 | -0.7 | 1.1 | 3.1 | 5.8 | 5.8 | 3.3 | 1.6 | 0.2 |

# 5.0 CASTAIC LAKE STORAGE ANALYSIS

## 5.1 ANALYSIS METHODOLOGY AND ASSUMPTIONS

The Castaic Lake storage analysis is a qualitative analysis describing the potential impacts resulting from implementation of the Project to storage in Castaic Lake.

### 5.1.1 Background

As was discussed previously in section 1.1, Castaic Lake is the terminal reservoir on the West Branch of the California Aqueduct and is operated to provide regulatory storage to help meet peak deliveries during the summer months to the three SWP Contractors that receive deliveries from Castaic Lake (CLWA, MWD, and the Ventura County Flood Control District), and to provide an emergency water supply to those Contractors in case of a major supply system outage. Castaic Lake is also used for year-round recreational purposes.

Total deliveries to Contractors from Castaic Lake averaged 403,000 AF from 1990 through 2000, ranging from 158,000 AF in 1995 (a very wet year) to 787,000 AF in 1990 (see Table 1-1). During this same period, deliveries to CLWA averaged 19,200 AF, while deliveries to MWD, due to its relatively larger Table A Amount and demand, averaged 380,000 AF. As a percent of total deliveries, deliveries to CLWA averaged about 6 percent of the total during this period, while deliveries to MWD averaged about 93 percent.

As part of the Monterey Amendment, the three West Branch Contractors have access to a total of 160,000 AF of the storage from Castaic Lake as "flexible storage." These Contractors may withdraw up to their proportionate share of the total flexible storage, in addition to their allocated SWP supplies, and must replace any water withdrawn within five years of withdrawal. CLWA's proportionate share of this flexible storage is 4,684 AF. CLWA's proportionate share of flexible storage and their access to this storage do not change due to the Project.

With implementation of the Monterey Amendment in 1996, annual operations at Castaic Reservoir were somewhat modified as a result of flexible storage. In order to keep enough water available in storage to provide both for flexible storage and for emergency purposes, since 1996 DWR has typically limited the amount of its storage withdrawals over the summer to meet peak deliveries to about 30,000 AF. These more limited annual storage withdrawals since 1996 can be seen on Figure 1-6. Any withdrawals from flexible storage, which have occurred in several years since implementation of the Monterey Amendment, are in addition to these typical DWR annual operations and have resulted in larger total withdrawals during those years in which they occurred.

### 5.1.2 Overview of Analysis

The qualitative analysis of the potential impact of the Project on storage in Castaic Lake was based on storage data from model studies conducted based on the With Monterey Amendment scenario, which includes Castaic Lake operations consistent with the Monterey Amendment.

The conclusions drawn from this analysis, however, are independent of how water is allocated and so would be the same for all allocation scenarios.

***Methodology***

1. Monthly target storage values for Castaic Lake that were used as input to the two DWRSIM studies described in section 2.1, and well as model output of monthly storage at Castaic Lake for the 73 hydrologic years of each study, were reviewed to determine the amount of storage that would be withdrawn in normal operations to meet peak summer Contractor deliveries from Castaic Lake.

2. This annual storage withdrawal was then compared to typical total Contractor deliveries from Castaic Lake.

***Assumptions***

1. The monthly target storage values used to govern Castaic Lake operations, and therefore the annual withdrawal from the Lake to meet peak summer deliveries, would not change in the future, regardless of whether deliveries from Castaic Lake increase.

## 5.2 ANALYSIS CONCLUSIONS

The monthly target storage values used to govern Castaic Lake operations in the model studies range from a maximum of 324,000 AF in April to a minimum of 294,000 AF in October. This means that operational targets are to have the lake full by the end of April, and to draw the storage down by 30,000 AF by the end of October. This storage withdrawal of 30,000 AF is used to meet Contractor deliveries from Castaic Lake during the peak demand period over the summer. This modeled operation of Castaic Lake is consistent with actual operations of the lake since implementation of the Monterey Amendment.

The 30,000 AF of storage withdrawal from Castaic Lake is small relative to total deliveries from the lake. These total deliveries averaged about 403,000 AF per year from 1990 through 2000, and deliveries from Castaic Lake are anticipated to increase in the future as demands within MWD and CLWA service areas increase. Typically, roughly two thirds of total annual deliveries from the lake are made during the storage withdrawal period from May through October. Applying this two-thirds value to the average deliveries from 1990 to 2000 means an average of roughly 270,000 AF delivered from May through October, which significantly exceeds the 30,000 AF of storage withdrawal during those same months. This means that under existing operations, most deliveries from Castaic Lake are conveyed through the California Aqueduct and through Castaic Lake in about the same month water is delivered. In other words, Castaic Lake is used more for conveyance than for storage.

Since the 30,000 AF of storage withdrawal at Castaic Lake is limited both by contractual and operational considerations, this amount of withdrawal is not anticipated to increase as delivery demands increase. Therefore, any additional deliveries from the lake must be delivered through the aqueduct in about the same month as the delivery, and storage in the lake would not change. This is true regardless of whether deliveries from Castaic Lake increase due to increasing Contractor demands, or due to Table A Amount transfers such as the Project.

Therefore, the increase in water delivery to CLWA from the Project would result in additional water being conveyed to, and delivered from, Castaic Lake, but would have little effect on the overall storage volume in the lake at any given time.

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# 6.0 CLWA SUPPLIES FOR ENVIRONMENTAL SETTING

## 6.1 ASSUMPTIONS

The current water supply for the Santa Clarita Valley is derived from both local and imported sources. The principal components of this supply are groundwater from the Alluvial Aquifer, groundwater from the Saugus Formation and imported water from the SWP. A variety of future water sources (including local recycled water,[9] desalted ocean water, increased Saugus Formation production, conjunctive use of local or non-local groundwater basins, and other imported water sources) could be developed to supply future development planned for the CLWA service area. CLWA completed an analysis of its water supply as part of its Urban Water Management Plan (UWMP) (CLWA 2000). The UWMP is scheduled to be updated in 2005.

The water supplies included in this EIR for the pre-project 1998 environmental baseline and current environmental setting were limited to existing supply sources and programs, with the amount of water available from these sources estimated based only on existing supply facilities. The existing supply sources are:

| | |
|---|---|
| Local Supplies: | Groundwater from the Alluvial Aquifer |
| | Groundwater from the Saugus Formation |
| Imported Supplies: | SWP Table A |
| | SWP Flexible Storage |
| | SWP Table A Amount in Semitropic Storage |

### 6.1.1 Common Assumptions

Assumptions that are common to both the 1998 environmental baseline and current environmental setting are described below.

***Local Groundwater*** - The amount of available groundwater supplies from the Alluvial Aquifer and Saugus Formation are taken, for the most part, directly from the UWMP. In the UWMP, annual supplies from the Alluvial Aquifer were projected to be 30,000 to 40,000 AF in average years, and 30,000 to 35,000 AF in dry years; and annual supplies from the Saugus Formation were projected to be 7,500 to 15,000 AF in average years, and 11,000 to 15,000 AF in dry years. While an updated report on these two aquifers (Slade 2002) concluded that short-term, dry-year supply from the Saugus Formation could increase to up to 35,000 AF per year, annual pumping from existing wells and appurtenant facilities is limited to approximately 15,000 AF. Therefore, given the additional supply capability of the Saugus Formation, it is assumed that annual dry-year pumping would be limited only by existing facilities, to 15,000 AF.

The projected groundwater supplies used in this EIR are generally the midpoints of the ranges set forth in the UWMP, with the exception as noted above for dry-period pumping from the

9 Initial deliveries of recycled water commenced in 2003.

Saugus Formation. For the multiple dry-year period, it was assumed that while groundwater supplies might change from year to year during that period, the average annual supply over the dry period would be the same as for a single, very dry year. Therefore, the dry-year supply identified above was used in both the single dry year and the multiple dry-year period.

The detection of perchlorate in four production wells in the Saugus Formation in 1997 and one production well in the Alluvial Aquifer in 2002 has resulted in suspending the use of these five wells. Due to the number and distribution of the remaining production wells, however, this suspended use has not had a substantial effect on overall water supply.

***SWP Flexible Storage*** - Under the SWP Water Supply Contracts, the Contractors that share in the repayment of Castaic Lake may access a portion of the storage in that reservoir. This accessible storage is referred to as "flexible storage." These Contractors may withdraw water from flexible storage, in addition to their allocated Table A supplies, on an as-needed basis. A Contractor must replace any water it withdraws from this storage within five years. As one of the three Contractors sharing in the repayment of Castaic Lake, CLWA has access to this flexible storage. Its share of the total flexible storage is about 4,680 AF.

For this EIR, it is assumed that this supply would only be used in dry years. For the single dry-year condition, it is assumed the entire amount would be used. For the multiple dry-year condition, it is assumed that the entire amount would be used sometime during the four-year period, so the average annual supply during that period would be one fourth of the total, or 1,170 AF.

### 6.1.2 Scenario-Specific Assumptions

#### *6.1.2.1 1998 Environmental Baseline*

Assumptions that are specific to the 1998 environmental baseline are described below.

***SWP Table A Supplies*** – The SWP Table A supplies estimated for this environmental baseline are based on results from the DWRSIM model study at existing (1998) demand conditions (as was described previously in section 2.1), with SWP water supplies allocated among Contractors under the Water Supply Contract provisions then in effect (i.e., based on Monterey Amendment provisions). The availability of SWP supplies to CLWA are estimated by multiplying CLWA's pre-project Table A Amount of 54,200 AF, by the Table A delivery percentages determined in the With Monterey Amendment water supply analysis for Other M&I Contractors (see section 3.1 for an explanation of this water supply analysis). For the three hydrologic conditions evaluated, the delivery percentages used here are based on: the average over DWRSIM's entire hydrologic period for the average year, 1977 for the single dry year, and the 1988 to 1991 average for the multiple dry year. The specific delivery percentages multiplied by CLWA's Table A Amount for each of these three hydrologic conditions were 86.3 percent, 22.4 percent, and 44.2 percent, respectively.

#### *6.1.2.2 Current Environmental Setting*

Assumptions that are specific to the current environmental setting are described below.

***SWP Table A Supplies*** - The SWP Table A supplies estimated for the current environmental setting are based on results in DWR's SWP Delivery Reliability Report (DWR, 2003) from the CALSIM II model study at existing (2001) demand conditions (as was described previously in section 2.1). In the CALSIM II studies, SWP water supplies are allocated among Contractors based on Monterey Amendment provisions. Since the Project's 41,000 AF of Table A Amount has actually already been transferred, the availability of SWP supplies to CLWA are estimated by multiplying CLWA's Table A Amount with the Project, or 95,200 AF, by the Table A delivery percentages from the CALSIM II study. For the three hydrologic conditions evaluated, the delivery percentages used here are based on the average over the model's entire hydrologic period for the average year, 1977 for the single dry year, and the 1988 to 1991 average for the multiple dry year. The specific delivery percentages multiplied by CLWA's Table A Amount for each of these three hydrologic conditions were 71.7 percent, 19.5 percent, and 36.0 percent, respectively.

***Semitropic Storage*** - In 2002, CLWA stored some of its allocated SWP Table A supply through a groundwater banking agreement with the Semitropic Water Storage District in Kern County. Under this agreement, CLWA stored 24,000 AF of its excess SWP supply and, after consideration for losses within the groundwater basin, may withdraw up to 21,600 AF when needed over the next ten years. In addition to this short-term storage for CLWA, Semitropic has a long-term groundwater banking program with several other partners, including SWP Contractors. The facilities that Semitropic may use in the return of CLWA's banked water supply are the same facilities that Semitropic may use to return banked water to its long-term banking program partners. As a result, there may be competition for use of those facilities in a particularly dry year, which could limit CLWA's ability to access that water in that year.

It is assumed that this supply would only be used in dry years. For the single dry-year condition, it is assumed that competition among Semitropic's banking partners for use of return facilities would limit CLWA's supply to one third of the storage available, or 7,200 AF. For the multiple dry-year condition, it is assumed that the entire amount would be accessible and used sometime during the four-year period, so the average annual supply during that period would be one fourth of the total available, or 5,400 AF.

It should be noted that in February 2004, CLWA was again able to store up to 35,000 AF of its allocated 2003 SWP Table A supply on a short-term basis (10 years or less) pursuant to a groundwater banking agreement with the Semitropic Water Storage District. CLWA may withdraw up to 31,500 AF within 10 years. This recently stored water is not included in the existing water supplies (for this analysis, those available in 2002) shown below.

## 6.2 BASELINE SUPPLIES

### 6.2.1 1998 Environmental Baseline

Table 6-1 summarizes waters supplies available to meet demands in the CLWA service area in 1998, prior to the Project. The table displays water supplies available under various hydrologic conditions.

**Table 6-1. 1998 Water Supplies for the CLWA Service Area**
(all values in AF)

| *Hydrologic Condition*[1] | *SWP Supplies* | | *Existing Local Supplies* | | ***Total*** |
|---|---|---|---|---|---|
| | *Table A*[2] | *SWP Flexible Storage*[3] | *Alluvial Aquifer* | *Saugus Formation* | |
| Average Year | 46,500 | 0 | 35,000 | 11,000 | **92,500** |
| Single Dry Year | 12,100 | 4,680 | 32,500 | 15,000 | **64,280** |
| Multiple Dry Year Period | 24,000 | 1,170 | 32,500 | 15,000 | **72,670** |

1. As defined in section 3.1.1.2, the average year supply is the average amount of water available, based on DWRSIM model results over its entire period of hydrologic record. The single dry year supply is the supply available in the single year with the lowest total SWP deliveries, based on DWRSIM model results (1977). Multiple dry year period supply is the average amount of water available over the four consecutive drought years of 1988 through 1991, based on DWRSIM model results.
2. Values based on CLWA's Table A Amount in 1998 (prior to the Project) of 54,200 AF, and percentages for Table A deliveries based on DWR's DWRSIM SWP operations model (discussed in section 3.1).
3. CLWA may withdraw up to about 4,680 AF of water from Castaic Lake as "flexible storage". It is assumed that CLWA would use this supply only in drier years, with the entire amount used in the one single dry year. For the multiple dry year, it is assumed that the entire amount would be used during the four-year period, or an annual average of 1,170 AF.

### 6.2.2 Current Environmental Setting

Table 6-2 summarizes existing (2002) water supplies available to meet demands in the CLWA service area, and includes the Project. The table displays water supplies available under various hydrologic conditions.

**Table 6-2. Existing Water Supplies for the CLWA Service Area**
(all values in AF)

| *Hydrologic Condition*[1] | *SWP Supplies* | | | *Existing Local Supplies* | | ***Total*** |
|---|---|---|---|---|---|---|
| | *Table A*[2] | *SWP Flexible Storage*[3] | *Semitropic Storage*[4] | *Alluvial Aquifer* | *Saugus Formation* | |
| Average Year | 68,300 | 0 | 0 | 35,000 | 11,000 | **114,300** |
| Single Dry Year | 18,600 | 4,680 | 7,200 | 32,500 | 15,000 | **77,980** |
| Multiple Dry Year Period | 34,300 | 1,170 | 5,400 | 32,500 | 15,000 | **88,370** |

1. As defined in section 3.1.1.2, the average year supply is the average amount of water available, based on DWRSIM model results over its entire period of hydrologic record. The single dry year supply is the supply available in the single year with the lowest total SWP deliveries, based on DWRSIM model results (1977). Multiple dry year supply is the average amount of water available over the four consecutive drought years of 1988 through 1991, based on DWRSIM model results.
2. Values based on current Table A Amount of 95,200 AF (which includes the Project), and percentages for Table A deliveries from DWR's SWP Delivery Reliability Report (DWR 2003b).
3. CLWA may withdraw up to about 4,680 AF of water from Castaic Lake as "flexible storage". It is assumed that CLWA would use this supply only in drier years, with the entire amount used in the one single dry year. For the multiple dry year, it is assumed that the entire amount would be used during the four-year period, or an annual average of 1,170 AF.
4. In 2002, CLWA was able to store some if its allocated SWP Table A supply on a short-term basis (10 years or less) under a groundwater banking agreement with the Semitropic Water Storage District. Under this agreement, CLWA stored 24,000 AF of SWP water, and after consideration for losses, may withdraw up to 21,600 AF within 10 years. It is assumed that CLWA could expect to withdraw up to 1/3 of this amount in the single dry year, and the entire amount would be used during the four-year dry period. It is assumed that CLWA would only use this supply in drier years.

# 7.0 REFERENCES

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CLWA (Castaic Lake Water Agency). 2000. *2000 Urban Water Management Plan.* Prepared by SA Associates, Reiter/Lowry Consultants, Black & Veatch. December.

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# 8.0 ACRONYMS

| | |
|---|---|
| AF | acre-feet |
| AFRP | Anadromous Fish Restoration Plan |
| cfs | cubic feet per second |
| CLWA | Castaic Lake Water Agency |
| CVP | Central Valley Project |
| CVPIA | Central Valley Project Improvement Act |
| CVWD | Coachella Valley Water District |
| Delta | Sacramento-San Joaquin River Delta |
| DWA | Desert Water Agency |
| DWR | California Department of Water Resources |
| EIR | Environmental Impact Report |
| KCWA | Kern County Water Agency |
| M&I | municipal and industrial |
| MWD | Metropolitan Water District of Southern California |
| NOP | Notice of Preparation |
| PCL | Planning and Conservation League |
| SBCFC & WCD | Santa Barbara County Flood Control and Water Conservation District |
| SWRCB | California State Water Resources Control Board |
| USBR | U.S. Bureau of Reclamation |
| UWMP | Urban Water Management Plan |
| VCFCD | Ventura County Flood Control District |
| WRMWSD | Wheeler Ridge-Maricopa Water Storage District |

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FINAL

# Environmental Impact Report

California State Clearinghouse No. 1998041127

# Castaic Lake Water Agency

## Supplemental Water Project Transfer of 41,000 Acre-Feet of State Water Project Table A Amount

**Volume II**

CASTAIC LAKE WATER AGENCY

Volume I is the Draft Environmental Impact Report

December 2004

FINAL

# Environmental Impact Report

California State Clearinghouse No. 1998041127

# Castaic Lake Water Agency

## Supplemental Water Project Transfer of 41,000 Acre-Feet of State Water Project Table A Amount

## Volume II

*Prepared for:*

**Castaic Lake Water Agency**
**27234 Bouquet Canyon Road**
**Santa Clarita, California 91350**

*Prepared by:*

Science Applications International Corporation
An Employee-Owned Company
525 Anacapa Street, Santa Barbara, California 93101

December 2004

# TABLE OF CONTENTS

1.0 INTRODUCTION ..... 1
Other CEQA Actions Related to this EIR ..... 2

2.0 PUBLIC COMMENTS ..... 3
List of Commenting Agencies, Organizations, and Individuals, and Comment Letters ..... 3
State of California, Department of Transportation (Caltrans)
Letter dated August 4, 2004 from Cheryl Powell, IGR/CEQA Branch Chief ..... 7
California Department of Water Resources (DWR)
Letter dated July 30, 2004 from Barbara McDonnell, Chief ..... 9
Department of California Highway Patrol (CHP)
Letter dated July 6, 2004 from E. Conley, Captain ..... 11
State Water Contractors (SWC)
Letter dated August 16, 2004 from Terry L. Erlewine, General Manager ..... 13
City of Santa Clarita (City SC)
Letter dated July 20, 2004 from Vincent Bertoni, Interim Director of Planning and Building Services ..... 17
County of Los Angeles Department of Parks and Recreation (LA DPR)
Letter dated August 16, 2004 from Bryan Moscardini, Park Project Coordinator ..... 19
County of Los Angeles Fire Department (LAFD)
Letter dated August 9, 2004 from David L. Leininger, Chief, Forestry Division, Prevention Bureau ..... 21
County of Ventura, Resource Management Agency (VRMA)
Letter dated August 16, 2004 from Christopher Stephens, County Planning Director . 23
County of Ventura, Public Works Agency (VPWA)
Letter dated July 21, 2004 from Lowell Preston, Water Resources Division ..... 24
Stanislaus County Environmental Review Committee (SCERC)
Letter dated August 9, 2004 from W. Richard Jantz, Deputy Executive Officer ..... 25
Building Industry Association (BIA)
Letter dated July 28, 2004 from Ray Pearl, Executive Officer, and Terra Donlon, Director of Government Affairs ..... 27
California Water Impact Network (C-WIN)
Letter dated August 1, 2004 from Carolee Krieger, President ..... 29
Friends of the Santa Clara River (FSCR I)
Letter dated August 2, 2004 from Ron Bottorff, Chair ..... 59
Friends of the Santa Clara River (FSCR II)
Letter dated August 6, 2004 from Ron Bottorff, Chair ..... 61
Planning and Conservation League (PCL) and Citizens Planning Association (CPA)
Letter dated August 16, 2004 from Sage Sweetwood, PCL President and Naomi Kovacs, CPA Executive Director (PCL/CPA) ..... 71

Public Citizen
Letter dated August 16, 2004 from Juliette Beck, Director, Water for All California..... 85
SCOPE
Letter dated August 16, 2004 from Pat Saletore ..... 87
Sierra Club, Angeles Chapter
Letter dated August 10, 2004 from Johanna Zetterberg ..... 89
TriCounty Watchdogs (TCW)
Letter dated August 13, 2004 from Jan de Leeuw ..... 349
United Water Conservation District (UWCD)
Letter dated July 26, 2004 from Dana L. Wisehart, General Manager..... 353
Arve R. Sjovold
Letter dated August 15, 2004..... 355
Mr. and Mrs. Arnold D. Swan, et al.
Letter dated August 13, 2004 ..... 381
Jim Churchill
Letter dated August 14, 2004..... 383
Law Offices of Stephan C. Volker
Letter dated August 16, 2004 from Stephan C. Volker, Attorney ..... 385
Meeting of Castaic Lake Water Agency on July 28, 2004, Public Comment Section
Transcript ..... 387
Endangered Habitats League (EHL)
Letter dated August 19, 2004 from Dan Silver, Executive Director..... 415
County of Los Angeles, Public Library
Letter dated August 23, 2004 from Malou Rubio, Head, Staff Services..... 417
The Southern California Association of Governments (SCAG)
Letter dated September 3, 2004 from Jeffrey M. Smith, Senior Regional Planner,
Intergovernmental Review ..... 419

3.0 RESPONSES TO COMMENTS ..... 421

4.0 CHANGES TO THE DEIR TEXT ..... 515

Attachment A Tables Included in the Responses to Comments .....A-1

Attachment B DEIR Mailing List ..... B-1

# Section 1 – Introduction

# 1.0 INTRODUCTION

The Environmental Impact Report (EIR) for the Castaic Lake Water Agency Supplemental Water Project Transfer of 41,000 Acre-Feet of State Water Project Table A Amount contains two volumes. The first volume of the EIR, incorporated herein by reference, comprises the Draft EIR (DEIR), published in June 2004. The second volume of the EIR (this volume) contains public comments received on the DEIR, responses to the public comments and changes to the text of the DEIR.

**BOTH VOLUMES OF THE EIR MUST BE READ TOGETHER. THE SECOND VOLUME DOES NOT REPEAT THE INFORMATION INCLUDED IN THE FIRST VOLUME.**

A 60-day public review period (June 17 to August 16, 2004) was held to receive comments on the DEIR. A public hearing was held at CLWA on July 28, 2004 to receive comments on the DEIR.

A second public hearing was noticed prior to consideration of the adoption of the EIR to consider the comments to the DEIR and the responses to those comments. The purpose of this additional public hearing is to provide the CLWA Board the opportunity to consider the public comments and responses thereto as part of its decisional process concerning the proposed project (Project). This additional hearing neither re-opens nor extends the public review period, which closed on August 16, 2004. While the public is invited to attend the hearing, the EIR is now in final form for Board review and possible certification.

This second volume contains the following information:

**Section 1—Introduction**

**Section 2—Public Comments** contains the list of agencies, organizations, and individuals that submitted comment letters on the DEIR, copies of those letters, and the transcript of the July 28, 2004 public hearing. Each substantive comment is numbered.

**Section 3—Responses to Comments** contains a matrix including each of the public comments received and individual responses to those comments. The comments in the matrix were excerpted directly from the comment letters or public hearing transcript. This section also includes a Master Response that addresses similar issues raised in a number of comments regarding the appropriate lead agency for the EIR and the relationship of the Project to the Monterey Amendment EIR.

**Section 4—Changes to the Text of the EIR** presents text changes since publication of the DEIR.

Copies of the second volume of the EIR and a notice of availability identifying the date of the public hearing at which the CLWA Board of Directors is scheduled to consider certification of the EIR were mailed to those who provided comments on the DEIR.

Copies of both volumes of the FEIR are available for review at CLWA or can be purchased by contacting Mary Lou Cotton, CLWA Water Resources Manager, 27234 Bouquet Canyon Road,

Santa Clarita, California 93150-2173 or by calling (661) 297-1600. Both volumes of the FEIR also are available for public review at the following local public libraries:

Los Angeles County Public Library, Newhall
22704 W. 9th Street
Newhall, CA 91321

Los Angeles County Public Library, Canyon Country Jo Anne Darcy Library
18601 Soledad Canyon Road
Canyon Country, CA 91351

Los Angeles County Public Library, Valencia
23743 West Valencia Boulevard
Valencia, CA 91355

## OTHER CEQA ACTIONS RELATED TO THIS EIR

A public hearing will be scheduled by the CLWA Board of Directors to consider certification of the EIR and approval of the Project. The public hearing date and time will be set forth in a separate notice provided to the public, public agencies, and other interested parties. As required by Public Resources Code (PRC), Division 13, section 21092.5, CLWA will provide a proposed written response to public agencies that commented on the DEIR at least 10 days prior to certifying the EIR. Those proposed responses are contained in Section 3 of this second volume of the EIR.

If the CLWA Board of Directors acts to certify the EIR and approves the Project, a Notice of Determination will be filed with Los Angeles County, Ventura County, and the State Clearinghouse.

# Section 2 – Public Comments

# 2.0 PUBLIC COMMENTS

## LIST OF COMMENTING AGENCIES, ORGANIZATIONS, AND INDIVIDUALS, AND COMMENT LETTERS

The following agencies, organizations, and individuals submitted comment letters on the DEIR during the 60-day review period. Verbal comments also were provided during the public hearing held on July 28, 2004. The comment letters are contained on the following pages, along with the transcript of the public hearing.

**State Agencies**

State of California, Department of Transportation (Caltrans)
Letter dated August 4, 2004 from Cheryl Powell, IGR/CEQA Branch Chief

California Department of Water Resources (DWR)
Letter dated July 30, 2004 from Barbara McDonnell, Chief

Department of California Highway Patrol (CHP)
Letter dated July 6, 2004 from E. Conley, Captain

State Water Contractors (SWC)
Letter dated August 16, 2004 from Terry L. Erlewine, General Manager

**Local or Regional Agencies**

United Water Conservation District (UWCD)
Letter dated July 26, 2004 from Dana L. Wisehart, General Manager

City of Santa Clarita (City SC)
Letter dated July 20, 2004 from Vincent Bertoni, Interim Director of Planning and Building Services

County of Los Angeles Department of Parks and Recreation (LA DPR)
Letter dated August 16, 2004 from Bryan Moscardini, Park Project Coordinator

County of Los Angeles Fire Department (LAFD)
Letter dated August 9, 2004 from David L. Leininger, Chief, Forestry Division, Prevention Bureau

County of Ventura, Resource Management Agency (VRMA)
Letter dated August 16, 2004 from Christopher Stephens, County Planning Director

County of Ventura, Public Works Agency (VPWA)
Letter dated July 21, 2004 from Lowell Preston, Water Resources Division

Stanislaus County Environmental Review Committee (SCERC)
Letter dated August 9, 2004 from W. Richard Jantz, Deputy Executive Officer

**Organizations**

Building Industry Association (BIA)
Letter dated July 28, 2004 from Ray Pearl, Executive Officer, and Terra Donlon, Director of Government Affairs

California Water Impact Network (C-WIN)
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Friends of the Santa Clara River (FSCR I)
Letter dated August 2, 2004 from Ron Bottorff, Chair

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Public Citizen
Letter dated August 16, 2004 from Juliette Beck, Director, Water for All California

SCOPE
Letter dated August 16, 2004 from Pat Saletore

Sierra Club, Angeles Chapter
Letter dated August 10, 2004 from Johanna Zetterberg

TriCounty Watchdogs (TCW)
Letter dated August 13, 2004 from Jan de Leeuw

**Individuals**

Arve R. Sjovold
Letter dated August 15, 2004

Mr. and Mrs. Arnold D. Swan, et al.
Letter dated August 13, 2004

Jim Churchill
Letter dated August 14, 2004

Law Offices of Stephan C. Volker
Letter dated August 16, 2004 from Stephan C. Volker, Attorney

Letters from the following were received after the close of the public comment period, but these comments were considered, and responses have been provided in the FEIR.

Endangered Habitats League (EHL)
Letter dated August 19, 2004 from Dan Silver, Executive Director

County of Los Angeles, Public Library
Letter dated August 23, 2004 from Malou Rubio, Head, Staff Services

The Southern California Association of Governments (SCAG)
Letter dated September 3, 2004 from Jeffrey M. Smith, Senior Regional Planner, Intergovernmental Review

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**DEPARTMENT OF TRANSPORTATION**
DISTRICT 7, REGIONAL PLANNING
IGR/CEQA BRANCH
120 SO. SPRING ST.
LOS ANGELES, CA 90012
PHONE: (213) 897-3747
FAX: (213) 897-1337

*Flex your power!*
*Be energy efficient!*

IGR/CEQA No. 040627AL, EIR
Supplemental Water Project Transfer of 41,000 Acre-Feet of State Water Project Table A Amount
Vic. LA-5 / Various Locations
SCH # 1998041127

August 4, 2004

Ms. Mary Lou Cotton
Castaic Lake Water Agency
27234 Bouquet Canyon Road
Santa Clarita, CA 91350-2173

Dear Ms. Cotton:

Thank you for including the California Department of Transportation (Caltrans) in the environmental review process for the above referenced project.

The Project would not involve construction or operational changes that could generate traffic or otherwise affect traffic conditions. Based on the information received, we have no comments at this time. Thank you for the opportunity to have reviewed this project. 1

Any transportation of water which requires the use of oversized-transport vehicles on State highways will require a Caltrans transportation permit. We recommend that large size truck trips be limited to off-peak commute periods. Thank you for the opportunity to have reviewed this project.

If you have any questions, please feel free to contact me at (213) 897-3747 or Alan Lin the project coordinator at (213) 897-8391 and refer to IGR/CEQA No. 040627AL.

Sincerely,

Cheryl Powell

CHERYL POWELL
IGR/CEQA Branch Chief

cc: Scott Morgan, State Clearinghouse

STATE OF CALIFORNIA -- THE RESOURCES AGENCY ARNOLD SCHWARZENEGGER, Governor

**DEPARTMENT OF WATER RESOURCES**
1416 NINTH STREET, P.O. BOX 942836
SACRAMENTO, CA 94236-0001
(916) 653-5791

July 30, 2004

| Post-it® Fax Note 7671 | Date 7/30/04 | # of pages ▶ 2 |
|---|---|---|
| To CLWA - Mary Lou Cotton | From H. Walter | |
| Co./Dept. | Co. | |
| Phone # 916 227-1311 | Phone # | |
| Fax # | Fax # | |

Ms. Mary Lou Cotton
Water Resources Manager
Castaic Lake Water Agency
27234 Bouquet Canyon Road
Santa Clarita, California 91350

Dear Ms. Cotton:

The Department of Water Resources' (DWR) staff have reviewed the Draft Environmental Impact Report (DEIR) for the *Castaic Lake Water Agency Supplemental Water Project Transfer of 41,000 Acre-Feet of Table A Amount* (SCH No. 1998041127), and found that the document adequately and thoroughly discusses the proposed project and its impacts. The DEIR discusses the effects of the project on the environment and State Water Project (SWP) and uses baseline conditions consistent with those being considered for inclusion in the DEIR. DWR is currently preparing for the *Monterey Amendment to the State Water Project Contracts (including Kern Water Bank Transfer and Other Contract Amendments and Associated Actions as Part of a Proposed Settlement Agreement in Planning and Conservation League v. Department of Water Resources* (SCH No. 2003011118), referred to hereafter as "Monterey Plus." 2

The DEIR provides a good discussion of the relationship between the 41,000 acre-feet Table A transfer and the current Monterey Plus process. DWR will analyze the effects of all Table A transfers that were part of the Monterey Amendment to the SWP contracts in the Monterey Plus EIR. The proposed CLWA 41,000 acre-feet Table A transfer will be included in this analysis. 3

One of the tools being used by DWR to assess potential impacts associated with these Table A transfers is the CALSIM II model. DWR acknowledges that CLWA used an earlier model, DWRSIM, to analyze the effect of the 41,000 acre-feet transfer; however, DWR will use the next generation model, CALSIM II, to assess potential impacts associated with all Table A transfers in its DEIR for Monterey Plus. The use of CALSIM II may cause slight changes in results, which may lead DWR to different conclusions than the conclusions made by Castaic Lake Water Agency in the current DEIR. 4

As final comments, DWR notes that this DEIR adequately discusses the reliability of the SWP, pre- and post-Monterey Amendment conditions, future conditions, and SWP operations. 5

Coordination between DWR and CLWA is essential to produce accurate environmental documentation that leads to informed decision-making and full public disclosure as the California Environmental Quality Act mandates. DWR appreciates inclusion and consultation in the early stages of preparation of this DEIR. Please ensure that DWR's Division of Environmental Services and SWP Analysis Office receive copies of the Final EIR. 6

Sincerely,

Barbara McDonnell

Barbara McDonnell, Chief
Division of Environmental Services

State of California—Business, Transportation and Housing Agency ARNOLD SCHWARZENEGGER, Governor

**DEPARTMENT OF CALIFORNIA HIGHWAY PATROL**
**28648 The Old Road**
**Valencia, CA 91355**
**(661)294-5540**
**(800) 735-2929 (TT/TDD)**
**(800) 735-2922 (Voice)**

SCH#1998041127

July 6, 2004

File No.: 540.10868. 9367

State Clearinghouse
1400 Tenth Street
Sacramento, CA 95812-3044

This is in response to the Notice of Preparation of a Draft Environmental Impact Report, dated June 18, 2004 regarding the Castaic Lake Water District Supplemental Water Project Transfer.

The proposed project will be located in the unincorporated area of Los Angeles County and within the jurisdiction of the California Highway Patrol. Therefore, traffic enforcement and accident investigation will be the responsibility of our agency.

In reviewing this project, our concern was what effect these projects will have on traffic. It is our opinion there should not have a significant impact. 7

Sergeant B. A. Dibene will be our Department's contact person for the project. If you have any questions or concerns, he may be reached at the above address or telephone number.

Thank you for allowing us the opportunity to comment on this project.

Sincerely,

For E. CONLEY, Captain
Commander
Newhall Area

RECEIVED
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e

# State Water Contractors

455 Capitol Mall, Suite 220 • Sacramento, CA 95814-4409
*Terry L. Erlewine - General Manager* (916) 447-7357 • FAX 447-2734



*Directors*

*Russell E. Fuller, President*
*Antelope Valley-East Kern Water Agency*
*Vince Wong, Vice President*
*Alameda County FC&WCD, Zone 7*
*Ray A. Stokes, Secretary-Treasurer*
*Central Coast Water Authority*
*Stephen N. Arakawa*
*Metropolitan Water District of Southern California*
*Thomas N. Clark*
*Kern County Water Agency*
*Thomas R. Hurlbutt*
*Tulare Lake Basin Water Storage District*
*Thomas E. Levy*
*Coachella Valley Water District*
*Dan Masnada*
*Castaic Lake Water Agency*
*David B. Okita*
*Solano County Water Agency*


August 16, 2004

Mary Lou Cotton
Water Resources Manager
Castaic Lake Water Agency
27234 Bouquet Canyon Road
Santa Clarita, CA 91350

Dear Ms. Cotton:

This letter provides comments on the Draft EIR entitled "Supplemental Water Project Transfer of 41,000 Acre-Feet of State Water Project Table A Amount," on behalf of the State Water Contractors ("SWC"). As you know, the SWC represents nearly all contractors that receive water from the State Water Project ("SWP"). Thus, the SWC is vitally interested in the proper application of CEQA to water transfers under Articles 41 and 53 of the SWP water service contracts and, in general, with respect to operations of the SWP. 8

The SWC commends Castaic Lake Water Agency ("Castaic") for going far beyond what is required by CEQA and the appellate court decision that invalidated Castaic's earlier EIR for the 41,000 acre foot water transfer. Both the trial court and the appellate court found that all of the environmental analyses contained in that first EIR complied with CEQA, except for reliance (through "tiering") on the original Monterey Amendment EIR which had later been found inadequate by the Third District Court of Appeal. Nevertheless, Castaic has taken a comprehensive, fresh look at the transfer's potential impacts in a single document, when arguably a short supplement eliminating the references to the Monterey Amendment would have sufficed. By so doing, you have provided decision makers with a complete picture of the transfer and its impacts so they can make new informed decisions related to the project.

During scoping, several parties made suggestions that this Supplemental EIR should not move forward until the new EIR for the Monterey Amendment had been completed. The SWC suggests that Castaic should respond more directly to these contentions. Those contentions overlook or intentionally mischaracterize a central element of the Monterey EIR litigation Settlement Agreement. The Settlement Agreement explicitly states that the SWP will operate under the Monterey Amendment while the new EIR is prepared. This includes operation 9

under Article 53, pursuant to which the Kern County Water Agency consented to up to 130,000 acre feet of agriculture to urban transfers. Suggestions that consideration of such transfers must await completion of the new Monterey Plus EIR would render this element of the Settlement Agreement a nullity, contrary to the clear understanding of the signatories to that document. 9

Further, nothing in the Settlement Agreement affects the rights of contractors and DWR to agree to and proceed with implementing long-term transfers of Table A Amounts. In this respect, the draft Supplemental EIR contains a confusing statement to the effect that certain terms in the Settlement Agreement constitute a "specific exclusion" of the 41,000 acre foot transfer from "any prohibitions against transfers of Table A amounts by the Settlement Agreement." The Settlement Agreement does not contain any such prohibitory language. Thus, specific exclusions are not necessary. The final Supplemental EIR for the 41,000 acre foot transfer should point out that several other Table A transfers have been consummated since the Settlement Agreement was executed and that the Settlement Agreement contains no language that could be interpreted as prohibiting such transactions or the 41,000 acre foot transfer. 10

The SWC suggests that the final Supplemental EIR reference the July 14, 2004, trial court opinion in *California Water Network v. Castaic Lake Water Agency*, which discusses the proper lead agency for projects similar to the 41,000 acre foot transfer. In that case, the Court held that Castaic was the proper lead agency for a water banking project, stating "Castaic is the agency most deeply involved in the planning, and execution of this project." The trial court rejected the argument that DWR was the only proper lead agency when actions concerning the SWP are involved. As in the *California Network Case*, Castaic is the agency promoting, planning, and primarily carrying out the 41,000 acre foot transfer. It is also the agency with the greatest knowledge about growth inducement and similar local issues. State government, including DWR, has no role in local land use planning and the local water supply issues that arise from planning decisions. The plenary role of local agencies in the land use arena should be pointed out in the final Supplemental EIR. 11

The SWC has reviewed the water supply analysis set forth in the draft Supplemental EIR and believes it will provide valuable information for decision makers in determining how the 41,000 acre foot transfer will affect Castaic's ability to meet the future water needs engendered by Los Angeles County's and local cities' land use decisions. The SWC suggests that the final Supplemental EIR reemphasize that urban water suppliers do not make the land use and growth decisions; but, instead, try to provide needed water supplies in the most economical and environmentally sound manner. From this standpoint, the draft Supplemental EIR provides the best information reasonably available from recognized scientific sources. More than that can not be asked of lead agencies dealing with highly complex natural and man made water systems. 12

Thank you for the opportunity to comment on the draft Supplemental EIR. If you have any questions, please contact me at (916) 447-7357.

Sincerely,

Terry L. Erlewine
General Manager

cc: Mr. Lester A. Snow, DWR
SWC Members

23920 Valencia Blvd.
Suite 300
Santa Clarita
California 91355-2196
Website: www.santa-clarita.com

Phone
(661) 259-2489
Fax
(661) 259-8125

**City of Santa Clarita**

July 20, 2004

Ms. Mary Lou Cotton
Water Resources Manager
Castaic Lake Water Agency
27234 Bouquet Canyon Road
Santa Clarita, CA 91350

Subject: Draft Environmental Impact Report for the Transfer of Supplemental Water

Dear Ms. Cotton:

Thank you for allowing the City of Santa Clarita to comment on the Draft Environmental Impact Report for the Supplemental Water Project Transfer. At this time, the City of Santa Clarita has no comments on the draft document regarding this project. 13

Thank you again for this opportunity to comment on the project. Please contact Fred Follstad, AICP, Senior Planner or myself at (661) 255-4330 if you have any questions.

Sincerely,

Vincent P. Bertoni, AICP
Interim Director of Planning and Building Services

VPB:FLF:lep
pbs\current\agency monitoring\CLWA EIR Comments 0704

cc: Mayor Kellar and Members of the City Council
Chair Trautman and Members of the Planning Commission
Chair Hauser and Members of the Parks, Recreation and Community Services Commission
Kenneth R. Pulskamp, City Manager
Michael Murphy, Intergovernmental Relations Officer
Fred Follstad, AICP, Senior Planner

PRINTED ON RECYCLED PAPER

COUNTY OF LOS ANGELES
DEPARTMENT OF PARKS AND RECREATION
*"Creating Community Through People, Parks and Programs"*

Tim Gallagher, Director

August 16, 2004

Ms. Mary Lou Cotton
Water Resources Manager
Castaic Lake Water Agency
27234 Bouquet Canyon Road
Santa Clarita, CA 91350

Dear Ms. Cotton:

**ENVIRONMENTAL IMPACT REPORT FOR THE CASTAIC LAKE WATER AGENCY SUPPLEMENTAL WATER PROJECT TRANSFER OF 41,000 ACRE-FEET OF TABLE A AMOUNT PROJECT**

The Environmental Impact Report (EIR) for the Castaic Lake Water Agency Supplemental Water Project Transfer of 41,000 Acre-Feet of Table A Amount has been reviewed for potential impacts on the facilities of this Department. The Castaic Lake Recreation Area, a recreational lake that is managed and operated by the Department, would be directly affected by the project. Common activities at the lake include sailing, power boating, water and jet skiing, fishing, non-power boating, and canoeing. That Department offers the following comments regarding the EIR:

- Page 3.0-10 of the Draft EIR states that the "DWR's operation of these lakes (Quali, Pyramid, and Castaic) generally would not change with the Project, although the project would result in additional water transported through these lakes in about the same months the water is delivered to CLWA." Page 3.15-41 also confirms that "the amount of water stored at Castaic Lake would not be expected to change as a result of the Project." The optimum operating level of Castaic Lake is 1515 above sea level. Scheduling of the release of the SWP water should be done so to maintain this level. Assuming that this operating criterion and the physical conditions of the lake do not change as a result of the project, adverse impacts to Department facilities are not anticipated. The Department requests that any future changes in the operating criteria of the lake be coordinated directly with Mr. Dana Robertson, Parks Superintendent. Contact information is provided below: **14**

  Mr. Dana Robertson, Parks Superintendent
  Castaic Lake Recreation Area
  32132 Castaic lake Drive
  Castaic, CA 91384
  Phone (661) 257-4050 / Fax (661) 257-3759

- Section 3.12.3 of the Draft EIR states that the implementation of the project will have no direct or indirect impacts to recreation within the CLWA. However, the potential development (Page 4-2) for 106, 700 new residents and 35,600 new units to house them may impact future recreation opportunities for those within the CLWA, and in turn, to future Castaic Lake operations. 15

Thank you for including this department in the review of this notice. If we may be of further assistance, please me at (213) 351-5133.

Sincerely,

Bryan Moscardini, Park Project Coordinator

cc: Kathleen Ritner, DPR
Dana Robertson, DPR
Boyd Horan, DPR

# COUNTY OF LOS ANGELES

**FIRE DEPARTMENT**

1320 NORTH EASTERN AVENUE
LOS ANGELES, CALIFORNIA 90063-3294
(323) 890-4330

P. MICHAEL FREEMAN
FIRE CHIEF
FORESTER & FIRE WARDEN


August 9, 2004

Ms. Mary Lou Cotton
Water Resource Manager
Castaic Lake Water Agency
27234 Bouquet Canyon Road
Santa Clarita, CA 91350

Dear Ms. Cotton:

**DRAFT ENVIRONMENTAL IMPACT REPORT FOR THE CASTAIC LAKE WATER AGENCY SUPPLEMENTAL WATER PROJECT TRANSFER OF 41,000 ACRE-FEET OF STATE WATER PROJECT TABLE A AMOUNT FROM KERN COUNTY WATER AGENCY – "CASTAIC" (EIR #2028/2004)**

The Draft Environmental Impact Report for the above project has been reviewed by the Planning Division, Land Development Unit, and Forestry Division of the County of Los Angeles Fire Department. The following are their comments: The project site that is reflective of our statutory responsibilities encompasses approximately 180 square miles of land in northwestern Los Angeles County in unincorporated Castaic.

**LAND DEVELOPMENT UNIT:** 16

The County of Los Angeles Fire Department, Land Development Unit appreciates the opportunity to comment on this project. However, this project does not propose structures or any other improvements that appear to have a significant impact that requires a comment from the Land Development Unit.

Specific fire and life safety requirements for the construction phase will be addressed at the Building and Fire Safety plan check. There may be additional fire and life safety requirements during this time. Should any questions arise regarding subdivision, water systems or access, please contact Inspector Marvin Dorsey at (323) 890-4243.

**FORESTRY DIVISION:** 17

The statutory responsibilities of the County of Los Angeles Fire Department, Forestry Division include erosion control, watershed management, rare and endangered species, vegetation, fuel modification for Very High Fire Hazard Severity Zones or Fire Zone 4, archeological and cultural resources, and the County Oak Tree Ordinance. The areas germane to the statutory responsibilities of the Los Angeles County Fire Department, Forestry Division have been addressed.

If you have any additional questions, please contact this office at (323) 890-4330.

Very truly yours,

David R. Leininger

DAVID R. LEININGER, CHIEF, FORESTRY DIVISION
PREVENTION BUREAU

DRL:sc

RESOURCE MANAGEMENT AGENCY

county of ventura

Planning Division
Christopher Stephens
Director

August 16, 2004

| Post-it® Fax Note 7671 | Date 8/16/04 # of pages ▶ 2 |
|---|---|
| To ML Cotton | From C. Morehouse |
| Co./Dept. | Co. |
| Phone # | Phone # |
| Fax # | Fax # |

Mary Lou Cotton
Water Resources Manager
Castaic Lake Water Agency
27234 Bouquet Canyon Road
Santa Clarita, CA 91350

FAX #: (661) 297-1610

Subject: Castaic Lake Water Agency Supplemental Water Project Transfer of 41,000 acre-feet of Table A Amount; Draft EIR

Thank you for the opportunity to review and comment on the subject document. Attached are the comments that we have received resulting from intra-county review of the subject document. 18a

Your proposed responses to these comments should be sent directly to the commentator, with a copy to Carl Morehouse, Ventura County Planning Division, L#1740, 800 S. Victoria Avenue, Ventura, CA 93009.

If you have any questions regarding any of the comments, please contact the appropriate respondent. Overall questions may be directed to Carl Morehouse at (805) 654-2476.

Sincerely,

Brian Leith, FOR
Christopher Stephens
County Planning Director

*G:\WPC\WINWORD\1H4-7.04.doc*

Attachment

County RMA Reference Number 04-053

**COUNTY OF VENTURA**
**PUBLIC WORKS AGENCY**
**Watershed Protection District**
**Water Resources Division**

# MEMORANDUM

July 21, 2004

To: Carl Morehouse
RMA Planning Division

From: Lowell Preston
Water Resources Division

Subject: **RMA 04-0053, Draft EIR - Supplemental Water Project Transfer of 41,000 acre-ft of Table A**

Project Description

The project authorizes the Castaic Lake Water Agency (CLWA) to use 41,000 af of water from the State Water Plan (SWP) Table A amount for water demands of existing users and a portion of future water demand from anticipated growth within the CLWA service area. Water will be transferred from the Kern County Water Agency. The project does not include the construction of any additional SWP facilities or new facilities in the CLWA. CLWA is the lead agency and has for the most part determined to have less than significant impacts.

Comment

None. 18b

Stanislaus County
Striving to be the Best

**CHIEF EXECUTIVE OFFICE**

*1010 10th Street, Suite 6800, Modesto, CA 95354*
*P.O. Box 3404, Modesto, CA 95353-3404*

***Patricia Hill Thomas***
*Interim Chief Executive Officer*
*Phone: 209.525.6333 Fax 209.544.6886*

## STANISLAUS COUNTY ENVIRONMENTAL REVIEW COMMITTEE

August 9, 2004

Mary Lou Cotton
Castaic Lake Water Agency
27234 Bouquet Canyon Road
Santa Clarita, CA 93150

SUBJECT: **ENVIRONMENTAL REFERRALS-AMENDED NOTICE OF COMPLETION-CASTAIC LAKE WATER AGENCY-SUPPLEMENTAL WATER PROJECT TRANSFER OF 41,000 ACRE-FEET OF TABLE A AMOUNT, STATE CLEARINGHOUSE #1998041127**

Ms. Cotton:

The Stanislaus County Environmental Review Committee (ERC) has reviewed the subject project and has no comments at this time. 19

The ERC appreciates the opportunity to comment on this project.

Sincerely,

W. Richard Jantz, Deputy Executive Officer
Raul Mendez, Senior Management Consultant
Environmental Review Committee

cc: ERC Members

BIA
Greater L.A. / Ventura Chapter

Building Industry Association of Southern California
24005 Ventura Boulevard
Calabasas, California 91302
818.591.2001
fax 818.591.0072
http://www.biasc.org

July 28, 2004

Mr. Dan Masnada. General Manager
Castaic Lake Water Agency
27234 Bouquet Canyon Road
Santa Clarita, CA 91350

**RE: Castaic Lake Water Agency Supplemental Water Project Transfer of 41,000 AF of Table A**

Dear Mr. Masnada:

On behalf of the approximately 400 companies and their representative employees who make up the Greater LA/Ventura Chapter of the Building Industry Association of Southern California, thank you for the opportunity to comment on CLWA's Draft EIR on the Supplemental Water Project Transfer of 41,000 Acre-Feet of Table A.

CLWA's transfer of 41,000 acre-feet of water from Kern County in 1999 represented wise water planning for the Santa Clarita Valley. The BIA is pleased to see that the CLWA has produced this new EIR so that the litigation pending on the 1999 transaction can finally be resolved. 20

We are in the midst of a housing shortage in our State, especially in the Los Angeles and Ventura County regions. With housing supply in high demand it is critical for agencies such as CLWA to plan for future infrastructure needs. The continuance of such planning and water management programs is designed to enable the agency to meet its mission of providing water for anticipated growth in the Santa Clarita Valley. We support the Agency board and staff in continuing that mission.

CLWA has taken the proper steps to insure that its current users as well as future users will be assured safe and reliable water. The Building Industry Association would like to commend the CLWA for taking these preemptive actions.

Thank you once again for the opportunity to provide comments. Please feel free to contact us if you have any questions or comments.

Sincerely,

Ray Pearl
Executive Officer

Terra Donlon
Director of Government Affairs

# california water impact network

by fax
30 pgs

Carolee K. Krieger president
Dorothy Green secretary
Joan H. Wells treasurer
Melinda Chouinard director
Yvon Chouinard director
Hap Dunning director
Michael Jackson director
Huey Johnson director
Imaging Spence director

August 11, 2004

Mary Lou Cotton, Water Resources Manager
Castaic Lake Water Agency
27234 Bouquet Canyon Road
Santa Clarita, CA 91350

**RE: Comments on Castaic Lake Water Agency Supplemental Water Project Environmental Impact Report on the Proposed Transfer of 41,000 Acre-Feet of Table A Amount, State Clearinghouse Number 1998041127**

Dear Ms. Cotton;

The California Water Impact Network (C-WIN) would like to submit comments on the Castaic Lake Water Agency's EIR for the proposed permanent transfer of 41,000 Acre-feet of Table A allocation from the Kern County Water Agency to the Castaic Lake Water Agency. C-WIN is opposed to the proposed transfer on the following grounds:

1. **CLWA is the Wrong Lead Agency and Must Wait for DWR to Complete the new Monterey Plus EIR** 21

Under the principles articulated by the 3rd District Court of Appeal in the PCLvDWR case (#CO24576), CLWA is not the proper lead agency in this transaction which has tremendous statewide significance as it necessarily must address the Monterey Amendments. DWR is the only proper lead agency.

This transfer is not consistent with the PCLvDWR settlement, reached in May of 2003, under which DWR has already commenced its own statewide review of the Monterey Amendments. Until the new EIR, known as "Monterey Plus" is finalized and the project is approved, the only transfers recognized as final are those listed in attachment E of the settlement. This is not one of those transfers and therefore would be illegal until completion and certification of the new "Monterey Plus" EIR. The CLWA proposed EIR is potentially on a collision course with DWR's "Monterey Plus" EIR and could produce a result that is at odds with the court mandated EIR on the Monterey Amendments currently being produced by DWR. 22

C-WIN incorporates the January 10, 2002 letter from attorney Robert H. Clark to then General Manager of CLWA Robert C. Sagehorn where he points out this problem and warns,

> "Alternatively, CLWA may choose to create an EIR that does not rely in any way on Monterey Amendment provisions, and then complete the 41,000 AF water entitlement transfer outside of Monterey. There are adverse financial implications to this course of action, and any water transfer outside of Monterey—assuming it might be acceptable to Kern County Water Agency and Wheeler Ridge—*could be made subject to agricultural water deficiency provisions in the same manner that the Devil's Den water entitlement transfer was originally made subject to those agricultural water deficiency provisions." (emphasis added)* (See Attachment A.)

C-Win also incorporates a letter from attorney Alyse M. Lazar to DWR Director Lester Snow dated May 18, 2004 and the response from Mr. Snow's office dated June 17, 2004. In the response letter, Mr. Snow says,

> "DWR's treatment of the transfer of Table A amounts from Kern County Water Agency to Castaic

P.O. Box 5462, Santa Barbara, CA 93150, email: caroleekrieger@cox.net, Phone: 805.969.0824, Fax: 805.565.3334

Lake Water Agency will be governed by the Settlement Agreement. As provided in Paragraph III.C.4 of the Settlement Agreement, the EIR will include an "analysis of the potential environmental impacts relating to (a) the Attachment E transfers, and (b) the Kern-Castaic Transfer, in each case as actions that relate to the potential environmental impacts approving the Monterey Amendments." Section 1(0) of the Settlement Agreement defines the "Kern-Castaic Transfer" as "the transfer of 41,000 AF of water from Kern County Water Agency to the Castaic Lake Water Agency, approved by DWR on March 31, 1999." DWR has not completed any draft or final analysis regarding these transfers." (See Attachment B.) 22

2. **This Proposed Transfer is Currently the Subject of Litigation** 23

The CLWA EIR states that CLWA has 95,200 AF of Table A SWP water. This is not accurate as the 41,000 AF from the sale by KCWA to CLWA under the old Monterey Amendments is the subject of ongoing litigation. Allowing development of new homes based on this challenged and uncertain source of water is not prudent or reasonable.

C-WIN is currently a plaintiff in several cases against CLWA opposing proposed transfers that depend on the 41,000 AF transfer mentioned above. Any transfer that is dependent on a water source that is not free and clear is not reliable. C-WIN hereby incorporates our ongoing case against CLWA, the Department of Water Resources (DWR) and Semitropic Water Storage District, Civ No. 215327. Castaic is proposing to transfer 24,000 AF of its 2002 allocation of it's State Water Project (SWP) water, heavily relying on and siting the 41,000 AF transfer as complete to help justify the 24,000 AF transfer, and store it in the Semitropic Water Bank. This case is currently going to appeal.

As the EIR states, under current law, urban water suppliers must maintain updated water management plans (Urban Water Management Plan). CLWA's UWMP is currently being challenged in court for claiming to have more water than is actually available. Public comments submitted on the recently finalized DWR "SWP Delivery Reliability Report" underscore the continuing problem that contractor estimates of reliability have frequently promised more water than is actually obtainable for building purposes. This EIR is representative of the "paper water" critically described in the 3rd District Appeal Court decision mentioned above. 24 25

3. **Water Reliability as Stated in the Proposed EIR is Not Accurate**

This EIR, along with many other proposed developments in California, is dependent on the analysis by DWR and its State Water Project Delivery Reliability Report, Final 2002, to give planners and the public accurate information on SWP water reliability. These numbers are critical because planners and the public count on them when considering water availability to meet future demand. This Reliability Report has been seriously criticized for overstating actual available supply, questionable modeling and simulations, and lack of proper peer review. C-WIN hereby incorporates this Final Report, including all of the published comment letters in Appendix E. Please make a special note of those letters submitted by Senator Michael Machado, Robert Wilkinson, Arve Sjovold, Joan Wells, Dr. Peter Gleick and myself.

C-WIN also incorporates "A Strategic Review of CALSIM II and its Use for Water Planning, Management, and Operations in Central California" submitted by the California Bay Delta Authority Science Program Association of Bay Governments, December 4, 2003. This document raises significant questions about the accuracy of DWR's Delivery Reliability Report.

In addition, C-WIN incorporates two letters, the first from Systems Analyst Arve R. Sjovold dated November 11, 2003, titled, "Analysis of SWP Reliability of Delivery". (See Attachment C.) The second is from PCL President Sage Sweetwood dated February 2. 2004 to Delores Brown of DWR raising grave concerns about the validity of the DWR model known as CALSIM II. (See Attachment D.)

C-WIN incorporates a table prepared by DWR dated 9/16/02 titled "Historical versus Modeled Table A Deliveries and Demands." This is a draft document released by DWR. The modeled deliveries are significantly above the actual historical deliveries...graphically showing what the Third District Court of Appeal was referred to when they sited the "paper water" in the system. (See Attachment E.)

**4. Significant Cumulative Impacts Not Recognized** 26

CLWA is continuing to speculatively and irresponsibly approve proposed developments incrementally based on the hope that they will successfully acquire this 41,000 AF of SWP Table A allocation from the Kern County Water Agency. C-WIN hereby incorporates the following comment letters to show just how much is being proposed incrementally using this contended source as final. The cumulative impacts are not being considered. This is very significant when the true reliability numbers for the actual water supply are factored in as well.

- The C-WIN January 1, 2004 objection letter to the CLWA on the Negative Declaration for a proposed 35,000 AF transfer for a Groundwater Banking Project that depends on this same 41,000 AF transfer.

- The C-WIN February 3, 2004 objection letter to the LA County Regional Planning Department on the proposed West Creek Project #98-008 to build 2,545 residential units that depend on this same 41,000 AF transfer.

- The C-WIN February 26, 2004 objection letter to the County of Los Angeles Regional Planning Department regarding the proposed River Valley Project No.00-196 to build 1,444 residential units, 1.5 million square feet of non-residential mixed-use space, along with a 7 acre elementary school and public recreational facilities; this project also relies on this 41,000 acre foot transfer.

- The C-WIN May 4, 2004 letter to the Planning and building Services Department of the City of Santa Clarita regarding the proposed River Park Project No. 02-175 to build 1,183 residential units, heavily relying on this same 41,000 AF transfer.

This 41,000 AF water transfer should be rejected until the EIR for the new "Monterey Plus" has been finalized and adopted. When and if you do proceed, it is required that DWR be the lead agency. 27

CWN hereby incorporates all other comments by reference opposing this transfer submitted on this CLWA EIR proposing to permanently transfer 41,000 AF of Table A allocation from the Kern County Water Agency to the Castaic Lake Water Agency. 28

Sincerely,

Carolee Krieger

Carolee K. Krieger,
President

Attachments:

A. Letter from Robert H. Clark to CLWA Manager Robert C. Sagehorn, dated 1.10.02
B. Correspondence between Alyse Lazar (5.18.04) and DWR Director Lester Snow (6.17.04)
C. Analysis of SWP Reliability of Delivery by Arve Sjovold, 11.11.03
D. Letter from Sage Sweetwood to Delores Brown, 2.2.04
E. DWR Historical versus Modeled Table A Deliveries and Demands (Draft), 9.16.02

(A)

LAW OFFICES
**ROBERT H. CLARK**

[illegible] JURAMA COURT
SANTA CLARITA, CA [illegible]

TELEPHONE: [illegible]
FACSIMILE: [illegible]

January 10, 2002

To: Robert C. Segahorn, General Manager
Castaic Lake Water Agency

From: Counsel

Subject: Today's Court of Appeal Decision in Friends of the Santa Clara River vs. Castaic Lake Water Agency

Further environmental work needs to be done to secure CLWA's March, 1999 acquisition of 41,000 acre feet of State Project water entitlement from Wheeler Ridge-Maricopa Water Storage District.

The Court of Appeal this afternoon found that all challenges to CLWA's environmental documents on the above-specified water entitlement transfer were "without merit," except for the legal implications of the last year's PCL case wherein another Court of Appeal ordered decertification of the Monterey Amendment EIR. Specifically, the Court of Appeal in our current case wrote: "If the PCL/tiering problem had not arisen, we would have affirmed the [Superior Court] judgment [in favor of CLWA]".

CLWA's 41,000 acre foot water entitlement transfer is now in the hands of the Los Angeles Superior Court, unless CLWA chooses to and receives California Supreme Court acceptance of an Agency appeal from the current Court of Appeal judgment.

It is in the Los Angeles Superior Court's discretion whether to enjoin, reverse, or condition all or portions of CLWA's 41,000 acre foot water entitlement acquisition pending completion of a new and adequate environmental document that does not tier on the Monterey Amendment EIR. In the opinion of the Court of Appeal, CLWA may be able to "cure the PCL problem by awaiting action by the State DWR complying with the PCL decision, then issuing a subsequent EIR, supplement to EIR, or addendum to EIR tiering upon a newly certified Monterey Amendment EIR." Of course, as we know, the course suggested in the preceding sentence may be impossible to complete for a period of years, due to the inherent delays involved with DWR's preparation of a new EIR on the Monterey Agreement.

Alternatively, CLWA may choose to create an EIR that does not rely in any way on Monterey Amendment provisions, and then complete the 41,000 acre foot water entitlement transfer outside of Monterey. There are adverse financial implications

to this course of action, and any water transfer outside of Monterey--assuming it might be acceptable to Kern County Water Agency and Wheeler Ridge--could be made subject to agricultural water deficiency provisions in the same manner that the Devils Den's water entitlement transfer was originally made subject to these agricultural water deficiency provisions.

Bottom line, this decision is not a good development; however, it creates an opportunity to preserve the Wheeler Ridge water transfer pending completion of other environmental documents as described above, provided that the Los Angeles Superior Court determines that such a course of action is appropriate under CEQA.

The text of the decision was received at approximately 3 p.m. today, is some 20 pages in length, and will require further analysis. That said, CLWA has essentially been made a victim of the Monterey Amendment environmental deficiencies as first outlined in the year 2000 decision in the PCL case.

(B)

LAW OFFICE OF
**ALYSE M. LAZAR**
**Attorney at law**
3075 East Thousand Oaks Blvd., Suite 100
Westlake Village, California 91362

Telephone: (805) 496-5390
Facsimile: (805) 496-7462

Admitted to practice
*STATE BAR OF CALIFORNIA*
*NEW YORK STATE BAR*

May 18, 2004

Lester Snow, Director
Department of Water Resources
Room 1115-1
P.O. Box 942836
Sacramento, California 94236

RE: New Monterey Agreement EIR

Dear Director Snow:

Pursuant to the Court decision in *Planning & Conservation League v. Department of Water Resources* (2000) 83 CalApp.4th 892 (hereafter "*PCL*"), the Department of Water Resources is required to prepare a new Environmental Impact Report regarding all aspects of the Monterey Amendments. I understand that you will be overseeing this process.

The Settlement Agreement that was entered into between all of the parties to the *PCL* case on May 5, 2003 set forth various requirements for the EIR. According to Attachment E-1 of this Settlement Agreement, the parties specifically excluded the 41,000 afy entitlements purchased by Castaic Lake Water Agency ("CLWA") emanating from the Monterey Amendments from the list of final transfers. It is therefore my understanding that your office will be evaluating the environmental impacts of this 41,000 afy transfer as part of the Environmental Impact Report for your project (the Monterey Amendments Project.) In fact, page 11, paragraphs III C.4 of the Settlement Agreement mandates DWR to analyze the potential environmental effects relating to CLWA's project ("the Kern-Castaic Transfer").

As you may also be aware, the EIR prepared by CLWA for the 41,000 afy transfer was decertified by the Los Angeles Superior Court on November 1, 2002 in *Friends of the Santa Clara River v. Castaic Lake Water Agency*, Los Angeles County Superior Court Case No. BS 056954. In order for CLWA's new EIR to be legally sufficient and in conformance with the appellate court's decision, it must contain an analysis of the potential environmental effects of the Kern-Castaic Transfer on the entities that have and will continue to lose this 41,000 afy source of water due to the transfer as well as the impacts on the State Water Project ("SWP") system resulting from the movement of this water from its source in Kern County to Santa Clarita. Logically and in conformance with CEQA, both DWR's EIR and CLWA's EIR must contain an analysis of the impacts from this loss of water upon Kern County agricultural users as well as all others affected by the transfer.

I currently represent Friends of the Santa Clara River in the *Friends of the Santa Clara River v. Castaic Lake Water Agency*, litigation. In the Judgment Granting Peremptory Writ of Mandate in the Friends' case, the Court ordered that it " retains jurisdiction until respondent Castaic Lake Water Agency certifies an Environmental Impact Report that complies with the California Environmental

May 18, 2004 letter to Dir. Snow, Dept of Water Resources

Quality Act and is consistent with the views expressed by the Court of Appeal Opinion filed January 10, 2002, Case No. B 145283."

For these reasons, I am requesting that you provide me with a copy of any analysis performed to date by DWR regarding the potential environmental impacts of the Kern-Castaic transfer, whether in draft or final form.

Additionally, please advise me of the procedural steps that DWR will take before making a determination whether or not to approve the Kern-Castaic transfer as a "final" transfer and the criteria that will be utilized for making this determination. If there is a proposed schedule for the completion of the Monterey Amendments EIR and/or for these procedural steps for determining whether or not to approve the Kern-Castaic transfer as a long-term transfer, please provide me with a copy of same.

I would appreciate receiving this information from you by May 28, 2004. If you have questions regarding the above or would like to discuss the matter, please call me at (805) 496-5390. Thank you for your anticipated assistance. I look forward to hearing from you.

Very truly yours,

Alyse M. Lazar

cc: Delores Brown

ARNOLD SCHWARZENEGGER, Governor

STATE OF CALIFORNIA – THE RESOURCES AGENCY
**DEPARTMENT OF WATER RESOURCES**
1416 NINTH STREET, P.O. BOX 942836
SACRAMENTO, CA 94236-0001
(916) 653-5791

JUN 17 2004

Alyse M. Lazar, Esq.
3075 East Thousand Oaks Boulevard, Suite 100
Westlake Village, California 91362

Dear Ms. Lazar:

In response to your letter of May 18, 2004, the Department of Water Resources (DWR) is preparing an Environmental Impact Report (EIR) on the Monterey Amendments and the Settlement Agreement resulting from the Court of Appeal decision in *Planning and Conservation League v. Department of Water Resources* (2000) 83 Cal.App.4th 892.

DWR's treatment of the transfer of Table A amounts from Kern Country Water Agency to Castaic Lake Water Agency will be governed by the Settlement Agreement. As provided in Paragraph III.C.4 of the Settlement Agreement, the EIR will include an "analysis of the potential environmental impacts relating to (a) the Attachment E transfers, and (b) the Kern-Castaic Transfer, in each case as actions that relate to the potential environmental impacts of approving the Monterey Amendments." Section 1(D) of the Settlement Agreement defines the "Kern-Castaic Transfer" as "the transfer of 41,000 acre feet of water from Kern Country Water Agency to the Castaic Lake Water Agency, approved by DWR on March 31, 1999." DWR has not completed any draft or final analysis regarding these transfers. Attached is an estimated schedule for completion of the EIR.

The Settlement Agreement (Section III.E) also provides "with respect to Section III.(C)(4)(b) regarding the Kern-Castaic Transfer, the Parties recognize that such water transfer is subject to pending litigation. The Parties agree that jurisdiction with respect to that litigation should remain in that court and that nothing in this Settlement Agreement is intended to predispose the remedies or other actions that may occur in that pending litigation."

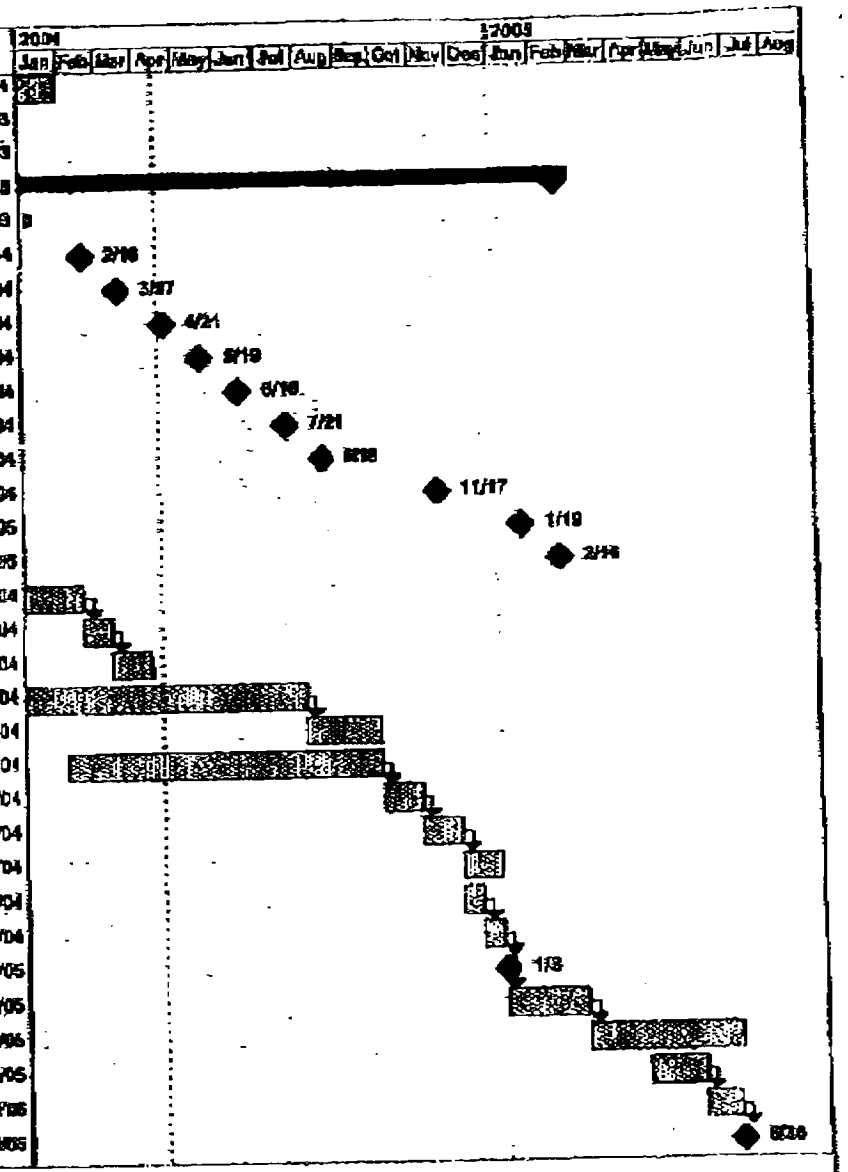
If you would like further information regarding the EIR on the Monterey Amendments and the Settlement Agreement, please contact Delores Brown at (916) 227-2407.

Sincerely,

Lester A. Snow
Director

Attachment

| ID | Task Name | Start | Finish |
|---|---|---|---|
| 1 | Conduct non-model dependent environmental analyses | Wed 10/1/03 | Fri 1/30/04 |
| 2 | DWR Review of selected sections | Mon 11/3/03 | Fri 11/7/03 |
| 3 | EIP Revise | Mon 11/10/03 | Wed 11/12/03 |
| 4 | EIR Committee Meetings | Wed 11/19/03 | Wed 2/16/05 |
| 5 | Meeting 1 | Wed 11/19/03 | Wed 11/19/03 |
| 6 | Meeting 2 | Wed 2/18/04 | Wed 2/18/04 |
| 7 | Meeting 3 | Wed 3/17/04 | Wed 3/17/04 |
| 8 | Meeting 4 | Wed 4/21/04 | Wed 4/21/04 |
| 9 | Meeting 5 | Wed 5/19/04 | Wed 5/19/04 |
| 10 | Meeting 6 | Wed 6/16/04 | Wed 6/16/04 |
| 11 | Meeting 7 | Wed 7/21/04 | Wed 7/21/04 |
| 12 | Meeting 8 | Wed 8/18/04 | Wed 8/18/04 |
| 13 | Meeting 9 | Wed 11/17/04 | Wed 11/17/04 |
| 14 | Meeting 10 | Wed 1/19/05 | Wed 1/19/05 |
| 15 | Meeting 11 | Wed 2/16/05 | Wed 2/16/05 |
| 16 | Prepare Admin Draft EIR Part 1 | Wed 10/1/03 | Mon 2/16/04 |
| 17 | DWR Review | Tue 2/17/04 | Tue 3/9/04 |
| 18 | EIP Revise | Wed 3/10/04 | Thu 4/8/04 |
| 19 | Conduct CALSIM modeling & Post Processing | Mon 12/1/03 | Mon 8/2/04 |
| 20 | Conduct Model-dependent Environmental Analysis | Tue 8/3/04 | Fri 10/1/04 |
| 21 | Prepare Admin Draft EIR Part 2 | Mon 3/2/04 | Fri 10/1/04 |
| 22 | DWR Review | Mon 10/1/04 | Mon 11/1/04 |
| 23 | EIP Revise | Tue 11/2/04 | Wed 12/1/04 |
| 24 | Prepare Draft EIR | Thu 12/2/04 | Fri 12/31/04 |
| 25 | DWR Review | Thu 12/2/04 | Thu 12/16/04 |
| 26 | EIP Revise | Fri 12/17/04 | Fri 12/31/04 |
| 27 | Publish DEIR | Mon 1/3/05 | Mon 1/3/05 |
| 28 | Public Review of Draft EIR | Mon 1/3/05 | Thu 3/3/05 |
| 29 | Prepare Final EIR | Fri 3/4/05 | Thu 6/30/05 |
| 30 | DWR Review | Wed 4/28/05 | Thu 6/2/05 |
| 31 | EIP Revise | Fri 6/3/05 | Wed 6/29/05 |
| 32 | Publish FEIR | Thu 6/30/05 | Thu 6/30/05 |




Project: Monterey Pine EIR Schedule
Date: Fri 4/16/04

Task | Split | Progress | Milestone | Summary



07/16/2004 06:54 8050000000 LAW OFF JULIA LEWIS

(C)

# ANALYSIS OF SWP RELIABILITY OF DELIVERY

**(Based on the DWR Report: "The State Water Project Delivery Reliability Report, 2002, Final)**

**November 11, 2003**

## Introduction

The California Department of Water Resources (DWR) released its final draft of a report presenting its analyses of the reliability of delivery of State Water Project (SWP) delivery reliability. The analyses are based on a series of simulations performed with its CALSIM II model, which is a combination of two previously independent models, DWRSIM developed by DWR for the SWP, and PROSIM developed by the Bureau of Reclamation (BOR) for the Central Valley Project. It was deemed necessary to merge these two models because the joint operations in the Delta from which the water is exported have become very integrated.

The CALSIM II model is also being proposed as the primary analytic tool to evaluate the impacts of the SWP under the Monterey Amendments in an EIR now underway. The adequacy of this model is now under scrutiny as part of this EIR process and questions have been raised as to how accurate its calculations are and how well those calculations have verified by model calibrations.

This analysis of SWP reliability is based on the calculations done with CALSIM II as reported in DWR's report as stated above. This report does not assume that the calculations are necessarily accurate but there still is much to be learned from these results even if their accuracy is in question.

This analysis first explores the character of the statistical output of the CALSIM II published results. Then we explore the kinds of interpretations that can be deduced from these results once we understand their statistical character. Some conclusions are then drawn about SWP delivery reliability in general and under varying circumstances that can be expected among the several SWP contractors receiving this water and what they can truly rely on. However, we must stress that even these conclusions are preliminary and still subject to change once the CALSIM II model has been properly calibrated and peer reviewed.

## CALSIM Calculations

The basis for the statistical analysis in this report is the CALSIM II output record presented in the referenced report as Table B-3, "Study 2001 SWP Delta water delivery," which provides calculations of the annual export of SWP water over the 73 year period from 1922 to 1994. The reference to 2001 in the Table title refers to the condition that all actual hydrologic records for this period have been adjusted to reflect 2001 conditions of development. That is, the withdrawals of water in the Sacramento Valley are based on the

level of agriculture evident or reasonably expected to prevail at that time and the system of dams and diversions are those expected to be in place at that time. The calculations also assume the level of State Water Resources Control Board (SWRCB) constraints that will exist at that time except for variable restrictions that may be imposed by the Endangered Species Act (ESA) to protect targeted species in the Delta.

The calculations also make assumptions about the level of demands from the SWP contractors to be supplied by water exported from the Delta by the project. The explicit demand functions for each contractor are not presented in the report but it is evident in Table B-3 that the demands are variable. The Table B-3 calculations present for each year, the level of demand sought by the contractors in the aggregate, the calculated deliveries against those demands (explained in the report to be the "Table A" demands called for in the contracts), the calculated percentage of the full "Table A" demands that the estimated delivery represents, and the calculated delivery of Article 21 water that would be expected to be delivered. (Article 21 water is essentially "surplus" water that is available only on certain conditions and cannot be assumed to be reliably available.) The Table B-3 is reproduced here as Table 1 for reference except the column for the percentage calculation was not included.

This statistical analysis deals only with the deliveries of Table A water that DWR is obligated to deliver when it is available to meet contractor requests. Reliability of delivery should be related solely to that water that DWR is obligated to deliver.

**How is Reliability defined?**

Reliability is not a precisely calculated attribute. It involves considerations of risk. For water supply, one normally establishes the level of risk for shortfalls in the supply at some level of probability. For "Safe Yield" calculations for reservoirs like Cachuma in Santa Barbara County, a reservoir dedicated primarily to urban supply, the risk level is established at a 5% chance of not delivering the stated "safe yield" in any given year if the worst drought of record is repeated. This is a relatively prudent choice if the record of runoff supplying the reservoir is sufficiently lengthy to provide confidence in the calculation. For Cachuma, the worst drought is probably the late 40s and early 50s and it establishes a six year period that the reservoir must carry-over water before it is refilled and spilling.

For SWP contractors, it is apparent that no one level can be chosen that will provide the same risks to all. Each contractor has different capabilities to withstand a drought depending on his particular mix of other water supplies. So it is important for each contractor to be able to deduce what level of deliveries he can utilize and rely on from the SWP, so that he may be able to efficiently operate all of his sources in conjunction. Since the SWP is not operated to carry-over water for more than a year, it is important to characterize the level of deliveries that can be expected over a variety of conditions. In this manner, each contractor can deduce the reliable level of SWP deliveries appropriate to his system of water supplies.

Since periods of drought are the ones that stress water supplies, the calculation of reliability must focus strongly on the project's capability to deliver water in those periods. Contractors that have significant storage means may be able to take delivery of more water in preceding wet periods to be held in reserve for use in droughts. Thus such

TABLE 1

CALSIM RESULTS, TOTAL SAMPLE=73

| | OBSERVATION | MODEL_DEM | CALSIM_DE | ART_21 | *KEYWORDS |
|---|---|---|---|---|---|
| 1 | 1922 | 3407 | 3389 | 175 | |
| 2 | 1923 | 3717 | 3727 | 143 | |
| 3 | 1924 | 3961 | 1014 | 0 | |
| 4 | 1925 | 3940 | 1502 | 0 | |
| 5 | 1926 | 3777 | 2951 | 0 | |
| 6 | 1927 | 3543 | 3504 | 220 | |
| 7 | 1928 | 3897 | 3337 | 155 | |
| 8 | 1929 | 3952 | 1037 | 0 | |
| 9 | 1930 | 3922 | 2697 | 92 | |
| 10 | 1931 | 3971 | 1141 | 0 | |
| 11 | 1932 | 3673 | 1620 | 199 | |
| 12 | 1933 | 3938 | 1663 | 134 | |
| 13 | 1934 | 3981 | 1689 | 0 | |
| 14 | 1935 | 3697 | 3439 | 81 | |
| 15 | 1936 | 3769 | 3638 | 0 | |
| 16 | 1937 | 3451 | 3297 | 87 | |
| 17 | 1938 | 3418 | 3438 | 470 | |
| 18 | 1939 | 3673 | 3475 | 227 | |
| 19 | 1940 | 3713 | 3544 | 102 | |
| 20 | 1941 | 3013 | 3036 | 100 | |
| 21 | 1942 | 3583 | 3599 | 513 | |
| 22 | 1943 | 3632 | 3545 | 447 | |
| 23 | 1944 | 3563 | 3449 | 0 | |
| 24 | 1945 | 3612 | 3479 | 136 | |
| 25 | 1946 | 3710 | 3724 | 3 | |
| 26 | 1947 | 3954 | 2652 | 0 | |
| 27 | 1948 | 3959 | 2681 | 2 | |
| 28 | 1949 | 3864 | 2568 | 2 | |
| 29 | 1950 | 3812 | 2909 | 0 | |
| 30 | 1951 | 3779 | 3794 | 311 | |
| 31 | 1952 | 3078 | 3108 | 103 | |
| 32 | 1953 | 3790 | 3801 | 272 | |
| 33 | 1954 | 3833 | 3803 | 98 | |
| 34 | 1955 | 3761 | 1694 | 0 | |
| 35 | 1956 | 3639 | 3649 | 261 | |
| 36 | 1957 | 3759 | 3331 | 96 | |
| 37 | 1958 | 3481 | 3492 | 441 | |
| 38 | 1959 | 4055 | 3506 | 265 | |
| 39 | 1960 | 4115 | 1795 | 0 | |
| 40 | 1961 | 4115 | 2873 | 0 | |
| 41 | 1962 | 3689 | 3158 | 21 | |
| 42 | 1963 | 3634 | 3630 | 223 | |
| 43 | 1964 | 3907 | 3262 | 5 | |
| 44 | 1965 | 3586 | 3256 | 98 | |
| 45 | 1966 | 3722 | 3731 | 147 | |
| 46 | 1967 | 3439 | 3424 | 497 | |
| 47 | 1968 | 3792 | 3548 | 402 | |
| 48 | 1969 | 3157 | 3151 | 100 | |
| 49 | 1970 | 3714 | 3727 | 406 | |
| 50 | 1971 | 3837 | 3845 | 0 | |
| 51 | 1972 | 4012 | 3057 | 2 | |
| 52 | 1973 | 3611 | 3592 | 261 | |
| 53 | 1974 | 3649 | 3664 | 287 | |
| 54 | 1975 | 3720 | 3737 | 415 | |
| 55 | 1976 | 4014 | 3150 | 110 | |

TABLE 1 (cont.)

CALSIM RESULTS, TOTAL SAMPLE=73 (Cont.)

| | OBSERVATION | MODEL_DEM | CALSIM_DE | ART_21 | *KEYWORDS |
|---|---|---|---|---|---|
| 56 | 1977 | 3948 | 804 | 0 | |
| 57 | 1978 | 3126 | 3036 | 100 | |
| 58 | 1979 | 3527 | 3509 | 140 | |
| 59 | 1980 | 3197 | 3208 | 100 | |
| 60 | 1981 | 3834 | 3532 | 124 | |
| 61 | 1982 | 3451 | 3471 | 386 | |
| 62 | 1983 | 3007 | 3036 | 200 | |
| 63 | 1984 | 3692 | 3706 | 408 | |
| 64 | 1985 | 3753 | 3540 | 0 | |
| 65 | 1986 | 3345 | 3023 | 51 | |
| 66 | 1987 | 3904 | 2894 | 0 | |
| 67 | 1988 | 4026 | 967 | 0 | |
| 68 | 1989 | 4097 | 2902 | 0 | |
| 69 | 1990 | 3961 | 1101 | 0 | |
| 70 | 1991 | 3957 | 983 | 0 | |
| 71 | 1992 | 3880 | 1199 | 0 | |
| 72 | 1993 | 3559 | 3505 | 133 | |
| 73 | 1994 | 3739 | 3272 | 9 | |
| 74 | *VARIABLES | DEM | DELKAF | ARTKAF | |
| 75 | *KEYWORDS | | | | |

a contractor can improve his capability to serve demand during droughts. However, that capability for that contractor does not necessarily improve the prospects of those contractors without much storage who must rely on SWP.

The first step then is to examine the CALSIM II calculated output record in Table 1 to establish the temporal variations in expected deliveries.

**Statistical Character of the 73 year record**

Table 1 presents the results of the CALSIM II model for the 73 year period, 1922 to 1994. This record was analyzed using standard statistical techniques available in a software package called "COSTAT," which includes a variety of standard calculational routines for multiple regression as well as simple univariate data sets. Only the univariate capability was necessary to apply here.

The results of a univariate analysis of the entire 73 year sample are presented in Table 2 and in Figure 1. Table 2 shows the sample mean, variance, standard deviation, and other attributes of the data set. Figure 1 shows the histogram of the frequency of different levels of delivery. Figure 1 is most interesting in that it shows the sample to comprise two distinct domains, one constituting most of the sample showing the deliveries for what can be called normal or wet years and the other constituting the collection of dry years. There is a region in between these two domains, between 2100 and 2540 taf (thousands of acre-feet) for which there are no calculated deliveries. According to Table 2 the average of this 73 sample is 2961.8 taf which is not within the main mode of the normal/wet year data. Thus the sample average is not representative of any particular attribute of this bi-modal distribution.

Statistical tests were performed to determine whether or not these two subsets of the data, normal/wet and dry, can be considered to come from the same population. The answer is most definitely not. To perform this test the 73 year period was separated into the two nominal populations for which means and variances were calculated and tested for significant differences using a standardized "t-test." The probability that such a bi-modal distribution could be drawn from one population by chance is infinitesimally small. Accordingly, no confident statements can be made about probabilities of delivery by assuming the sample to come from one population. As a consequence, the reported average and the use of the frequency charts in DWR's report are without statistical validity.

If we examine the record of calculated deliveries shown in Table 1, it is quite evident that there are extensive dry periods, the worst of which is shown as that from 1929 through 1934. In fact, this is referred to as the historic worst drought. The drought most recently experienced, 1987 through 1992, also 6 years in duration, was almost as severe from a hydrologic standpoint. Each of these two periods has embedded one decent year that if it were not part of the drought episode would not be so significant. The fact that it is embedded is important because following a dry year or dry sequence the embedded year is not good enough to refill the two big SWP reservoirs, Oroville and San Luis, for the following year. Hence it is part of the drought sequence. (It would have been helpful to understanding SWP operations if the calculated record showed the end of water year storage levels for these two reservoirs.)

TABLE 2
ANALYSIS, TOTAL SAMPLE

Data Set: SWP_REL.cst
Date & Time: 01-04-80 09:37 am

UNIVARIATE DATA ANALYSIS : ( DELKAF )

**Data Description**

| | |
|---|---|
| # of observations | : 73 |
| # of missing values | : 0 |
| Maximum | : 3845.000 |
| Minimum | : 804.000 |
| Range | : 3041.000 |

**Descriptive Measures**

| | |
|---|---|
| Mean | : 2961.781 |
| Std Dev(Sample) | : 878.175 |
| RMS(Population) | : 872.139 |
| Median | : 3297.000 |
| 1st Quartile | : 2785.000 |
| 3rd Quartile | : 3544.500 |
| Skewness | : -1.269 |

**Inferential Values**

| Measures | | Confidence Interval (95%) | |
|---|---|---|---|
| Mean | : 2961.781 | Lower | : 2760.327 |
| Std Error | : 102.783 | Upper | : 3163.235 |

FIGURE 1

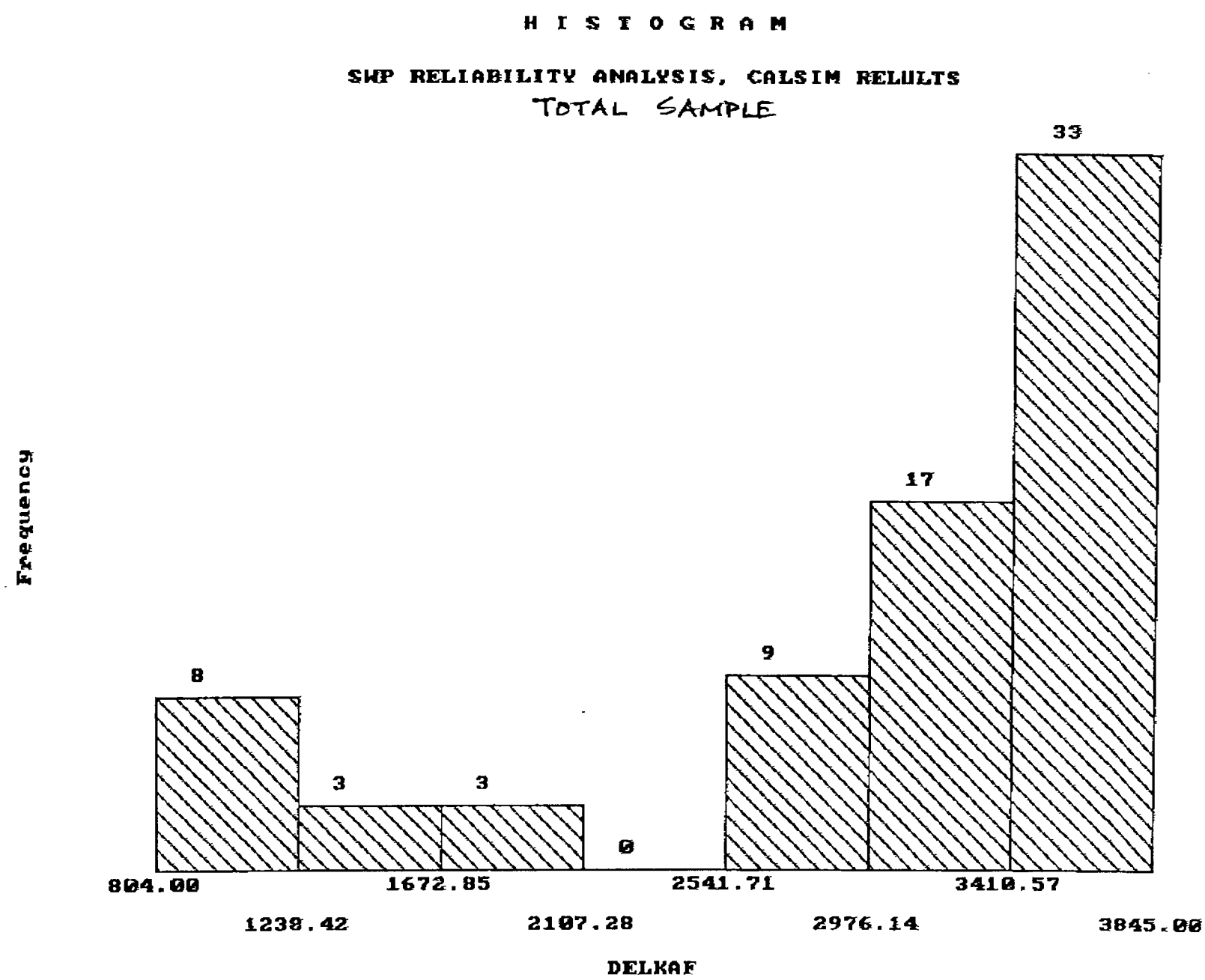

HISTOGRAM
SWP RELIABILITY ANALYSIS, CALSIM RELULTS
TOTAL SAMPLE
Frequency
8
3
3
0
9
17
33
804.00
1238.42
1672.85
2107.28
2541.71
2976.14
3410.57
3845.00
DELKAF

TABLE 3

SWP RELIABIITY ANALYSIS, DROUGHT YEARS

| | OBSERVATION | MODEL_DEM | CALSIM_DE | ART_21 | *KEYWORDS |
|---|---|---|---|---|---|
| 1 | 1929 | 3952 | 1037 | 0 | |
| 2 | 1930 | 3922 | 2697 | 92 | |
| 3 | 1931 | 3971 | 1141 | 0 | |
| 4 | 1932 | 3673 | 1620 | 199 | |
| 5 | 1933 | 3938 | 1663 | 134 | |
| 6 | 1934 | 3981 | 1689 | 0 | |
| 7 | 1988 | 4026 | 967 | 0 | |
| 8 | 1989 | 4097 | 2902 | 0 | |
| 9 | 1990 | 3961 | 1101 | 0 | |
| 10 | 1991 | 3957 | 983 | 0 | |
| 11 | 1992 | 3880 | 1199 | 0 | |
| 12 | *VARIABLES | DEM | DELKAF | ARTKAF | |
| 13 | *KEYWORDS | | | | |

TABLE 4
ANALYSIS, DROUGHT YEARS

Data Set: SWP_REL4.cst
Date & Time: 01-04-80 09:18 am

UNIVARIATE DATA ANALYSIS : ( DELKAF )

**Data Description**

| | |
|---|---|
| # of observations | : 11 |
| # of missing values | : 0 |
| Maximum | : 2902.000 |
| Minimum | : 967.000 |
| Range | : 1935.000 |

**Descriptive Measures**

| | |
|---|---|
| Mean | : 1545.364 |
| Std Dev(Sample) | : 678.004 |
| RMS(Population) | : 646.452 |
| Median | : 1199.000 |
| 1st Quartile | : 1037.000 |
| 3rd Quartile | : 1689.000 |
| Skewness | : 1.069 |

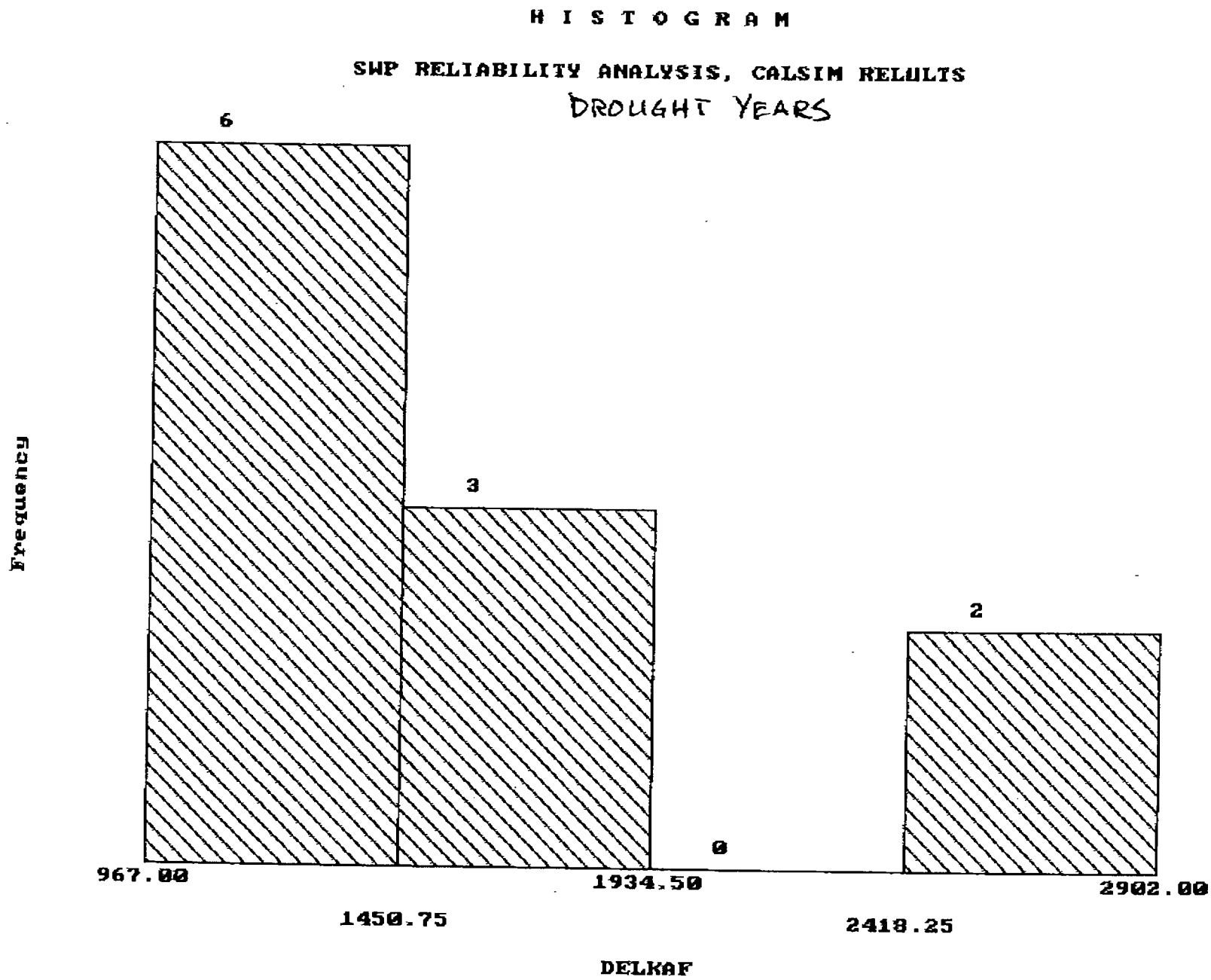
**Inferential Values**

| Measures | | Confidence Interval (95%) | |
|---|---|---|---|
| Mean | : 1545.364 | Lower | : 1089.903 |
| Std Error | : 204.426 | Upper | : 2000.825 |

is this saying that during droughts the SWP can reliably deliver:

lower 1.89 MAF
mean 1.54 MAF
upper 2.0 MAF

FIGURE 2


HISTOGRAM
SWP RELIABILITY ANALYSIS, CALSIM RELULTS
DROUGHT YEARS
Frequency
6
3
0
2
967.00
1450.75
1934.50
2418.25
2902.00
DELKAF

# TABLE 5

SWP RELIABILITY ANALYSIS, NORMAL_WET YEARS

| | OBSERVATION | MODEL_DEM | CALSIM_DE | ART_21 | *KEYWORDS | W |
|---|---|---|---|---|---|---|
| 1 | 1922 | 3407 | 3389 | 175 | | 1 |
| 2 | 1923 | 3717 | 3727 | 143 | | 1 |
| 3 | 1926 | 3777 | 2951 | 0 | | 1 |
| 4 | 1927 | 3543 | 3504 | 220 | | 1 |
| 5 | 1928 | 3897 | 3337 | 155 | | 1 |
| 6 | 1930 | 3922 | 2697 | 92 | | 1 |
| 7 | 1935 | 3697 | 3439 | 81 | | 1 |
| 8 | 1936 | 3769 | 3638 | 0 | | 1 |
| 9 | 1937 | 3451 | 3297 | 87 | | 1 |
| 10 | 1938 | 3418 | 3438 | 470 | | 1 |
| 11 | 1939 | 3673 | 3475 | 227 | | 1 |
| 12 | 1940 | 3713 | 3544 | 102 | | 1 |
| 13 | 1941 | 3013 | 3036 | 100 | | 1 |
| 14 | 1942 | 3583 | 3599 | 513 | | 1 |
| 15 | 1943 | 3632 | 3545 | 447 | | 1 |
| 16 | 1944 | 3563 | 3449 | 0 | | 1 |
| 17 | 1945 | 3612 | 3479 | 136 | | 1 |
| 18 | 1946 | 3710 | 3724 | 3 | | 1 |
| 19 | 1947 | 3954 | 2652 | 0 | | 1 |
| 20 | 1948 | 3959 | 2681 | 2 | | 1 |
| 21 | 1949 | 3864 | 2568 | 2 | | 1 |
| 22 | 1950 | 3812 | 2909 | 0 | | 1 |
| 23 | 1951 | 3779 | 3794 | 311 | | 1 |
| 24 | 1952 | 3078 | 3108 | 103 | | 1 |
| 25 | 1953 | 3790 | 3801 | 272 | | 1 |
| 26 | 1954 | 3833 | 3803 | 98 | | 1 |
| 27 | 1956 | 3639 | 3649 | 261 | | 1 |
| 28 | 1957 | 3759 | 3331 | 96 | | 1 |
| 29 | 1958 | 3481 | 3492 | 441 | | 1 |
| 30 | 1959 | 4055 | 3506 | 265 | | 1 |
| 31 | 1961 | 4115 | 2873 | 0 | | 1 |
| 32 | 1962 | 3689 | 3158 | 21 | | 1 |
| 33 | 1963 | 3634 | 3630 | 223 | | 1 |
| 34 | 1964 | 3907 | 3262 | 5 | | 1 |
| 35 | 1965 | 3586 | 3256 | 98 | | 1 |
| 36 | 1966 | 3722 | 3731 | 147 | | 1 |
| 37 | 1967 | 3439 | 3424 | 497 | | 1 |
| 38 | 1968 | 3792 | 3548 | 402 | | 1 |
| 39 | 1969 | 3157 | 3151 | 100 | | 1 |
| 40 | 1970 | 3714 | 3727 | 406 | | 1 |
| 41 | 1971 | 3837 | 3845 | 0 | | 1 |
| 42 | 1972 | 4012 | 3057 | 2 | | 1 |
| 43 | 1973 | 3611 | 3592 | 261 | | 1 |
| 44 | 1974 | 3649 | 3664 | 287 | | 1 |
| 45 | 1975 | 3720 | 3737 | 415 | | 1 |
| 46 | 1976 | 4014 | 3150 | 110 | | 1 |
| 47 | 1978 | 3126 | 3036 | 100 | | 1 |
| 48 | 1979 | 3527 | 3509 | 140 | | 1 |
| 49 | 1980 | 3197 | 3208 | 100 | | 1 |
| 50 | 1981 | 3834 | 3532 | 124 | | 1 |
| 51 | 1982 | 3451 | 3471 | 386 | | 1 |
| 52 | 1983 | 3007 | 3036 | 200 | | 1 |
| 53 | 1984 | 3692 | 3706 | 408 | | 1 |
| 54 | 1985 | 3753 | 3540 | 0 | | 1 |
| 55 | 1986 | 3345 | 3023 | 51 | | 1 |

TABLE 5 (cont.)

SWP RELIABILITY ANALYSIS, NORMAL_WET YEARS (Cont.)

| | OBSERVATION | MODEL_DEM | CALSIM_DE | ART_21 | *KEYWORDS | W |
|---|---|---|---|---|---|---|
| 56 | 1987 | 3904 | 2894 | 0 | | 1 |
| 57 | 1993 | 3559 | 3505 | 133 | | 1 |
| 58 | 1994 | 3739 | 3272 | 9 | | 1 |
| 59 | *VARIABLES | DEM | DELKAF | ARTKAF | *KEYWORDS | * |
| 60 | | | | | | |
| 61 | *KEYWORDS | | | | | |

TABLE 6
ANAYSIS, NORMAL_WET YEARS

Data Set: SWP_REL2.cst
Date & Time: 01-04-80 09:21 am

UNIVARIATE DATA ANALYSIS : ( DELKAF )

**Data Description**

| | |
|---|---|
| # of observations | : 58 |
| # of missing values | : 1 |
| Maximum | : 3845.000 |
| Minimum | : 2568.000 |
| Range | : 1277.000 |

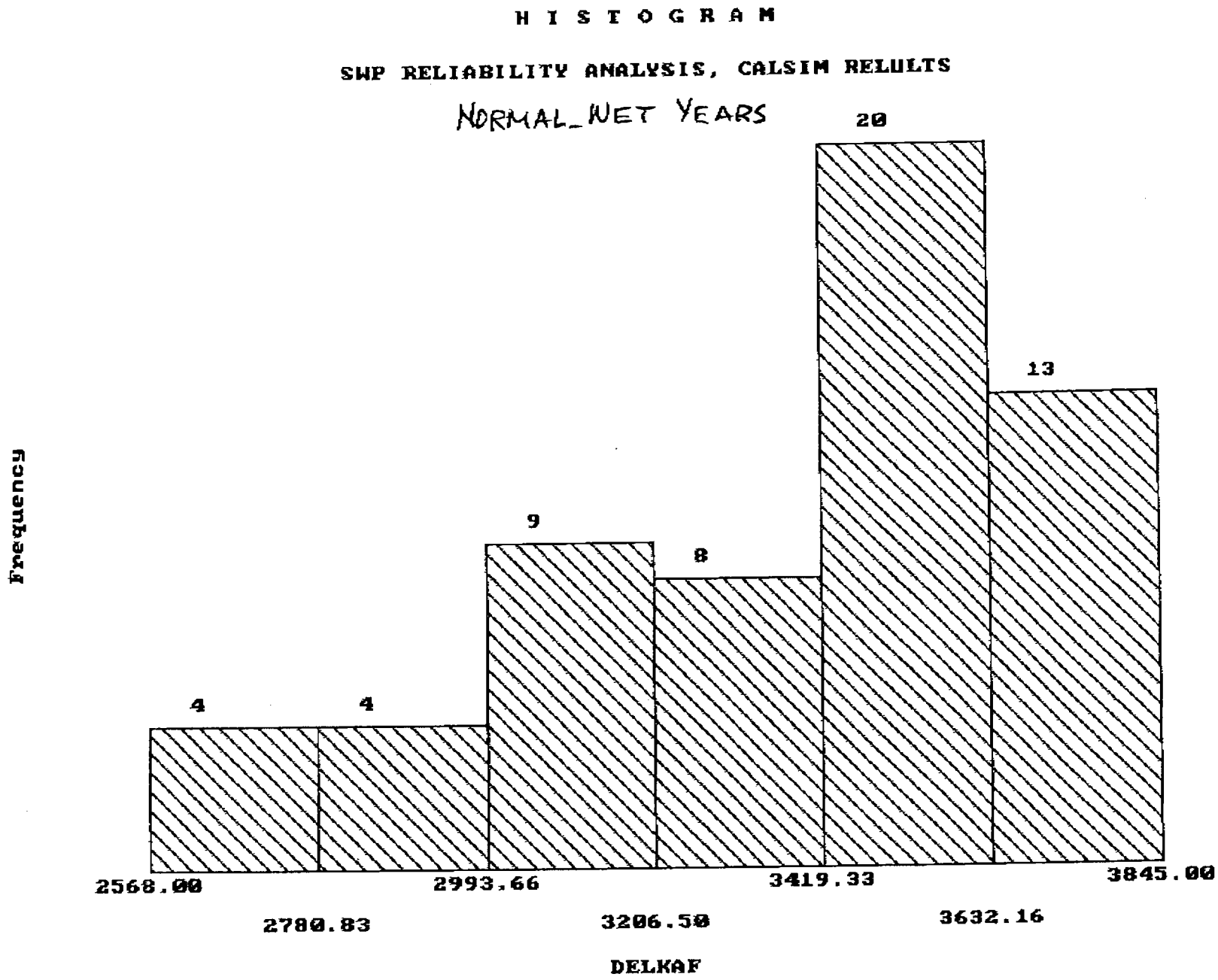
**Descriptive Measures**

| | |
|---|---|
| Mean | : 3363.776 |
| Std Dev(Sample) | : 324.661 |
| RMS(Population) | : 321.850 |
| Median | : 3460.000 |
| 1st Quartile | : 3139.500 |
| 3rd Quartile | : 3606.750 |
| Skewness | : -0.659 |

**Inferential Values**

| Measures | | Confidence Interval (95%) | |
|---|---|---|---|
| Mean | : 3363.776 | Lower | : 3278.516 |
| Std Error | : 42.630 | Upper | : 3449.036 |

FIGURE 3


HISTOGRAM
SWP RELIABILITY ANALYSIS, CALSIM RELULTS
NORMAL_WET YEARS
Frequency
4
4
9
8
20
13
2568.00
2780.83
2993.66
3206.50
3419.33
3632.16
3845.00
DELKAF

Further analyses were undertaken treating the two domains as independent populations. Because the dry year set comprises both the dry sequences of drought and several individual dry years sprinkled throughout the record, we have focused the dry year analyses on the drought periods. The two periods are combined into one population for analysis. However, we did exclude the beginning year, 1987, for the second period as it was not embedded in the sequence and could easily be classified as a fair to good year. Thus, we ended with a sample of 11 years, 6 years between 1929 and 1934 and 5 years between 1988 and 1992. The data set is shown in Table 3 and the resulting statistics are shown in Table 4. Table 4 shows an average delivery of 1545 taf and a standard deviation of 678 taf. If the year 1987 were included the average would increase to approximately 1657 taf with not much change in the standard deviation. If the two embedded decent years, 1930 and 1989, are eliminated from the sample the average is decreased to 1267 taf with a standard deviation of 302 taf. These changes suggest that judged as separate occurrences these two years may not be statistically representative of the dry population. However, we will assume that the results shown in Table 4 are representative of the expectation for drought periods.

Lastly, we analyze the population for the normal/wet periods, a record of 58 years, not all in sequence. The years 1930 and 1987 were included in this sample and the individual dry years not part of either of the extended drought periods were excluded. Table 5 presents the data set used in the analysis and Table 6 shows the calculated statistics. Figure 2 shows the frequency histogram for this data set which clearly depicts a central maximum but still with some skewness. (Skewness is a term used to identify distributions that are not symmetric, that is distributions whose sample mean and median are significantly different.) Table 6 shows an average delivery of 3364 taf with a standard deviation of 325 taf. This then represents what is typical of periods of non-drought, an average that is about 81% of the full Table A value of delivery. The standard deviation represents 9.66% of the average delivery, showing a very consistent delivery for normal and wet periods.

**How much delivery can we rely on?**

As we stated before, what each contractor can rely on depends on the circumstances of his other sources of supply. However, we now have some valid statistical analyses upon which to base the level of delivery that can be relied on for specific circumstances.

First, we note that for any contractor without significant storage availability, the reliable level of delivery is dictated almost solely by drought conditions. If a particular contractor had no other supply to tap and wanted to pick a confident level of supply from the SWP, he would have to select from among the lowest individual years on record which could be as low as 804 taf or 19.5% of the full Table A value. However, we assume that most SWP contractors have other sources available with which to operate conjunctively with SWP deliveries and the appropriate level of delivery would be the average value during a drought episode, approximately 38% of the full Table A value. If the average level is to be relied on, the other sources must make up the variation within the drought period. In other words, SWP deliveries would have to be taken at the available level shown in the CALSIM II output. This might cause a rearrangement of

priorities of when all the other local sources are brought in to play in a given year. Ordinarily, local purveyors operate on a least cost basis meaning that sources are used in the order of increasing marginal cost. Since SWP marginal costs are likely in some instances to be greater than some local sources, the requirement to use SWP as available may require it to supersede the priority of some local sources in order that the notion of a reliable average delivery is indeed fact. This switch in priorities would entail some cost increases depending on the differences in marginal costs.

If a contractor has significant storage available, he may be able to store some wet year deliveries to be held in reserve for drought periods thereby increasing his reliance on SWP during droughts. The normal/wet period deliveries at 81% could be relied on with high confidence (95%) at the average minus 1.6 times the standard deviation. This 95% confidence level would then be 69% of the full Table A value. In other words, such a contractor could state with high confidence that in normal or wet periods he can rely on 69% of full Table A deliveries with the strong likelihood that in many years he could receive more if it can be utilized. Whether or not it can be utilized depends again on his willingness to reorder the priorities of use of all his sources with the expectation that such a reordering will increase overall costs of supply slightly.

Even if a highly confident 69% can be relied on for normal and wet periods, that leaves the question of what to do in drought periods. Clearly, there will be sufficient excess delivery that can be stored for drought use but the level depends critically on the magnitude of storage. If it was desired to bring the drought level of SWP use up to the normal/wet year reliable level, 69%, enough storage would have to provided to make up the 31% of Table a value represented by the difference between the drought period average and the 69% level. Thus, 31% per year for 6 years (the worst drought on record) of the contractor's Table A value would have to be kept in storage. This amounts to 1.86 times the contractor's Table A amount and there would have to be some allowance for storage losses, say 2.5 times would be reasonable. Thus, for such a contractor to rely on 69% deliveries from the SWP through wet and dry periods, he would have to have available in magnitude 2.5 times or so his Table A amount dedicated to SWP storage. For the entire SWP contract in the aggregate, this amounts to 2.5 times 4130 taf or approximately 10 million acre-feet. This would have to be storage south of the Delta since the CALSIM already takes maximum advantage of the pumping capability of the project.

Clearly, the right level of reliance on SWP deliveries depends on the circumstances for each contractor. Because it is highly unlikely that the storage requirement to reach 69% can be achieved for many contractors, especially the larger ones, a level lower than 69% will have to be calculated. Each contractor will have to do so independently.

**Some Conclusions**

We have shown that the values for SWP delivery reliability presented in DWR's report are not statistically valid. The level of 76%, which represents the average calculated by CALSIM over the 73 year record, cannot be assumed without question by any contractor and it is highly unlikely that such a level can be substantiated by any contractor. The DWR report does acknowledge that during the two 6 year drought

periods, a level of only 39% to 40% can be relied on. However, that is the average for a six year drought period and still requires each contractor to analyze how he will adjust his priorities of use among all his sources. Even levels in wet years may stretch an individual contractor's capabilities given that there are capacity constraints in the aqueducts that prevent taking full deliveries in low demand months without significant means for equalizing storage between low and high demand periods. In all of this it is important to recognize that seizing on an "average" value implies that deliveries will follow the project's capability to pump the amounts calculated in the CALSIM II model. This means that in wet years the water must be taken and either used or stored if the average is to have any meaning. The DWR report is not candid on this aspect.

(D)

February 2, 2004

Delores Brown
Chief, Mitigation and Restoration Branch
Department of Water Resources
3251 S Street, Sacramento, CA 95816

Dear Ms. Brown:

As you are aware, the CALSIM II External Review Panel issued its findings on December 4, 2003. This panel included some of the world's leading experts on water resource systems modeling. We applaud CALFED's willingness to solicit input from these experts, as well as the thoughtful conclusions that they reached during their brief but concentrated model review process.

We have carefully reviewed this document and find that it raises several issues relevant to the application of CALSIM II in the context of the Monterey Plus Environmental Impact Report, which must come to terms with both the applications and limitations of the model if it is to be used. While the Panel concluded that "CALSIM II represents a state-of-the-art modeling system" (page 4), the experts also pointed out several shortcomings regarding the current formulation of this system. In general, their findings indicate that while the use of a simulation model that employs optimization to solve the allocation problem is consistent with the current state of the practice, problems remain with the way this approach is being used to model the California water system. In fact, several of the Panel findings are coincident with concerns we have articulated in the EIR committees regarding the use of CALSIM II in the context of the Monterey Plus EIR.

The following excerpts, which are taken directly from the Strategic Review, highlight points of agreement between the Panel findings and our comments to DWR over the past several months.

1. Most successful applications of optimization that attempts to simulate the behavior of a system have calibrated the objective functions (i.e. set the weights that prioritize flows over time and space) so that the model results correspond to

what actually happens or would happen under a particular hydrologic and demand scenario. It does not appear that such a calibration of the objective function weights in CALSIM has yet been completed. (page 4)

2. The model provides limited and inadequate coverage of non CVP or SWP water and of the California water system south of the Delta. (page 8)

3. Regardless of how possible it is to match the model closely with observed behavior, statistics on the accuracy of the calibration run should be supplied to users to enable them to gauge the likely errors involved with using the model output. (page 9)

4. Examination of the report *'CALSIM II Simulation of Historical SWP/CVP Operations'*, indicates that the current formulation of CALSIM II:

    - Overestimates water deliveries to SWP and CVP contractors,
    - Determines carryover storage target values that differ from those the operators have determined in the past, and
    - Operates the San Luis Reservoir at lower levels and fills it later in the season than operators have in the past. (page 11)

5. Important aspects of CALSIM II rest upon the representations of other models of Delta hydrodynamics and water quality, water demands, and groundwater. The creditability of CALSIM II also rests on testing these models, which send important data/representations to CALSIM II, and documenting them adequately. (page 22)

6. In general, it appears that the developers of CALSIM II do not have a clear idea of how to define the scope of CALSIM II use and many of its applications are evolving in a reactionary manner. Model developers should identify clearly the desired uses for CALSIM II and then determine acceptable approaches for satisfying those desires. Developers should

> seek to improve data accuracy and overcome unrealistic assumptions to improve the confidence in model results. (page 25)

These findings, coming from such an esteemed review panel, deserve thorough review and assessment from DWR.

We ask that DWR be prepared present a plan to address these concerns at the next meeting of the Monterey Plus EIR Modeling Sub-Committee that is currently scheduled for February 18, 2004. We find it implausible to conclude that the results of any completed or anticipated CALSIM II runs could be considered relevant to the EIR process in advance of such an analysis. Assuming that you agree, we stand ready to work with DWR to define actions that can be taken to address the Panel's concerns.

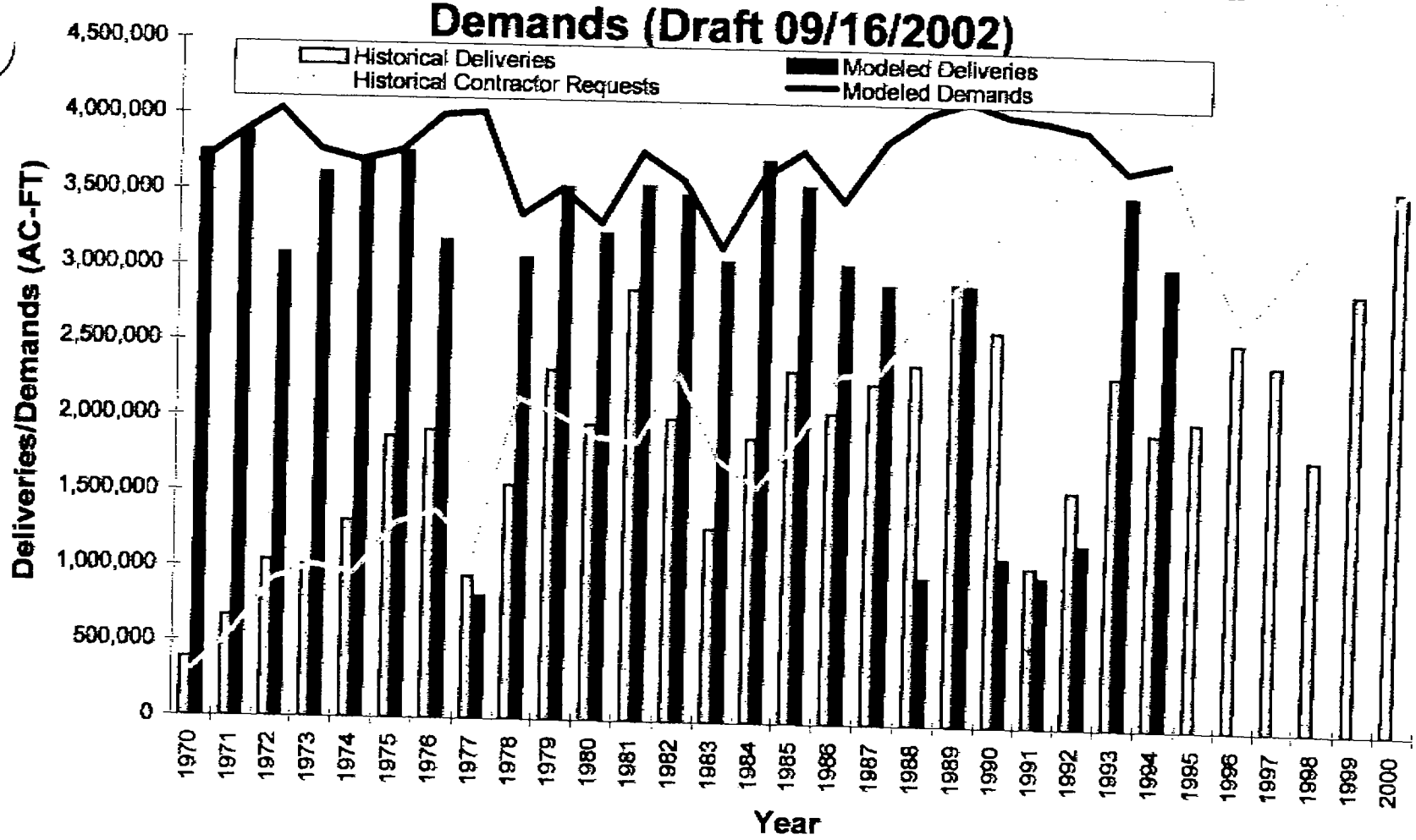
Sincerely,

Sage Sweetwood
Planning and Conservation League

E

DWR

# Historical versus Modeled Table A Deliveries and Demands (Draft 09/16/2002)



# Friends of the Santa Clara River

*660 Randy Drive, Newbury Park, California 91320-3036 • (805) 498-4323*



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*Ventura Chapter*

Ventura County Environmental Coalition

Wishtoyo Foundation


August 2, 2004

Mary Lou Cotton
Water Resources Manager
Castaic Lake Water Agency
27234 Bouquet Canyon Road
Santa Clarita, CA 91350

Re: Draft EIR for Supplemental Water Project Transfer of 41,000 Acre-Feet of State Water Project Table A Amount, State Clearinghouse Number 1998041127

Dear Ms. Cotton,

Friends of the Santa Clara River (FSCR) offers the following comments on the referenced Draft Environmental Impact Report (DEIR).

As we noted in our response to the Notice of Preparation, the Castaic Lake Water Agency (CLWA) is not the proper Lead Agency to prepare an Environmental Impact Report (EIR) for this project under the California Environmental Quality Act. **29**

The 1995 Monterey Agreement between the California Department of Water Resources (DWR) and water contractors of the State Water Project was put in place to control transfers of the type described in the subject document. There is at present no Monterey Agreement EIR because of the PCL decision of September 2000, which held that the Monterey Agreement EIR prepared by CCWA was inadequate. The court held that the DWR was the proper Lead Agency for this Agreement because only the DWR has the statewide perspective needed to evaluate the environmental impacts to the entire water distribution system. **30**

The EIR for the 41,000 acre-feet transfer must tier from a certified Monterey Agreement EIR, which does not currently exist. This was indeed suggested by the Second Appellate District Court decision of January 2002 in the case brought against CLWA by Friends of the Santa Clara River. Page 19 of this decision states that "Respondent may be able to cure the PCL problem by awaiting action by the state DWR complying with the PCL decision, then issuing a subsequent EIR, supplement to EIR, or Addendum to EIR (Guidelines 15162, 15163, 15164) tiering on a new Monterey Agreement EIR." **31**

Since CLWA cannot legally be the Lead Agency for the subject transfer, the only legitimate way for CLWA to proceed with EIR preparation is to await DWR's preparation and certification of a Monterey Agreement EIR. The subject DEIR is thus invalid and not in compliance with court decisions involving this transfer of state water. 32

Thank you for the opportunity to comment.

Sincerely,

Ron Bottorff

Ron Bottorff, Chair

RECEIVED
AUG 12 2004
By

Friends of the Santa Clara River
660 Randy Drive Newbury Park, California 91320 (805) 498 - 4323

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Surfrider Foundation

Ventura Audubon Society

8-6-04

Castaic Lake Water Agency
27234 Bouquet Canyon Rd.
Saugus, Ca. 91350

Re: 41,000 AF Transfer EIR SCH #1998041127

Dear Directors:

Please include the following correspondence between our attorney and the Department of Water Resources and their response regarding the timeline for the completion of the Monterey Agreement Environmental Impact Report. Because this EIR must be tiered on the State wide impacts addressed in the Monterey Agreement EIR and could not proceed without this Agreement, your Agency must wait until the state wide document has been certified before certifying the EIR for this project. 33

We continue to protest that you may not approve this document because you are not the correct lead agency for a project with state-wide impacts. Since the Dept. of Water Resources was found to be the legitimate lead agency for such a transfer in the decision *PCL v. DWR*, 2000, we protest your disregard for legal precedent on this matter. We note that your current general manager, Dan Masnada, is the same person that proceeded illegally in the above case when he was general Manager of Central Coast Water Agency. He is well aware that your agency is not proceeding according to law. 34

Further, we wish to state that none of these documents, nor the current EIR before you address the effects of an earthquake or levee break (such as recently occurred in the Sacramento Delta, news article attached). These emergencies were also not addressed in the Urban Water Management Plan 2000. We ask that you address how your agency intends to manage such a water emergency under current water availability scenarios and how water supply would be affected under such an emergency with the additional buildout this transfer would permit. 35

We ask that you respond to the recommendations made recently by the two experts, Kathy Kelly and Jonas Minton who gave testimony regarding State Water project availability before the City of Santa Clarita Planning Commission on June 29th, 2004. They both suggested that the planners should analyze the effect of cutbacks that would be required under the worst case historical delivery rate, 13% of Title A amounts in 1991, on existing businesses and residents in the Santa Clarita Valley. Since ground water sources are in the Santa Clarita Valley are fully utilized, substantial cutbacks would be required. This significant impact should be addressed. 36

Thank-you for your time.

Sincerely,
RON BOTTORFF, Chair

Attachments :
1. Court order in *PCL v. DWR*
2. Correspondence from Alyse Lazar to DWR dated May 18th, 2004 re: Status of Monterey Agreement EIR
3. Correspondence from DWR to Alyse Lazar dated June 16th, 2004 re: Status of Monterey
4. LA Times Article June 4th, 2004

FILED
ENDORSED

03 JUN -6 PM 3:27

SACRAMENTO COURTS
DEPT. #53

IN THE SUPERIOR COURT OF THE STATE OF CALIFORNIA

FOR THE COUNTY OF SACRAMENTO

| | |
|---|---|
| PLANNING AND CONSERVATION LEAGUE a California not for profit corporation, PLUMAS COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT, a California public agency; CITIZENS PLANNING ASSOCIATION OF SANTA BARBARA COUNTY, INC., a California not for profit corporation,<br><br>Plaintiffs and Petitioners,<br><br>v.<br><br>DEPARTMENT OF WATER RESOURCES, a California State Agency, et al.,<br><br>Defendants and Respondents. | Case No. 95CS03216<br><br>ORDER PURSUANT TO PUBLIC RESOURCES CODE SECTION 21168.9 |

On remand from the Third District Court of Appeal on May 20, 2003, in Department 53 of the Sacramento Superior Court, the Honorable Loren E. McMaster, presiding, this proceeding came on for a status report and joint motion. Petitioners and Plaintiffs, Planning and Conservation League, Plumas County Flood Control and Water Conservation District, and Citizens Planning Association of Santa Barbara County ("Petitioners"), appeared through Antonio Rossmann and Roger B. Moore. Respondent and Defendant, Central Coast Water Authority (CCWA), appeared through Susan F. Petrovich of the Law Firm of Hatch & Parent. Respondent and Defendant, Department of Water Resources (DWR), appeared through Deputy Attorney General Marian E. Moe.

Robert S. Draper of O'Melveny and Myers, LLP and Clifford W. Schulz appeared, respectively, on behalf of the Metropolitan Water District of Southern California and Dudley Ridge Water District, entities that submitted answers to the First Amended Complaint subsequent to the Court of Appeal's final determination in this action and prior to any further order of this Court on remand.

In light of the direction from the Third District Court of Appeal on remand in Planning and Conservation League v. Department of Water Resources (2000) 83 Cal.App.4th 892, this Court hereby makes the following findings:

1. The parties to this lawsuit and other public agencies have engaged in extensive settlement negotiations, mediated by retired Judge Daniel Weinstein of JAMS Dispute Resolution, with the intent to avoid further litigation and associated expenses, to provide for an effective way to cooperate in the preparation of a new environmental impact report (EIR), and to make other specified improvements in the administration and operation of the State Water Project.

2. The mediation has resulted in an executed Settlement Agreement for approval by this Court, attached to this Order as Exhibit A.

3. DWR as lead agency has commenced the preparation of the new EIR.

4. As part of the Settlement Agreement, DWR and the State Water Project (SWP) contractors who are signatories to the Settlement Agreement have agreed that, pending DWR's filing of a return in satisfaction of the Writ of Mandate and this Court's dismissal of the Writ of Mandate, they will not approve any new project or activity (as defined in section VII.A of the Settlement Agreement) in reliance on the 1995 Environmental Impact Report for the Implementation of the Monterey Agreement.

5. This Order is made pursuant to the provisions of Public Resources Code section 21168.9 and pursuant to this Court's equitable powers. This Court finds that the actions described in this Order, including actions taken in compliance with the Writ of Mandate, comprise the actions necessary to assure DWR's compliance with Division 13 of the Public Resources Code. This Court further finds that this Order includes only those

mandates necessary to achieve compliance with Division 13.

THEREFORE, IT IS HEREBY ORDERED as follows:

1. This Court's Final Judgment denying the petition for writ of mandate, entered August 15, 1996, is reversed in accordance with the directive of the Third District Court of Appeal's decision in Planning and Conservation League v. Department of Water Resources (2000) 83 Cal.App.4th 892.

2. This Court's order granting the summary adjudication on the fifth cause of action, entered June 10, 1996, is vacated.

3. The Settlement Agreement attached as Exhibit A is hereby approved.

4. A Peremptory Writ of Mandate directed to Respondents Central Coast Water Authority and DWR shall issue under seal of this Court in the form attached hereto as Exhibit B.

5. In accordance with the Settlement Agreement and this Order, pending DWR's filing of the return in compliance with the Peremptory Writ of Mandate and this Court's Order discharging the Writ of Mandate, DWR and CCWA shall not approve any new project or activity (as defined section VII.A of the Settlement Agreement) in reliance on the 1995 EIR for the Implementation of the Monterey Agreement.

6. In the interim, until DWR files its return in compliance with the Peremptory Writ of Mandate and this Court orders discharge of the Writ of Mandate, the administration and operation of the State Water Project and Kern Water Bank Lands shall be conducted pursuant to the Monterey Amendments to the State Water Contracts, as supplemented by the Attachment A Amendments to the State Water Contracts (as defined in the Settlement Agreement) and the other terms and conditions of the Settlement Agreement.

7. Plaintiffs and petitioners shall recover such costs and attorney's fees as provided in prior court orders and in an amount as determined in the arbitration procedures agreed to in the Settlement Agreement, or as otherwise agreed to by the parties.

8. Except as provided, the Peremptory Writ of Mandate shall not limit or constrain the lawful jurisdiction and discretion of DWR. This Court retains jurisdiction until DWR files a return that complies with the terms of the Writ of Mandate, and this Court issues an order discharging the Writ of Mandate.

IT IS SO ORDERED.

Dated: JUN - 6 2003, 2003

LOREN E. McMASTER

Judge of the Superior Court

LAW OFFICE OF
**ALYSE M. LAZAR**
**Attorney at law**
3075 East Thousand Oaks Blvd., Suite 100
Westlake Village, California 91362

Admitted to practice
*STATE BAR OF CALIFORNIA*
*NEW YORK STATE BAR*

Telephone: (805) 496-5390
Facsimile: (805) 496-7462

May 18, 2004

Lester Snow, Director
Department of Water Resources
Room 1115-1
P.O. Box 942836
Sacramento, California 94236

RE: New Monterey Agreement EIR

Dear Director Snow:

Pursuant to the Court decision in *Planning & Conservation League v. Department of Water Resources* (2000) 83 Cal.App.4th 892 (hereafter "*PCL*"), the Department of Water Resources is required to prepare a new Environmental Impact Report regarding all aspects of the Monterey Amendments. I understand that you will be overseeing this process.

The Settlement Agreement that was entered into between all of the parties to the *PCL* case on May 5, 2003 set forth various requirements for the EIR. According to Attachment E-1of this Settlement Agreement, the parties specifically excluded the 41,000 afy entitlements purchased by Castaic Lake Water Agency ("CLWA") emanating from the Monterey Amendments from the list of final transfers. It is therefore my understanding that your office will be evaluating the environmental impacts of this 41,000 afy transfer as part of the Environmental Impact Report for your project (the Monterey Amendments Project.) In fact, page 11, paragraphs III C.4 of the Settlement Agreement mandates DWR to analyze the potential environmental effects relating to CLWA's project ("the Kern-Castaic Transfer").

As you may also be aware, the EIR prepared by CLWA for the 41,000 afy transfer was decertified by the Los Angeles Superior Court on November 1, 2002 in *Friends of the Santa Clara River v. Castaic Lake Water Agency,* Los Angeles County Superior Court Case No. BS 056954. In order for CLWA's new EIR to be legally sufficient and in conformance with the appellate court's decision, it must contain an analysis of the potential environmental effects of the Kern-Castaic Transfer on the entities that have and will continue to lose this 41,000 afy source of water due to the transfer as well as the impacts on the State Water Project ("SWP") system resulting from the movement of this water from its source in Kern County to Santa Clarita. Logically and in conformance with CEQA, both DWR's EIR and CLWA's EIR must contain an analysis of the impacts from this loss of water upon Kern County agricultural users as well as all others affected by the transfer.

I currently represent Friends of the Santa Clara River in the *Friends of the Santa Clara River v. Castaic Lake Water Agency,* litigation. In the Judgment Granting Peremptory Writ of Mandate in the Friends' case, the Court ordered that it " retains jurisdiction until respondent Castaic Lake Water Agency certifies an Environmental Impact Report that complies with the California Environmental

Quality Act and is consistent with the views expressed by the Court of Appeal Opinion filed January 10, 2002, Case No. B 145283."

For these reasons, I am requesting that you provide me with a copy of any analysis performed to date by DWR regarding the potential environmental impacts of the Kern-Castaic transfer, whether in draft or final form.

Additionally, please advise me of the procedural steps that DWR will take before making a determination whether or not to approve the Kern-Castaic transfer as a "final" transfer and the criteria that will be utilized for making this determination. If there is a proposed schedule for the completion of the Monterey Amendments EIR and/or for these procedural steps for determining whether or not to approve the Kern-Castaic transfer as a long-term transfer, please provide me with a copy of same.

I would appreciate receiving this information from you by May 28, 2004. If you have questions regarding the above or would like to discuss the matter, please call me at (805) 496-5390. Thank you for your anticipated assistance. I look forward to hearing from you.

Very truly yours,

Alyse M. Lazar

cc: Delores Brown

STATE OF CALIFORNIA ~ THE RESOURCES AGENCY ARNOLD SCHWARZENEGGER, Governor

**DEPARTMENT OF WATER RESOURCES**
1416 NINTH STREET, P.O. BOX 942836
SACRAMENTO, CA 94236-0001
(916) 653-5791

JUN 17 2004

Alyse M. Lazar, Esq.
3075 East Thousand Oaks Boulevard, Suite 100
Westlake Village, California 91362

Dear Ms. Lazar:

In response to your letter of May 18, 2004, the Department of Water Resources (DWR) is preparing an Environmental Impact Report (EIR) on the Monterey Amendments and the Settlement Agreement resulting from the Court of Appeal decision in *Planning and Conservation League v. Department of Water Resources* (2000) 83 Cal.App.4th 892.

DWR's treatment of the transfer of Table A amounts from Kern Country Water Agency to Castaic Lake Water Agency will be governed by the Settlement Agreement. As provided in Paragraph III.C.4 of the Settlement Agreement, the EIR will include an "analysis of the potential environmental impacts relating to (a) the Attachment E transfers, and (b) the Kern-Castaic Transfer, in each case as actions that relate to the potential environmental impacts of approving the Monterey Amendments." Section 1(O) of the Settlement Agreement defines the "Kern-Castaic Transfer" as "the transfer of 41,000 acre feet of water from Kern Country Water Agency to the Castaic Lake Water Agency, approved by DWR on March 31, 1999." DWR has not completed any draft or final analysis regarding these transfers. Attached is an estimated schedule for completion of the EIR.

The Settlement Agreement (Section III.E) also provides "with respect to Section III.(C)(4)(b) regarding the Kern-Castaic Transfer, the Parties recognize that such water transfer is subject to pending litigation. The Parties agree that jurisdiction with respect to that litigation should remain in that court and that nothing in this Settlement Agreement is intended to predispose the remedies or other actions that may occur in that pending litigation."

If you would like further information regarding the EIR on the Monterey Amendments and the Settlement Agreement, please contact Delores Brown at (916) 227-2407.

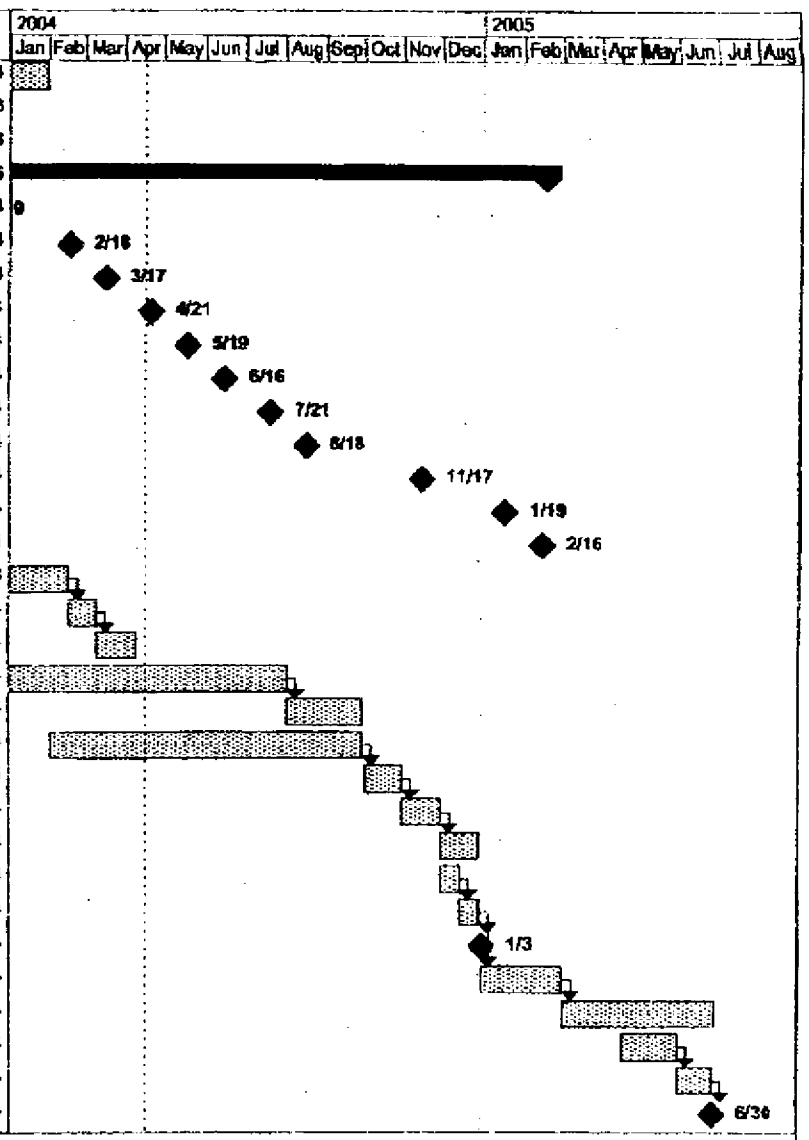
Sincerely,

Gerald E. Johns

for Lester A. Snow
Director

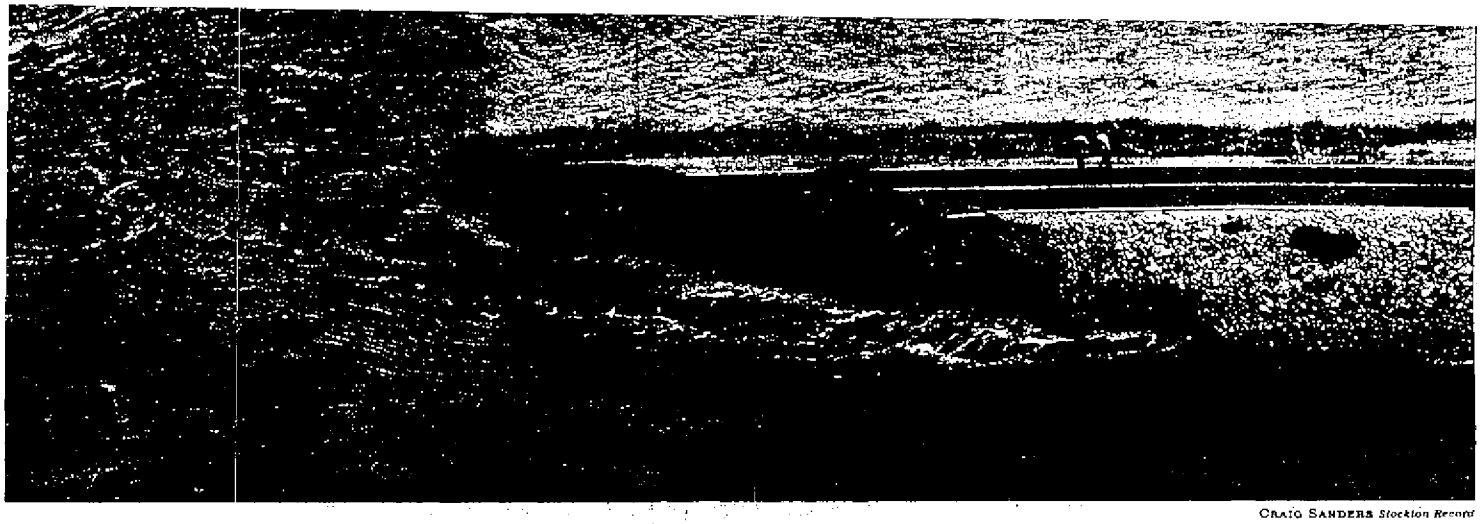
Attachment

| ID | Task Name | Start | Finish |
|---|---|---|---|
| 1 | Conduct non-model dependent environmental analyses | Wed 10/1/03 | Fri 1/30/04 |
| 2 | DWR Review of selected sections | Mon 11/3/03 | Fri 11/7/03 |
| 3 | EIP Revise | Mon 11/10/03 | Wed 11/12/03 |
| 4 | **EIR Committee Meetings** | **Wed 11/19/03** | **Wed 2/16/05** |
| 5 | Meeting 1 | Wed 11/19/03 | Wed 11/19/03 |
| 6 | Meeting 2 | Wed 2/18/04 | Wed 2/18/04 |
| 7 | Meeting 3 | Wed 3/17/04 | Wed 3/17/04 |
| 8 | Meeting 4 | Wed 4/21/04 | Wed 4/21/04 |
| 9 | Meeting 5 | Wed 5/19/04 | Wed 5/19/04 |
| 10 | Meeting 6 | Wed 6/16/04 | Wed 6/16/04 |
| 11 | Meeting 7 | Wed 7/21/04 | Wed 7/21/04 |
| 12 | Meeting 8 | Wed 8/18/04 | Wed 8/18/04 |
| 13 | Meeting 9 | Wed 11/17/04 | Wed 11/17/04 |
| 14 | Meeting 10 | Wed 1/19/05 | Wed 1/19/05 |
| 15 | Meeting 11 | Wed 2/16/05 | Wed 2/16/05 |
| 16 | Prepare Admin Draft EIR Part 1 | Wed 10/1/03 | Mon 2/16/04 |
| 17 | DWR Review | Tue 2/17/04 | Tue 3/9/04 |
| 18 | EIP Revise | Wed 3/10/04 | Thu 4/8/04 |
| 19 | Conduct CALSIM modeling & Post Processing | Mon 12/1/03 | Mon 8/2/04 |
| 20 | Conduct Model-dependent Environmental Analysis | Tue 8/3/04 | Fri 10/1/04 |
| 21 | Prepare Admin Draft EIR Part 2 | Mon 2/2/04 | Fri 10/1/04 |
| 22 | DWR Review | Mon 10/4/04 | Mon 11/1/04 |
| 23 | EIP Revise | Tue 11/2/04 | Wed 12/1/04 |
| 24 | Prepare Draft EIR | Thu 12/2/04 | Fri 12/31/04 |
| 25 | DWR Review | Thu 12/2/04 | Thu 12/16/04 |
| 26 | EIP Revise | Fri 12/17/04 | Fri 12/31/04 |
| 27 | Publish DEIR | Mon 1/3/05 | Mon 1/3/05 |
| 28 | Public Review of Draft EIR | Mon 1/3/05 | Thu 3/3/05 |
| 29 | Prepare Final EIR | Fri 3/4/05 | Thu 6/30/05 |
| 30 | DWR Review | Wed 4/20/05 | Thu 6/2/05 |
| 31 | EIP Revise | Fri 6/3/05 | Wed 6/29/05 |
| 32 | Publish FEIR | Thu 6/30/05 | Thu 6/30/05 |




Project: Montrey Plus EIR Schedule
Date: Fri 4/16/04

Task | Split | Progress | Milestone | Summary



CRAIG SANDERS *Stockton Record*

**A TORRENT:** *Water pours through an estimated 300-foot break in a levee along the Middle River into low-level farmland about 20 miles west of Stockton.*

# Levee Break Forces 300 to Evacuate

San Joaquin Valley farmland is flooded, shutting a rail line. Drinking water supplies for millions could be affected.

By SARA LIN
*Times Staff Writer*

A levee break in fields west of Stockton on Thursday morning prompted the evacuation of about 300 people from a farming community, and forced federal and state water agencies to slow the pumping of delta water for irrigation and drinking water.

The break, estimated at 300 feet long, was discovered about 8:30 a.m. on the Middle River along Bacon Island Road north of California 4, about 20 miles west of Stockton, said Connie Cassinetto, a spokeswoman for the San Joaquin County Office of Emergency Services.

The amount of freshwater rushing across the low-lying farmlands of man-made Bacon Island is enough to supply 150,000 families for one year. Authorities expect the change in water levels to cause salt water from San Francisco Bay to seep into the San Joaquin-Sacramento River Delta, threatening freshwater fish and the quality of drinking water supplies for cities, including Los Angeles.

The federal Bureau of Reclamation cut its water exports from the delta by 80%, said spokesman Jeff McCracken. The California Department of Water Resources halted its exports from the area completely.

"We need to wait until island flows have stabilized to get decent readings on what salinity levels look like," McCracken said.

After that, he said, state and federal water agencies probably would consider releasing water from storage facilities to freshen the delta.

The break occurred on a stretch known as Upper Jones Tract, close to a main rail line and several pipelines that carry water to the San Francisco Bay Area. The pipes, located a mile north of the break, were not affected by floodwaters. Officials said those pipelines have been submerged before.

At 1:30 p.m., officials at the Burlington Northern and Santa Fe Railway shut down one of its two main lines after water reached the edge of the track.

While trains were being operated at restricted speeds on the second line, officials said they would shut it down if water crept closer. Forty trains pass daily through the area.

The railroad tracks, which were built on raised trestles where a levee broke in 1980, divide the island's 12,000 acres roughly in half and are keeping floodwaters from contaminating the lower portion of the island.

"Those levees in the delta are very old and very fragile," said Don Strickland, a spokesman for the Department of Water Resources.

Most levees were not built properly, he said, and were created more than a century ago by "farmers pushing dirt together."

"Over the years," he said, "more people put up dirt and rocks, and then people put a highway on it."

As a result, many of the man-made islands in that region sit more than 10 feet below sea level.

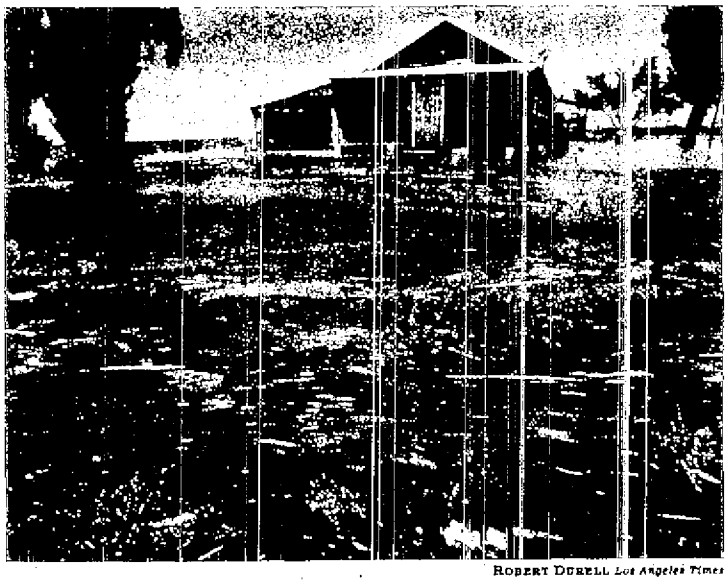
California Highway Patrol officials said a high-pressure fuel line in the flood zone was shut down, but there were no immediate plans to close California 4.

"This mostly affects farmers, their equipment, and some migrant farm laborers," Cassinetto said.

Typically, fewer than 100 migrant workers live in camps in the area, primarily used to farm row crops such as alfalfa, she said.

County officials expected water to spill through the break into the night before engineers could plug it and begin pumping water out.

"When these levees break, it's pretty slow. It's not like a flood," Cassinetto said. A levee can break at any time, she added. "They're just dirt."



ROBERT DURELL *Los Angeles Times*

**ENGULFED:** *Floodwaters surround a farmworker house about three miles from the levee. The occupants were among about 300 people who had to be evacuated.*

## Tell of Laci Last Hours

## Issues facing voters in November

The Nov. 2 general election ballot will lead with the race for U.S. president but will include 14 California measures, the last of which was qualified Thursday by the secretary of state.

Railroad — A $9.95-billion bond ... strike and imposes more severe

## Jury Deliberations Begin in Killing of Transgender Teen

# PCL

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Sanctuary Forest
San Elijo Lagoon Conservancy
Save Mount Diablo
South Yuba River Citizens League

Mary Lou Cotton
Water Resources Manager
Castaic Lake Water Agency
27234 Bouquet Canyon Road
Santa Clarita, CA 91350
(661) 297-1600

August 16, 2004

Dear Ms. Cotton:

This letter provides comments on the Draft EIR entitled *Supplemental Water Project Transfer of 41,000 Acre-Feet of State Water Project Table A Amount*, on behalf of the Planning and Conservation League (PCL) and the Citizens Planning Association of Santa Barbara County (CPA). If finalized, that transfer would be the largest permanent agriculture-to-urban transfer under article 53 of the Monterey Amendments, with major implications for water resources and land use planning in Southern California. The environmental impacts of these amendments, including the instant transfer, remain to be addressed in DWR's pending "Monterey Plus" EIR review. The scoping comments submitted for that review (attached as Exhibit 1), including those of PCL, should be studied in connection with the present EIR review. **37**

PCL and CPA were among the plaintiffs whose successful CEQA challenge set aside the Central Coast Water Authority's original 1995 Monterey Program EIR. That ruling led to decertification of the predecessor EIR for Castaic's transfer, which unlawfully relied upon that defective analysis. **38**

The instant Draft EIR, prepared by the same firm (SAIC) as the decertified Monterey EIR, provides a case of history repeating itself. It is legally insufficient in process and substance, failing Castaic's duty under CEQA to properly inform decision-makers and the public of the project's environmental consequences. The Draft EIR cannot be reconciled with the Monterey Amendments court decision (*Planning and Conservation League v. Department of Water Resources* (2000) 83 Cal.App.4th 892) and the settlement agreement later reached in that case. (The full Settlement Agreement appears on DWR's website at http://www.montereyamendments.water.ca.gov/.)

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## PROCESS ISSUES:

### Failure to Address Comments

PCL and CPA submitted a comment letter on August 22, 2004. This letter, attached as exhibit 1, addressed both the instant transfer and a related proposal to transfer 16,000 acre-feet of Table A amounts from another of the Kern County Water Agency's member districts. PCL urged Castaic that it should "refrain from moving forward with these separate project reviews, which are premature and likely to operate at cross-purposes with DWR's statewide review" of the project referenced in the Monterey Amendments case settlement. PCL and CPA advised Castaic that if it prematurely attempted to proceed with separate EIRs on these permanent transfers, it would "lack the institutional authority and statewide accountability" to serve as CEQA lead agency. The Draft EIR simply ignores PCL's comments, and sidesteps similar ones made by other organizations. 39

PCL filed similar comment letters on several local projects contesting Castaic's improper and premature reliance on the 41,000 acre-feet transfer as an integral part of its reliable water supply. These comments (addressing, respectively, the West Creek Project, the River Village Project, and the Riverpark project) are attached as exhibits 2-4. They raise important questions affecting the adequacy of this EIS, as well as the prospect of possible cumulative impacts not addressed in Castaic's draft. 40

### Inconsistency with DWR's "Monterey Plus" Review 41

Castaic's so-called "stand-alone" Draft EIR is fraught with potential for inconsistency with DWR's upcoming environmental review and decision on the "Monterey Plus" project. That review will address the identical transfer from a statewide perspective, with an integrated analysis of that project in its entirety. Castaic lacks the expertise and authority to proceed based upon its isolated assessment of project impacts, alternatives, and mitigation, each of which may well be undermined by DWR's subsequent analysis and decision.

Two recent Second District Court of Appeals cases reinforce the point that Castaic Lake Water Agency (CLWA) should not pursue its own independent EIR on the 41,000 acre foot transfer in advance of the 42

completion of DWR's tier-one "Monterey Plus" EIR. 42

In *Friends of the Santa Clara River v. Castaic Lake Water Agency* (2002) 95 Cal.App.4th 1373, the Second District court of appeal ordered the decertification of the previous EIR Castaic prepared to support the instant transfer. The Friends group and other environmental organizations opposed the project decision on that Kern/Castaic transfer, citing environmental consequences in the Santa Clara River area and association with numerous sprawl development projects. In its CEQA assessment, the court recognized that the proposed 41,000 acre-feet transfer "is part of an overall larger scheme, analyzed on a programmatic basis in the Monterey Agreement EIR." (*Id.* at 1384.)

Another recent Second District appellate decision, *Santa Clarita Organization for Planning and the Environment (SCOPE) v. County of Los Angeles* (2003) 106 Cal.App.4th 715, critically addressed Castaic's characterization of the 41,000 acre-feet transfer. In that case, the County of Los Angeles violated CEQA in its review of the West Creek development project that erroneously assumed that 100 per cent of Castaic's purported 41,000 acre-feet would be available in wet years and 50 per cent in drought years. Drawing on *Planning and Conservation League's* assessment of the historic disparity between Table A amounts and deliverable water, the court concluded that the EIR failed to undertake a "serious and detailed analysis" of State Water Project supplies, and observed that "[t]he dream of water entitlements for the incomplete State Water Project is no substitute for the reality of actual water the SWP can deliver." (*Id.* at pp. 723, 717.) 43

**Inconsistency with the "Lead Agency" Principle**

The Courts have also emphasized that DWR must act as lead agency in performing Tier 1 environmental studies. If Castaic continues with its separate environmental reviews without awaiting DWR's assessment in the "Monterey Plus" EIR, it would violate CEQA's lead agency requirement based upon the well-established standards set forth in *Planning and Conservation League v. Department of Water Resources*. The court in that case could hardly have been clearer that *DWR* is the "state agency charged with the statewide responsibility to build, maintain, and operate" the State Water Project. (*Id.* at p. 906.; see also Wat. Code, §12930, *et seq.*) Finding that DWR was the only entity with the requisite statewide perspective and expertise to serve as lead agency, the court found it "incongruous to assert that any of the regional contractors" could "assume 44

DWR's principal responsibility for managing the SWP." (*Id.*) 44

The court-approved settlement agreement in *Planning and Conservation League* recognizes DWR's duty as "the State agency responsible for administration and operation of the SWP," as well as its continuing obligation to comply with applicable requirements of CEQA and the Water Code. (Settlement Agreement, Section X.B.) The transfer guidelines disclosed to contractors under the settlement agreement also recognize the continuing need to comply with all existing legal requirements, including CEQA, and to honor the lead agency principles identified in the Third District's decision in the Monterey Amendments case (see http://ceres.ca.gov/ceqa/cases/2000/PCLvDWR-2000.html).

These principles apply clearly to the proposed permanent transfers of the Table A amounts referenced in the state project contracts, which require DWR's approval and presuppose the application of Monterey. They also concededly require changes in the amount of supplies available to several water agencies, the location and timing of project deliveries, and changed utilization of the project's conveyance and storage facilities. The transfers, which may require the fallowing of farmland in agricultural areas outside the jurisdiction of CLWA and are associated with proposed annexations linked to some of the more controversial development projects in California, demand the statewide authority and experience that only DWR can provide.

**Improper Hypothetical Assessment of Non-Monterey Transfer**

Lastly, Castaic's hypothetical "non-Monterey" analysis of the transfers in the Draft EIR cannot substitute for DWR's new assessment of the Monterey changes. In *Friends*, Castaic unsuccessfully attempted to portray its transfer EIR as capable of standing alone, outside the Monterey Amendments program. Although transfers were available under Article 41 of the pre-Monterey State Water Project contracts subject to express DWR approval, DWR has neither reviewed nor conferred approval on the present transfer under Article 41. Moreover, it is highly speculative whether agriculture-to-urban transfers such as the 41,000 acre foot transfer would even have taken place without the Monterey Amendments, since those Table A amounts would have been subject to "agriculture first" cutbacks under pre-Monterey article 18(a). Read in context, such maneuvers would amount to little more than the "straw man" argument considered and rejected in the *Friends* appeal. (95 Cal.App. 4th at p. 1387.) 45

## SUBSTANTIVE ISSUES

### Mischaracterization of Settlement Agreement

The instant Draft EIR, includes glaring errors. A piecemeal and startlingly inaccurate description of the Monterey case Settlement Agreement (ES 2-4) fails even to inform the reader that DWR's statewide review of the "Monterey Plus" project could affect the future of this transfer or of the Monterey Amendments themselves. 46

The "Settlement Agreement underscores the non-finality of the 41,000 acre-feet transfer and the need for DWR's statewide review. For example: 47

- Section III.D refers to a list of transfers listed in attachment E to the agreement, which the settling parties, without specifically endorsing or opposing them, recognize as "final" and agree not to challenge. This transfer is *not* included in that list.

- Further evidence of the non-finality of the Castaic transfer is that section III.E singles out this transfer for a special acknowledgment recognizing that it is the subject of pending litigation in this Court.[1]

- Section III.C.4 recognizes DWR's commitment to provide in its forthcoming statewide programmatic EIR an "[a]nalysis of the potential environmental effects" relating to "the Kern-Castaic Transfer," identifying it as one of the actions "that relate to the potential environmental impacts of approving the Monterey Amendments."

DWR has recently confirmed that this transfer remains subject to the Settlement Agreement and its future "Monterey Plus" EIR. As DWR Director Lester Snow wrote on June 17, 2004 to *Friends* case lead counsel 48

[1] The Draft EIR erroneously attempts to recast this provision as a "specific exclusion" of this transfer from "any prohibitions against transfers of Table A amounts by the Settlement Agreement." That is simply wrong. Section III.E recognizes that this transfer is "subject to pending litigation in the Los Angeles Superior Court following remand from the Second District Court of Appeal." It reflects a recognition that "jurisdiction with respect to that litigation should remain in the [Los Angeles] court," and the settling parties' concurrence that "nothing in this settlement agreement is intended to predispose the remedies or other actions that may occur in that pending litigation."

Alyse Lazar, "DWR's treatment of the transfer of Table A amounts from Kern County Water Agency to Castaic Lake Water Agency will be governed by the Settlement Agreement. As provided in Paragraph 111C4 of the Settlement Agreement, the EIR will include an "analysis of the potential environmental impacts relating to (a) the Attachment E transfers, and (b) the Kern-Castaic Transfer, in each case as actions that relate to the potential environmental impacts approving the Monterey Amendments." Section 1(0) of the Settlement Agreement defines the "Kern-Castaic Transfer" as "the transfer of 41,000 AF of water from Kern County Water Agency to the Castaic Lake Water Agency, approved by DWR on March 31, 1999." DWR has not completed any draft or final analysis regarding these transfers." Given both the required state leadership on an ongoing Tier 1 environmental study and the pending litigation, the future of the Castaic transfer and, indeed, the broader Monterey Amendments, cannot be assumed. 48

The Draft EIR's assertion that the Settlement Agreement "did not change the substance of the Monterey Amendments" is also misleading. Although those amendments are part of the "Monterey Plus" project, the agreement also eliminates misleading references to "entitlements" from the state contracts and adds a new provision to the contracts imposing water reporting requirements. The agreement also imposes a host of other substantive changes in State Water Project operation that should be described in the Final EIR. 49

**Faulty Assessment of the No Project and Project Alternatives**

Castaic's refusal to await DWR's "Monterey Plus" EIR would fatally compromise its ability to identify alternatives to the proposed transfer that might maximize its benefits and minimize its environmental impacts statewide prior to rendering the transfer a *fait accompli*. DWR's EIR will programmatically address Castaic's transfer in the context of statewide contract amendments. A major issue requiring assessment in that document will be the possible *alternative* dispositions of the 41,000 acre feet of Table A amounts to serve other uses. To list several possible examples, the alternative uses subject to statewide analysis might include ecological restoration, urban infill development in Los Angeles or San Diego, and relief from cutbacks of Colorado River deliveries in excess of the California's 4.4 million acre-feet in annual entitlement. (See *Arizona v. California* (1964) 376 U.S. 340 (Colorado River); fn. 7, *supra* p. 16).) In short, legally adequate assessment of these issues under CEQA will require 50

DWR's "statewide perspective" rather than the provincial experience of a local water agency, and demands recognition that this transfer is an overall part of the Monterey program. (*Friends I*, 95 Cal.App.4th at p. 1384.) 50

**Faulty Assessment of Water Reliability**

The Draft EIR's water supply assessment (especially in sections 3.15 and Appendix D) make highly problematic assumptions about state water reliability, as well as the availability of "surplus" water under Article 21 of the state project contracts. DWR's record of deliveries to contractors under the SWP figured centrally in the Third District's conclusion that the 1995 EIR must be set aside. (See *PCL v. DWR*, 83 Cal. App. 4th at 908 (noting the "huge gap between what is promised and what can be delivered" and that "actual, reliable water supply" is "in the vicinity of 2 to 2.5 MAF of water annually" rather than the 4.23 MAF of Table A "entitlements"); 83 Cal. App. 4th at 913 (average actual deliveries under the SWP from 1980-1993 "were around 2.0 MAF"). A frank assessment of DWR's record of deliveries is essential to a wide variety of issues addressed in the EIR, including the no project alternative as well as the assessment of hydrologic impacts, land use and planning impacts, growth-inducing impacts, and cumulative impacts. Anticipating the importance of this issue, the Monterey Settlement Agreement required periodic SWP reporting on the reliability of SWP deliveries. 51a 51b 51c

The Draft EIR uses dubious modeling assumptions to claim an average of annual deliveries exceeding the historical record by approximately a million acre-feet. (See DEIR, 3.15-7.) In part, Castaic's EIR relies upon dated studies employing an outmoded model (DWRSIM). To move beyond DWRSIM's obvious deficiencies, the Draft EIR also makes unwarranted extrapolations from DWR's 2003 reliability report. 51d 51e 51f

That report has faced significant controversy regarding its overall conclusions and the computer modeling that underpins its reliability projections. For instance, the reliability report constructs delivery probability charts for the SWP for two years, 2001 and 2021. As noted by several commenters, the median delivery identified in the report (3.297 MAF) is on the order of 50% greater than the actual record of historic deliveries to the SWP as reported by DWR. A detailed analysis by Dennis O'Connor for the California Research Bureau, referenced in the comment 51g

letter of Senator Machado,[2] indicates that the draft reliability report provides no credible explanation for this disparity. O'Connor's analysis concludes that among other problems, the results are inconsistent with previous estimates and models, recent deliveries were lower than the modeled 2001 conditions, and 2021 does not reflect any growth in upstream consumptive use. His assessment also observes that CALSIM II is not calibrated or otherwise verified, and that the draft reliability report does not use the CALSIM II model as designed. Because the draft reliability report appears to overstate the supply reliability of the SWP, O'Connor's analysis warns that DWR's assessments of reliability should not replace the "paper water" problem with a new, simulation-based "cyber water" problem. Other comment letters, notably those of Robert C. Wilkinson, Peter Gleick, and Arve Sjovold, reach similar conclusions. (Please see http://swpdelivery.water.ca.gov/ and comments submitted regarding the instant EIR by Arve Sjovold.) **51g**

Controversy over the reliability report, on which this EIR relies, led to review of CALSIM II modeling by an External Review Panel including some of the world's leading experts on water resource systems. Their report, "Strategic Review of CALSIM II and its Use for Water Planning, Management, and Operations in Central California" was released on December 4, 2003. The Panel raised serious concerns regarding the application of the model to predicting reliable deliveries, especially as those deliveries related to particular contractors. Many of the Panel findings agree with concerns we have articulated throughout the Monterey EIR process. Notably, the Panel found that: **51h**

- "Examination of the report "CALSIM II Simulation of Historical SWP/CVP Operations,' DWR (2003) indicates that the current formulation of CALSIM II: Overestimates water deliveries to SWP and CVP contractors…" (p. 11)
- "Most successful applications of optimization [CALSIM's type of computer model] …have calibrated their objective functions…so that the model results correspond to what actually happens or would happen under a particular hydrologic and demand scenario…It does not appear that such a calibration of the objective function weights in CALSIM has yet been completed." (p. 4)

[2] See Appendix E page E-94 at http://swpdelivery.water.ca.gov/SWP%20Delivery%20Reliability.final.2002.pdf.

- "...currently many users are not sure of the accuracy of the results. A sensitivity and uncertainty prediction capability and analysis is needed" (p. 8) 51h
- "In our opinion, CALSIM II has not yet been calibrated or validated for making absolute predictions values." (p. 9)
- Regardless of how possible it is to match the model closely with observed behavior, statistics on the accuracy of the calibration run should be supplied to users to enable them to gauge the likely errors involved with using the model output. (page 9)
- In CALSIM II, "Groundwater resources are assumed infinite, i.e., there is no upper limit to groundwater pumping." (p. 8)
- "Realistic upper bounds to pumping from any of the aquifers represented in the model need to be developed and implemented." (p. 27)
- "In general, the level of representation of groundwater in CALSIM II is not reasonable from the point of view of the reviewers." (p. 27)
- "In many cases, it appears that water use and other hydrologic data inputs to CALSIM II are based on data collection and analyses that took place during the 1960's when DWRSIM and PROSIM were being constructed. It is important to ensure that data used for CALSIM II are up-to-date and consistent with the best current information." (p. 20).
- In general, it appears that the developers of CALSIM II do not have a clear idea of how to define the scope of CALSIM II use and many of its applications are evolving in a reactionary manner. Model developers should identify clearly the desired uses for CALSIM II and then determine acceptable approaches for satisfying those desires. Developers should seek to improve data accuracy and overcome unrealistic assumptions to improve the confidence in model results. (page 25)

Furthermore, as numerous CEQA cases have consistently held, local agencies such as CLWA have an independent responsibility to adequately assess reliability. Castaic therefore, and cannot rest its analysis solely on its old DWRSIM studies and the DWR Reliability Report. 52

**Faulty Assessment of Growth-Inducing Impacts**

Without adequate review, the transfer would place available water in one of the places in California most likely to promote urban sprawl and destroy environmental habitat The Draft EIR's growth inducement section (Chapter 4) fails to appreciate the significance of this transfer as a linchpin of sprawl development. Following the *PCL* decision and through the Monterey EIR, the state has a responsibility and, as noted above is the only entity with the requisite resources and purview, to determine the environmental impacts, particularly including induced growth impacts, of transfers such as the 41,000 acre-foot transfer. Local agency analysis of these impacts prior to the Tier I Monterey EIR impermissibly and imprudently ignore the state's role in considering alternatives to that transfer which would, for example, meet existing shortfalls in developed Southern California dependent on diminishing Colorado River supplies, while avoiding "dumb growth" in the undeveloped frontier at the Los Angeles-Kern County border. **53**

Rather than squarely confronting the scope and mitigation of growth inducement, the Draft EIR improperly defers the issue to subsequent decisions of local agencies on individual projects. A "chicken and egg" problem emerges here. As reflected in PCL's comment letters on specific projects, local agencies are relying upon *Castaic* to inform them of the reliable water available to support specific proposed projects ranging in scope from small developments to Newhall Ranch. The Draft EIR is entirely speculative in its assumption that project-related growth can be mitigated to insignificance. This issue cannot be credibly reviewed in isolation from the statewide Monterey EIR. **54**

Your consideration of these comments is greatly appreciated.

Sincerely,

Sage Sweetwood

Sage Sweetwood
President, PCL

Naomi Kovacs, MPA
Executive Director, CPA

STATE OF CALIFORNIA • THE RESOURCES AGENCY ARNOLD SCHWARZENEGGER, Governor
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JUN 17 2004

Alyse M. Lazar, Esq.
3075 East Thousand Oaks Boulevard, Suite 100
Westlake Village, California 91362

Dear Ms. Lazar:

In response to your letter of May 18, 2004, the Department of Water Resources (DWR) is preparing an Environmental Impact Report (EIR) on the Monterey Amendments and the Settlement Agreement resulting from the Court of Appeal decision in *Planning and Conservation League v. Department of Water Resources* (2000) 83 Cal.App.4th 892.

DWR's treatment of the transfer of Table A amounts from Kern Country Water Agency to Castaic Lake Water Agency will be governed by the Settlement Agreement. As provided in Paragraph III.C.4 of the Settlement Agreement, the EIR will include an "analysis of the potential environmental impacts relating to (a) the Attachment E transfers, and (b) the Kern-Castaic Transfer, in each case as actions that relate to the potential environmental impacts of approving the Monterey Amendments." Section 1(O) of the Settlement Agreement defines the "Kern-Castaic Transfer" as "the transfer of 41,000 acre feet of water from Kern Country Water Agency to the Castaic Lake Water Agency, approved by DWR on March 31, 1999." DWR has not completed any draft or final analysis regarding these transfers. Attached is an estimated schedule for completion of the EIR.

The Settlement Agreement (Section III.E) also provides "With respect to Section III.(C)(4)(b) regarding the Kern-Castaic Transfer, the Parties recognize that such water transfer is subject to pending litigation. The Parties agree that jurisdiction with respect to that litigation should remain in that court and that nothing in this Settlement Agreement is intended to predispose the remedies or other actions that may occur in that pending litigation."

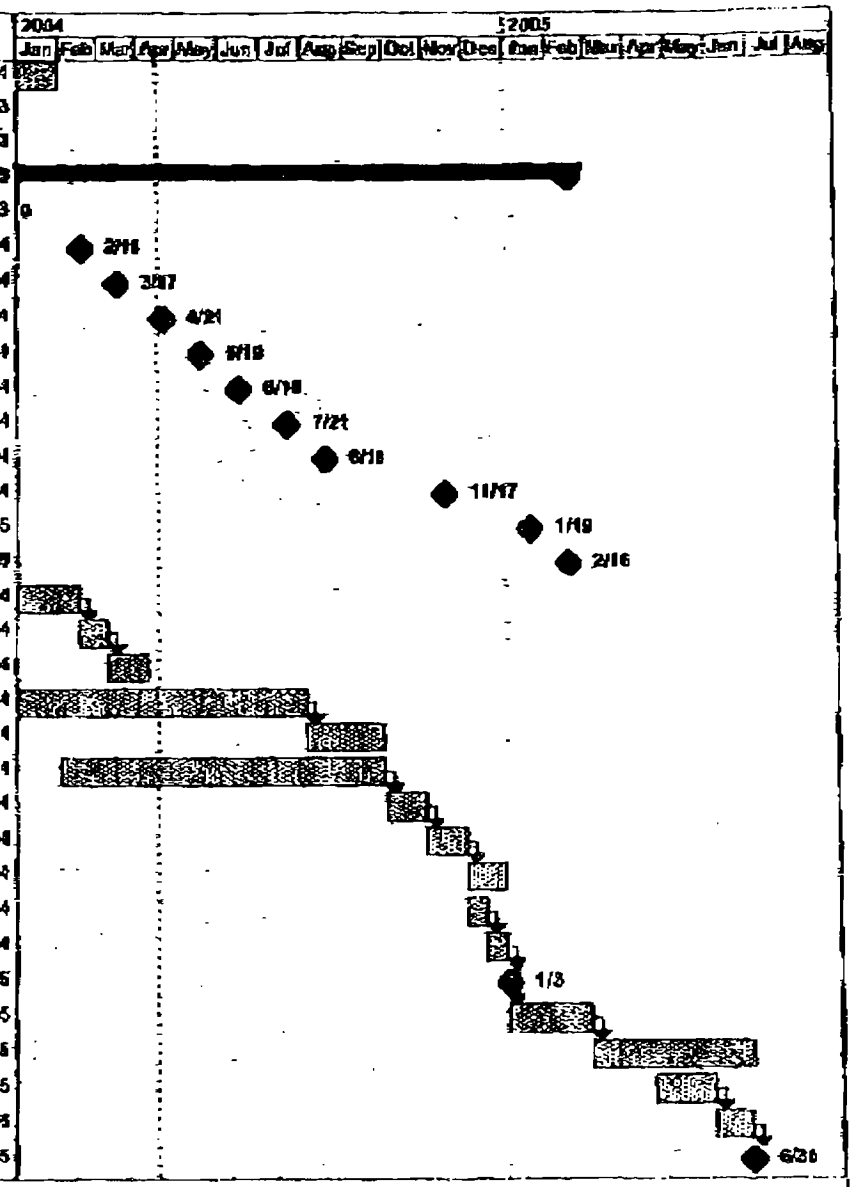
If you would like further information regarding the EIR on the Monterey Amendments and the Settlement Agreement, please contact Delores Brown at (916) 227-2407.

Sincerely,

for Lester A. Snow
Director

Attachment

| ID | Task Name | Start | Finish |
|---|---|---|---|
| 1 | Conduct non-model dependent environmental analyses | Wed 10/1/03 | Fri 1/30/04 |
| 2 | DWR Review of selected sections | Mon 11/3/03 | Fri 11/7/03 |
| 3 | EIP Revise | Mon 11/10/03 | Wed 11/12/03 |
| 4 | EIR Committee Meetings | Wed 11/19/03 | Wed 2/18/05 |
| 5 | Meeting 1 | Wed 11/19/03 | Wed 11/19/03 |
| 6 | Meeting 2 | Wed 2/18/04 | Wed 2/18/04 |
| 7 | Meeting 3 | Wed 3/17/04 | Wed 3/17/04 |
| 8 | Meeting 4 | Wed 4/21/04 | Wed 4/21/04 |
| 9 | Meeting 5 | Wed 5/19/04 | Wed 5/19/04 |
| 10 | Meeting 6 | Wed 6/16/04 | Wed 6/16/04 |
| 11 | Meeting 7 | Wed 7/21/04 | Wed 7/21/04 |
| 12 | Meeting 8 | Wed 8/18/04 | Wed 8/18/04 |
| 13 | Meeting 9 | Wed 11/17/04 | Wed 11/17/04 |
| 14 | Meeting 10 | Wed 1/19/05 | Wed 1/19/05 |
| 15 | Meeting 11 | Wed 2/16/05 | Wed 2/16/05 |
| 16 | Prepare Admin Draft EIR Part 1 | Wed 10/1/03 | Mon 2/16/04 |
| 17 | DWR Review | Tue 2/17/04 | Tue 3/2/04 |
| 18 | EIP Revise | Wed 3/10/04 | Thu 4/8/04 |
| 19 | Conduct CALSIMmodeling & Post Processing | Mon 12/1/03 | Mon 8/2/04 |
| 20 | Conduct Model dependent Environmental Analysis | Tue 8/3/04 | Fri 10/1/04 |
| 21 | Prepare Admin Draft EIR Part 2 | Mon 2/2/04 | Fri 10/1/04 |
| 22 | DWR Review | Mon 10/4/04 | Mon 11/1/04 |
| 23 | EIP Revise | Tue 11/2/04 | Wed 12/1/04 |
| 24 | Prepare Draft EIR | Thu 12/2/04 | Fri 12/31/04 |
| 25 | DWR Review | Thu 12/2/04 | Thu 12/16/04 |
| 26 | EIP Revise | Fri 12/17/04 | Fri 12/31/04 |
| 27 | Publish DEIR | Mon 1/3/05 | Mon 1/3/05 |
| 28 | Public Review of Draft EIR | Mon 1/3/05 | Thu 3/3/05 |
| 29 | Prepare Final EIR | Fri 3/4/05 | Thu 6/30/05 |
| 30 | DWR Review | Wed 4/20/05 | Thu 6/2/05 |
| 31 | EIP Revise | Fri 6/3/05 | Wed 6/29/05 |
| 32 | Publish FEIR | Thu 6/30/05 | Thu 6/30/05 |




Project: Monterey Plus EIR Schedule
Date: Fri 4/16/04

Task | Split | Progress | Milestone | Summary

LAW OFFICE OF
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May 18, 2004

Lester Snow, Director
Department of Water Resources
Room 1115-1
P.O. Box 942836
Sacramento, California 94236

RE: New Monterey Agreement EIR

Dear Director Snow:

Pursuant to the Court decision in *Planning & Conservation League v. Department of Water Resources* (2000) 83 Cal.App.4th 892 (hereafter "*PCL*"), the Department of Water Resources is required to prepare a new Environmental Impact Report regarding all aspects of the Monterey Amendments. I understand that you will be overseeing this process.

The Settlement Agreement that was entered into between all of the parties to the *PCL* case on May 5, 2003 set forth various requirements for the EIR. According to Attachment E-1 of this Settlement Agreement, the parties specifically excluded the 41,000 afy entitlements purchased by Castaic Lake Water Agency ("CLWA") emanating from the Monterey Amendments from the list of final transfers. It is therefore my understanding that your office will be evaluating the environmental impacts of this 41,000 afy transfer as part of the Environmental Impact Report for your project (the Monterey Amendments Project.) In fact, page 11, paragraphs III C.4 of the Settlement Agreement mandates DWR to analyze the potential environmental effects relating to CLWA's project ("the Kern-Castaic Transfer").

As you may also be aware, the EIR prepared by CLWA for the 41,000 afy transfer was decertified by the Los Angeles Superior Court on November 1, 2002 in *Friends of the Santa Clara River v. Castaic Lake Water Agency*, Los Angeles County Superior Court Case No. BS 056954. In order for CLWA's new EIR to be legally sufficient and in conformance with the appellate court's decision, it must contain an analysis of the potential environmental effects of the Kern-Castaic Transfer on the entities that have and will continue to lose this 41,000 afy source of water due to the transfer as well as the impacts on the State Water Project ("SWP") system resulting from the movement of this water from its source in Kern County to Santa Clarita. Logically and in conformance with CEQA, both DWR's EIR and CLWA's EIR must contain an analysis of the impacts from this loss of water upon Kern County agricultural users as well as all others affected by the transfer.

I currently represent Friends of the Santa Clara River in the *Friends of the Santa Clara River v. Castaic Lake Water Agency*, litigation. In the Judgment Granting Peremptory Writ of Mandate in the Friends' case, the Court ordered that it " retains jurisdiction until respondent Castaic Lake Water Agency certifies an Environmental Impact Report that complies with the California Environmental

May 18, 2004 letter to Dir. Snow, Dept of Water Resources

Quality Act and is consistent with the views expressed by the Court of Appeal Opinion filed January 10, 2002, Case No. B 145283."

For these reasons, I am requesting that you provide me with a copy of any analysis performed to date by DWR regarding the potential environmental impacts of the Kern-Castaic transfer, whether in draft or final form.

Additionally, please advise me of the procedural steps that DWR will take before making a determination whether or not to approve the Kern-Castaic transfer as a "final" transfer and the criteria that will be utilized for making this determination. If there is a proposed schedule for the completion of the Monterey Amendments EIR and/or for these procedural steps for determining whether or not to approve the Kern-Castaic transfer as a long-term transfer, please provide me with a copy of same.

I would appreciate receiving this information from you by May 28, 2004. If you have questions regarding the above or would like to discuss the matter, please call me at (805) 496-5390. Thank you for your anticipated assistance. I look forward to hearing from you.

Very truly yours,

Alyne M. Lazar

cc: Delores Brown

Buyers Up • Congress Watch • Critical Mass • Global Trade Watch • Health Research Group • Litigation Group
Joan Claybrook, President

August 16, 2004

Castaic Lake Water Agency
Attn: Marylou Cotton
27234 Bouquet Canyon Rd.
Saugus, Ca. 91350
Fax 661 297-1611

Re: 41,000 Acre Foot Water Transfer SCH# 1998041127

Dear Ms. Cotton:

Public Citizen, a consumer rights organization that has been working to strengthen public oversight over water, urges Castaic Lake Water Agency to refrain from conducting the environmental review of permanent transfers of State Water Project Table Amounts. We believe that is unlawful for CLWA to be the lead agency under CEQA for this project because the Department of Water Resources is currently conducting its statewide review of the "Monterey Plus" Project. 55

Please refer to the Sierra Club's August 15 letter for further reasoning why the DWR must be the lead agency.

We request that this document be withdrawn and that the document not be re-submitted for circulation until the Monterey Agreement EIR is completed and certified. 56

Sincerely,

Juliette Beck

Juliette Beck
Director, Water for All California

1615 Broadway, Ninth Floor • Oakland, CA 94612 • (510) 663-0888 • www.citizen.org

**SCOPE**
**Santa Clarita Organization for Planning the Environment**
TO PROMOTE, PROTECT AND PRESERVE THE ENVIRONMENT, ECOLOGY
AND QUALITY OF LIFE IN THE SANTA CLARITA VALLEY
POST OFFICE BOX 1182, CANYON COUNTRY, CA 91386

8-10-04

Castaic Lake Water Agency
Attn: DEIR Comments
27234 Bouquet Canyon Rd.
Saugus, Ca. 91350
Fax 661 297-1611

08-16-2004 P01:17

Re: 41,000 Acre Foot Water Transfer SCH# 1998041127

Dear Sirs:

As we stated in our NOP comments, we believe that Dept. of Water Resources must be the lead agency for the following reasons 57

- The published appellate decision in *PCL v. DWR*, 2000 found that the Dept, of Water Resources should be the lead agency for this review.
- DWR is best suited to ensure that widespread notification of interested parties occur.
- DWR is best suited to recognize environmental impacts that might be incurred to a wide spread area of the state as a result of this water transfer and to properly asses such impacts.
- DWR, in its capacity as operations manager of the SWP, will be acquainted with other state projects that would affect or be affected by this transfer.

Changes to water quality including increased chlorides, nitrates or other constituents of SWP project water, and how those constituents will affect the new TMDL requirements approved by Regional Water Quality Control Board approved subsequently to the previous EIR, should be discussed and mitigated. Increased pollution from Trihalimethanes in public water supply due to higher percentage of reliance on SWP project water as main source should be disclosed. Trihalamethanes now exceed the new MCL standards after filtration by CLWA due to the filtration method currently used. 58

This document relies on transfers to the Semi-Tropic Water Banking project for supply reliability, but does not address potential water quality issues that could preclude ground water from being pumped back into the aqueduct. This is an issue that would be addressed if DWR were the lead agency. We incorporate by reference all contracts between, DWR, CLWA, and Semitropic, particularly the pumpback agreements and sections of the EIR indicating high arsenic and radon levels in the Semi-tropic ground water basin. There is no up to date water quality data from the ground water in the Semi-Tropic area included in this report. If the Semi-tropic Water Storage program is going to be relied upon to increase water supply reliability, then water quality data should be made available for review. 59

In conclusion, we request that this document be withdrawn, that the document not be re-submitted for circulation until the Monterey Agreement EIR is completed and certified, and that all parties whose ground water may be impacted are properly notified when re-circulation occurs. 60

Sincerely,
Pat Saletore
Pat Saletore

3435 Wilshire Boulevard
Suite 320
Los Angeles, CA 90010-1904

SIERRA CLUB
FOUNDED 1892
Angeles Chapter

08-16-2004 P01:17 (213) 387-4287 phone
(213) 387-5383 fax
www.angeles.sierraclub.org

8-10-04

Castaic Lake Water Agency
Attn: Marylou Cotton
27234 Bouquet Canyon Rd.
Saugus, Ca. 91350
Fax 661 297-1611

Re: 41,000 Acre Foot Water Transfer SCH# 1998041127

Dear Ms. Cotton:

In the notice of preparation for this project, the Castaic Lake Water Agency announced its intention to move forward with its own separate environmental review of permanent transfers of State Water Project Table A Amounts. The Sierra Club and others commented at that time that such a procedure would violate state law, several court decisions and the Monterey Agreement Settlement to which CLWA is a signatory. 61

As you are aware, in the Monterey settlement agreement, which Castaic signed, the court-identified lead agency, the Department of Water Resources. DWR is already conducting a statewide environmental review of a new "Monterey Plus" project. We strongly urge Castaic to refrain from moving forward with this separate project review, which is premature and likely to operate at cross-purposes with DWR's statewide review.

Moreover, even if Castaic continues to proceed now with its own separate EIR on this transfer, it lacks the institutional authority and statewide accountability to serve as CEQA lead agency under the *Planning and Conservation League* decision. 62

The Sierra Club re-iterates the following legal issues put forward in the January 2004 comment letter by the Planning and Conservation League. These issues were either ignored or inadequately addressed in the Environmental Impact Report now under review: 63

**The "Monterey Amendments" Problem**

Under *Planning and Conservation League* and two sequel decisions addressing Castaic's transfer of Table A amounts, "tiering" or otherwise relying on that EIR would render the approval decision vulnerable to CEQA challenge. However, any attempts by Castaic to conduct a separate Monterey review in advance of DWR's, or to rely on its own hypothetical non-Monterey analysis, would shift rather than solve this fundamental CEQA problem.

In *Planning and Conservation League,* the Third District Court of Appeal found that Central Coast Water Agency's 1995 EIR "failed to meet the most important purpose of CEQA, to fully inform the decision makers and the public of the environmental impacts of the choices before them." (83 Cal.App.4th at 920.) CCWA improperly served as lead agency in place of DWR and prejudicially failed to analyze the enforcement of the pre-Monterey permanent shortage provision, article 18(b), prior to its elimination from the State Water Project contracts. The appellate court found it unnecessary to adjudicate the other CEQA deficiencies identified by the Monterey plaintiffs after analyzing the defects in the lead agency selection and no project assessment,

observing that "DWR, with its expertise on the statewide impacts of water transfers, may choose to address those issues in a completely different and more comprehensive manner." (*Id.*) The court also noted that the deficiencies in the 1995 EIR might be related to the "provincial experience" of CCWA. (*Id.*) 63

In *Friends of the Santa Clara River v. Castaic Lake Water Agency* (2002) 95 Cal.App.4th 1373, the Second District Court of Appeal ordered the decertification of an EIR prepared by Castaic, supporting its Monterey Amendments-based attempt to permanently acquire 41,000 acre-feet of State Water Project entitlements (now "Table A" amounts) from the Kern County Water Agency and its Wheeler Ridge member district. The appellate court found that Castaic's EIR violated CEQA by "tiering" from the invalidated Monterey EIR. This ruling involved precisely the same transfer that Castaic now attempts to address in its separate 41,000 NOP. That piecemeal approach, however, is in apparent defiance of the expectation of the court of the appeal in the *Friends* case that Castaic would await "action by the DWR complying with the *PCL* decision." (95 Cal.App.4th at p. 1388.)

Another recent Second District appellate decision, *Santa Clarita Organization for Planning and the Environment (SCOPE) v, County of Los Angeles* (2003) 106 Cal.App.4th 715, critically addressed Castaic's characterization of the 41,000 acre-feet transfer. In that case, the County of Los Angeles violated CEQA in its review of the West Creek development project that erroneously assumed that 100 per cent of Castaic's purported 41,000 acre-feet would be available in wet years and 50 per cent in drought years. Drawing on *Planning and Conservation League's* assessment of the historic disparity between Table A amounts and deliverable water, the court concluded that the EIR failed to undertake a "serious and detailed analysis" of State Water Project supplies, and observed that "[t]he dream of water entitlements for the incomplete State Water Project is no substitute for the reality of actual water the SWP can deliver." (*Id.* at pp. 723, 717.)

The EIR appears to confuse the legitimacy of Castaic's separate review with the distinct issue of the interim operation of the 41,000 acre-feet transfer pending further environmental review. (See Public Resources Code section 21168.9; 41,000 NOP p. 1.) The trial court did not enjoin interim operation, but left the issue open to further demonstrations that could lead to interim prohibition. Various cases addressing the interim use of this water for new projects prior to the completion of CEQA review are now working their way through the Court system.

The 41,000 acre-feet transfer is on not on the list of Table A amount transfers recognized as "final" in the Monterey Amendments settlement agreement (Attachment E). Such transfers cannot proceed without new environmental analysis satisfying CEQA. (Monterey Settlement Agreement, section VII.A.) That settlement agreement, while recognizing that the remedial issue remains before the Second District, also requires DWR's "Monterey Plus" EIR to analyze the 41,000 acre-feet transfer, as well as other transfers facilitated by Monterey Amendments provisions, such as other agriculture-to-urban transfers referenced in Article 53 of those amendments. (Section II.C.4.)

If Castaic rushes to finality by continuing its separate environmental reviews at this stage, without the benefit of DWR's statewide "Monterey Plus" EIR, its perspective would mirror the "provincial experience" criticized in the *Planning and Conservation League* decision. (83 Cal. App. 3d at 918.) Such an attempt would also create a substantial risk of final decisions based on local analysis that may well prove inconsistent with DWR's "Monterey Plus" EIR.

**The "Lead Agency" Problem** 64

If Castaic continues with this separate environmental review without awaiting DWR's assessment in the "Monterey Plus" EIR, it would violate CEQA's lead agency requirement based upon the well-established standards set forth in *Planning and Conservation League v. Department of Water Resources*. The court in that case could hardly have been clearer that DWR is the "state agency charged with the statewide responsibility to build, maintain, and operate" the State Water Project. (*Id.* at p. 906.; see also Wat. Code, §12930, *et seq.*) Finding that DWR was the only entity with the requisite statewide perspective and expertise to serve as lead agency, the court found it "incongruous to assert that any of the regional contractors" could "assume DWR's principal responsibility for managing the SWP." (*Id.*)

Similarly, the court-approved settlement agreement in *Planning and Conservation League* expressly recognizes DWR's duty as "the State agency responsible for administration and operation of the SWP," as well as its continuing obligation to comply with applicable requirements of CEQA and the Water Code. (Agreement, Section X.B.) The transfer guidelines disclosed to contractors under the settlement agreement also recognize the continuing need to comply with all existing legal requirements, including CEQA, and to honor the lead agency principles identified in the Third District's decision in the Monterey Amendments case. (Agreement, Attachment C.)

These principles apply clearly to the proposed permanent transfers of the Table A amounts referenced in the state project contracts, which require DWR's approval and presuppose the application of Monterey. They also concededly require changes in the amount of supplies available to several water agencies, the "location and timing" of project deliveries, and changed utilization of the project's "conveyance and storage facilities." The transfers, which may require the fallowing of farmland in agricultural areas and are associated with proposed annexations linked to some of the more controversial development projects in California, demand the statewide authority and experience that only DWR can provide.

Neither the summary references to other project EIRs nor a hypothetical "non-Monterey" analysis of the transfers can substitute for DWR's new assessment of the Monterey changes based on its statewide expertise and authority. For example, although transfers with DWR approval were available under Article 41 of the pre-Monterey State Water Project contracts, it is highly speculative whether agriculture-to-urban transfers such as this proposal would even have taken place without the Monterey Amendments, since those Table A amounts would have been subject to "agriculture first" cutbacks under pre-Monterey article 18(a). Read in context, such maneuvers would amount to little more than the "straw man" argument considered and rejected in the *Friends* appeal. (95 Cal.App. 4th at p. 1387.)

Lastly, we note that the same General Manager of Central Coast Water Agency, Dan Masnada, under whose guidance, CCWA proceeded in violation of CEQA as the wrong lead agency, is now the general manager of Castaic Lake Water Agency. In that capacity, he is once again directing his agency with full knowledge of the consequences, to proceed as lead agency in violation of the law.

**Failure to notify all interested parties** 65

Communities, local organizations and agencies that would have the most knowledge of impacts surrounding these statewide issues, the accuracy of the environmental disclosure and the viability of proposed mitigation, were not notified. Failure to notice and receive input from interested parties deprives the decision-makers of a full disclosure of all impacts and deprives the affected community or public agency of its right to provide information during the public process. The

DWR would be better equipped to ensure that all parties are properly noticed and involved in the project review. 65

**Issues not addressed by the Environmental document** 66

This EIR purports to analysis statewide issues, including but not limited to, impacts to agricultural lands, sensitive species, the accuracy of the DWR CalSim model, air quality, etc., but since the EIR was not circulated on a statewide basis, the public and agencies from other areas may not have been informed of the release of the document, and thus did not have the opportunity to review its accuracy.

Inpacts to DWR facilities - Castaic Lake Water Agency cannot presume to be the lead agency for State Water Project facilities. Nor does it discuss the ability of the State Water Project facilities to accommodate this huge transfer now that the Metropolitan Water District will be requiring delivery of a greater amount, if not all of its Tile A amount. Adequacy of facilities such as the Banks pumping station, effects of the ESA and CalFED Record of Decision, capacity in the San Luis Reservoir in light of recent sharing agreements are not discussed. 67 68

Impacts to Agricultural Resources - In a letter dated 5-19-98 from the Planning Department of Kern County to the original Notice of Preparation for this project, a request was made to ensure that the transfer of 130,000 acre feet from the Monterey agreement was not exceeded. This Agency requested that acknowledgment of previous actions be made in the DEIR and that cumulative impacts of SWP capacity rights be analyzed. We would like to re-state that request for this document and include that letter which you have in your possession by reference into these comments. They also requested an analysis of the impacts on the land within the WRMWSD in Kern County including agricultural Preserve Map 204, 220 and 220No. 4-12-19. Additionally, they requested a table showing "the ultimate potential amount of capacity that could be transferred how many acre feet would be converted to M&I allotment for urban users and as a condition of transfer, if any land in WRMWSD would be permanently fallowed, retired or detached from the District". This information is important because it allows the decision-makers to access the impacts that might be caused to agricultural land or the increase in pumping of groundwater that might be caused by this project. 69 70

The EIR includes a report entitled "Effects on Agricultural Production ...etc." found in Appendix C. We note that this report, included for circulation in the DEIR is labeled as *DRAFT* report. We wonder why the Final Report was not included for circulation and request that CLWA state how they can base their assumptions on a draft report. 71

A chart found on page 15 of this report is apparently presented in response to the Kern Agency request. It appears to show water needs already in excess of WRMWSD Title A amount even using 100% of the water entitlement, a situation that the Court has already found not to be tenable (see foot note 7, *PCL v DWR*, 2000). This chart is footnoted with the statement that it "Assumes supplies available regardless of source." There is no analysis as to whether this transfer will cause fallowing in future drought years, only the statement that it hasn't in the past. There is also no analysis as to whether overdraft is occurring or will occur in the next drought cycle, only a statement that the chart assumes supplies are available without any explanation of the impacts of over-pumping to make them available. There is no chart that shows how much water was used from what sources before the transfer in question and how much water will be needed and how it will be supplied *after the transfer.* 72

The original purpose of the state water project was to provide a supplementary water source so that ground water would not be pumped in excess of sustainable levels. Now it appears that this water transfer will bring about the very situation one sought to avoid. We believe it is imperative that CLWA notify all interested parties in surrounding areas of their intention to make this transfer, and of the possible increased need for ground water pumping if this transfer occurs. Because pumping of ground water sources to replace state water transferred to other areas will have significant impacts on the Public Trust and the viability of farming operations, we reiterate, the DWR should be the lead agency for this document. 73

The closing paragraphs of this report include a rather chilling understatement 74

> ***"In a series of consecutive 'dry years', the unavailability of a proportional share of the SWP contract amount may contribute to a mismatch between water supply and demand."***

Have farmers been notified of this "mismatch"? How much fallowing will this cause, what will be the economic impacts to farmers, laborers and communities? Isn't this exactly the question that everyone has requested that the EIR address? Where is the answer? Given the substantial move away from annual row crops into permanent orchards of fruits, nuts and vineyards that require multiple years of investment (see Table 2 on pg. 6), dry years with insufficient state water will substantially damage these crops. *One should also note the increase in groundwater pumping indicated by this table.*

Flooding and water quality changes - In a letter dated May 21st 1998 also from the previous EIR review, the Ventura County Flood Control Department notes that the NOP correctly identifies downstream flooding from increased effluent flows as a potential significant impact. There should be a discussion of the potential for this impact in the DEIR for the project before you. 75

Changes to water quality including increased chlorides, nitrates or other constituents of SWP project water, and how those constituents will affect the new TMDL requirements approved by Regional Water Quality Control Board approved subsequently to the previous EIR, should be discussed and mitigated. Increased pollution from Trihalimethanes in public water supply due to higher percentage of reliance on SWP project water as main source should be disclosed. (See attached news article). 76

This document purports to address statewide issues, but fails to discuss the impacts of the Bay-Delta water quality standards on this project. Again, this is but another example of why DWR must be the lead agency. 77

This document relies on transfers to the Semi-Topic Water Banking project for supply reliability, but does not address potential water quality issues that could preclude ground water from being pumped back into the aqueduct. This transfer project is currently being litigated. 78

Growth Impacts - In a letter dated May 12th, 1998 from the City of Santa Clarita, the City states that "the DEIR should define current and anticipated water availability for the CLWA service area as compared to the ultimate buildout of the City of Santa Clarita General Plan, and the Santa Clarita Valley Areawide Plan. This information was requested to clearly identify the need for the project, and should be included for the current project. The City's requests for disclosure in the areas of geology, growth inducement and impacts to Kern County ground water and development monitoring system analysis should also be addressed for the current project. 79

In response to this question, the CLWA relies, but pretends not to rely, on the Urban Water Management Plan that is being litigated. The issue under litigation is over-statement of 80

water supply, particularly the reliance on the availability of polluted water from wells that are now closed because they exceed the MCL for ammonium perchlorate. The Sierra Club requests that an analysis of the impact of growth in a multiyear drought scenario in the Santa Clarita Valley be conducted as part of this EIR. Santa Clarita is now relying on state water as its primary source of supply (since the ground water is either fully committed or polluted -see attachment). We believe it would be particularly important for decision makers to understand the impacts of the recurrence of the historical SWP worst case scenario when only 13% of the contractors' Title A amounts were available. (See notes attached from presentation to Santa Clarita City Council, June 29, 2004. Transcript to be provided before Final EIR is released.) 80

Sensitive Species - The current project is based on an EIR that does not address impacts to endangered species as a result of the entitlement transfer. Draw down of ground water will result in reduction or elimination of surface water and may occur in both the transferring and receiving agencies (during drought periods when state water is unavailable) as a result of this project. Since species issues were not addressed in the Warm Springs/Maricopa/Belridge EIR, they should be addressed for the proposed project, as its implementation would cause significant impacts. These include impacts to endangered species impacted in both areas including but not limited to the San Joaquin Kit Fox in the WRMWSD and the Unarmored Three-Spine Stickleback in the Castaic Lake Water Agency . The Kit fox could be impacted by drawdown of ground water that impacts surface flows or diversion of surface flows required by lack of state water project supplies. The Stickleback could be affected by increased effluent flows that cause a change in surface water quality (this problem has already been identified as an area of concern by the Regional Water Quality Board) or increased pumping of ground water required to make up for delivery cutbacks during a drought. Impacts and proposed mitigations should be discussed. We note that a section 4d consultation may be required if endangered species will be affected and request that the US Army Corps of Engineers be sent notification of this project since it appears that they have not been so notified. 81

The EIR includes a list of sensitive species in Appendix B, but does not discuss how these species will be affected when substantial over-draft occurs, either due to over-reliance on this SWP water in the Santa Clarita Valley without sufficient back up sources or over-draft in the farming areas due to transferring away to much of their supplemental SWP water supply. 82

Further, it has recently come to our attention that Berenda Mesa has published a draft EIR to withdraw/divert approximately 70,00AF from local streams and ground water sources. Since the transfer of SWP surface water will affect ground water pumping sources, this EIR and its impacts must be included and addressed during the water transfer review process. We therefore believe this document must be included in the review process and incorporate it by reference. 83

Air Quality - The effect of the project on increasing particulate matter from increased or overdraft use of ground water in a PM10 non-attainment zone for this air pollution problem should also be addressed. THE EIR only addressed project specific impacts such as pumping facilities and grading for new pipes. It did not address fugitive dust created by dried up landscapes. CLWA is well aware of the problems created by dust due to draw down of the Owens Lake and its impact on surrounding communities because one of its Directors helped negotiate the settlement on behalf of LADWP. This is an example of an impact that must be anticipated in both the transferring farmlands and the receiving Santa Clarita area. Santa Clarita is already in a non-attainment zone for PM10s as is the Central Valley. Clean Air Act compliance will be necessary. A cut-back in water supply caused by air quality concerns as already occurred for the LA Dept. of Water and Power in the Owens Valley, would be much more appropriately dealt with in the planning process than after new building is already approved based on that water. 84

State Water Reliability - One of the most apparent reasons that the review must await completion of the Monterey "Plus" environmental review is that a new hydrological model "CalSim II" is being proposed for use in evaluating the reliability of water deliveries of the sate project supply. This information is obviously critical to all the above stated issues. There has been substantial criticism of the model (peer review attached). Among other circumstances, the model does not address climate change or levee breaks such as the substantial recent failure in the Jones tract (news article attached). The DWR must complete its environmental review of this issue and resolve discrepancies before reliability factors on which the Castaic EIR is based, can be assumed to be accepted. Again, tiering is based on a DWR document that has not been circulated for review, has not been through the public comment process and has not been certified. 85

**Summary**

We believe that DWR must be the lead agency for the following reasons 86

- The published appellate decision in *PCL v. DWR*, 2000 stated:

  > *"We agree with the trial court that DWR, not CCWA, has the statutory duty of assessing environmental consequences of projects involving the SWP* [State Water Project]." (Pg. 1 of Decision).

  We incorporate this decision by reference into the administrative record.
- DWR is best suited to ensure that widespread notification of interested parties occur.
- DWR is best suited to recognize environmental impacts that might be incurred to a wide spread area of the state as a result of this water transfer and to properly asses such impacts.
- DWR, in its capacity as operations manager of the SWP, will be acquainted with other state projects that would affect or be affected by this transfer.
- CLWA failed to address many issues of statewide concern in this document.

We therefore request that this document be withdrawn, that the document not be re-submitted for circulation until the Monterey Agreement EIR is completed and certified, and that all parties whose ground water may be impacted are properly notified when re-circulation occurs. 87

Sincerely,

**Johanna Zetterberg**
Conservation Coordinator

Attachments

1. News article on Trihalimethane pollution
2. Excerpt from "Groundwater Modeling Analysis Upper Santa Clara River Basin". Ch2Mhill showing loss of production from perchlorate contaminated wells.
3. Excerpts from reports indicating safe yield of the Santa Clara River and current pumping levels.
4. Notes from Presentation by DWR and the Planning and Conservation League to the City of Santa Clarita on June 29th, 2004.
5. Peer review of CalSim II water model for the state water project
6. News article on the June 2004 levee break in Upper Jones tract from the ACWA newsletter

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**Royal Beating** — The Angels win their fifth straight and sweep Kansas City. B1

**Getting Even** — Teen seeks to buy maker of gun that left his a quadriplegic. A9

50 cents

# Treatment Taints Val Verde Water

■ Beyond-threshold levels of trihalomethanes found in drinking water, officials say.

**By Matt Levin**
SIGNAL STAFF WRITER

A potentially dangerous group of compounds linked to higher cancer risks and miscarriage rates have exceeded acceptable levels in Val Verde's drinking water, county water officials said Monday.

More than 3,700 customers of Water Works District 36, the water utility that supplies Val Verde, have been drinking beyond-threshold levels of trihalomethanes (TTHMs), chemicals associated with various health problems including liver and kidney failure, bladder and colon cancer and failed pregnancy.

Water district and Environmental Protection Agency officials downplayed the danger and stressed that only a period of "prolonged exposure" of several years could cause serious health problems.

Val Verde water users have been exposed to the high contaminant levels for only three months and should not worry about their water, water district spokeswoman True Pawluk said.

"The water is safe," Pawluk said. "If it was dangerous, we would have taken it off-line immediately."

Water officials discovered the abnormally high levels of the contaminant in early July after conducting a routine test.

Samples revealed a TTHM concentration of 88 parts per billion, above the federal standard of 80 parts per billion.

This is the first time Water Works District 36 has exceeded the legal maximum TTHM concentration after the threshold was lowered in 2001, Pawluk said.

TTHMs are byproducts of the disinfection process used by many State Water Project wholesalers, including the Castaic Lake Water Agency. The chlorine used to kill bacteria and other harmful microorganisms bonds with organic matter present in the state water system, and the resulting toxic compound escapes the treatment plant undetected.

Water Works District 36 supplies only CLWA water to its customers.

CLWA officials said they plan to replace chlorine as the primary disinfection agent in June 2005. They will instead use the more costly chloramine, which does not produce TTHMs when combined with organic material.

"This switch has been in our plans for the better part of three years," CLWA General Manager Dan Masnada said. "Essentially, chloramine deals with the TTHMs better, and that's why

See WATER, page A3

# *Trying to Beat the Summer Heat*

■ Residents are urged to conserve

# Protecting Against West

# Water

Continued from page A1

we're phasing it in."

Other Santa Clarita utilities that purchase water from CLWA are less at risk for a high TTHM concentration because they combine CLWA's state water with local groundwater that is not susceptible to TTHM production.

Water Works District 36 is in negotiation with the Sheriff's Department to share some of the well water from the Pitchess Detention Center in Castaic until CLWA's chlorination process is phased out.

Although most of Val Verde's water would still come from CLWA, the new groundwater would help dilute the concentration of contaminants.

Pawluk said that although TTHM levels may not subside for the next few months, it is unnecessary for residents to take extreme measures such as boiling tap water or purchasing bottled water.

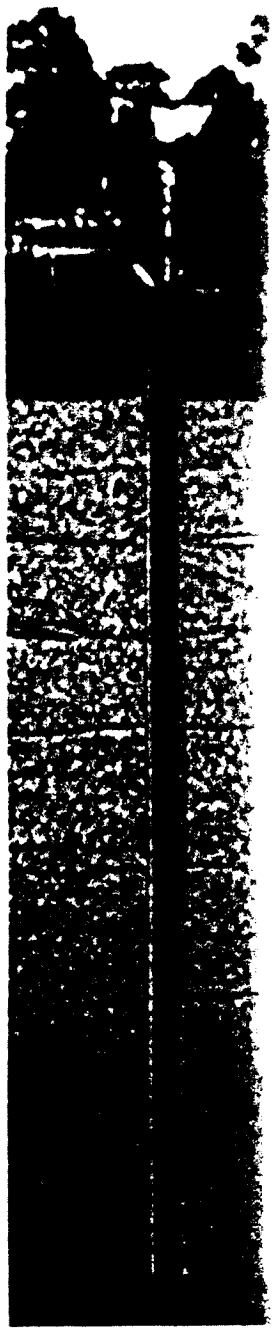
"This doesn't mean that customers will get sick," she said. "It's just an increased chance of getting sick. They (customers) don't need to use bottled water, but they can if they want."

Although most studies conducted on TTHMs concluded that only prolonged consumption leads to higher cancer risks, several studies have found a correlation between consumption during the first trimester of pregnancy and an increased likelihood of miscarriage.

A 1988 California study found a miscarriage rate of 15.7 percent for women who drank five or more glasses of cold water containing more than 75 parts per billion TTHMs, compared to a miscarriage rate of 9.5 percent for women with relatively low exposure.

> 'This doesn't mean that customers will get sick. It's just an increased chance of getting sick. They (customers) don't need to use bottled water, but they can if they want.'
>
> — True Pawluk, Spokeswoman Water Works District 36

East Fine Extinguished



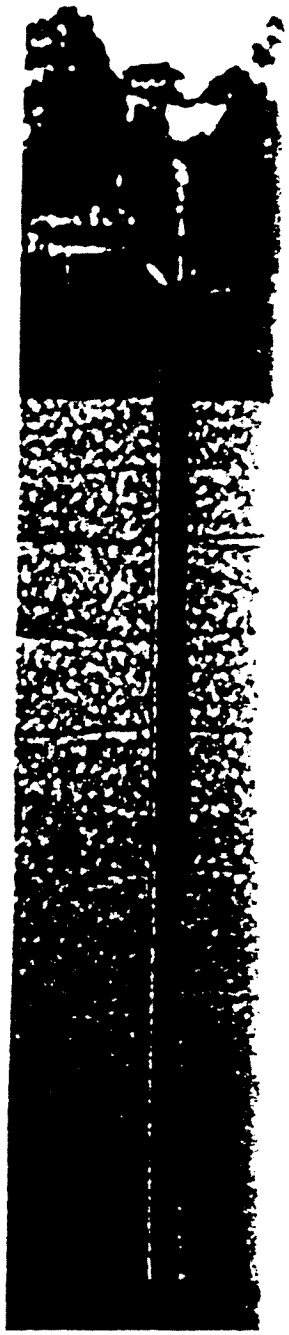
# Groundwater Modeling Analysis
## Upper Santa Clara River Basin

## Restoring Impacted Water Supplies Near Whittaker-Bermite

*presented by*

**John Porcello/CH2M HILL**

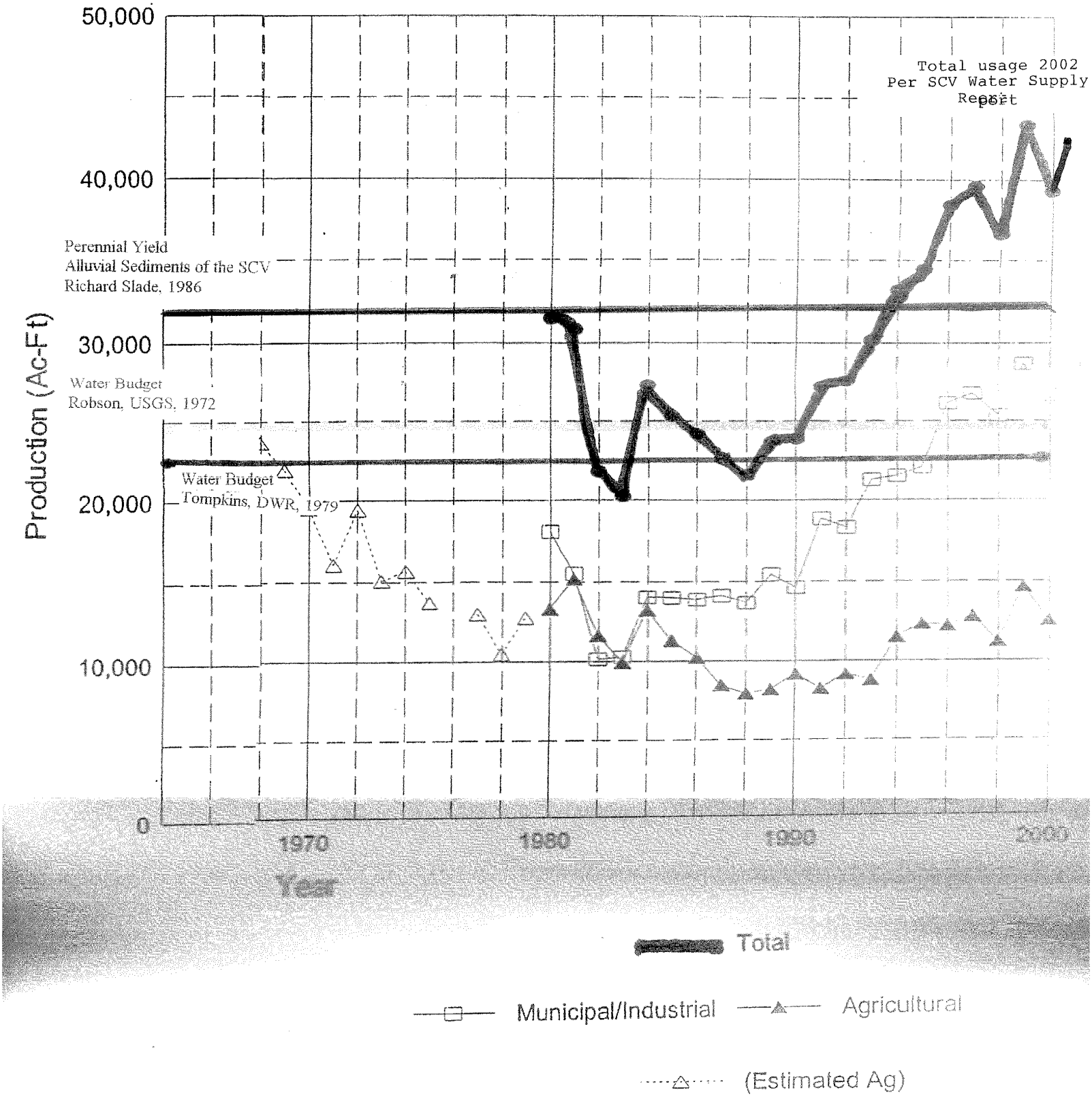
December 10, 2003



# Objectives and Methods

- Evaluate pumping strategies for impacted wells that meet specific goals
  - Restoring lost water supplies
    - Saugus: 4,000 AF/yr
    - Alluvium: 700-1,000 AF/yr
  - Protecting downgradient wells
- Develop and apply groundwater flow model

# Groundwater Production
## Santa Clarita Valley Alluvial Aquifer




FROM: Figure II-2

Santa Clarita Valley Water Report
2000

COPY

# VOLUME I — REPORT TEXT

HYDROGEOLOGIC INVESTIGATION

## PERENNIAL YIELD
## and
## ARTIFICIAL RECHARGE POTENTIAL
## of the
## ALLUVIAL SEDIMENTS
## in the
## SANTA CLARITA RIVER VALLEY
## of
## LOS ANGELES COUNTY, CALIFORNIA

FOR
UPPER SANTA CLARA WATER COMMITTEE
MEMBERS: LOS ANGELES COUNTY WATERWORKS
DISTRICT NO. 36 — VAL VERDE
NEWHALL COUNTY WATER DISTRICT
SANTA CLARITA WATER COMPANY
VALENCIA WATER COMPANY

AFFILIATE: CASTAIC LAKE WATER AGENCY

DECEMBER 1986

RICHARD C. SLADE
CONSULTING GROUNDWATER GEOLOGIST

a larger degree in the shallow wells of the alluvium compared to wells in the underlying Saugus Formation.

The Saugus Formation ranges in thickness between at least 1500 feet and at least 5000 feet from the northerly to the southerly sides of the San Gabriel fault, respectively. Little is known of the hydrogeology and water-yielding characteristics of the Saugus Formation.

2. Groundwater flows from east to west across the alluvium in the river valley; April 1945 represents the all-time water level high, while November 1965 represents the all-time water level low in much of the alluvium. In general, 1985 water levels are 10 to 30 feet lower than the 1945 levels. Water levels west of Castaic Junction have remained high throughout the period of record.

3. Groundwater in storage in the alluvium has ranged from a high in April 1945 of 201,000 ac-ft, to a low of 107,000 ac-ft in November 1965; at present (Fall 1985) groundwater in storage is approximately 176,400 ac-ft. Because the theoretical maximum storage capacity in the alluvium is 239,900 ac-ft, there is a theoretically available storage capacity of 63,500 ac-ft between the 1985 storage and the theoretically maximum possible storage.

4. Though historic groundwater extraction data are somewhat contradictory, groundwater production for 1985 was: 24,103 ac-ft from the alluvium, using 59 active wells; and 4892 ac-ft from the underlying Saugus Formation, using 8 active wells. The numbers, locations, and annual production from wells actively used by private homeowners, industries and/or commercial establishments are not known; it is probable that total annual production from these sources does not presently exceed a few hundred ac-ft/yr.

5. For our base period of study of 1957-58 through 1984-85, we calculate a practical perennial yield for the alluvium of 31,600 to 32,600 ac-ft per year.

6. Alluvial groundwater quality ranges from a natural calcium-bicarbonate character on the east near Lang to a degraded sodium-sulfate character west of Castaic Junction. Generally, TDS increases in the

their annual extractions are not metered. Because the cumulative total production by these private pumpers is not considered to be large, it has not been included in our perennial yield assessment.

Prior to 1954, alluvial groundwater production accounted for almost 100 percent of the total water production in the study area. However, in 1954, this percentage decreased to approximately 95 percent because in that year Newhall County Water District constructed the first of six wells which tap the Saugus Formation for domestic use. By 1985, production from the Saugus Formation approached 16 percent of total groundwater extractions (refer also to Table 2).

In recent years, there have been several shifts in the supply/demand usage of water in the region. Groundwater extractions from the Saugus Formation have gradually increased to about 15 percent of the total local production, while total extractions (alluvium plus Saugus Formation) have declined slightly. Water usage has shifted toward a greater proportion for urban uses, with a reduction for agricultural uses, as the region has become urbanized. In the future, it is projected that local alluvium production will remain relatively constant with more water going to urban uses as the agriculture is phased out, and there will be greater use of groundwater from the Saugus Formation.

Urbanization has had a rather startling impact on the availability of areas for recharge, however. All recharge to the aquifer system does not occur in the low-flow channels of the river and its tributaries, but infiltrates over much of the alluviated areas which are not within the flood channels of the Santa Clara River system. Paving of these areas has, and will continue to reduce the net effective area for natural recharge to the underlying groundwater system.

calculated values of average annual pumpage and average annual change in storage.

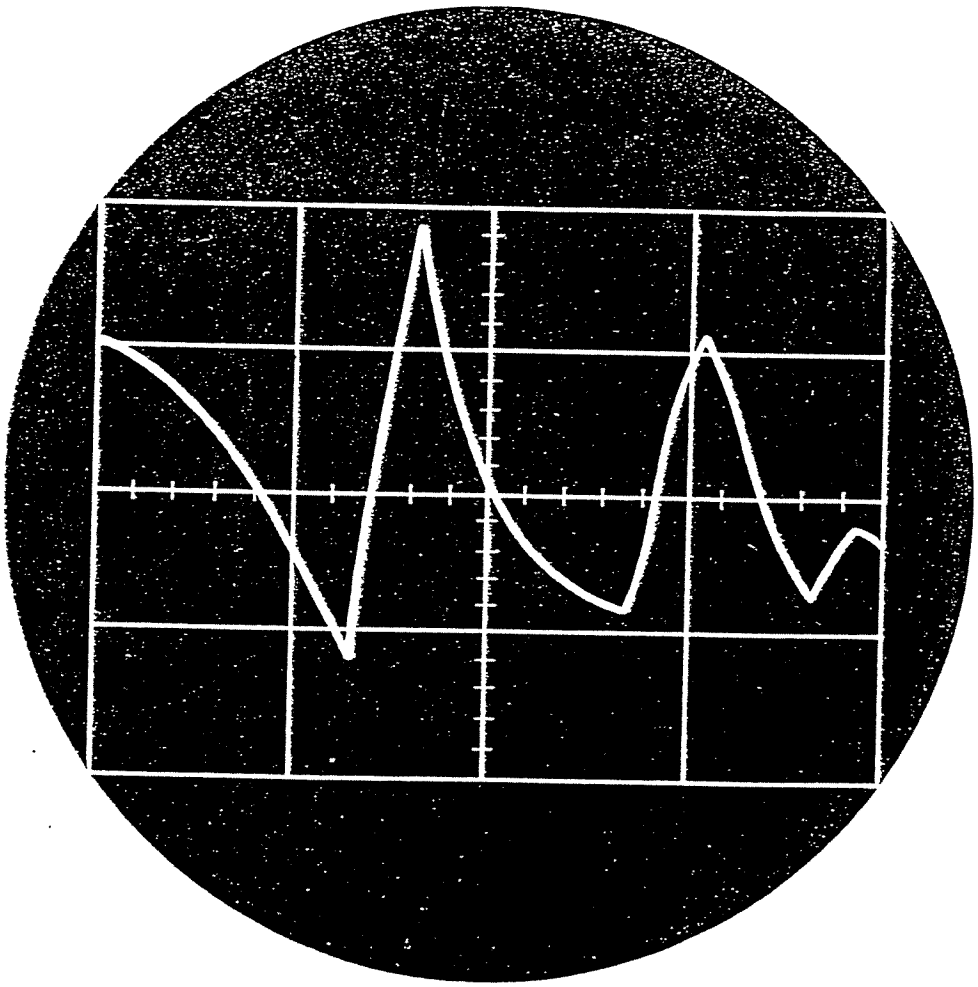
To determine the average annual groundwater production from the alluvial sediments in the Valley, files at the major water purveyors concerning present and historic production were obtained. These data vary widely in their apparent level of accuracy. For example, some of the data do not date back to 1957-58, other data are based on electrical consumption at the pump and not on actual metered gallonage, while other data are only estimates based on the number of persons using the water. Regardless, during the 28-year base period 1957-58 to 1984-85, we estimate the average annual groundwater production from the alluvial sediments in the Santa Clarita Valley to have been approximately in the range of 31,000 to 32,000 acre-feet per year.

In addition, at the beginning of the base period, the quantity of groundwater stored in the alluvial sediments was calculated to be approximately 159,688 acre-feet. By 1985, the quantity of groundwater in storage in the alluvium had been increased to 176,409 acre-feet (see Table 8). The increase in the quantity of water in storage in the alluvium is thus 16,721 acre-feet. This increase is the total quantity of groundwater added to storage during the 28-year Base Period as a result of excess precipitation. Hence, the average annual net change in groundwater in storage was determined by dividing the total quantity of water added to storage by the length of the Base Period, or +597 acre-feet per year.

The perennial yield is the quantity of groundwater what can be pumped annually without any change in groundwater levels or net change in groundwater in storage over the Base Period. This may be computed by determining the average annual pumping during the Base Period (31,000 to 32,000 acre-feet), and adding or subtracting from this value, that amount

# WATER-RESOURCES INVESTIGATION USING ANALOG MODEL TECHNIQUES

## IN THE SAUGUS-NEWHALL AREA LOS ANGELES COUNTY, CALIFORNIA



UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
WATER RESOURCES DIVISION

OPEN-FILE REPORT
Menlo Park, California
1972

PREPARED IN COOPERATION WITH THE NEWHALL COUNTY WATER DISTRICT

Because of the lack of data only four short-term deep-well hydrographs were available to use in the non-steady-state verification of the Saugus aquifer (pl. 7). The measurements indicate that in the area south of the San Gabriel fault and east of Castaic Junction, the potentiometric surface produced by the model is too flat (pl. 7). This was also indicated by the steady-state run. The model-based heads shown on plate 7 are correct south of Castaic Junction but are about 70 feet low at Newhall. This is shown by the discrepancy between the two hydrographs for well 4N/16W-35L1 (pl. 7). Because there are no water-level measurements for the area north of the San Gabriel fault and Castaic Junction, it is not known whether or not the potentiometric surface shown for that area is correct.

In view of the lack of definitive data for the Saugus aquifer, it is felt that this layer of the model is adequately verified for present needs. The hydrologic parameters used to model the Saugus aquifer are initial estimates. Consequently, before more detailed information about the Saugus aquifer can be obtained from the model, additional studies of the hydrologic characteristics of the aquifer should be made. With present data only general information can be deduced regarding the ground-water flow network in the Saugus aquifer.

A comparison of the assumed steady-state potentiometric surface (pl. 6). with the 1963 potentiometric surface (pl. 7) shows that in the model the Saugus aquifer has undergone a decline in head over most of the area of the aquifer. This decline is due to pumping from the Saugus aquifer and to water-level declines in the overlying alluvial aquifer. The model-generated hydrographs on plate 7 indicate that the declines in the Saugus aquifer have been similar to those that occurred at adjacent points in the alluvial aquifer. This suggests that future pumping from or artificial recharge to one of the aquifers will have an effect on the head in the other aquifer. Head changes in the Saugus aquifer, however, are generally less than the corresponding changes in the alluvial aquifer. This is due to the low vertical component of permeability between the two aquifers and lesser quantities of pumping from the Saugus aquifer than from the alluvial aquifer.

## WATER BUDGET

Table 5 shows the water budgets for the steady-state and the non-steady-state model. All quantities of inflow and outflow used in the model are shown. Under steady-state conditions the quantity of inflow to the model must equal the quantity of outflow. As shown, the total inflow and total outflow are both equal to about 25,000 acre-feet per year. Surface-water recharge and underflow are the major sources of inflow, and ground-water discharge is the principal outflow.

In the water budget for the non-steady-state condition the figures shown are the total quantities of inflow or outflow which occurred in each area during the 23-year study period. When the ground-water storage depletion is added to the inflow data, the total inflow must equal the total outflow within the limits of accuracy of the model. As shown, these totals agree within 5.2 percent or about 44,000 acre-feet. Surface-water recharge and underflow are still the main sources of inflow, but ground-water pumpage is by far the greatest source of outflow from the basin.

## MODEL READOUTS

The major water purveyors in the Saugus-Newhall area are presently considering the effects of various water-resources management practices in order to arrive at management techniques that will make the best use of the existing and future water resources of the areas. The analog model was used to supply information about the response of the aquifers to each of the following conditions:

1. What are the effects of loss of natural floodwater recharge to the aquifers?

2. What are the effects on the aquifers of artificial recharge of imported water?

3. What are the effects on the aquifers of increased pumpage to meet future water requirements?

### Effects of Loss of Floodflow

Because water levels in the alluvial aquifer respond to variations in surface-water recharge, information about the effects of an extended drought during which no floodflow recharge occurs is of value.

To simulate an extended drought, the model was run for the 1945-67 period under the following conditions:

1. The surface-water recharge to the model did not exceed steady-state surface-water recharge.

2. Loss of floodflow recharge to the aquifers will cause large water-level declines which will decrease the quantity of ground-water discharge in the Santa Clara River below Castaic Junction. This ground-water discharge cannot be decreased by more than the original steady-state ground-water discharge. To simulate this limit in the model, the induced recharge in the area was not allowed to exceed the value of the steady-state ground-water discharge.

3. The aquifers were assumed to be in steady-state conditions at the beginning of the drought.

4. All other hydrologic parameters were maintained at the values which were normally used in the non-steady-state model during the 1945-67 study period.

Under these conditions the model produced the hydrographs shown in figure 9. Because the transmissibility in the model does not vary as a function of head, these hydrographs represent the theoretical response of the basin to the conditions set forth above. Under actual field conditions the decrease in transmissibility with decline in head would cause the alluvial aquifer to be dewatered sooner than indicated by the hydrographs in figure 9. The hydrographs do indicate, however, that without the effects of floodflow recharge most of the alluvial aquifer could not support the modeled rate of ground-water pumpage for more than 14 to 18 years after steady-state conditions. The aquifer would support this pumpage for an even shorter period of time if the basin were not at steady-state condition at the beginning of the drought. The benefit the basin receives from floodflow recharge can be seen by comparing the hydrographs produced by the model for the alluvial aquifer under 1945-67 historic conditions with the hydrographs for the no-floodflow condition.

The loss of floodflow recharge in the alluvial aquifer causes head declines in the Saugus aquifer. As shown by the hydrographs in figure 10, after 23 years the no-floodflow condition produces declines in the Saugus aquifer about 100 feet below those of the normal condition. These declines do not produce complete dewatering of the aquifer because of its large saturated thickness.

## Effects of Artificial Recharge

The Upper Santa Clara Valley Water Agency has contracted with the State of California for delivery of northern California water to meet future water requirements in the study area. The quantities of imported water tentatively will range from 1,600 acre-feet per year in 1971 to 41,500 acre-feet per year in 1990 but could be increased somewhat if required (table 6). One management procedure under consideration proposes that all water imported between 1971 and 1980 be artificially recharged to defer the cost of treatment facilities. The channel of the Santa Clara River between Solemint and Saugus was chosen as a possible site for artificial recharge on the basis of the hydrology of this area and the proposed alinement of a 36-inch diameter pipeline. The analog model was used as an aid in determining the effects of the recharge on the aquifers.

A second model run was made to show the effects on the basin of the conditions imposed in the previous run without artificial recharge in the Santa Clara River. The hydrographs produced under these conditions are shown on plate 9.

The model indicated that the alluvial aquifer would be dewatered in the upper and lower Soledad Canyon areas prior to 1980. This is primarily due to the heavy pumping in the lower Soledad Canyon area between 1970 and 1980 which is not compensated for by artificial recharge as it was in the previous run. After 1980 the hydrographs for this run and the previous run are almost parallel with the previous run water levels between 10 and 50 feet higher than those for this run.

In the Saugus aquifer the hydrographs for this run are between 10 and 30 feet lower than the corresponding hydrographs for the previous run. In general the removal of the artificial recharge from the alluvial aquifer does not produce a significant change in water levels in the Saugus aquifer. The same management problems are produced by this set of conditions as were produced in the previous run, the major differences being that the problems occur as much as 10 years sooner. These model-generated readouts are subject to the same limitations as are the readouts from the previous run (page 54).

## CONCLUSIONS

On the basis of the study of the hydrology of the area and the readouts from the analog model the following conclusions have been reached:

1. The alluvial aquifer has been the source of most of the ground water pumped in the area. The quality of water in this aquifer is readily affected by small quantities of inflow of either better or poorer quality water because of the relatively small quantity of ground water in storage in the aquifer. The water in this aquifer can in turn affect the chemical quality of the water in the Saugus aquifer. Urbanization will place additional stress on both aquifers by increasing the quantity of poor-quality sewage effluent and good-quality imported water available for recharge into the alluvial aquifer. In addition, heavy pumping from the Saugus aquifer to meet future water demands could drastically reduce the ground-water discharge from the basin. This could result in the buildup of salts within the basin because of the lost flushing action of the ground-water discharge.

These conditions substantiate the belief that a proper water-quality management program must be established within the basin. This should include the initiation and operation of a systematic periodic water-quality sampling program. These data can then be used to evaluate the effects on the basin of the above water-quality considerations.

2. The ability of the alluvial aquifer to accept artificial recharge is dependent on the storage space available within the aquifer. In the Saugus-Newhall area the space available for recharge in the alluvial aquifer varies widely depending on the quantity of surface-water recharge that occurs each year. To determine how much artificial recharge could take place each year, a water-level measuring program should be initiated in the lower Soledad Canyon area. Using these measurements and other data, estimates of the space available for the storage of water in the aquifer in the coming year could be made. This would facilitate obtaining the proper quantities of imported water for artificial recharge each year.

3. The model indicates that under historic pumping conditions the full entitlement of imported water to the year 1980 probably could not be artificially recharged in the 3.5-mile reach of the Santa Clara River below Solemint. This is due to the lack of storage in the alluvial aquifer. When an estimated maximum pumping rate to 1990 is distributed so the pumping near the artificial recharge reach is greatly increased, it seems possible to artificially recharge all the imported water to be delivered prior to 1980.

4. On the basis of readouts from the analog model it seems that the maximum quantities of pumping that might be demanded of the alluvial aquifer to 1990 cannot be supplied by that aquifer. To meet the maximum water requirements of the area, either more water must be imported than was used in the model run or pumping from the Saugus aquifer must be increased. However, the model indicates that increased pumping from the Saugus aquifer causes large head declines in that aquifer and induces declines in the alluvial aquifer. In the model declines were large enough to greatly diminish the ground-water discharge from the alluvial aquifer and to eliminate all natural outflow from the Saugus aquifer. If this condition were allowed to continue unchecked, water-quality problems could develop in the basin because of the imbalance of salts being carried in and out of the basin.

As a result, pumping in the Saugus aquifer cannot be increased indiscriminately without producing detrimental effects in both aquifers. A proper choice of pumping patterns in the Saugus and alluvial aquifers could minimize the adverse effects of increased pumpage. However, further interrogation of the model is required to determine whether or not the Saugus aquifer can support the proposed rate of pumping without dewatering the alluvial aquifer.

5. The Saugus aquifer is a potentially large source of ground water with an estimated maximum of 6 million acre-feet of recoverable water in storage. Further study of this aquifer is required to delineate the areas of poor water quality and to determine more accurately the transmissibility and storage coefficients of the aquifer. Future studies of the Saugus aquifer should give prime consideration to the area north of Castaic Junction and the San Gabriel fault because few hydrologic data are available for this area. With greater knowledge of this aquifer the ground-water basin model could be updated to give more precise information about the response of this aquifer to various ground-water management practices and to more accurately determine the potential for future utilization of the aquifer.

TECHNICAL INFORMATION RECORD
STUDY CODE NO. 1610-9-J-1

State of California
The Resources Agency
DEPARTMENT OF WATER RESOURCES
Southern District
Water Projects Branch

# PRELIMINARY EVALUATION OF STATE WATER PROJECT GROUND WATER STORAGE PROGRAM: SANTA CLARA RIVER VALLEY BASINS

-by-

Evelyn Tompkins
Graduate Student Assistant

This Technical Information Record (TIR) was prepared to document information developed during a reconnaissance-level investigation of the Santa Clara River Valley Ground Water Basins to determine if inclusion of these basins in the State Water Project Future Supply Program is feasible. Therefore, it should be considered as preliminary and subject to revision. This is primarily an internal office document with distribution limited to the cooperating agencies only.

February 1979

basins. Ground water is classed mainly as desirable for domestic and irrigation uses. TDS concentrations range from 260 mg/l to 500 mg/l.

### Ground Water Use

The volume of ground water in storage is reduced by: pumped extractions, consumptive use of water by phreatophytes, and the outflow of rising water to Eastern Basin.

Currently, water demand is met entirely by pumped extractions; however, by 1980 imported water will be needed to meet the projected demands of an increasing population. Annual extractions were estimated to be 14.8 cubic hectometres (12,000 acre-feet) per year.

### Storage Capacity

Ground water in storage between high and low water levels was estimated to be 19.7 cubic hectometres (16,000 acre-feet). Specific yield is approximately 20 percent.

The ground water level is often at or near the surface during storm flows. Therefore, the river channel alluvium has little capacity for further recharge immediately after heavy rains.

## EASTERN BASIN

### Description

Eastern Basin is downstream from Acton Basin and lies almost entirely within Los Angeles County. The basin is separated from Acton Basin by an impermeable bedrock constriction. Eastern Basin is composed of water-bearing deposits occurring along the Santa Clara River between the towns of Lang and Blue Cut and in the numerous canyons tributary to this area. The water-bearing deposits cover an approximate surface area of 11 655 hectares (29,000 acres).

The major aquifers in the basin are the Saugus Formation and the river channel alluvium. Only 1 067 metres (3,500 feet) of the Saugus Formation contribute to ground water development. This formation has been faulted, folded, and eroded. The river channel alluvium ranges from a few metres in thickness to about 61 metres (200 feet) thick near the town of Saugus.

Newhall-Saugus is the largest population center for the basin as well as for the whole Santa Clara River Valley.

Ground Water Occurrence

Ground water in the alluvium is unconfined, while ground water in the Saugus Formation is confined. Ground water moves westward. The San Gabriel and Holser Faults cross the water-bearing sediments and cause a water level differential of approximately 3 to 6 metres (10 to 20 feet).

No measurable subsurface inflow occurs from Acton Basin; inflow from Acton Basin occurs as rising water only. Outflow occurs either as subsurface outflow or as rising water. Rising water outflow was estimated to average 13 cubic hectometres (10,600 acre-feet) per year. The subsurface outflow was estimated to be 0.3 cubic hectometre (240 acre-feet) per year.

Percolation of precipitation, streamflow and the return flows of irrigation water recharge the basin. To a minor extent, inflow is derived from the semi-permeable formations which flank the main ground water basin. Other sources of recharge water for the basin are sewage and industrial waste effluents.

Quality

Widely ranging ground water conditions in this basin may cause localized variations from the favorable water quality of the basin. Ground water quality for domestic use ranges from suitable in most areas of the basin to unsuitable in the western portion. Ground water is generally suitable for irrigation of all but the most sensitive crops.

TDS ranges from 600 mg/l to 1 800 mg/l. The concentration of mineral constituents in the ground water increases westward along the basin. Concentrations of chlorides and nitrates are generally lower than 100 mg/l and 45 mg/l respectively.

Ground Water Use

Wells tapping the alluvium are very productive with yields up to 7 570.8 litres (2,000 gallons) per minute. Well extractions from both the alluvium and the Saugus Formation average 28.7 cubic hectometres (23,300 acre-feet) per year. Near Blue Cut, the Newhall Land and Farming Company pumps and exports from 4.9 to 8 cubic hectometres (4,000 to 6,500 acre-feet) per year to Piru Basin for agricultural purposes.

Storage Capacity

No data is available for the total storage capacity of the basin or the current volume in storage; however, data does indicate the basin had an available capacity of 24.7 cubic hectometres (20,000 acre-feet). The safe yield was estimated at 28.5 cubic hectometres (23,100 acre-feet) per year.

## PIRU BASIN

Description

Piru Basin is the easternmost basin lying entirely within Ventura County between the towns of Blue Cut and Fillmore. The ground water basin covers a surface area of about 2 843 hectares (7,025 acres).

Piru Basin is comprised of two principal aquifers: alluvium beneath the flood-plains and permeable freshwater-bearing zones in the San Pedro Formation. Over most of the basin the thickness of the alluvial aquifer ranges from 26 to 70 metres (85 to 200 feet). The alluvium consists of fluvial sand and gravel of Recent and

# Conjunctive Use of the Saugus Aquifer

Castaic Lake Water Agency

January 1990
K/J/C 884605.00

Kennedy/Jenks/Chilton

CLWA. Consequently, the water is currently utilized for agricultural lease operations within the Devil's Den Water District.

The SWP release pattern from its storage reservoirs is based on maintaining a supply of water to satisfy demand in a drought. Consequently, SWP entitlements are subject to cutbacks at times. To assess potential future reductions, Reiter created a model of the SWP supply available for release using a Monte-Carlo iteration, a random analysis, to project precipitation. Historical hydrologic data are incorporated into the analysis. Because the State plans to develop additional sources of water in the future, the Reiter model includes scenarios for each projected yield increase. The expected increases are 60,000 acre-feet/year in 1991, 300,000 acre-feet/year in 1995 and 300,000 acre-feet/year in 2000. Based on the method of determining reductions discussed in Chapter 3, the potential reductions to CLWA's deliveries (assuming full entitlement amounts were requested), and thus the projected water available for CLWA's use, are calculated for each scenario.

The sources of groundwater available to users within CLWA's boundaries in the future will continue to be the alluvial and Saugus aquifers. From the alluvial aquifer the safe yield is anticipated to be 32,500 acre-feet/year, a portion of which will be used for agricultural purposes and, therefore, is not available for M&I use. The Saugus aquifer production is anticipated to be 11,000 to 22,000 acre-feet/year of which the assumption is made that 10,000 acre-feet/year is allocated for use by the water purveyors and 2,000 acre-feet/year is utilized by other water users.

In addition to groundwater and imported water, reclaimed water will be available for CLWA's use. A reclaimed water system with a maximum capacity of 8,600 acre-feet/year is planned for construction in a phased program. It is anticipated that reclamation will begin in 1992 and will increase until reaching the maximum in 1999. The reclaimed water will be used for landscape irrigation, and, therefore, will most likely be utilized from May through September.

From Table 4-1 and Figure 4-1, it can be seen that, based on Reiter's analysis, the supply does not meet the demand every year. The remaining 1,000 to 10,000 acre-feet/year of unused Saugus water is available for development by CLWA for use in the years of shortfall. Development of additional supplies in the Saugus aquifer will be considered in the following chapters.

Final Report

# Reclaimed Water System Master Plan

Castaic Lake Water Agency

September 1993
K/J 894012.00

Kennedy/Jenks Consultants

# CHAPTER 3

# EXISTING AND PROJECTED WATER SUPPLY AND DEMAND

In order to evaluate the need for reclaimed water, water supplies and demands were projected into the future. This chapter describes the existing and future water supplies, demands, and facilities within the Castaic Lake Water Agency (CLWA) service area.

## EXISTING WATER SUPPLY, DEMAND AND FACILITIES

### Water Supply

Water demands in the Santa Clarita Valley are currently met by two sources: the State Water Project (SWP) and local groundwater supplies. The estimated average total supply available for municipal and industrial (M&I) and agricultural uses is 98,000 to 109,000 acre-feet per year, depending on the yield available from the local groundwater aquifers. CLWA purchases State water and wholesales it to four domestic water purveyors, these being the Los Angeles County Waterworks District No. 36, the Newhall County Water District, the Santa Clarita Water Company and the Valencia Water Company. The approximate boundaries of the water purveyors are shown on Figure 3-1. CLWA has SWP entitlements of 41,500 acre-feet per year for M&I uses. In addition, SWP agricultural entitlements of 12,700 acre-feet per year have been transferred to CLWA from the Devil's Den Water District in Kern and Kings Counties. To date, the Devil's Den entitlements have not been used within the CLWA service area.

In addition to imported water, local groundwater supplies have been developed by domestic water purveyors and by agricultural water users. Two fresh-water bearing aquifers, the alluvial and Saugus aquifers, underlie CLWA's boundaries and form the Eastern Groundwater Basin of the Santa Clara River Valley Basin.

The alluvial aquifer lies above the Saugus aquifer and is comprised of the alluvial sediments along the river and its major tributaries. The maximum thickness of the alluvium is about 200 feet. A large number of wells penetrate this upper aquifer, and, historically, most water extracted from the groundwater basin has been from the alluvial aquifer. The perennial yield of the aquifer is considered to be 32,500 acre-feet, a portion of which is used for agricultural purposes and is increasingly available for M&I uses as agricultural land is developed for urban use.

Much less information is known about the Saugus aquifer. Historically, few wells penetrated the Saugus aquifer. However, as water demands in the valley have increased, more wells have been drilled into the aquifer. The anticipated annual

# VALENCIA WATER COMPANY

# WATER MANAGEMENT PROGRAM

DECEMBER, 1995

TABLE III-1

## WATER SOURCES FOR SANTA CLARITA VALLEY

| SOURCE<br>Acre-Feet per Year | Minimum | Maximum |
|---|---|---|
| Santa Clara River Alluvium | 31,600 | 32,600 |
| Saugus Formation Normal Pumping | 11,000 | 22,000 |
| **Saugus Short Term Overdraft** | 20,300 | None |
| State Project Water | | |
| CLWA Table A Entitlement[1] | 43,360 | 54,200 |
| TOTAL CURRENT RESOURCES | 106,260 | 108,800 |
| Reclaimed Water Potential | 10,000 | 10,000 |
| TOTAL WATER RESOURCES AVAILABLE | 116,260 | 118,800 |
| NON DOMESTIC & OTHER | | |
| Agricultural uses | 12,000 | 5,000[3] |
| Pitchess Honor Rancho | 2,000[2] | 3,000[3] |
| **NET WATER RESOURCES FOR M & I** | **102,260** | **110,800** |

[1] Entitlements are subject to drought related cutbacks. Maximum cutback on Table A is estimated to be 20%. CLWA plans a conjunctive use program to mitigate the effects of State Project Water cutbacks which are shown in the column designated as minimum. This requires **Saugus Short Term Overdraft.**

[2] Estimated current use.

[3] Estimated future use.

# Castaic Lake Water Agency

Draft

# Integrated Water Resources Plan
# Water Demand and Supply Evaluation

February 1998

MONTGOMERY WATSON

BOOKMAN-EDMONSTON
ENGINEERING, INC.

Pumping from the Saugus Aquifer has varied from about 3,900 acre-ft/yr up to 14,800 acre-ft/yr. In 1996, Saugus pumping was about 8,200 acre-ft/yr. Installed pumping capacity can produce 15,000 to 16,000 acre-ft/yr from the Saugus Aquifer.

In 1991, groundwater was pumped into the CLWA distribution system because of SWP supply deficiencies and the cost of water was less than purchasing State Drought Bank water. By moving groundwater from areas of adequate supply into areas with limited groundwater, the local water community illustrated a major element of a conjunctive use program.

## Estimated Dry Period Groundwater Production Capability

Slade (1984) reported that the perennial yield of the Alluvial Aquifer is about 32,000 acre-ft/yr. This yield is the historical annual production adjusted for a minor change in storage. Because of he limited storage capacity in the Alluvium, this groundwater source may be limited in dry periods. Wells in the Alluvium near the eastern reaches of the Santa Clara River are known to have groundwater levels which decline during consecutive dry years by as much as 100 feet, reducing pumping capacity. A series of winter storms recharge the aquifer and result in water level recovery.

The data reviewed for the Pardee area (located near Bouquet Canyon Road and the Santa Clara River) shows that in 1990 and 1991, groundwater levels did not decline as much as those in the easterly areas. In 1991, the Valencia Water Company increased its pumping to offset limited SWP water supplies. Valencia Water Company reported delivery of about 5,000 acre-ft/yr into the CLWA distribution system. Total pumping from the Alluvium by Valencia Water Company in 1991 was about 9,900 acre-ft/yr, as reported to the State Water Resources Control Board.

Based on historical data, the Alluvial Aquifer east of Castaic Junction can support production of at least 20,400 acre-ft/yr as shown in **Table 3-2**.

**Table 3-2**
**1991 Alluvial Groundwater Production**
**East of Castaic Junction**

| Water Purveyor | Annual Production (acre-ft/yr) |
|---|---|
| Newhall CWD | 1,900 |
| Santa Clarita WC | 5,900 |
| Valencia WC [1] | 10,400 |
| Wayside Honor Rancho | 2,200 |
| Total | 20,400 |

1. Includes 500 acre-ft pumped in 1991 by Newhall Land & Farming Co. east of Castaic Junction.

PROPOSED FINAL

# Supplemental Water Project Environmental Impact Report

SCH # 98041127

FEBRUARY 1999

## 3.2 SURFACE WATER, WATER USE, GROUNDWATER

*Surface Water.* The primary drainage course in the CLWA area is the Santa Clara River. Principal tributaries to the Santa Clara River include Mint Canyon, Bouquet Canyon, San Francisquito Canyon, Castaic Creek Canyon, Oak Spring Canyon, Sand Canyon, and Potrero Canyon. Water flow in the stream canyons is ephemeral, and diminishes rapidly after most rainfall events. Surface water resources include the Santa Clara River, Bouquet Reservoir, and Castaic Lake. Water (both imported and naturally occurring) is diverted from Pyramid Lake located a few miles to the north, through hydroelectric power generation facilities, into Castaic Lake. Water quality in the Santa Clara River is generally poor due to high concentrations of total dissolved solids, however, water in Pyramid Lake, Castaic Lake, and Bouquet Reservoir is suitable for municipal use. Primary flood hazard areas occur in and along natural drainage channels, such as the Santa Clara River and its tributaries, and in areas where sheetflow may occur during high intensity rainfall (CLWA 1988, 1998; Slade 1986).

*Water Supplies.* The existing local water supply in the CLWA service area is groundwater extracted from the alluvial aquifer and from the underlying Saugus Formation aquifer. Historically, groundwater has been the primary source of water in the Santa Clarita Valley. Since 1980, local groundwater supplies have been supplemented with imported water from the SWP. From 1984 to 1996, historic SWP entitlement has averaged 24,568 acre-feet per year (AFY) (including deliveries to Devil's Den in Kern County and Kings County), which is 45 percent of the existing 54,200 AFY entitlement.

*Groundwater.* Large quantities of water are pumped from relatively shallow wells in the highly permeable alluvial aquifer. Although this alluvial aquifer is the smaller of the two-aquifer systems, as measured by storage capacity, most water wells within CLWA are drilled into the alluvial aquifer. Slade (1986) estimated the perennial yield of the alluvial aquifer to be from 31,600 AFY to 32,600 AFY. The maximum historic quantity of water stored in the alluvium has been estimated to be approximately 201,000 acre-feet, following substantial rainfall in 1945 (CLWA 1998). Recharge amounts are highly variable, depending on annual precipitation with documented annual water level recoveries of 70 feet or more. Dry years have resulted in water level drops of approximately 100 feet, particularly in Soledad Canyon. However, groundwater levels have remained near the ground surface in the vicinity of Castaic Junction, due to the east-

# SANTA CLARITA VALLEY WATER REPORT
## 1999

Castaic Lake Water Agency

Los Angeles County Waterworks District #36

Newhall County Water District

Santa Clarita Water Company

Valencia Water Company

Prepared by: The Upper Santa Clara Valley Water Committee
February 2000

# Executive Summary

## Santa Clarita Valley Water Report
## 1998

This annual report provides factual information about the current water resources within the Santa Clarita Valley. The Upper Santa Clara Valley Water Committee, (Committee) whose members are responsible for ensuring that Valley residents have a safe, adequate and reliable water supply, prepared this report.

The Santa Clarita Valley is served by four retail water purveyors: Los Angeles County Waterworks District 36, Newhall County Water District, Santa Clarita Water Company and Valencia Water Company. The Castaic Lake Water Agency (CLWA) provides imported water from California's State Water Project to the four purveyors for distribution. These five entities meet regularly as the Upper Santa Clara Valley Water Committee to coordinate the beneficial use of water in the Valley.

This report provides information about the area's geology, the local groundwater basin, imported water supplies, water quality, precipitation, recycled water, existing and projected water demand and an overall outlook of water supply and demand.

In 1998, the Committee reports a total water supply of approximately 107,000 acre-feet per year and an existing water demand of 48,858 acre-feet. The Santa Clarita Valley currently has a surplus of supply of about 58,142 acre-feet over existing demand. The Committee projects this condition to continue for the foreseeable future given the overall availability of local and imported water supplies, the levels of precipitation both locally and regionally, the favorable operating condition of the groundwater basin and the existing facilities in place to deliver water throughout the valley.

Water Supplies include groundwater from the shallow Alluvial Aquifer and the underlying deeper Saugus Formation and imported water from the State Water Project. The following summarizes the water resources of the Valley in 1998:

### Alluvial Aquifer

- The annual perennial yield for the Alluvial Aquifer is 32,500 acre-feet per year. This quantity of water represents an amount of water that can be pumped annually from the aquifer on a long-term basis and during dry year conditions without causing an undesirable result.

# Section I

# Introduction

## Section I.A Background

For most residents of the Santa Clarita Valley (Valley), domestic water service is provided by four retail water purveyors. They are Los Angeles County Waterworks District 36, Newhall County Water District, Santa Clarita Water Company, and Valencia Water Company. The Castaic Lake Water Agency (CLWA) is a wholesaler that obtains water from California's State Water Project. CLWA draws water from Castaic Lake where it is filtered and disinfected at two treatment plants before distribution to the purveyors. These five entities meet regularly as the Upper Santa Clara Valley Water Committee (Committee) to coordinate the beneficial use of water in the Valley. Their respective service areas are shown in **Figure I-1**.

The Committee was officially formed in 1967 when its members requested the United States Geological Survey (USGS) to prepare a joint water resources study of the Santa Clara River Watershed. The purpose of the Committee was to consult with the USGS regarding the study, to assist with the accumulation of data, and to continue working toward coordinating water management programs for the area. The study was completed in 1972 by S. G. Robson of the USGS and provides the initial baseline information of the valley's groundwater resources.

Over the years, the Committee has continued to review and document the availability of water resources in the region. Past studies have assessed the condition of the local groundwater aquifers, their hydro-geologic character, aquifer storage capacity, perennial yield and recharge rate and the potential for conjunctive use of both groundwater and imported water resources.

Other efforts have included developing drought contingency plans, evaluating the impact of landfills on the groundwater basin, coordinating emergency response

## Section II

## Water Supplies

Historically, local groundwater extracted from the Alluvial and Saugus Aquifers has been the primary source of water in the Santa Clarita Valley. However, local groundwater supplies since 1980 have been supplemented with imported water from the State Water Project. This Section describes the geologic setting of the Santa Clarita Valley, the local and imported water supplies, water quality, precipitation records and recycled water programs.

### Section II.A Eastern Groundwater Basin

**Figure II-1** shows the approximate boundaries of the Eastern Groundwater Basin, which is the largest and most developed groundwater body of the Upper Santa Clara River HA. It is an alluvial-valley aquifer-stream system. The basin consists of Holocene Alluvium, Pleistocene terrace deposits, and the Plio-Pleistocene Saugus Formation.

Information on the hydrologic conditions of the groundwater basin comes from three previous studies. Robson (1972) evaluated the availability, quantity, and potential for development of the groundwater resources of the Saugus-Newhall area. Slade (1986) conducted an evaluation of the hydrologic conditions of the Alluvial Aquifer underlying the Santa Clarita Valley and its potential for artificial recharge. In 1988, Slade conducted a hydrologic evaluation of the Saugus Formation, its quantity, and potential for development.

#### Section II.A.1.a. Alluvial Aquifer - General

The Holocene Alluvium exists extensively on the valley floor and becomes restricted at the narrow channels of the river's tributaries in the upper reaches. The Alluvium is deepest along the center of the present river channel, with a

values where the alluvium is thickest in the center of the valley and generally west of Bouquet Canyon.

The amount of groundwater in storage in the Alluvium can vary considerably because of the effects of recharge and discharge from the aquifer. Based on an Alluvial area of 16,410 acres, variable thickness, and specific yield of 9 to 16 percent, it has ,been estimated that the theoretical maximum amount of groundwater that could be held and retrieved in usable storage is 240,000 acre-feet. Based on historical fluctuations in groundwater levels, calculated volumes of groundwater in storage in the Alluvium have ranged from a high of 201,000 acre-feet in April 1945 to a low of 107,000 acre-feet in November 1965.

Three of the four water companies pump local groundwater in addition to purchasing imported water from CLWA. The Los Angeles County Waterworks District 36 presently has no operating groundwater extraction facilities. Also, the County of Los Angeles and the Newhall Land and Farming Company pump from the Alluvial Aquifer to service their own lands.

In 1986, the Committee hired Richard C. Slade and Associates to study the Alluvial Aquifer and determine, among other things, the aquifer's hydrogeologic condition, perennial yield, storage capacity and potential for artificial recharge. Based on historical pumpage and hydrologic conditions over a 28 year base period (1957-58 through 1984-85), Slade estimated that the annual perennial yield for the Alluvial Aquifer is 31,600 acre-ft to 32,600 acre-ft per year (one acre-ft is +/- 325,900 gallons). Based on the results of that hydrogeologic report and the operating experience of its members, the Committee has adopted a perennial yield of 32,500 acre-ft per year. This quantity represents the amount of water that can be pumped annually from the aquifer on a long-term basis, including fluctuations above and below the perennial yield amount during wet and dry year conditions, without causing an undesirable result. Undesirable results could include long-term groundwater level decline (and associated decline in groundwater storage), degradation of water quality in the aquifer, or land

# SANTA CLARITA VALLEY WATER REPORT
# 2002

## PREPARED BY:

**Castaic Lake Water Agency**

**Los Angeles County Waterworks District #36**

**Newhall County Water District**

**Valencia Water Company**

**April 2003**

Table II-7
Total Water Supplies
(Acre-Feet)

| Year | Sources of Supply | | | | | | | | | Total Per Year |
|---|---|---|---|---|---|---|---|---|---|---|
| | Water Retailors | | | Agriculture, Irrigation, & Miscellaneous Uses | | | Total Per Source | | | |
| | Alluvial Aquifer | Saugus Form. | SWP | Alluvial Aquifer | Saugus Form. | SWP | Alluvial Aquifer | Saugus Form. | SWP | All Sources |
| 1980 | 16,625 | 4,569 | 1,125 | 14,831 | 20 | 0 | 31,456 | 4,589 | 1,125 | 37,170 |
| 1981 | 14,056 | 4,950 | 5,816 | 16,737 | 20 | 0 | 30,793 | 4,970 | 5,816 | 41,579 |
| 1982 | 8,684 | 3,569 | 9,659 | 13,184 | 521 | 0 | 21,868 | 4,090 | 9,659 | 35,617 |
| 1983 | 8,803 | 3,398 | 9,185 | 11,483 | 454 | 0 | 20,286 | 3,852 | 9,185 | 33,323 |
| 1984 | 12,581 | 3,809 | 10,996 | 14,737 | 640 | 0 | 27,318 | 4,449 | 10,996 | 42,763 |
| 1985 | 12,519 | 4,140 | 11,823 | 12,828 | 575 | 0 | 25,347 | 4,715 | 11,823 | 41,885 |
| 1986 | 12,418 | 4,975 | 13,759 | 11,787 | 510 | 0 | 24,205 | 5,485 | 13,759 | 43,449 |
| 1987 | 12,630 | 4,962 | 16,285 | 10,012 | 599 | 0 | 22,642 | 5,561 | 16,285 | 44,488 |
| 1988 | 12,197 | 6,404 | 19,033 | 9,451 | 524 | 0 | 21,648 | 6,928 | 19,033 | 47,609 |
| 1989 | 13,978 | 7,217 | 21,618 | 9,743 | 542 | 0 | 23,721 | 7,759 | 21,618 | 53,098 |
| 1990 | 13,151 | 8,302 | 21,613 | 10,725 | 559 | 0 | 23,876 | 8,861 | 21,613 | 54,350 |
| 1991 | 17,408 | 14,417 | 7,968 | 9,779 | 500 | 0 | 27,187 | 14,917 | 7,968 | 50,072 |
| 1992 | 16,897 | 10,458 | 13,911 | 10,694 | 466 | 987 | 27,591 | 10,924 | 14,898 | 53,413 |
| 1993 | 19,808 | 10,151 | 13,393 | 10,318 | 459 | 443 | 30,126 | 10,610 | 13,836 | 54,572 |
| 1994 | 20,068 | 11,531 | 14,389 | 13,065 | 494 | 311 | 33,133 | 12,025 | 14,700 | 59,858 |
| 1995 | 20,590 | 8,087 | 16,996 | 13,874 | 473 | 6 | 34,464 | 8,560 | 17,002 | 60,026 |
| 1996 | 24,681 | 7,373 | 18,093 | 13,757 | 813 | 780 | 38,438 | 8,186 | 18,873 | 65,497 |
| 1997 | 25,273 | 6,752 | 22,148 | 14,326 | 993 | 1,067 | 39,599 | 7,745 | 23,215 | 70,559 |
| 1998 | 23,898 | 4,706 | 20,254 | 12,750 | 849 | 12 | 36,648 | 5,555 | 20,266 | 62,469 |
| 1999 | 27,240 | 2,728 | 27,282 | 16,166 | 988 | 20 | 43,406 | 3,716 | 27,302 | 74,424 |
| 2000 | 25,216 | 3,193 | 32,579 | 14,433 | 887 | 3 | 39,649 | 4,080 | 32,582 | 76,311 |
| 2001 | 22,055 | 3,267 | 35,369 | 15,218 | 873 | 0 | 37,273 | 4,140 | 35,369 | 76,782 |
| 2002 | 22,097 | 4,360 | 41,768 | 16,006 | 800 | 0 | 38,103 | 5,160 | 41,768 | 85,031 |

# NEWHALL COUNTY WATER DISTRICT

## Summary of Annual Rainfall

October 1st Thru September 30th

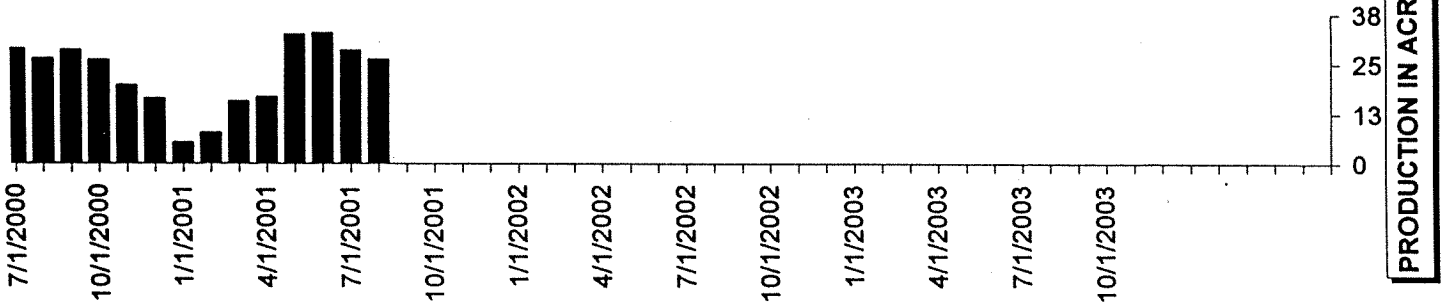
(Totals in inches)

| | 1986-87 | 1987-88 | 1988-89 | 1989-90 | 1990-91 | 1991-92 | 1992-93 | 1993-94 | 1994-95 |
|---|---|---|---|---|---|---|---|---|---|
| Oct | 0.68 | 3.47 | 0.00 | 0.86 | 0.00 | 0.50 | 1.55 | 0.57 | 0.78 |
| Nov | 1.55 | 1.25 | 0.92 | 0.37 | 0.63 | 0.00 | 0.00 | 0.75 | 0.71 |
| Dec | 0.24 | 4.80 | 6.74 | 0.00 | 0.01 | 5.59 | 7.25 | 1.76 | 1.94 |
| Jan | 2.11 | 3.37 | 0.89 | 2.89 | 1.11 | 3.28 | 17.11 | 0.48 | 21.98 |
| Feb | 0.62 | 3.49 | 4.13 | 4.23 | 5.72 | 16.64 | 11.73 | 5.31 | 1.93 |
| Mar | 1.69 | 1.16 | 1.30 | 0.22 | 11.33 | 9.73 | 4.27 | 2.33 | 8.30 |
| Apr | 0.14 | 3.98 | 0.30 | 0.48 | 0.00 | 0.15 | 0.00 | 0.42 | 0.72 |
| May | 0.10 | 0.09 | 0.00 | 0.88 | 0.00 | 0.34 | 0.00 | 0.00 | 0.26 |
| Jun | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.65 | 0.00 | 0.76 |
| Jul | 0.09 | 0.00 | 0.00 | 0.00 | 0.00 | 0.30 | 0.00 | 0.00 | 0.00 |
| Aug | 0.02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Sep | 0.00 | 0.10 | 0.62 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **TOTAL** | **7.24** | **21.71** | **14.90** | **9.93** | **18.80** | **36.53** | **42.56** | **11.62** | **37.38** |

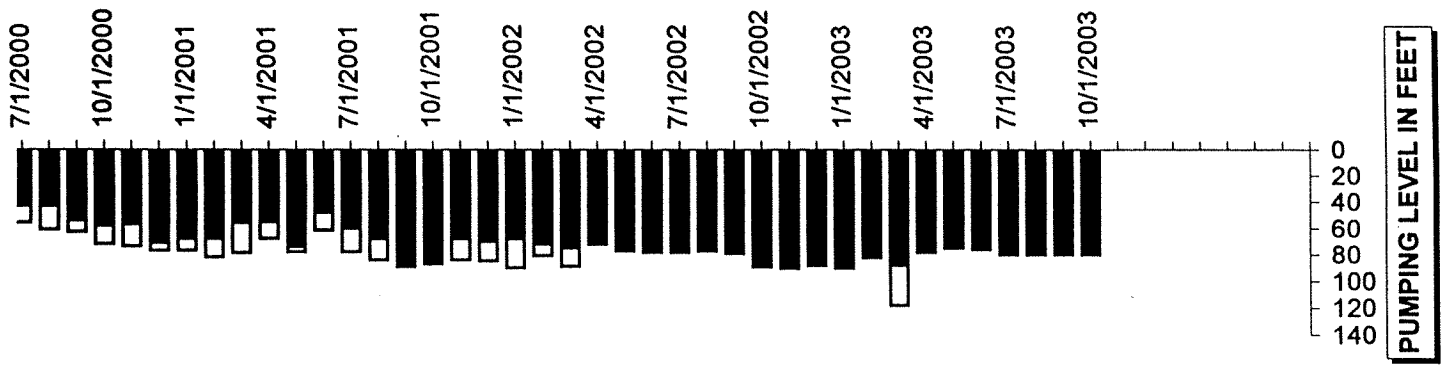
| | 1995-96 | 1996-97 | 1997-98 | 1998-99 | 1999-00 | 2000-01 | 2001-02 | 2002-03 | 2003-04 |
|---|---|---|---|---|---|---|---|---|---|
| Oct | 0.00 | 1.30 | 0.00 | 0.33 | 0.00 | 1.13 | 0.22 | 0.00 | 1.10 |
| Nov | 0.00 | 1.06 | 3.73 | 1.39 | 0.00 | 0.00 | 3.18 | 3.01 | 0.63 |
| Dec | 2.33 | 8.70 | 6.72 | 1.39 | 0.05 | 0.00 | 1.30 | 5.85 | 2.57 |
| Jan | 2.97 | 6.64 | 3.49 | 2.08 | 1.21 | 5.84 | 1.55 | 0.00 | |
| Feb | 6.73 | 0.23 | 22.00 | 0.65 | 9.43 | 10.76 | 0.51 | 9.03 | |
| Mar | 2.08 | 0.00 | 5.15 | 3.00 | 3.15 | 3.38 | 0.38 | 2.38 | |
| Apr | 0.13 | 0.00 | 2.28 | 3.78 | 2.10 | 2.56 | 0.05 | 2.35 | |
| May | 0.68 | 0.00 | 5.50 | 0.00 | 0.00 | 0.00 | 0.12 | 1.70 | |
| Jun | 0.00 | 0.00 | 0.06 | 0.48 | 0.00 | 0.00 | 0.01 | 0.00 | |
| Jul | 0.00 | 0.05 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.02 | |
| Aug | 0.00 | 0.00 | 0.00 | 0.00 | 0.31 | 0.00 | 0.00 | 0.00 | |
| Sep | 0.00 | 0.53 | 0.21 | 0.01 | 0.00 | 0.00 | 0.02 | 0.00 | |
| **TOTAL** | **14.92** | **18.51** | **49.14** | **13.11** | **16.25** | **23.67** | **7.34** | **24.34** | **4.30** |

Newhall County Water District

# PINETREE MONTHLY PRODUCTION SUMMARY OF WELL NO. 1




**WELL NO. 1**




***For October 2003***

| | |
|---|---|
| ***Current Month's Production (AF):*** | **0.00** |
| AVG GPD | 0 |

***"July 1 Thru June 30"***

| | |
|---|---|
| TOTAL TO DATE (AF) | 0.00 |
| PREVIOUS YEAR (AF) | 0.00 |
| ***Comparative Ratio*** | **0.0%** |

| | |
|---|---|
| *TIMED GPM* | 0 |
| *STATIC LEVEL* | 80 |
| *PUMPING LEVEL* | 0 |
| ***TOP OF BOWLS*** | **160** |

**WEATHER:**

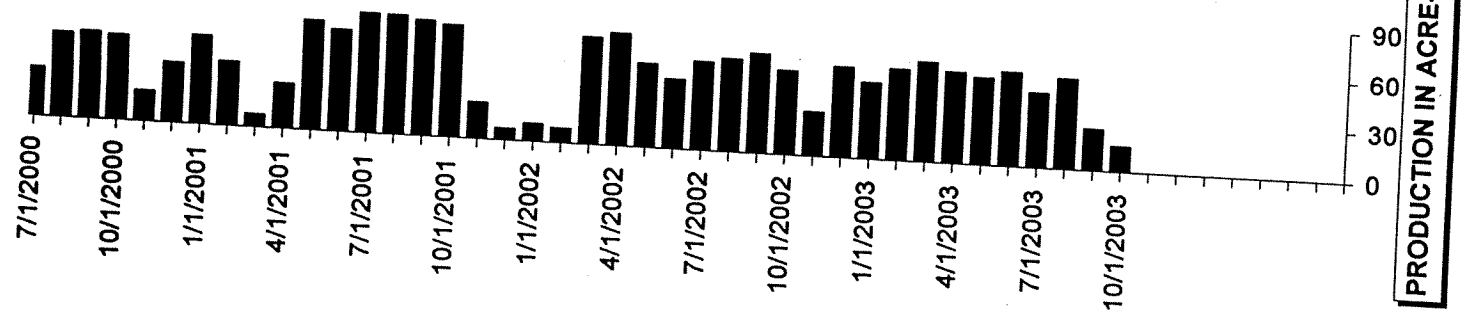
| | |
|---|---|
| AVG HIGH | 90.8 |
| AVG LOW | 57.3 |
| PRECIPITATION | 0.10 |

| | |
|---|---|
| **TOTAL PRECIPITATION SINCE OCT 1st** | 0.10 |

18

Newhall County Water District

# PINETREE MONTHLY PRODUCTION SUMMARY OF WELL NO. 3



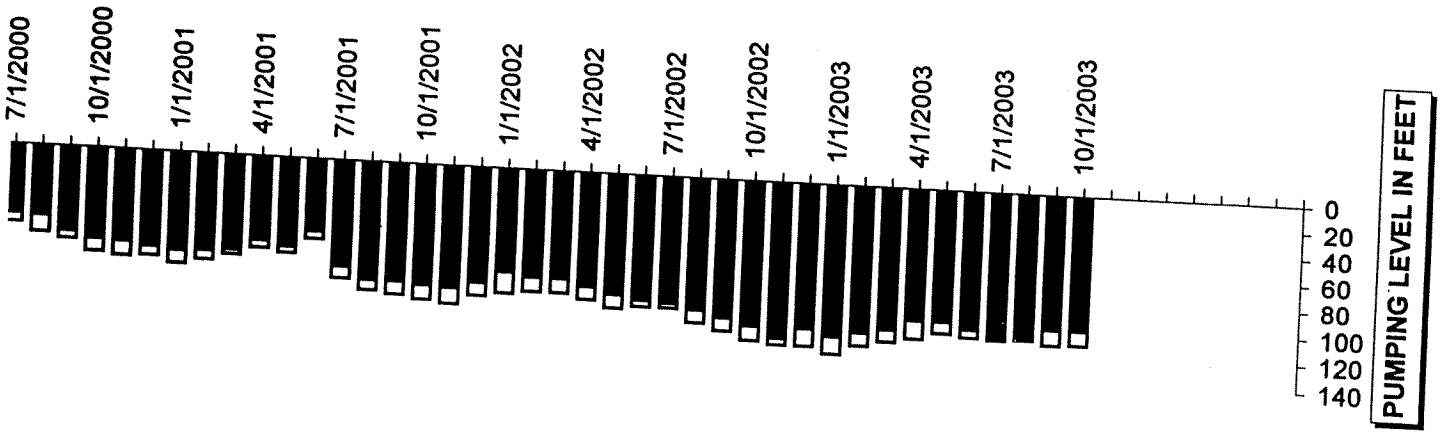

**For October 2003**

| | |
|---|---|
| ***Current Month's Production (AF):*** | **14.84** |
| AVG GPD | **156,032** |

***"July 1 Thru June 30"***

| | |
|---|---|
| TOTAL TO DATE (AF) | **138.43** |
| PREVIOUS YEAR (AF) | **220.18** |
| ***Comparative Ratio*** | **-37.1%** |

## WELL NO. 3




| | |
|---|---|
| *TIMED GPM* | **525** |
| *STATIC LEVEL* | **102** |
| *PUMPING LEVEL* | **113** |
| ***TOP OF BOWLS*** | **135** |

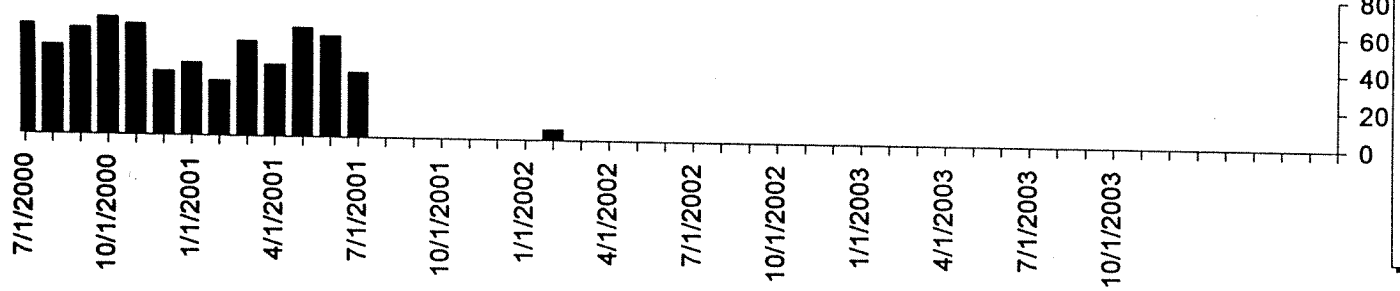
**WEATHER:**

| | |
|---|---|
| AVG HIGH | **90.8** |
| AVG LOW | **57.3** |
| PRECIPITATION | **0.10** |

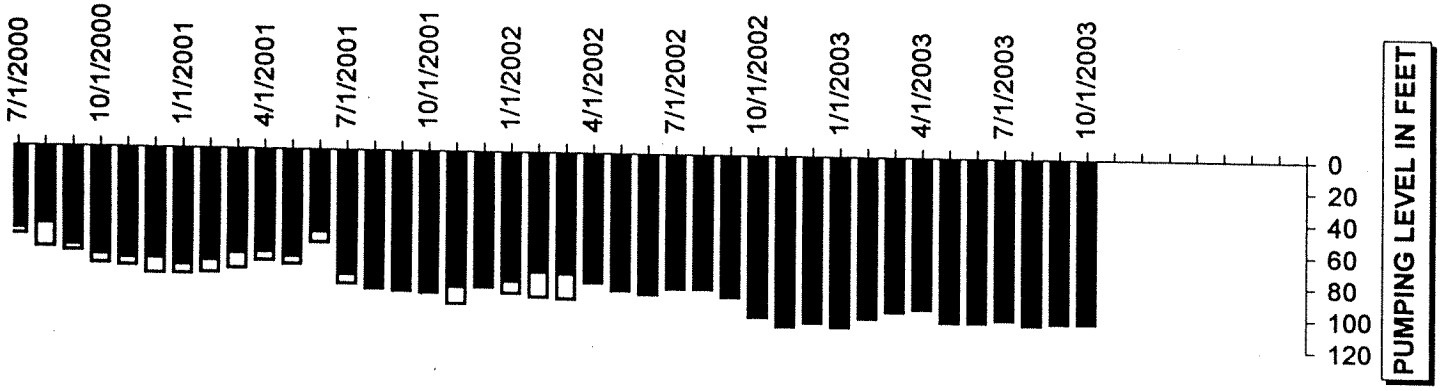
| | |
|---|---|
| **TOTAL PRECIPITATION SINCE OCT 1st** | **0.10** |

Newhall County Water District

# PINETREE MONTHLY PRODUCTION SUMMARY OF WELL NO. 4




**WELL NO. 4**




***For October 2003***

| | |
|---|---|
| ***Current Month's Production (AF):*** | **0.00** |
| AVG GPD | 0 |

***"July 1 Thru June 30"***

| | |
|---|---|
| TOTAL TO DATE (AF) | 0.00 |
| PREVIOUS YEAR (AF) | 0.00 |
| ***Comparative Ratio*** | **0.0%** |

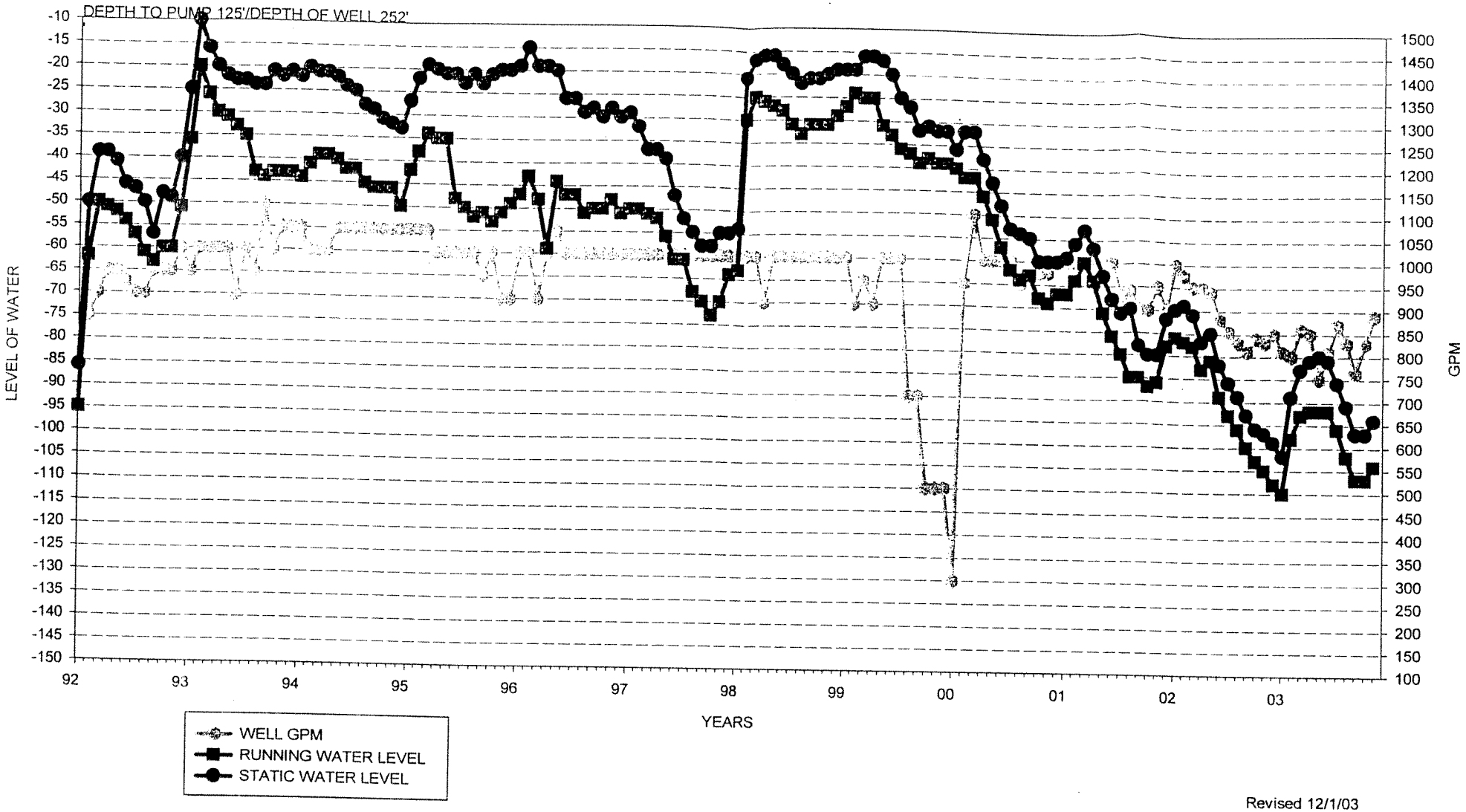
| | |
|---|---|
| *TIMED GPM* | 0 |
| *STATIC LEVEL* | 104 |
| *PUMPING LEVEL* | 0 |
| ***TOP OF BOWLS*** | **165** |

**WEATHER:**

| | |
|---|---|
| AVG HIGH | 90.8 |
| AVG LOW | 57.3 |
| PRECIPITATION | 0.10 |

| | |
|---|---|
| **TOTAL PRECIPITATION SINCE OCT 1st** | 0.10 |

# WATER LEVEL GRAPH




Revised 12/1/03

ITEM NO.
2A

STATE OF CALIFORNIA • RESOURCES AGENCY • DEPARTMENT OF WATER RESOURCES

# NOTICE TO
# STATE WATER PROJECT CONTRACTORS

NUMBER: 04-04

DATE: MAR 0 1 2004

SUBJECT: 2004 State Water Project Allocation Increase

FROM: Tom Glory
DEPUTY DIRECTOR, DEPARTMENT OF WATER RESOURCES

The Department of Water Resources is increasing the allocation of 2004 State Water Project water for long-term contractors from 2.06 million acre-feet to 2.68 million acre-feet. Based on recent water supply conditions, SWP supplies are projected to meet 65 percent of most SWP contractors' 2004 Table A amounts, which total 4.13 MAF. Attached is the revised 2004 SWP allocation table.

The Department's new approval considered several factors, including existing storage in SWP conservation reservoirs, SWP operational constraints, and 2004 contractor demands. The Department will revise allocations as the year's hydrologic and water conditions develop.

If you have any questions, please contact Dan Flory, Chief of the Department's State Water Project Analysis Office at (916) 653-4313, or you may call Craig Trombly of his staff at (916) 653-6250.

Attachment

# 2004 STATE WATER PROJECT ALLOCATION

(ACRE-FEET)

| SWP CONTRACTORS | TABLE A (1) | INITIAL REQUEST (2) | APPROVED ALLOCATION (3) | PERCENT APPROVED ALLOCATION (3)/(2) (4) |
|---|---|---|---|---|
| **FEATHER RIVER** | | | | |
| County of Butte | 3,500 | 3,500 | 2,275 | 65% |
| Plumas County FC&WCD | 1,750 | 1,750 | 1,138 | 65% |
| City of Yuba City | 9,600 | 9,600 | 6,240 | 65% |
| Subtotal | **14,850** | **14,850** | **9,652** | |
| **NORTH BAY** | | | | |
| Napa County FC&WCD | 21,850 | 21,850 | 14,203 | 65% |
| Solano County WA | 47,206 | 47,206 | 30,684 | 65% |
| Subtotal | **69,056** | **69,056** | **44,886** | |
| **SOUTH BAY** | | | | |
| Alameda County FC&WCD, Zone 7 | 80,619 | 80,619 | 52,402 | 65% |
| Alameda County WD | 42,000 | 42,000 | 27,300 | 65% |
| Santa Clara Valley WD | 100,000 | 100,000 | 65,000 | 65% |
| Subtotal | **222,619** | **222,619** | **144,702** | |
| **SAN JOAQUIN VALLEY** | | | | |
| Oak Flat WD | 5,700 | 5,700 | 3,705 | 65% |
| County of Kings | 9,000 | 9,000 | 5,850 | 65% |
| Castaic Lake WA | 12,700 | 12,700 | 8,255 | 65% |
| Dudley Ridge WD | 57,343 | 57,343 | 37,273 | 65% |
| Empire West Side ID | 3,000 | 3,000 | 1,950 | 65% |
| Kern County WA | 998,730 | 998,730 | 649,174 | 65% |
| Tulare Lake Basin WSD | 96,227 | 96,227 | 62,548 | 65% |
| Subtotal | **1,182,700** | **1,182,700** | **768,755** | |
| **CENTRAL COASTAL** | | | | |
| San Luis Obispo County FC&WCD | 25,000 | 25,000 | 16,250 | 65% |
| Santa Barbara County FC&WCD | 45,486 | 45,486 | 29,566 | 65% |
| Subtotal | **70,486** | **70,486** | **45,816** | |
| **SOUTHERN CALIFORNIA** | | | | |
| Antelope Valley-East Kern WA | 141,400 | 141,400 | 91,910 | 65% |
| Castaic Lake WA | 82,500 | 82,500 | 53,625 | 65% |
| Coachella Valley WD | 33,000 | 33,000 | 21,450 | 65% |
| Crestline-Lake Arrowhead WA | 5,800 | 5,800 | 3,770 | 65% |
| Desert WA | 38,100 | 38,100 | 24,765 | 65% |
| Littlerock Creek ID | 2,300 | 2,300 | 1,495 | 65% |
| Mojave WA | 75,800 | 75,800 | 49,270 | 65% |
| Metropolitan WDSC | 2,011,500 | 2,011,500 | 1,307,475 | 65% |
| Palmdale WD | 21,300 | 21,300 | 13,845 | 65% |
| San Bernardino Valley MWD | 102,600 | 102,600 | 66,690 | 65% |
| San Gabriel Valley MWD | 28,800 | 28,800 | 18,720 | 65% |
| San Gorgonio Pass WA | 6,000 | 6,000 | 3,900 | 65% |
| Ventura County FCD | 20,000 | 20,000 | 13,000 | 65% |
| Subtotal | **2,569,100** | **2,569,100** | **1,669,915** | |
| **TOTAL** | **4,128,811** | **4,128,811** | **2,683,727** | |

SWPAO
02-Mar-04

Los Angeles District

# Citizens Advisory Group Update on City of Santa Clarita, CA

# Eastern Santa Clara Subbasin Groundwater Study

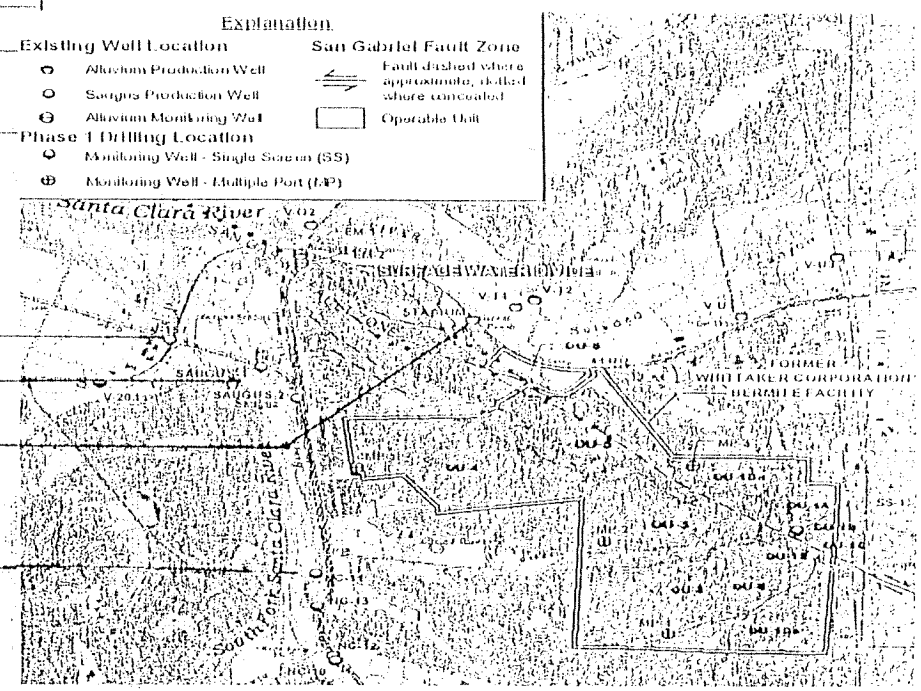
December 10, 2003

Larry Sievers
213 452 3989
Larry.A.Sievers@usace.army.mil

# Los Angeles District

## Impacted Production Wells

| Well ID | Total Cased Depth (ft) | Formation Perforated | Maximum Concentration (µg/L) |
|---|---|---|---|
| Inactive since 1997/1998: | | | |
| V-157 | 2,014 | Saugus | Perchlorate = 14<br>TCE = 3.8 |
| Saugus-1 | 1,640 | Saugus | Perchlorate = 42<br>TCE = 3.9 |
| Saugus-2 | 1,612 | Saugus | Perchlorate = 47<br>TCE = 1.3 |
| NC-11 | 1,136 | Saugus | Perchlorate = 23<br>TCE = ND |
| Recently on inactive status: | | | |
| Stadium | ~150 | Alluvium | Perchlorate = 5.9<br>TCE = ND |




V-157

Saugus 1 & 2

Stadium

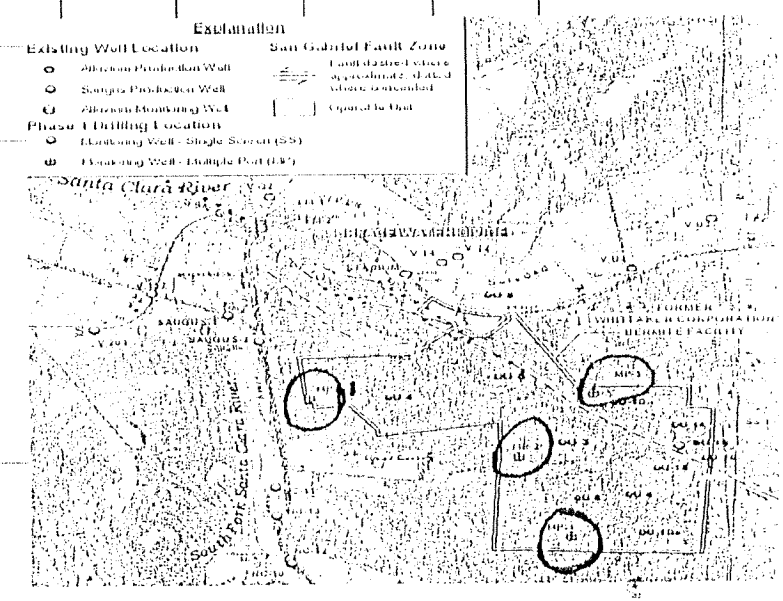
NC-11

# Los Angeles District

# Perchlorate - MP Wells

| Screen | MP-1 | | | MP-2 | | | MP-4 | | | MP-3 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Elev. | Rd. 1 | Rd. 2 | Elev. | Rd. 1 | Rd. 2 | Elev. | Rd. 1 | Rd. 2 | Elev. | Rd. 1 | Rd. 2 |
| 1 | 935 | 20.9 | 23.7 | 1,101 | 58,200 | 64,500 J | 1,022 | 3.5/ ND | ND/ ND | 1,260 | ND | ND |
| 2 | 785 | 9.1/ 9.7 | 114/ 113 | 897 | 53,700/ 44,600 | 13,200 J | 827 | ND | ND | 1,176 | 7.8 | ND |
| 3 | 645 | 14.9 | 29.9 | 827 | 21,400 | 72.2 J | 485 | ND | ND | 997 | 18.7/ 23.6 | ND |
| 4 | 429 | 2 J | ND | 657 | 99.6 | ND/ 1.06 J | 309 | ND | ND | 829 | 18.5 | ND/ ND |
| 5 | 344 | 2.5 J | ND | 336 | ND | 4.5 J | 209 | ND | ND | | | |
| 6 | 193 | 1.8 J | ND | 201 | 267 | 33,400 J /23,800 | | | | | | |
| 7 | 13 | ND | ND | | | | | | | | | |
| 8 | -47 | 3.7 J | 2 J | | | | | | | | | |
| 9 | -233 | 6.6 | ND | | | | | | | | | |
| 10 | -363 | ND | ND | | | | | | | | | |

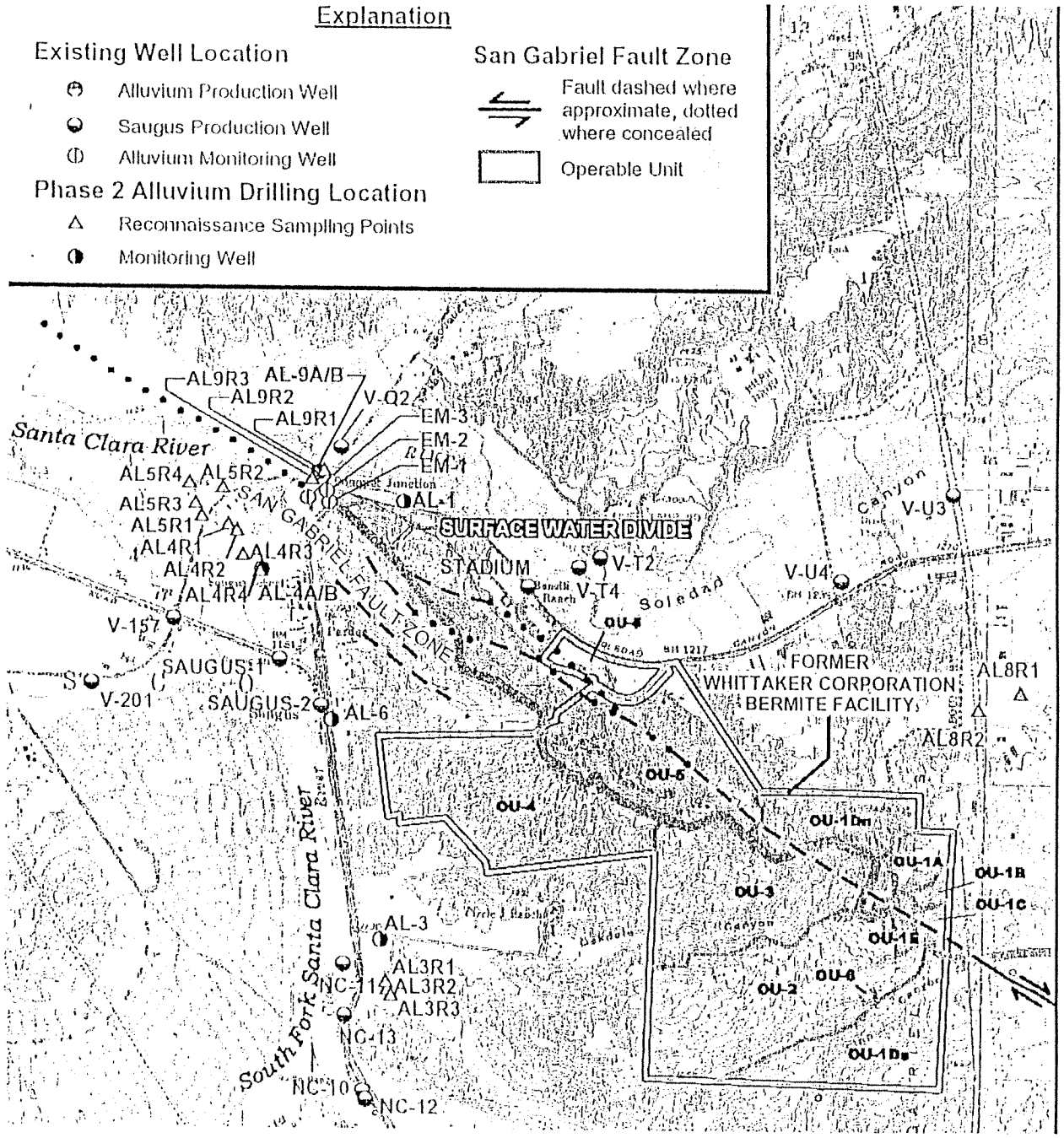
Concentration reported in µg/L
Elev. = MP port elevation in feet msl
J = Estimated value
ND = Not detected



# Perchlorate - AL Recon

| Sampling Point | AL-4 | | AL-5 | | AL-9 | |
|---|---|---|---|---|---|---|
| | Depth | Conc. | Depth | Conc. | Depth | Conc. |
| R1 | 56 | 3.6 | 46 | 2.9 J | 40 | 30.3 |
| R1 | 66 | 2.7 J | 56 | 2.0 J | 47 | 38.9 |
| R2 | 56 | 6.9 | 46 | ND | 41 | 17.6/18.0 |
| R2 | 81 | 2.0 J | 56 | ND | 51 | 31.2 |
| R2 | - | - | 76 | ND | - | - |
| R3 | 56 | 8.8 | 46 | ND | - | - |
| R3 | 66 | 4.9/4.6 | 56 | ND | - | - |
| R4 | 56 | 12.9 | 46 | ND | - | - |
| R4 | 77 | 2.6 J | 56 | ND | - | - |

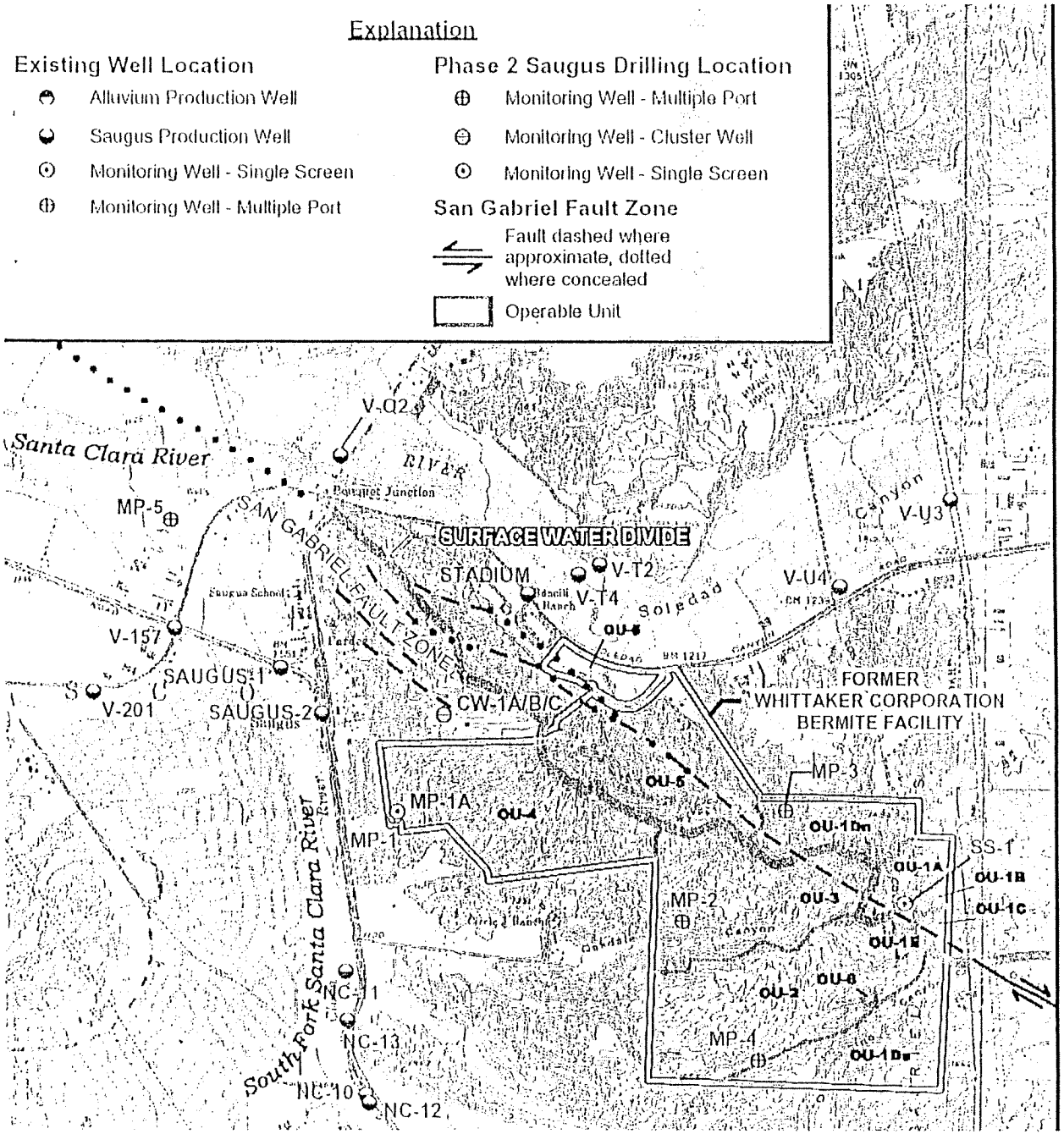
Conc. = reported in μg/L
Depth = in feet below ground surface
J = Estimated value
ND = Not detected




# Alluvium

# Phase 2 Monitoring Well Locations

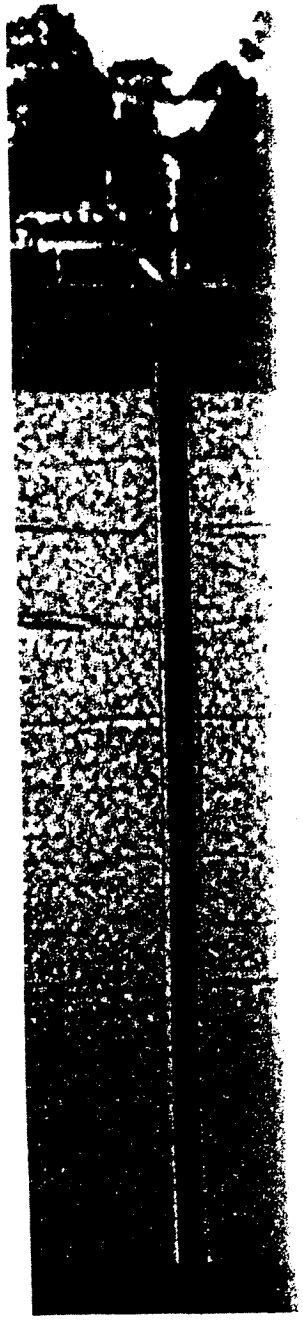
# Will be sampled again in Jan 04




# Saugus Formation

# Phase 2 Monitoring Well Locations

# Will be sampled again in Jan 04



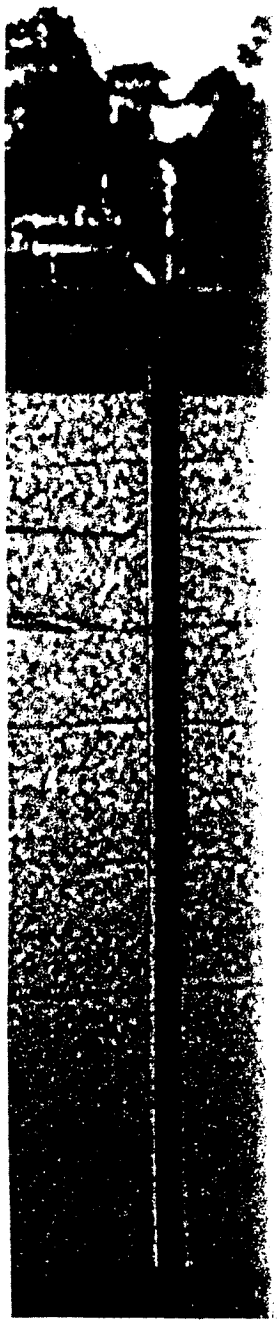
# Groundwater Modeling Analysis
## Upper Santa Clara River Basin

## Restoring Impacted Water Supplies Near Whittaker-Bermite

*presented by*

**John Porcello/CH2M HILL**

December 10, 2003



# Objectives and Methods

- Evaluate pumping strategies for impacted wells that meet specific goals
  - Restoring lost water supplies
    - Saugus: 4,000 AF/yr
    - Alluvium: 700-1,000 AF/yr
  - Protecting downgradient wells
- Develop and apply groundwater flow model

# State Water Project Delivery Reliability Report 2002

June 29, 2004

Department of Water Resources
Bay-Delta Office

Agenda Item: 1

# SWP Delivery Reliability Report

## Purpose

- To provide useful information to water suppliers and planners on the delivery reliability of the SWP presently and 20 years into the future.

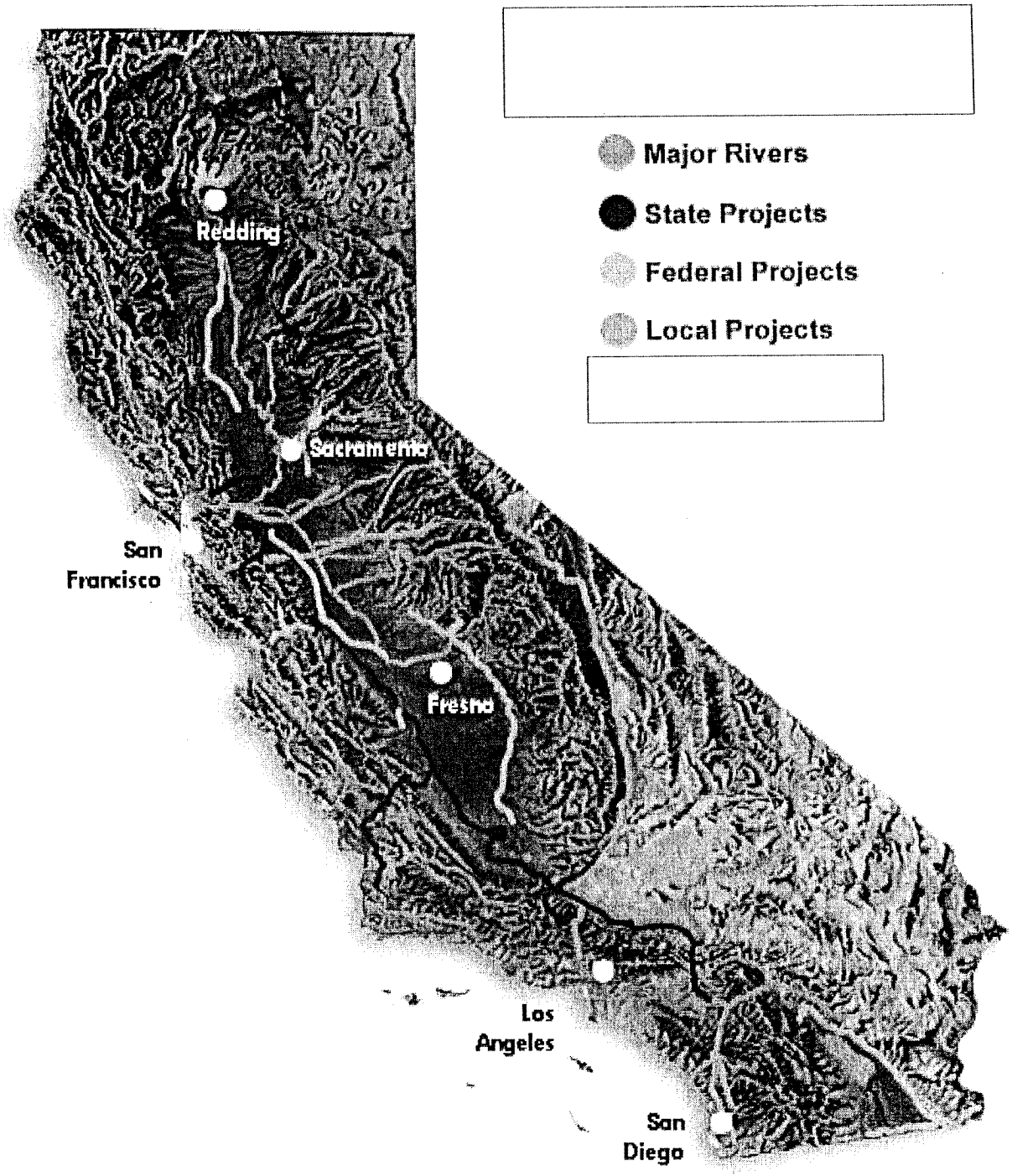
## Audience

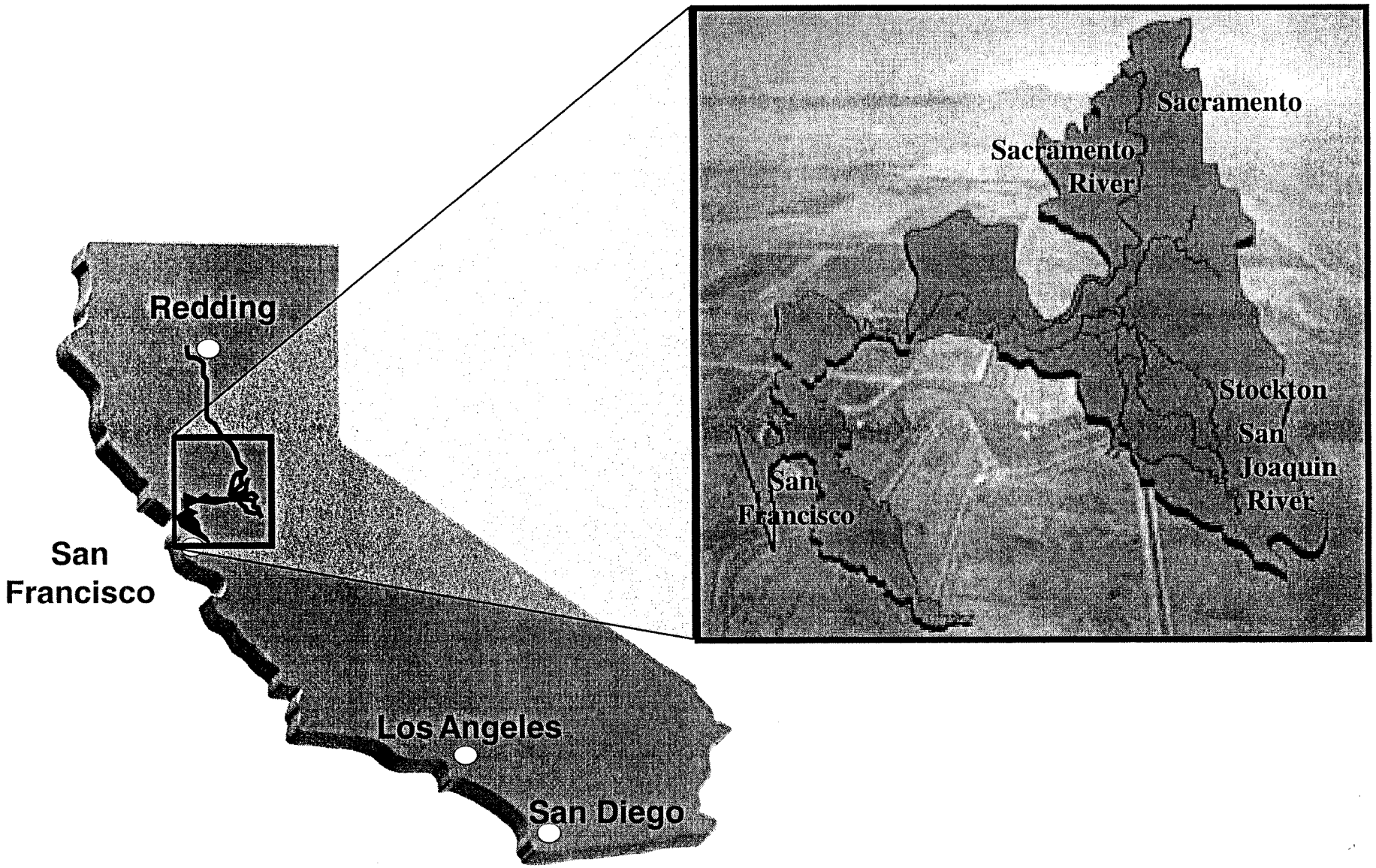
- State Water Contractors and related water providers; city, county, and regional planning agencies; interested citizens

# SWP Delivery Reliability Report

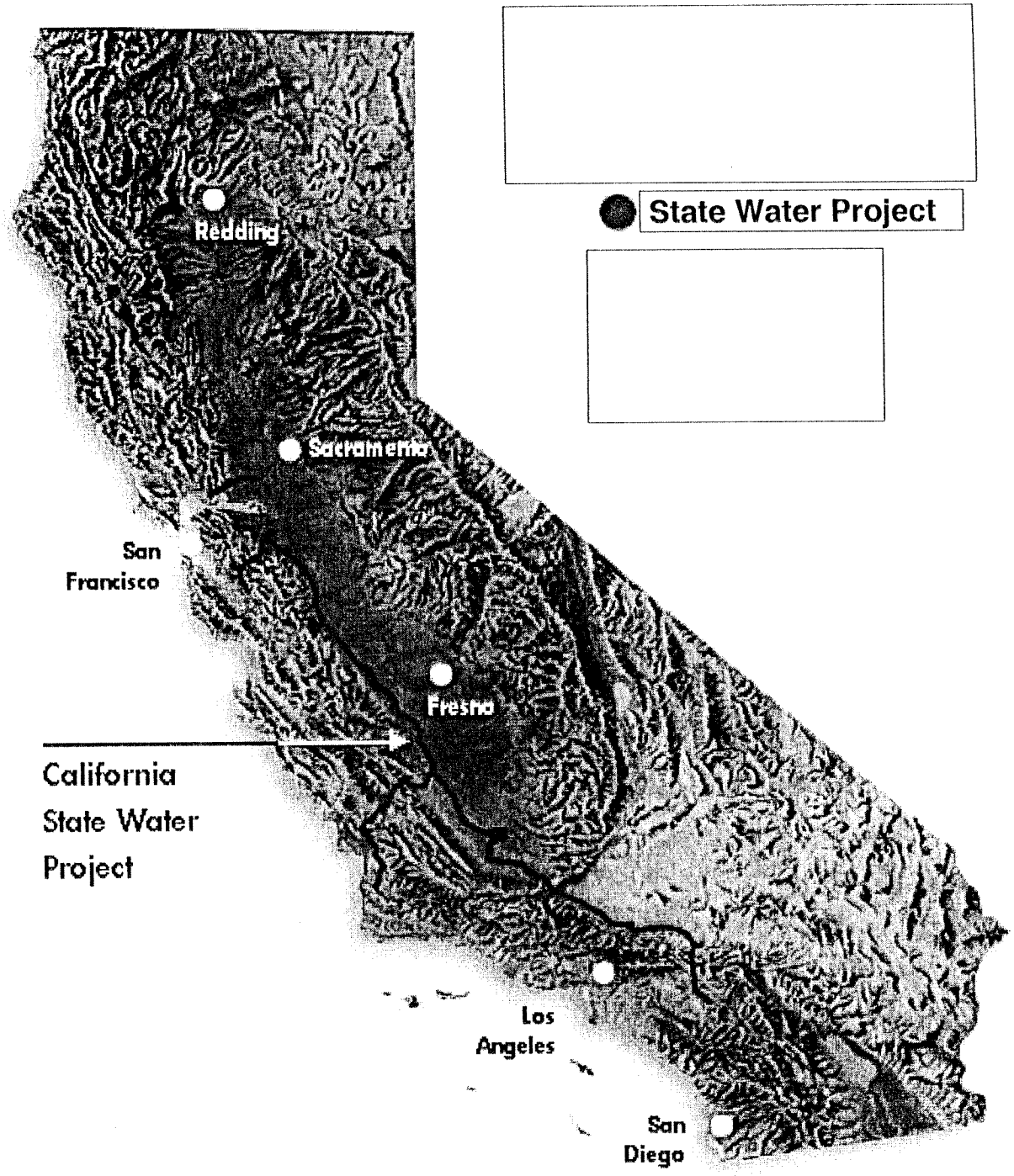
- DWR supports local determination of the sufficiency of local water supply
- Explains how SWP delivery reliability is determined
- Presents results
- Provides examples of how to apply the information.
- Commits to an evaluation of CALSIM II

# Some SWP Basics

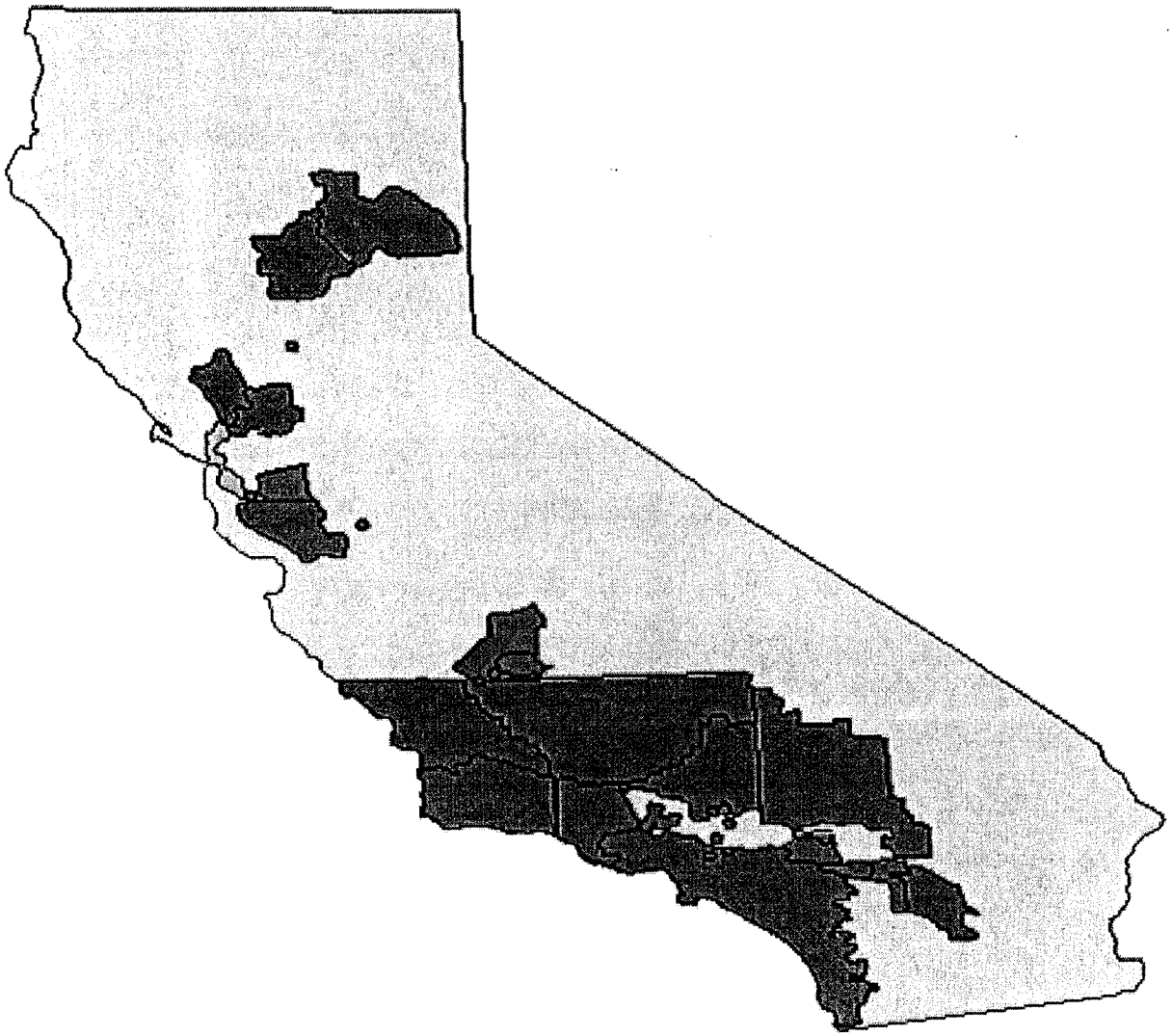

Major Rivers
State Projects
Federal Projects
Local Projects
Redding
Sacramento
San Francisco
Fresno
Los Angeles
San Diego




Bay-Delta detail image from CALFED


State Water Project
Redding
Sacramento
San Francisco
Fresno
California State Water Project
Los Angeles
San Diego

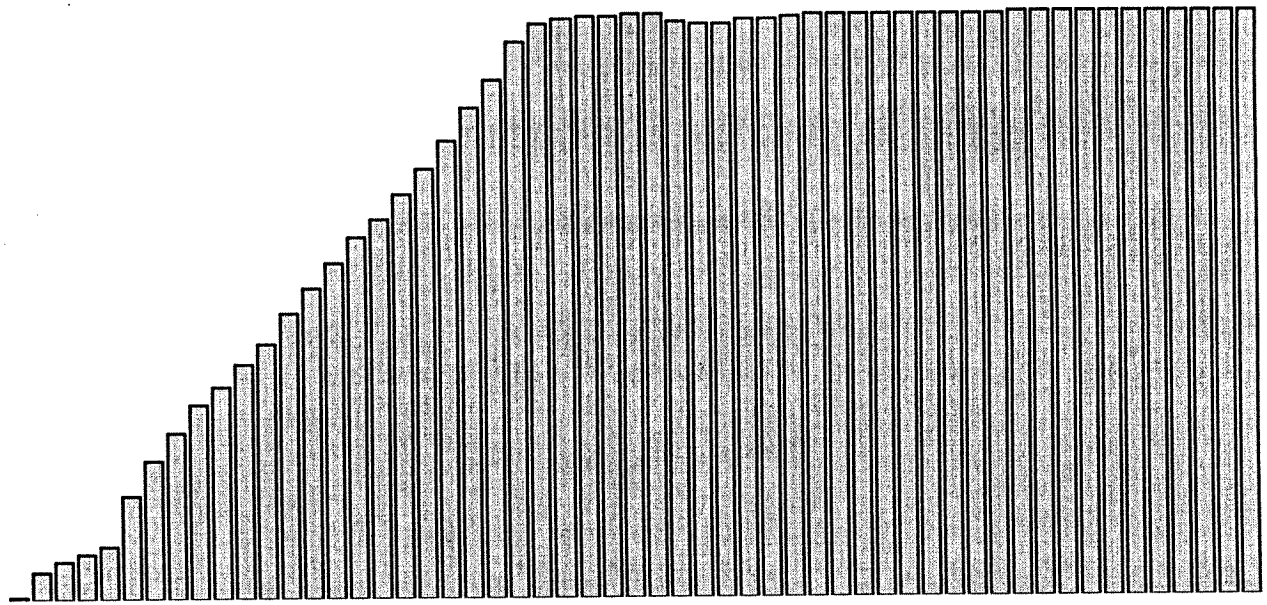
# SWP Service Area Map



# What is "Table A"?

- Maximum amount of water SWP is contracted to provide annually
- Tool used to apportion available water supply each year

# Table A Amounts



Source: Bulletin 132-00 Table B-4 column 39

# Conditions for Article 21 Deliveries

- Cannot interfere with SWP allocations or operations
- Excess water available in the Delta
- Conveyance capacity available
- Cannot be stored in the SWP system

# Estimating SWP Delivery Reliability

# CALSIM II

A computer model that simulates the operation of the SWP

# CALSIM II

- Simulates operations of SWP and CVP facilities
- Represents the Sacramento and San Joaquin River system and Delta
- Accounts for system operational objectives, physical constraints, legal and institutional agreements and statutes
- Uses historical water conditions, which are modified to reflect a certain level of development

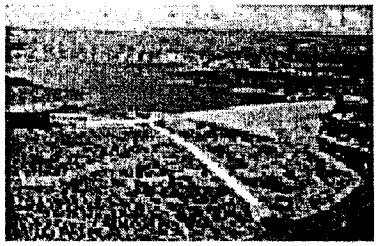
# CALSIM II

- Accepted by DWR, the U.S. Bureau of Reclamation and CALFED
- Used in studying
  - CALFED Conveyance Program
  - CALFED Storage Program
  - Annual Operation of SWP and CVP
  - Proposed changes in Delta flow and quality requirements

# What is Water Delivery Reliability?

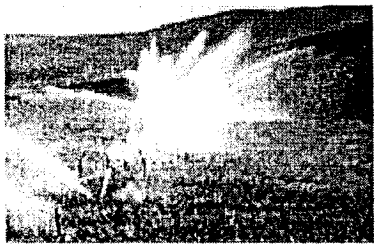
It is an estimate of the certainty that a given amount of water will be delivered to a specific place at a specific time.

# Factors affecting SWP Delivery Reliability



Availability of water from the source

The means to convey the water



Amount and pattern of water demand

# SWP Delivery Reliability Report Study Assumptions

- Existing facilities and regulatory requirements
- Three SWP Table A demand levels:
  - 2001 weather variable (3.0 – 4.1 maf/yr)
  - 2021 weather variable (3.3 – 4.1 maf/yr)
  - 2021 full Table A amount (4.1 maf/yr)
- Article 21 demand analyzed and assumed to increase from 2001 to 2021

# Study Results

## SWP Table A and Article 21 deliveries from the Delta (taf)

| Study | Average | Maximum | Minimum |
|---|---|---|---|
| **2001 Study** | | | |
| Table A | 2,960 (72%) | 3,850 (93%) | 800 (19%) |
| Article 21 | 130 | 510 | 0 |
| **2021A Study** | | | |
| Table A | 3,080 (75%) | 4,130 (100%) | 830 (20%) |
| Article 21 | 80 | 400 | 0 |
| **2021B Study** | | | |
| Table A | 3,130 (76%) | 4,130 (100%) | 830 (20%) |
| Article 21 | 70 | 400 | 0 |

Percent of Table A in parentheses.

# Study Results

## SWP Delta average and dry-year Table A deliveries [1]

| | Average 73-year 1922-94 | Single dry year 1977 | 2-year drought 1976-77 | 4-year drought 1931-34 | 6-year drought 1987-92 | 6-year drought 1929-34 |
|---|---|---|---|---|---|---|
| 2001 | 72% | 19% | 48% | 37% | 41% | 40% |
| 2006 | 73 | 19 | 47 | 38 | 41 | 40 |
| 2011 | 74 | 20 | 46 | 38 | 41 | 41 |
| 2016 | 74 | 20 | 45 | 39 | 40 | 41 |
| 2021 | 75 | 20 | 44 | 39 | 40 | 41 |

[1] Percent of Full Table A. Full Table A = 4.133 maf per year

# Study Results

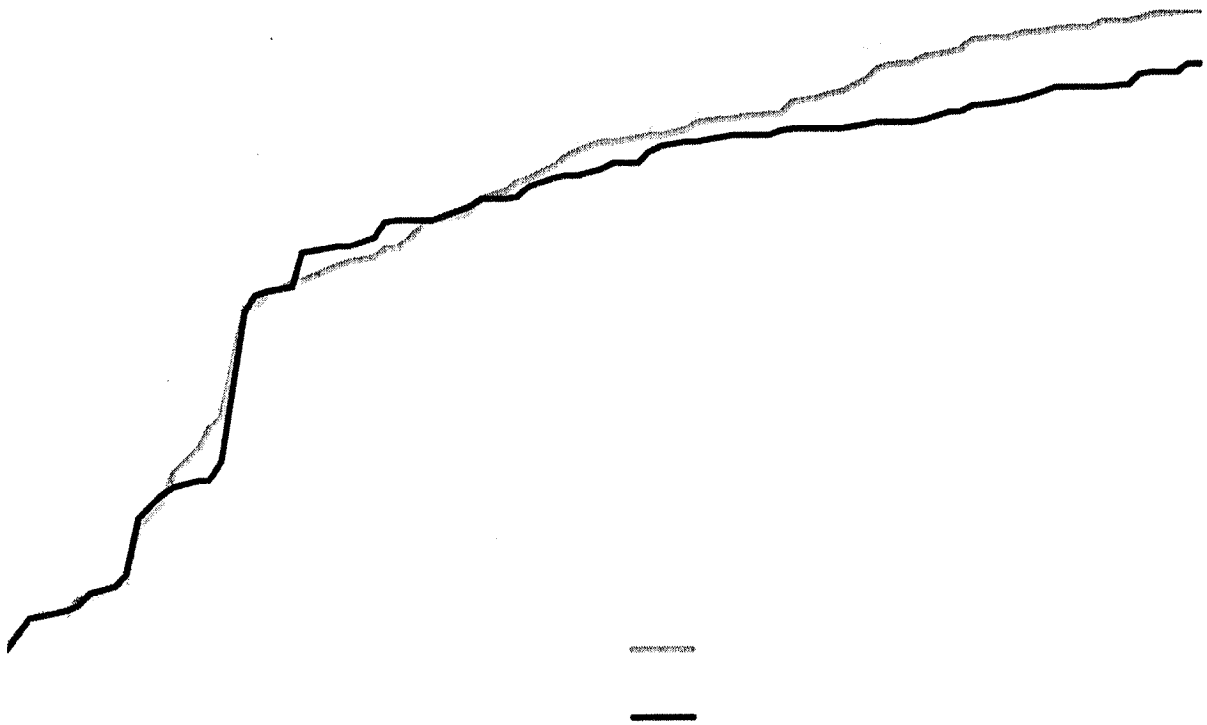
## SWP Delta average and wet-year delivery

(Percent of Full Table A, 4.13 MAF)

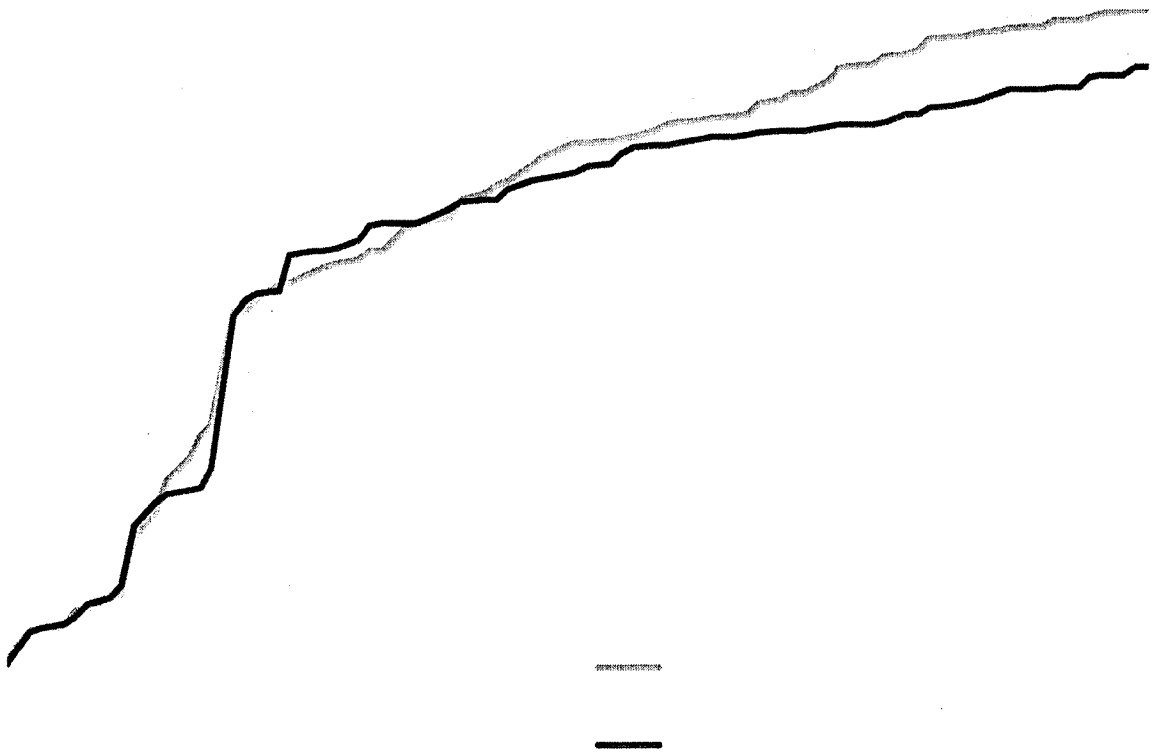
| Study | Average | Single wet 1983 | 2-year wet 1982-83 | 4-year wet 1980-83 | 6-year wet 1978-83 | 10-year wet 1978-87 |
|---|---|---|---|---|---|---|
| 2001 | 72% | 73% | 79% | 80% | 80% | 80% |
| 2021A | 75 | 82 | 89 | 86 | 87 | 84 |
| 2021B | 76 | 100 | 100 | 91 | 91 | 87 |

# Study Results

## Figure 1. SWP Delta Delivery Probability (Table A)

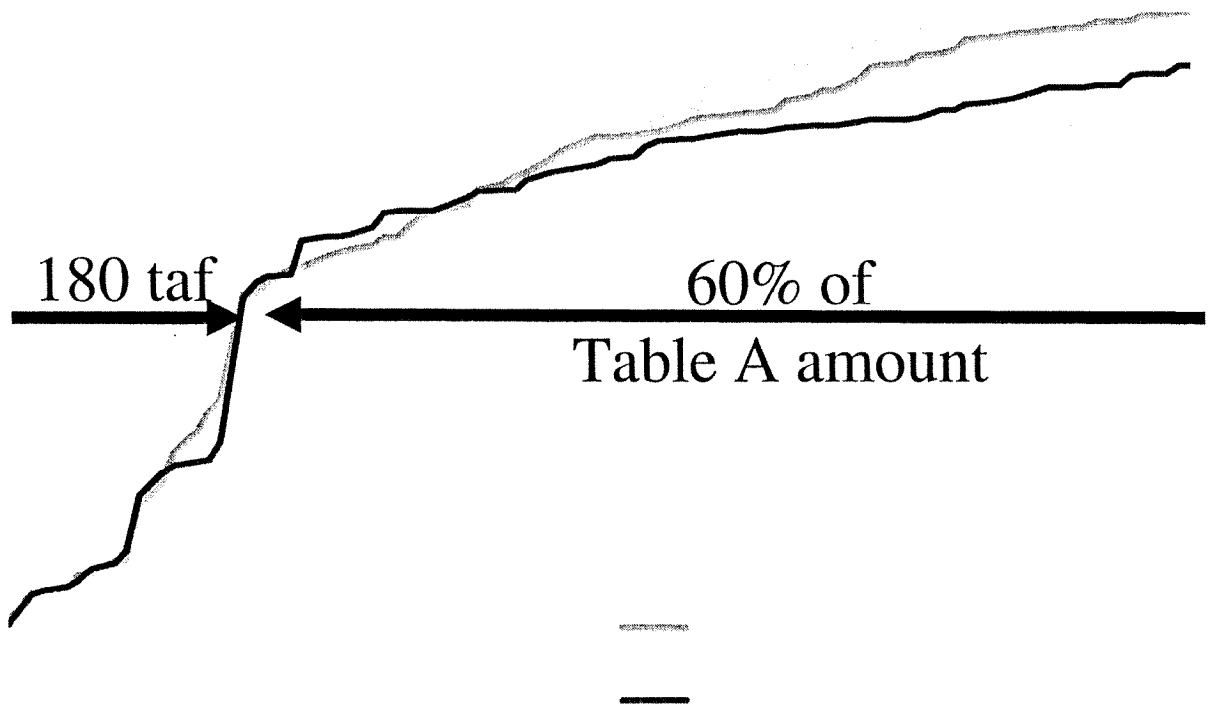


# Greenacres ID Delivery Probability
## Table A



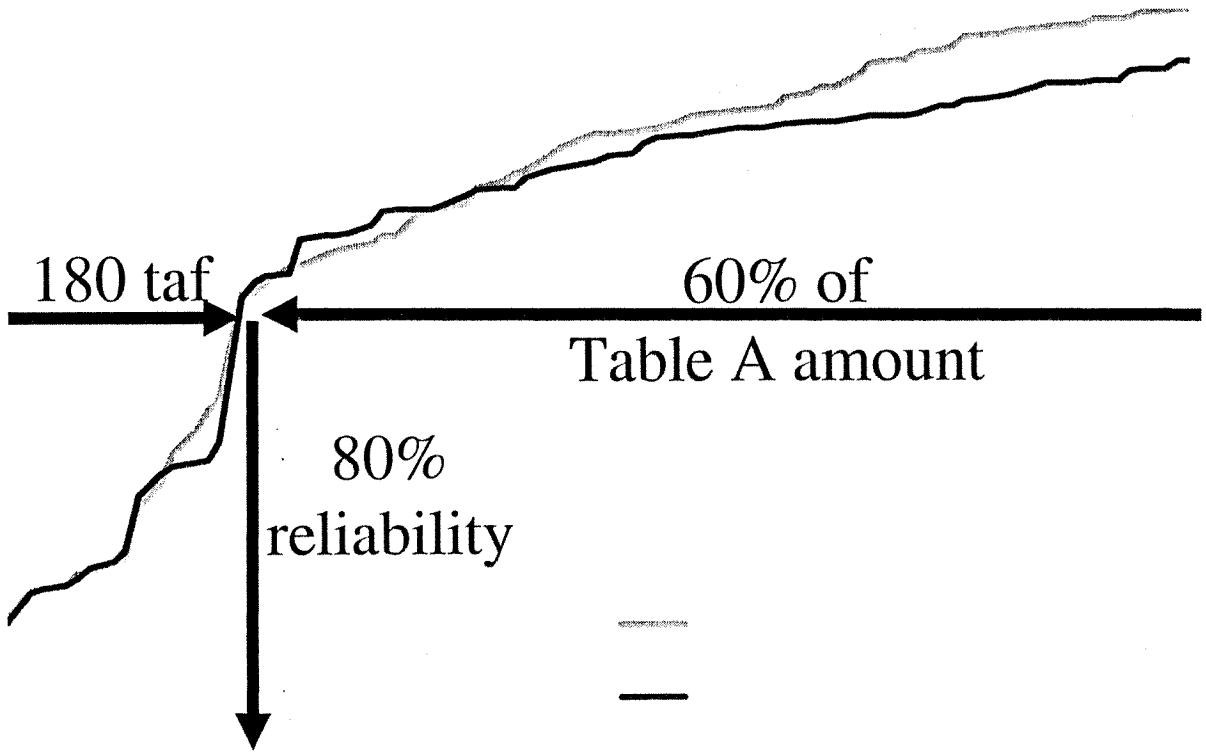
# Greenacres ID Delivery Probability
# Table A

Step 1: Identify desired annual delivery



# Greenacres ID Delivery Probability

Step 1: Identify desired annual delivery
Step 2: Determine delivery probability



# Status of Studies and Update

- Historical Simulations – Complete
- CALSIM II Peer Review – Complete
  - Draft work plan comments -- May, 2004
  - Final Work Plan -- August, 2004
- Sensitivity Studies – Underway
- Updated Delivery Reliability report -- Draft expected in October, 2004

# Discussion and Questions

# Study Results

Table 6a. Average and Wet Year Water supply under Article 21
(taf per year; year of delivery in parentheses)

| *Study* | *Average* | *Single wet year 1983* | *2-year wet 1982-1983* | *4-year wet 1980-1983* | *6-year wet 1978-1983* | *10-year wet 1978-1983* |
|---|---|---|---|---|---|---|
| 2001 | 130 | 200 | 390 (1982) | 100 (1980) | 100 (1978) | 100 (1978) |
| | | | 200 (1983) | 120 (1981) | 140 (1979) | 140 (1979) |
| | | | | 390 (1982) | 100 (1980) | 100 (1980) |
| | | | | 200 (1983) | 120 (1981) | 120 (1981) |
| | | | | | 390 (1982) | 390 (1982) |
| | | | | | 200 (1983) | 200 (1983) |
| | | | | | | 410 (1984) |
| | | | | | | 0 (1985) |
| | | | | | | 50 (1986) |
| | | | | | | 0 (1987) |

Numbers rounded to nearest 10,000 acre-feet

# Study Results

Table 4. Water supply under Article 21 (taf per year; year of delivery in parentheses)

| *Study* | *Average* | *Single dry year 1977* | *2-year drought 1976-1977* | *4-year drought 1931-1934* | *6-year drought 1987-1992* | *6-year drought 1929-1934* |
|---|---|---|---|---|---|---|
| 2001 | 130 | 0 | 110 (1976) | 0 (1931) | 0 | 0 (1929) |
| | | | | 200 (1932) | | 90 (1930) |
| | | | | 130 (1933) | | 0 (1931) |
| | | | | 0 (1934) | | 200 (1932) |
| | | | | | | 130 (1933) |
| | | | | | | 0 (1934) |
| 2021 (A and B) | 80 | 0 | 0 | 0 (1931) | 0 | 0 (1929) |
| | | | | 40 (1932) | | 30 (1930) |
| | | | | 10 (1933) | | 0 (1931) |
| | | | | 0 (1934) | | 40 (1932) |
| | | | | | | 10 (1933) |
| | | | | | | 0 (1934) |

Numbers rounded to nearest 10,000 acre-feet

# Contacts

- **Katherine Kelly**
  **(916) 653-1099**
- **Francis Chung**
  **(916) 653-5924**

**Web Site: http://swpdelivery.water.ca.gov**

# “The future ain’t what it used to be”

-Yogi Berra

Agenda Item: 1

# ... And What You Can Do About It

-Jonas Minton

# Jonas Minton

- 1978 California Department of Water Resources
- General Manager El Dorado County Water Agency

  -1994 first water supply assessment

  -17,000 acre feet of water rights for new development
- World Bank – Republic of China
- Executive Director American River Water Forum

  -Additional 200,000 acre feet of water for development

- Deputy Director California Dept. of Water Resources

  -Water Transfer Office; Water Conservation Office; Divisions of Planning, Dam Safety, Flood Management

  -Drought Task Force; Recycling Task Force; Desalination Task Force; Groundwater Bulletin

  -SB 610/221 Guidebook
- Retired in 2004
- Half Time for Planning and Conservation League

# What Did The Future Used To Be?

- State Water Project "Entitlements" of 4,230,00 acre-feet
- Ample supplies of drinkable groundwater
- Reliable snow pack
- "Will Serve" letters

# What's Changed?

- State Water Project says it can deliver about 2 million acre-feet (half the contract amount) 80% of the years

- In 1991 the State Water Project could just deliver 550,000 acre-feet- only 13% of contracted amounts

# What Else?

- Monterey Amendment Lawsuits
- Groundwater contamination: Perchlorate, MTBE, Hexavalent Chromium, Arsenic, Nitrates, NDMA, etc.
- Senate Bills 610 and 221 "Show Me The Water" requirements
- CALSIM II peer review

# "State Water Project Delivery Reliability Report," 2002;

In half the years SWP says it can deliver 80 % of Table A

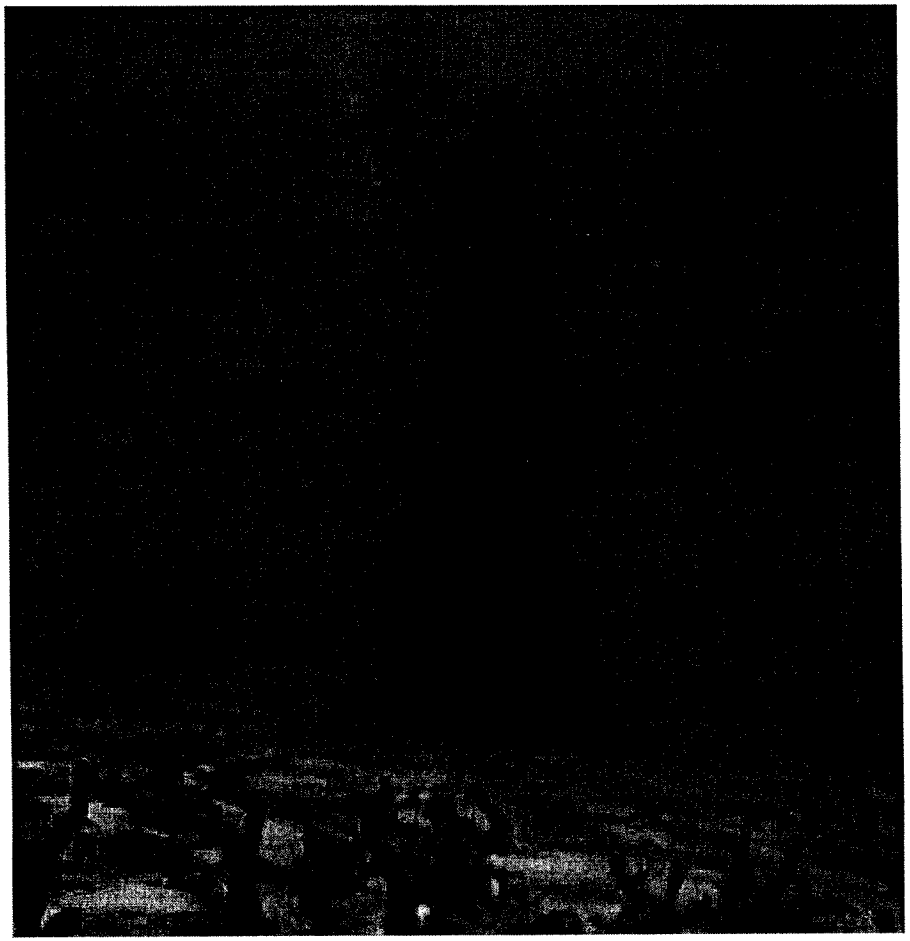
1 year in 5 SWP says it can deliver 50% of Table A

1 year in 10 the SWP says it can deliver 20% of Table A

# Limitations of the SWP Report

- Short time record
- Uses CALSIM II model
- Does not account for Climate Change impacts
- Ignores fragile levee system that delivers water to southern California

# Tree Stump In Lake Tahoe



# CALSIM II
# Peer Review by CALFED

- Model is not calibrated or validated, and findings do not include error bars
- Model is a comparative tool, rather than a predictive tool
- Model assumes no limits to northern California groundwater pumping; allowing greater deliveries to southern California

# Global Climate Change
## (No Matter What's Causing It)

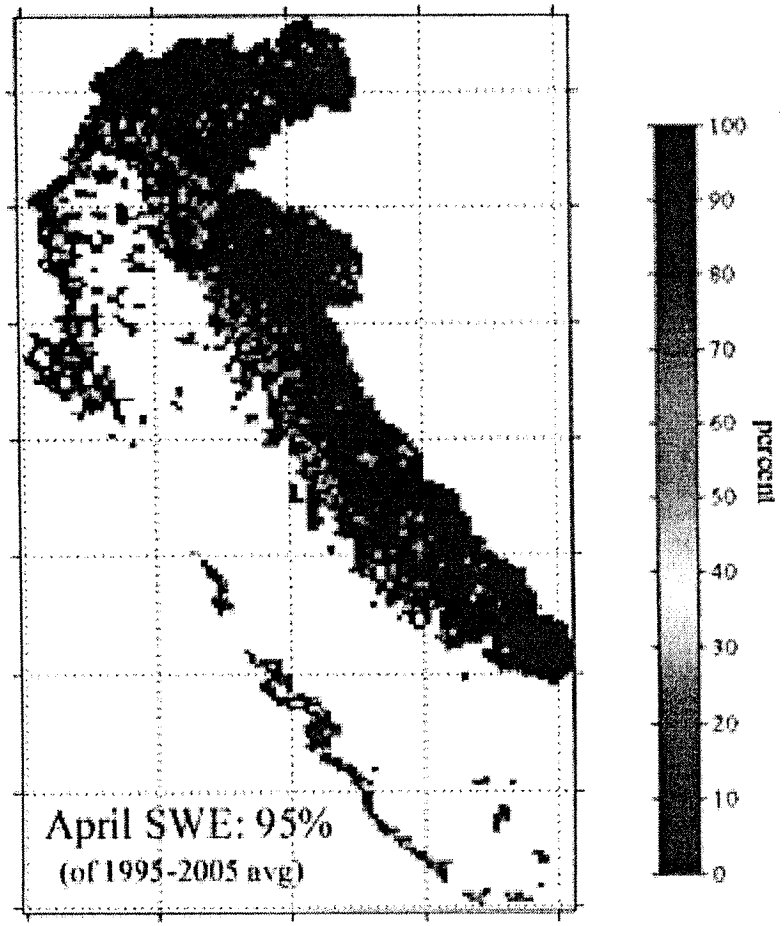
- Warmer temperatures mean less snow
- Feather River watershed is primary source of SWP
- Feather River watershed is relatively low elevation-most affected by winter warming
- "…reduction of snow water equivalent by about one third to one half current levels…"

# Snowpack Changes:

## Evolution of Average Annual Snow Water Equivalent as a Percentage of Average 1995-2005 Values

(effect of temperature changes only: historical P, baseline T from WY 1965-1987)

2030 SWE

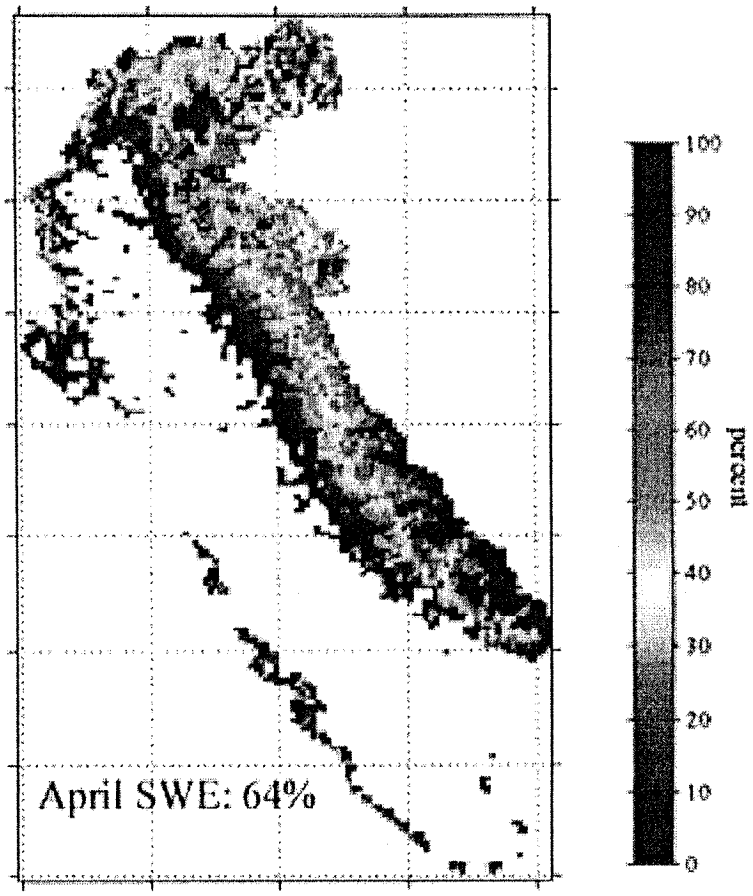


# Snowpack Changes:

## Evolution of Average Annual Snow Water Equivalent as a Percentage of Average 1995-2005 Values

(effect of temperature changes only: historical P, baseline T from WY 1965-1987)

2060 SWE

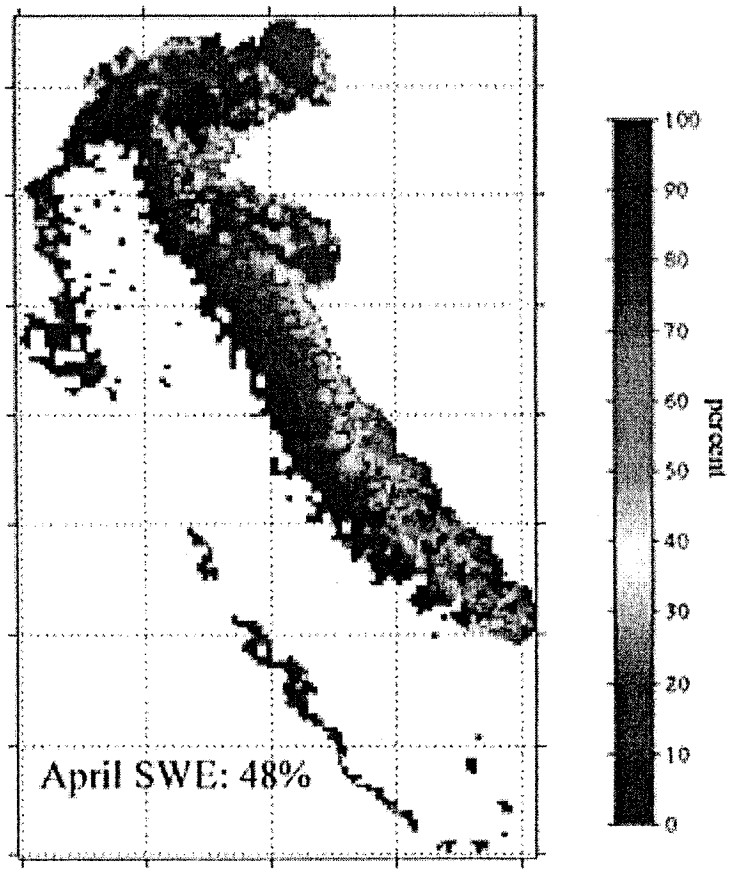


# Snowpack Changes:

## Evolution of Average Annual Snow Water Equivalent as a Percentage of Average 1995-2005 Values

(effect of temperature changes only: historical P, baseline T from WY 1965-1987)

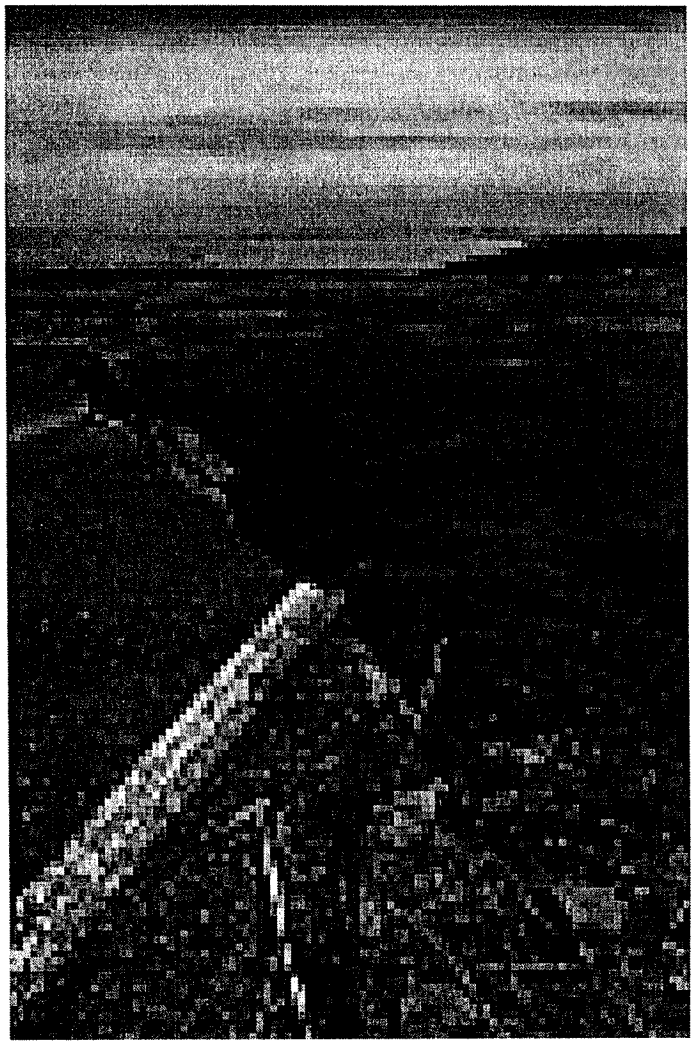
2090 SWE



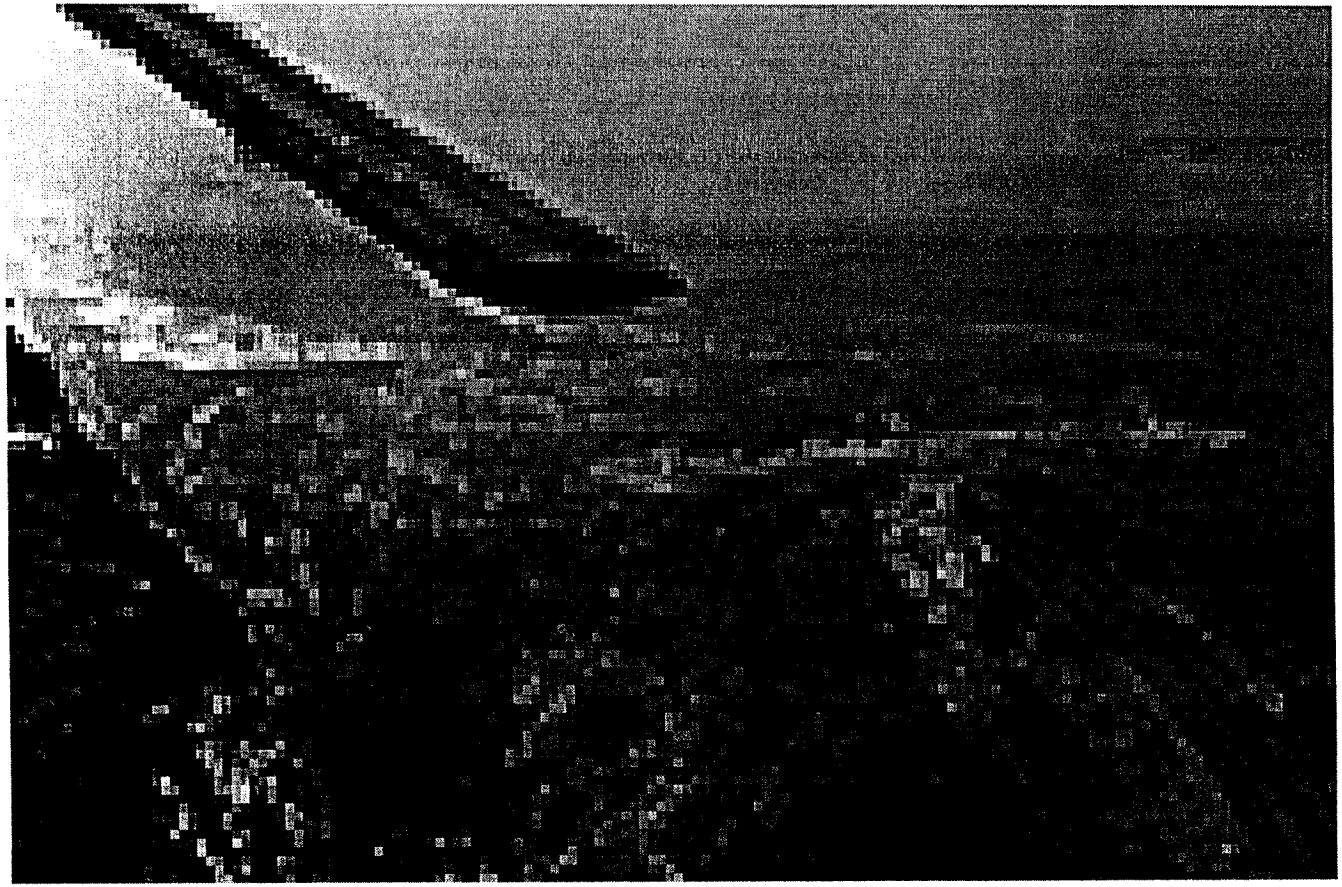
# Fragile Delivery System

- SWP water delivered through fragile Bay-Delta
- Between 1981 and 1990 there were 22 levee breaches and 15 islands flooded in the Delta region
- Islands continue to sink, sea level is rising, levees are not maintained
- One chance in four of 6.0 earthquake in the Delta which could cause 8 to 26 simultaneous levee failures

# Most recent break was on a "sunny day"!



# Lower Jones Tract June, 2004



# Who Is Supposed To Do What?

# What DWR Does
# (And Does Not Do)

- Tries its best to deliver as much water as possible

- DWR does not certify Urban Water Management Plans. (Water Code Section 10657)

# What Castaic Lake Water Agency Does

- Seeks to diversify water sources
- Uses DWR's "State Water Project Delivery Reliability Report" for water supply assessments
- All water managers are born optimists -We do not like saying there are limits

# What Happens If The Water Is Not There?

- Look at the Colorado River – who would have thought?
- Cutbacks
- Landscapes
- Jobs and Businesses

... The **drought** that couldn't happen is here." said Ms Mulroy

# Could It Happen Here?

February, 1991:

Governor Wilson within days of using Emergency Powers to order across the board 50% cutback in water use statewide – residential, business and agriculture

"March Miracle" bailed California out

# What About Possible New Supplies

- 41,000 transfer from Kern County Water Agency not a done deal
- Local groundwater- 6ppb, 4ppb, or 1ppb?
- Perchlorate migrates
- Groundwater banking/conjunctive use

# Conjunctive Use

- Can be good way to store water
- Conjunctive use does not create new water
- Need to be aware of potential and existing contaminants in some Central Valley aquifers

# What Are You Required To Do ?

Under SB 610, "The city or county *(in this case Santa Clarita)* shall determine, based on the entire record, whether projected water supplies will be sufficient to satisfy the demands of the project, in addition to existing and future planned uses."

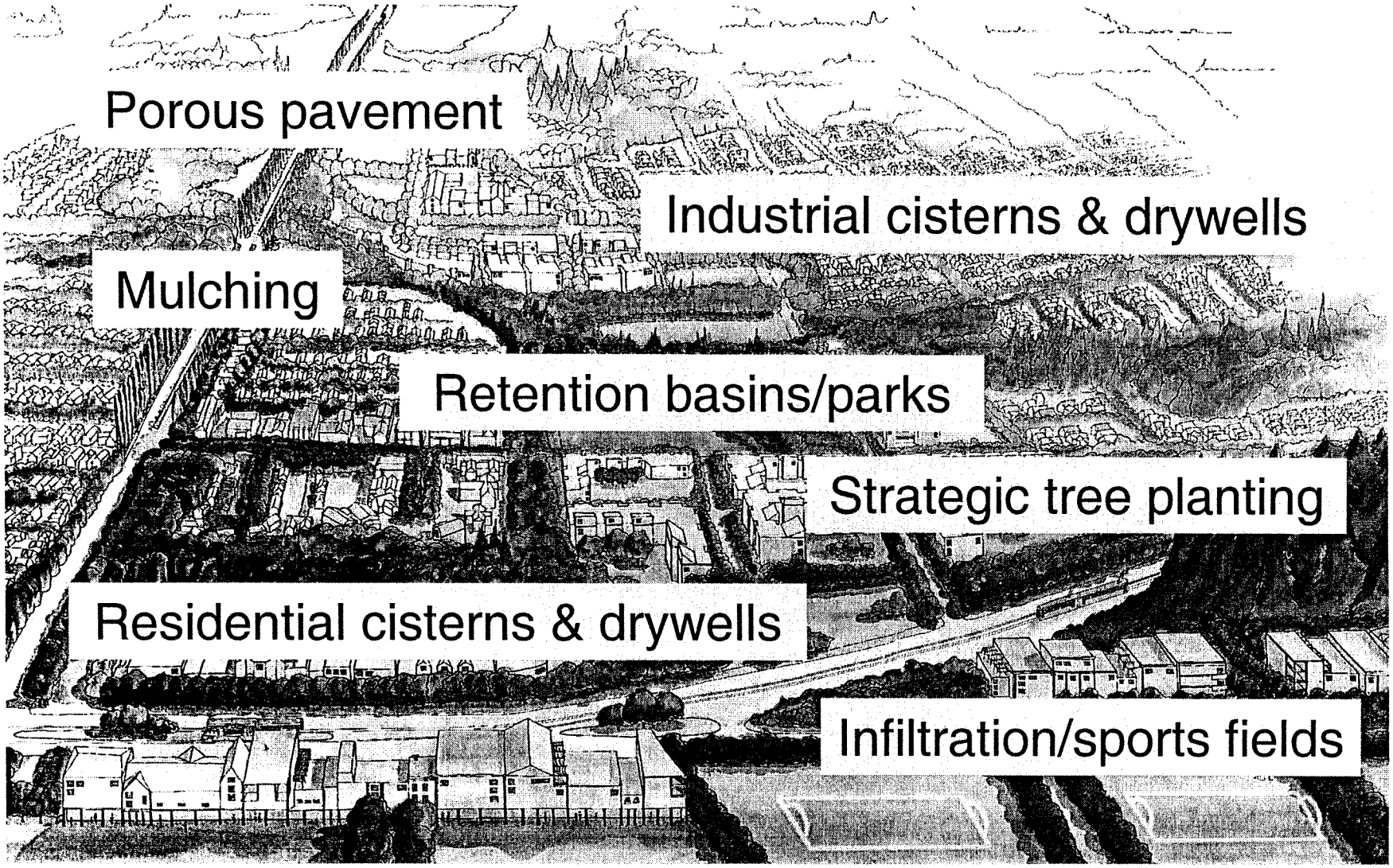
# SB 221 Requirement

- Under SB 221 "The legislative body of a city or county or the advisory agency, to the extent that it is authorized by local ordinance to approve, conditionally approve, or disapprove the tentative map, shall include as a condition in any tentative map that includes a subdivision a requirement that a sufficient water supply shall be available."

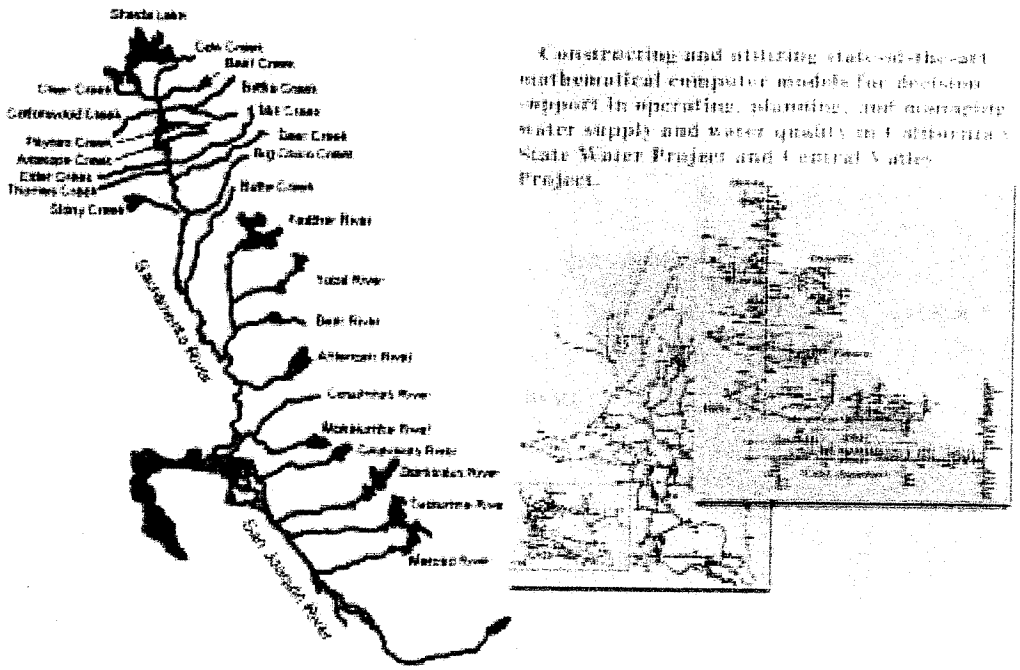
# What Santa Clarita Should Do

- For land-use decisions do not assume 41,000 acre-feet are available until final court decision
- Include a margin of safety
- Identify & disclose impacts to existing customers if supplies don't materialize
- Require water efficiency in new growth

# A vision for Sun Valley...



# A Strategic Review of CALSIM II and its Use for Water Planning, Management, and Operations in Central California



**Submitted to the**

**California Bay Delta Authority Science Program**
**Association of Bay Governments**
**Oakland, California**

**by**

**A. Close, W.M. Haneman, J.W. Labadie, D.P. Loucks (Chair), J.R. Lund, D.C. McKinney, and J.R. Stedinger**

**December 4, 2003**

## Executive Summary

### 1. Summary

The central all-encompassing question put to the panel is whether the CALFED program has adopted an appropriate approach to modeling the CVP-SWP-Central Valley system. Is the general CALSIM modeling approach appropriate for predicting the performance of the general facilities and for use in allocation planning, assessing water supply reliabilities and for carrying out operational studies? We believe the use of an optimization engine for simulating the hydrology and for making allocation decisions is an appropriate approach and is in fact the approach many serious efforts of this kind are using. It is a substantial improvement of the previous modeling approaches and provides a basis for consensus among federal and state interests. The modeling approach addresses many of the complexities of the CVP-SWP system and its water management decisions.

There exists a common tension between those who wish for greater detail and those who want less detail from the model. This argues for a more comprehensive, modular and flexible approach than is now available. In this report we suggest some ways this might be accomplished in the future. We also propose some management procedures that could be considered to improve model and model application quality control and documentation. The openness and availability of the model is admirable and very important given the numerous stakeholders who have interests in the management and allocation of water in the state. To increase the public's confidence in the many components and features of CALSIM II, we suggest that these components of CALSIM be subjected to careful technical peer review by appropriate experts and stakeholders.

### 2. Background

The California Department of Water Resources (DWR) and the U.S. Bureau of Reclamation (USBR) have developed a computer model called CALSIM II that simulates much of the water resources infrastructure in the Central Valley of California and the Delta region. This infrastructure is referred to as the CVP-SWP system. In particular CALSIM II provides quantitative hydrologic-based information to those responsible for planning, managing and operating the State Water Project (SWP) and the federal Central Valley Project (CVP). As the official model of those projects, CALSIM II is the default system model for any inter-regional or statewide analysis of water in the Central Valley of California.

CALSIM II has a central role in the analysis of many CVP-SWP and related issues, some of which require capabilities beyond those included in the model. California needs a large-scale relatively versatile inter-regional operations planning model and CALSIM II currently serves that purpose reasonably well. As the primary State and Federal-sponsored model available for water operations and planning, CALSIM II is critical to the study of many technical and policy issues related to water supply reliability, environmental management and performance, water demands, economics, hydrology and climate, and regulatory compliance.

CALSIM II is a particular application of the California Water Resources Simulation Model called CALSIM. It uses a mixed integer linear programming model solver to route water through a network over time. Currently it uses monthly time steps. Policies and priorities are implemented through the use of user-defined weights applied to the flows in the system (represented by arcs of the network). Simulation cycles at different temporal scales allow for successive implementation of constraints. The model can simulate the operation of relatively complex environmental water accounts and state and federal environmental regulations. In our judgment CALSIM II represents a very impressive modeling effort on the part of all those involved with its development and application.

The CALFED Science Program commissioned this external review panel (Appendix D) to 1) provide an independent analysis and evaluation of the strengths and weaknesses of CALSIM and CALSIM II, and 2) to offer suggestions on the appropriate uses of these modeling tools, on ways their use might complement or be complemented by other models, and on further development, quality assurance, and use in major water systems operations and planning in California.

The panel received background documents (Appendix B), including a survey by the University of California at Davis of stakeholder responses to questions about CALSIM II. We subsequently met for one and a half days in Sacramento for discussions and presentations (Appendix A) by CALFED, DWR and USBR staff. The discussions concluded with a summary presentation by the panel outlining our tentative conclusions.

The information we received and the shortness of our meetings with modeling staff precluded a thorough technical analysis of CALSIM II. We believe such a technical review should be carried out. Only then will users of CALSIM II have some assurance as to the appropriateness of its assumptions and to the quality (accuracy) of its results. By necessity our review is more strategic. It offers some suggestions for establishing a more complete technical peer review, for managing the CALSIM II applications and for ensuring greater quality control over the model and its input data, and for increasing the quality of the model, the precision of its results, and their documentation.

In this review we were asked to address the following questions:

1. Is CALSIM a reasonable modeling approach for current and proposed applications and problems?
2. Do other modeling approaches show similar or greater promise and flexibility for such problems? If so, how?
3. What are the major comparative strengths and weaknesses of the current CALSIM approach and alternative approaches?
4. What are major scientific, technical, and institutional limitations, uncertainties, and impediments for current and proposed applications of CALSIM?
5. What model, software, and data developments, special studies or tests would be beneficial to improve CALSIM for current and proposed uses?
6. How might CALSIM development and applications be managed and overseen to improve the quality assurance of model results for current and proposed applications?

7. What are your suggestions for long-term use, development, or replacement of the current suite of models and data available for the current and proposed uses of CALSIM?

The following sections of this summary present our responses to these questions. The main parts of this report and its appendices provide additional detail.

## 3. CALSIM Modeling Approach

CALSIM II is a simulation model developed as a joint venture between the California Department of Water Resources (DWR) and the U.S. Bureau of Reclamation (USBR) to (i) provide a significant modernization and upgrading of the DWRSIM and PROSIM models developed and used by these organizations, (ii) develop a comprehensive modeling system that simultaneously addresses the current and future needs of both the SWP and CVP systems; and (iii) develop a generalized modeling system that could be applied in any river basin system, in contrast with the previous models that were less generalized and more specifically designed for the existing SWP and CVP systems. In this respect, CALSIM II represents a state-of-the-art modeling system that is similar in general concept, while differing in specific details, to other data-driven river basin modeling systems such as ARSP, MODSIM, OASIS, REALM, RiverWare and WEAP.

CALSIM uses linear programming to solve sets of equations that simulate water movement through the CVP-SWP system in accordance with various objectives and constraints. This is a modeling approach which has been used successful in California (Johnson et al., 1991). In a complex system such as that being modeled, it is essential to have some mathematical representation of system flows that reflects all of the interconnections and constraints. Use of an optimization algorithm allows good decisions to be identified from among all possible and feasible decisions. To the extent this simulates what actually occurs, it is a good modeling approach. To the extent it optimizes when in reality no such optimization is implemented, it has the potential to produce inaccurate and overly optimistic outputs.

Most successful applications of optimization that attempt to simulate the behavior of a system have calibrated their objective functions (i.e., set the weights that prioritize flows over time and space) so that the model results correspond to what actually happens or would happen under a particular hydrologic and demand scenario. In these cases the model's decisions correspond to those the operators would make, as often prescribed by rules that have been worked out in a legal/political process. It does not appear that such a calibration of the objective function weights in CALSIM has yet been completed.

## 4. Other Modeling Approaches

There are two aspects of modeling, the model structure and algorithms used, and the model software. The use of linear optimization algorithms to solve simultaneous equations for simulating hydrology is a common way of avoiding a typically long list of procedural rules for simulating regional water systems. Such sets of procedures can be difficult to generate for

complex systems, and very different and new rule sets may be needed if structural or significant policy changes are to be investigated. In addition the performance of the system when simulated will be less than that which can be achieved in practice if a good set of rules is not provided. Optimization models are generally easier to reformulate when system changes are to be investigated. However unless the optimization is calibrated in such a way as to actually resemble what takes place in practice it can produce an optimistic description of system performance. This is particularly true if the optimization model is allowed to have perfect foresight of future events that in practice would not be available to system operators.

Large simulation models using optimization and procedural rules both need to have internal checks to ensure to the extent possible that errors in mass balances, for example, do not occur due to errors made when the model is being defined or created. Such internal checking is not apparent to us in our admittedly brief review of CALSIM II. Nor were calibration procedures well defined.

One obvious limitation of using linear optimization procedures is its inability to model accurately and efficiently some of the non-linear hydrologic and decision processes that occur in systems as complex as the CVP-SWP. One approach to addressing this issue of model accuracy, and possibly for decreasing the computational time as well, is to link linear optimization models to non-linear simulation models in a way that permits the simulation to represent the hydrology in any spatial and temporal detail desired. The optimization is used to determine what the decisions should be at every site where a water allocation, reservoir release, or other management decisions must be made. The time steps for simulation could be daily, or weekly or longer, depending on the needs of the user, but would likely be of shorter durations than the optimization time steps. After a predetermined number of simulation time steps, the optimization model would be run. The initial state of the optimization should be set at the beginning of each optimization time step. The optimization component should include multiple future time periods, with imperfect hydrologic and demand forecasts, but once solved only the current period's solutions are implemented – i.e., these decision variable values are sent to the simulation component. The decisions indicated for future periods are ignored. When appropriate, the initial state of the multi-period optimization model is updated and the model is again solved. And so on. Such a modeling approach may prove to be both more realistic, more accurate, and require less time, once developed. We believe such an approach might be worth considering for future development.

CALSIM II currently consists of a combination of software modules developed in several languages, including FORTRAN, Java and C. Several of the modules require proprietary software packages in order to run CALSIM II (Lahey FORTRAN and XA Solver). DWR and USBR staff have said that these components are being replaced by public domain software that can be obtained free of charge. We agree with this decision. Very good public domain software packages of optimization, visualization, file management, and data base support are currently available, and new ones will continually be produced. Periodic updates should be anticipated as part of the business of maintaining the modeling system.

Significant thought should be given to the sustainability of the CALSIM II software. How will future programmers be able to maintain this software? How will future software developments

be incorporated into the system? Will the solver currently being developed by LBNL be adequate in terms of accuracy and computation speed? Will other solvers need to be tested? Can the system accommodate these future developments without major modifications? What reasonable modifications could be made now in anticipate of future developments?

## 5. Comparative Strengths and Weaknesses

Many of the stakeholder perceived strengths and weaknesses of CALSIM and CALSIM II are very well identified in the survey report from the University of California at Davis (Ferreira, et al. 2003). Our background materials and briefings covered various strengths and weaknesses, but without first hand experience, all we can do here is to summarize those that we have heard expressed by others.

Here we provide a brief summary list.

### 5.1 Some Prominent Strengths

The strengths of CALSIM II are many. Most are expressed in comparison to previous DWRSIM and PROSIM models DWR and USBR were using. Some of these strengths include:

- Consensus model. CALSIM II is the official joint modeling environment of the State DWR and USBR. This includes a common schematic, hydrologic representation of the system, common set of facility capacities, and common representation of system operating policies. This helps all parties improve representations, rather than compete over representations.

- Common effort. The joint development of CALSIM II by USBR and DWR has provided more focused and effective use of resources and expertise than previous development of agency-specific models. CALSIM II development has also involved other agencies and consulting expertise more than pervious models of this system.

- Data-driven model. CALSIM II is a rather data-driven simulation model with an optimization engine. This modeling approach provides:
    a. greater flexibility than its predecessors and traditional water resources simulation approaches.
    b. a promising framework for improving transparency, data, and model documentation, compared to other approaches.

- Public domain. The model and data are substantially in the public domain, facilitating transparency and adaptability for California's decentralized water system.

- Steady improvements. Data improvements have been steadily pursued following the adoption of CALSIM II, although deficiencies remain.

- Improved Delta water quality representation. Although problems appear to remain, the model developers have made substantial gains in representing Delta water quality operating criteria and performance.

- Better groundwater representation. Efforts to better include groundwater and non-CVP-SWP project operations merit continuation and expansion.

- Benchmark Studies. The development of documented benchmark studies have resulted in significant model improvements and aided in the development of comparative model applications. Such exercises should be continued and improved.

- Long-term vision. The vision of a more transparent and publicly available model that can be employed by those outside the major agencies is excellent. This is a major change in direction, and achieving this vision will require adjustments over time. Often, these adjustments will be externally driven. Externally-driven improvements are a price of success and evidence of success for an open, public, modeling policy.

- Important CALSIM II features:
    a. CALSIM II is able to simulate the operation of the complete CVP-SWP system in all areas that contribute flow to the Delta in monthly time-steps.
    b. CALSIM II is being applied to examine a diverse range of options including flood control, water conservation and supply, power generation, recreation, water transfers, groundwater banking, recycling, desalination, conjunctive use, the purchase of options and streamflow and water quality protection.
    c. CALSIM II has successfully been applied by both DWR and USBR to examine both structural and non-structural changes to the CVP-SWP system as well as to ascertain the risks involved with different potential operating scenarios and to quantify the impacts of proposed actions.
    d. CALSIM II can dynamically model operation of environmental water accounts.
    e. Demands may vary according to various levels of development (e.g. 2001, 2020) and to hydrologic conditions.
    f. The regulatory environment under which the projects must operate can be simulated.
    g. CALSIM II can link to external modules as needed, e.g., to estimate the salinity at water quality stations within the Delta.

### 5.2 Some prominent weaknesses

As its strengths are many, so are its weaknesses. It seems worth saying, however, that no model can perfectly (meaning efficiently and effectively) serve all interests in a system as complex as the CVP-SWP. Tradeoffs need to be made. This can result in what some would call weaknesses. Such weaknesses are often accepted to gain strengths in another ways.

We heard that the CALSIM II model was too complex. We also heard that it did not handle particular components of the system with sufficient detail. And such is the dilemma of any

complex model, such as CALSIM II. The model is clearly too complex, and not complex enough. The root of this difficulty is that when such a model is constructed, it is not clear what level of detail is needed, so the model must be made sufficiently complex to ensure it is complex enough. And the complexity needed to address some issues will remain in the model when it is used to address other less complex issues, or the same issues at less complex locations. One approach to addressing this issue is to develop different linkable modules of CALSIM II having different complexities. In this way the level of detail can be varied to be consistent the application or study at hand, and level of sophistication and resources available to the user.

Other weaknesses model users would like addressed include:

- The model provides limited and inadequate coverage of non CVP or SWP water and of the California water system south of the Delta.
- The model assumes that facilities, land-use, water supply contracts and regulatory requirements are constant over this period, representing a fixed level of development rather than one that varies in response to hydrologic conditions or changes over time.
- Groundwater has only limited representation in CALSIM II.
- Groundwater resources are assumed infinite, i.e., there is no upper limit to groundwater pumping.
- The linear programming model considers only the current month, and hence CALSIM II operating rules are required to determine annual water allocations, to establish reservoir carryover storage targets, and to trigger transfers from north of Delta to south of Delta storage.
- Better quality control is needed both for the model and its current version and the input data. Procedures for model calibration and verification are also needed. Currently many users are not sure of the accuracy of the results. A sensitivity and uncertainty prediction capability and analysis is needed.
- Need improved ways of altering the model's geographic scope and resolution and its temporal resolution to better meet the needs of various analyses and studies.
- Need to improve the model's comparative as well as absolute (or predictive) capabilities.
- CALSIM II needs better capabilities for analyzing economic, water quality, and groundwater issues.
- Need improved documentation explaining how the model works, its assumptions, its limitations, and its applicability to various planning and management issues.
- DWR and USBR have not provided a centralized source of support for CALSIM II. More training for CALSIM II is needed. There is a need for more people who can run CALSIM II. There is a need for a well-publicized user group. A more extensive users' guide is needed.
- Improved capabilities are needed for real-time operations especially during droughts, gaming involving stakeholders during a simulation run, handling of evapotranspiration and agriculture demand changes over time, water transfers, Delta storage, carryover contract rights, refuge water demands and more up to date representation of Feather River, Stanislaus River, Upper American River, San Joaquin River and Yuba River operations.

- Need an improved graphical user interface to facilitate input of model data, setting of model constraints and weights, operating the model, and displaying and post analysis of model results.
- Need to be able to change the model time period durations for improved accuracy of model results.

## 6. Limitations, Uncertainties, and Impediments

### 6.1 Absolute Values or Comparative Results

Modelers sometimes make a distinction between the use of a model for *absolute* versus *comparative* analyses. In an absolute analysis one runs the model once to predict an outcome. In a comparative analysis, one runs the model twice, once as a baseline and the other with some specific change, in order to assess change in outcome due to the given change in model input configuration. The suggestion is that, while the model might not generate a highly reliable absolute prediction because of errors in model specification and/or estimation, nevertheless it might produce a reasonably reliable estimate of the relative change in outcome. The panel is somewhat skeptical of this notion because it relies on the assumption that the model errors which render an absolute forecast unreliable are sufficiently independent of, or orthogonal to, the change being modeled that they do not similarly affect the forecast of change in outcome; they mostly cancel out. This feature of the model is something that would need to be documented rather than merely assumed.

In our opinion CALSIM II has not yet been calibrated or validated for making absolute predictions values. Yet it is apparent that there has been a distinct need by model users for absolute predictions. In the absence of alternatives, users are adopting CALSIM II results as the best absolute prediction available and they are likely to continue to do so. We recommend that model developers recognize the requirement for CALSIM II to provide absolute predictions. To satisfy this new purpose, additional calibration of the model will be required to ensure that the output it produces is fit for this purpose. Regardless of how possible it is to match the model closely with observed behavior, statistics on the accuracy of the calibration run should be supplied to users to enable them to gauge the likely errors involved with using the model output.

### 6.2 Sensitivity and Uncertainty Analyses

Sensitivity analyses would be useful to identify which parameters and input data have major impacts on decisions and system performance criteria of concern. Uncertainty analyses would help users of the model understand better the risks of various decisions and the confidence they can have in various predictions.

### 6.3 Graphical User Interface

Having a graphical user interface would substantially aid those who use the model in managing both input and output data, and in controlling or managing model operations. This model will not likely become as available to and as well understood by the public, to the extent desired by the model developers, until an effective menu-driven GUI has been created that can help create and draw from a database of system parameters and characteristics, and simulation results.

### 6.4 Documentation and Training

When if ever is adequate documentation and training available? Rarely, but we believe there is a serious need to improve the documentation as well as the training available for all those interested in using CALSIM II.

## 7. Options for Improving CALSIM

### 7.1 CALSIM Model Software

We encourage the developers of CALSIM to convert their present software to that which is publicly available and to develop a useful graphic based user interface that can facilitate the input, editing, and display of all the data that are input to and output from CALSIM II. There are many options, some of which we have discussed with the model developers.

The CALSIM package should be made more modular and capable of linking to other more complex models of components of the CVP-SWP system. If the changes in code and modeling approach result in a quicker running model, it might be possible to link, when desired, modules that facilitate position analyses and other types of uncertainty analyses. A modular system would allow alternative representations of different components of the system. Thus different levels of spatial detail, or representations of the fundamental processes, would be allowed within the overall system representation and record of California hydrology. This will allow the use of more general and streamlined models for use of preliminary investigation and general planning, as well as a more detailed representation of the system for final analyses and more detailed studies. This would be very useful.

### 7.2 Sensitivity and uncertainty analyses

Both sensitivity analyses need to be performed, and procedures need to be developed to enable the estimation of measures of uncertainty associated with model output. Perhaps workshops focused on just these needs should be scheduled to better determine how best to meet these needs. There are numerous procedures available that could be applied. Appendix H contains some approaches for performing sensitivity and uncertainty analyses.

### 7.3 Model calibration

There is a need to develop the model so that it is able to provide absolute estimates of key model outputs rather than limiting the use of the model to comparative studies. One way to do this is to subject the model to a comprehensive calibration process where it is fine-tuned until it is able to reproduce the historical behavior of the system with sufficient accuracy to provide absolute results. The calibration of the model should aim to test all the key outputs of model including water quality in the San Joaquin River and in the Delta. It is necessary to test the monthly values of outputs for those outputs for which the monthly pattern is important.

### 7.4 Other extensions and improvements

- The opportunity of improving the collection of data on the use of water (preferably broken down by irrigation district and water source) should be investigated. The use of groundwater should be included in this investigation.
- It would be useful to expand the geographic extent of the model so that it includes all the components of the linked water supply system, including both the San Joaquin and Tulare Lake Basins of the Central Valley. The model should also account in some manner for imported supplies of water to users in southern California from the Colorado River.
- The linkage between surface water and groundwater would appear to be of critical importance and output that would enable the impact of surface water use on groundwater extractions would appear to be useful.
- Examination of the report *'CALSIM II Simulation of Historical SWP/CVP Operations'*, DWR (2003) indicates that the current formulation of CALSIM II:
  - Overestimates water deliveries to SWP and CVP contractors,
  - Determines carryover storage target values that differ from those the operators have determined in the past, and
  - Operates the San Luis Reservoir at lower levels and fills it later in the season than operators have in the past.

## 8. Managing CALSIM Development and Applications

The predicted impacts and other information derived from CALSIM II applied to the CVP and SWP can influence major investment decisions. It is thus self evident that those who use the model results need to have some confidence as to their precision. Is the science behind the information derived from CALSIM II been reviewed and judged correct? Is the model software free from errors? Are the assumptions made when performing the modeling the correct ones? Are the model results accurately and fully reported? In other words, just how much credence should decision makers place in the model output? Users of the model results should be assured that they are credible and unbiased. One way to help ensure this is to have the models, their associated software, and their applications under the control of some interagency organization that can oversee and provide quality control over model development, application and documentation. They can also plan and implement needed peer reviews.

One possible means of facilitating the peer review processes and for maintaining control on the particular versions of CALSIM II and accompanying models used for CVP-SWP planning and management decisions is to create an interagency modeling consortium (IMC) consisting of DWR, USBR, and other stakeholder organization (including university) personnel if they are interested and want to participate. This center would be responsible for maintaining a toolbox of 'acceptable' models for use by the agencies and contractors. The models placed in the toolbox should be peer reviewed with respect to their applicability and suitability for use in particular applications. Those that are not peer reviewed should be considered for peer review. New models proposed for use in California should be peer reviewed with respect to their suitability, and for their strengths and limitations, before being placed in the toolbox. The review should be of the theory underlying the model, the model's software, the documentation of the model as well as of its software, the model's functions and capabilities including those pertaining to model data input and output, the input data themselves, model calibration and verification, capabilities for sensitivity and uncertainty analyses, user control of all model operations including pre and post analyses (GUIs), spatial and temporal resolutions, and its limiting assumptions.

## 9. Future Use, Development, or Replacement of CALSIM

### 9.1 A coupled optimization simulation approach

Given a system as complex as the SWP/CVP system, it seems to us it might make sense to consider the development of a more detailed simulation 'engine' and couple it to an optimization or management 'engine'. The simulation component can more accurately model hydrologic processes. For example it can include the deterministic non-linear routing of flows and their quality constituents through the system on a smaller time step (e.g., daily) and hence much more realistically or accurately, than can linear optimization using longer time steps, even with all the known tricks for linearizing separable (single variable) non-linear functions and 'if-then-else' statements. The simulation engine itself may require a simultaneous equation solver, especially for the Delta. But the simulation engine needs to know what to do, i.e., what decisions to make. Periodic use of the optimization, say once a week or even less frequently if conditions are relatively constant, for determining the decisions to be simulated, e.g., the water allocation and reservoir release decisions, eliminates much of the maze of rules that otherwise would be required and which developers of CALSIM II are avoiding through the use of optimization. Each time the optimization or management 'engine' is run it is first updated with the current state of the system as determined from the more precise simulation 'engine'. The optimization component would include multiple time periods only to the extent that the current period's solution is not affected by the time horizon in the optimization. The other time period solutions are ignored. This coupled optimization-simulation approach has the potential to be both more accurate as well as quicker to execute. In our opinion it is worth considering for future development.

### 9.2 Models as hypotheses

CALSIM II is really about the future, not the past. Benchmarking studies can help establish the credibility of the model and provide estimates of its accuracy by comparing its performance to actual historical operations. A concern is how well the model reproduces historical operations, not whether it is valid or invalid on some absolute scale of perfection. But the real issue is how well CALSIM can predict what might happen in the future with sets of hydrological and meteorological conditions that have not yet been experienced, and may be significantly different from the past if climate variability and climate change are considered. In these cases the ability of the model to forecast what will happen depends both upon its ability to describe what would happen should a particular system operating policy, priorities and water demands be adopted. In this sense CALSIM II modeling studies should be thought of as the exploration of a hypothesis that particular policies and priorities have been adopted. Our ability to predict the future has generally been poor, but it is the obligation of agencies such as DWR and USBR to attempt to ensure that should water demands, water supplies, and water policies evolve as one would expect, society is prepared for the consequences. And that would seem to be what CALSIM II is about.

### 9.3 Future Model Development and Use

From the list of perceived weaknesses above, there are clearly many opportunities for further refinement of CALSIM II. Rather than attempt to meet all needs using only one model, namely CALSIM II, it seems preferable to improve its adaptability to various levels of detail through its ability to link to other models when additional detail in a particular region or for a particular feature is desired. For example, the monthly time step used by CALSIM II is sufficient for many studies. Yet some seasonal (multi-month) decision making is needed in CALSIM II to reflect decisions made by the SWP and CVP as to what Table A and other allocations to honor in full. On the other hand, it is clear that many water quality and ecosystem management decisions would profit from more detailed weekly or daily time steps. However, such shorted time-step models will need the guidance of a longer time-step model. As discussed earlier, models with shorter time scales can require increased spatial resolution, both of which lead to increased model complexity and a strong argument for model modularity.

Additional potential applications of CALSIM II include operational planning using gaming, or the involvement of potential decision makers during the simulation runs via a well developed graphical user interface, and to improve the capability of modeling water quality, energy production, conjunctive groundwater and surface water interactions and use, to mention a few.

There will always be a need to perform alternative 'what if' policy analyses where a relatively fast model that also provides some capability for uncertainty analyses is required. Perhaps CALSIM II will never be able to serve this need, and if so another more simplified modeling approach could be developed to fill that need. This simpler screening tool would be calibrated to produce results comparable to those of CALSIM II or observed data. Is this possible? We can not be certain but feel the idea should be seriously considered.

**Acknowledgments**

We want to acknowledge and thank all those who were involved in preparing the materials we received, in presenting additional information to us, and in arranging our activities and taking care of us during our brief review visit. Our special thanks to Kim Taylor for leading this effort, and to all those who did their best to educate us on the finer points of CALSIM II. All those involved in the development and implementation of CALSIM II are to be congratulated for extending the state-of-the-art in water systems modeling and for making it a critical part of the planning, development and management of California's water resource infrastructure.

**Caveat**

Just as all models are approximations of reality, so may all advice be an approximation of what it should be. We hope what we have written in this report is correct and useful, but encourage CALSIM model managers and California's water community to take our assessments and suggestions for what they are, arrived at based on our own experiences and some limited exposure to those who know much more about CALSIM and CALSIM II than we do.

## Table of Contents


| | Page |
|---|---|
| 1. CALSIM Compared to Other Modeling Approaches | 16 |
| 2. Comparative Strengths and Weaknesses | 18 |
| 3. Limitations, Uncertainties, and Impediments | 24 |
| 4. Options for Improving CALSIM | 29 |
| 5. Managing CALSIM Development and Applications | 35 |
| 6. Recommendations for Future Use, Development, and Application of CALSIM II | 37 |
| 7. References | 41 |
| 8. Appendices | 43 |

Appendix A: CALSIM II Science Review Schedule

Appendix B: Briefing Material for CALSIM II Peer Review

Appendix C: CALSIM II Review Process and Timeline

Appendix D: Peer Review Panel

Appendix E: Managing Model Development, Application, Documentation and Communication.

Appendix F: Analysis of the November 2003 CALSIM II Validation Report

Appendix G: Some Principles for Strategic Water Analysis

Appendix H: Model Sensitivity and Uncertainty Analysis

Appendix I: Model Calibration Examples

## 1. CALSIM Compared to Other Modeling Approaches

Management of complex systems such as coordination of the California State Water Project (SWP) and the Federal Central Valley Project (CVP) requires effective decision support tools for simulating and analyzing system components in a fully integrated manner. The classic definition of a decision support system (DSS) provided by Sprague and Carlson (1982) is *"an interactive computer-based support system that helps decision makers utilize data and models to solve unstructured problems."*

A DSS integrates the following interactive subsystems: (i) dialog generation and management subsystem (DGMS) for managing the interface between the user and the system; (ii) data base management subsystem (DBMS); and (iii) model base management subsystem (MBMS).

CALSIM II is a DSS developed as a joint venture between the California Department of Water Resources (DWR) and the U.S. Bureau of Reclamation (Bureau) to (i) provide a significant modernization and upgrading of the previous models DWRSIM and PROSIM employed by these organizations, (ii) develop a comprehensive modeling system that simultaneously addresses the current and future needs of both the SWP and CVP; and (iii) develop a generalized modeling system that could be applied in any river basin system, in contrast with the previous models that were less generalized and more specifically designed for the SWP and CVP. In this respect, CALSIM II represents a state-of-the-art modeling system that is similar in general concept, while differing in specific details, to other river basin modeling systems such as AQUATOOL (Valencia Polytechnic University, Spain), ARSP (Acres Reservoir Simulation Program) (Boss International, 2003), IRAS (Interactive River-Aquifer Simulation) (Loucks, et al. 1996), MIKE BASIN (Danish Hydrologic Institute, 2002), MODSIM (Labadie and Larson, 2000), OASIS (Randall, et al., 1997), RAISON (Young, et al. 2000), ResSim (U.S. Army Corps of Engineers, Hydrologic Engineering Center), Ribasim (River BAsin SIMulation Model) (Delft Hydraulics, Netherlands), REALM (REsource ALlocation Model) (James, 2003), RiverWare (Zagona, et al. 1998), WaterWare (Jamieson and Fedra, 1996), and WEAP (Water Evaluation and Planning System, 2003) (Hansen, 1994). All of these can be categorized as decision support systems since all three subsystems of a DSS are embodied within them.

A distinguishing feature of several of these modeling systems is the use of optimization on a period by period basis (not fully dynamic) to "simulate" the allocation of water under various prioritization schemes, such as water rights, without the presumption of perfect foreknowledge of future hydrology and other uncertain information. This is a valid approach since use of optimization overcomes the disadvantage of employing numerous, unwieldy prescriptive rules governing water allocation. Systems employing optimization in this manner include: ARSP, MODSIM, OASIS, REALM, RiverWare, and WEAP and are therefore more akin to CALSIM II. ARSP, MODSIM, REALM and Ribasim are further distinguished by use of specialized minimum cost network flow optimization algorithms, although of these only MODSIM includes iterative structures using an imbedded scripting language for including non-network "side constraints" in the optimization. The other modeling systems are essentially limited to a

pure network structure that does not allow inclusion of all the complex, non-network type constraints necessary to model the complex CVP-SWP system.

It may be useful to compare this use of optimization with some other uses that have appeared in the modeling literature. One use of optimization is purely for computational convenience; in this case optimization is employed as a numerical method for obtaining the solution of a series of simultaneous (often linear) equations. This approach, which was used in the first generation of computational economic models about forty years ago, exploited the fact that some existing computational algorithms for solving optimization problems were faster than those for solving large systems of simultaneous equations. A second use of optimization applies when the solution of the system of equations characterizing a water balance has multiple possible solutions; this is essentially the case described above, where optimization is being used primarily to identify a unique solution for a system of equations. Both of these uses of optimization are primarily descriptive rather than prescriptive (also referred to as positive vs. normative) in intent: the goal is to model how a system, characterized by a set of equations, operates. To the extent that the real–world managers of the system do optimize some objective function, the aim is to mimic their behavior by setting up and solving a similar optimization. But, the goal is to model what they actually do, not to advise them what they ought to do. The third use of optimization adopts an explicitly prescriptive goal and sets out to ascertain what managers ought to do if they wished to optimize some objective function (e.g. maximize economic efficiency). While this is certainly a legitimate analytical exercise, it should be kept conceptually distinct from the use of optimization in a purely descriptive context.

### 1.1 Advantages of Optimization-Driven Simulation

For large, complex, integrated systems, simulation models that optimize operation and allocation of water within each time-step by operational priorities have become the major simulation approach. Models of similar approach include ACRES (Acres Engineering), AQUATOOL (Spain), MODSIM (Colorado State U.), OASIS (Hydrologics, Inc.), WASP (Australia), and WEAP (Tellus Institute). Priority-based simulation models with optimization engines have become widespread in part because:

- The models are simpler to develop, comprehend, and modify.
- Their software is easier to upgrade, since the data set describing the system and its operating policies is substantially separate from the software code.
- Data are easier to update and modify, since changes require little or no software changes.
- Priority-based operations are a common basis for water rights and operating policies.
- Priority-based operations are relatively easy to explain.

The major exception to this technological trend in simulation modeling is to use more traditional procedural operating rules in simulation models with a graphical user interface for primarily flood control operations (HEC-RESSIM) or for exploratory study of large systems or detailed management of relatively small systems (Stella-type models).

Similar to several of these systems, CALSIM II allows specification of objectives and constraints in strategic planning and operations without the need for reprogramming of

complex models. The CALSIM II authors developed the English-like WRESL (Water Resources Engineering Simulation Language) as an intuitive means of defining the objective function and constraints for a mixed-integer linear programming model, similar to the OCL (Operational Control Language) used in OASIS and the Policy Editor employed in RiverWare. In MODSIM, the optimization model is formulated directly through the graphical user interface with no need for a modeling language, but with supplemental features of the optimization defined through the PERL scripting language. WRESL allows planners and operators to specify targets, objectives, guidelines, constraints, and their associated priorities, in ways familiar to them. WRESL provides simple text file output that is converted to FORTRAN 90 code by a parser-interpreter program, whereas PERL is fully embedded in the network optimization code. Both modeling systems are data centered, meaning that model operation is controlled solely by user specification of input data rather than hidden rules or hard-wired data structures.

CALSIM II, OASIS, RiverWare and MODSIM are similar in that all use a high level language with syntax and logical operators; are written to simple text files which are subsequently parsed and interpreted; use rule-based or IF-THEN-ELSE conditional structures; are designed to be easy for planners and operators to use without the need for reprogramming; allow adaptive and conditional rules which are dependent on current system state variable information; include constructs for assigning targets, guidelines and constraints, along with their associated priorities; and include a goal seeking capability. CALSIM employs a mixed integer linear programming solver for repeated period by period solution that is less efficient computationally than the network solver employed in MODSIM, ARSP, REALM and Ribasim.

Unfortunately, unlike these aforementioned modeling systems, CALSIM lacks a comprehensive graphical user interface for constructing and editing the river basin system topology. CALSIM II would be greatly enhanced if, similar to RiverWare, IRAS, and MODSIM, objects representing features of the basin such as reservoirs, canals, and river reaches, could be created on the palette of a graphical user interface by simply clicking and dragging various icons for the objects to the display. The objects are instances of various classes that share certain common characteristics, and each object contains its own physical process methods and associated data. We believe that complaints concerning the complexity of using CALSIM II would be greatly reduced with development of such an object-oriented graphical user interface.

## 2. Comparative Strengths and Weaknesses

### 2.1 Some Prominent Strengths

CALSIM II has important strengths as a general inter-regional operations planning model, particularly compared with available alternatives and its predecessors. The primary strengths include:

- Coordination of Federal and State Interests A unique aspect of CALSIM II is the high degree of cooperation between Federal (i.e., U.S. Bureau of Reclamation) and State (i.e.,

California Department of Water Resources) interests in its development. This kind of cooperation is rare, and in fact this may be the only such example of such coordination for a system of this scale and complexity. Although it is clear that DWR staff have taken the greatest degree of responsibility in the planning, development, coding, testing and application of CALSIM II, it is also clear that USBR staff have also played an important role. CALSIM II can provide a showcase for other states as to what can be accomplished with Federal and State cooperation for river basin management.

- Consensus model. CALSIM II is the official joint modeling environment of the State and USBR. This includes a common schematic, hydrologic representation of the system, common set of facility capacities, and common representation of system operating policies. This saves a lot of unproductive bickering and helps all parties improve representations, rather than compete over representations.

- Common effort. The joint development of CALSIM II by USBR and DWR has provided more focused and effective use of resources and expertise than previous development of agency-specific models. CALSIM II development has also involved other agencies and consulting expertise more than pervious models of this system.

- Data-driven model. CALSIM II is a rather data-driven simulation model with an optimization engine. This modeling approach provides:

    a. much greater flexibility than its predecessors and traditional water resources simulation approaches.
    b. a promising framework for improving transparency, data, and model documentation, compared to other approaches.

- Public domain. The model and data are substantially in the public domain, facilitating transparency and adaptability for California's decentralized water system. Ongoing software development efforts will improve CALSIM in this regard.

- Steady improvements. Data improvements have been steadily pursued following the adoption of CALSIM II, although deficiencies remain widespread.

- Improved Delta water quality representation. Although problems appear to remain, the model developers have made substantial gains in representing Delta water quality operating criteria and performance.

- Better groundwater representation. Efforts to better include groundwater and non-CVP-SWP project operations are good efforts in the right direction, and merit continuation and expansion.

- Benchmark Studies. The development of documented benchmark studies seems to have resulted in significant model improvements and aided in the development of comparative model applications. Such exercises should be continued and improved.

- Long-term vision. The vision of a more transparent and publicly available model that can be employed by those outside the major agencies is excellent. This is a major change in direction, and achieving this vision will require adjustments over time. Often, these adjustments will be externally driven. Externally-driven improvements are a price of success and evidence of success for modeling policy that is open and public.

Few, if any, modeling organizations in the country have consistently done as good a job on model development and application for such a large, complex, and controversial system as the modeling group which developed CALSIM II. They are to be commended for their work to take California water modeling beyond past "closed shop" practices in favor of the development and dissemination of modeling capabilities that are more relevant to California's current water management problems. Most areas and suggestions for improvement noted below are meant to aid the model developers in moving further and faster in the direction they are already heading.

### 2.2 Some Prominent Weaknesses

The strengths and weaknesses of CALSIM II are not only technical (software, data, and methods), but also are institutional regarding how this model has been developed and employed. The administrative setting and objectives of model development and application are important, and difficult to manage. Alas, the management/policy problems of a system change frequently, while data and modeling capability change more slowly, and effective administrative structures change very slowly, if at all.

- Inadequate data development and management are principal shortcomings of CALSIM II. There has not been a sufficiently systematic, transparent, and accessible approach to the development and use of hydrologic, water demand, capacity, and operational data for CALSIM II. This problem extends beyond inadequate documentation and has led to controversy, confusion, and inefficiency in application of CALSIM II.
    a. Inadequate data management steepens the unavoidably difficult learning curve inherent for a complex system. Data have mostly been considered a "back room" activity of a few experienced experts. Retirement, promotion, or departure of these experts has left many gaps in knowledge and created difficulties for re-developing data for newer policy and planning problems.
    b. The administration of data development is fragmented, disintegrated, and lacks a coherent technical or administrative framework. Data required by CALSIM II are developed by several administrative units, without systematic technical vision or quality control for modeling purposes. Within DWR, different groups develop hydrologic and water demand data under different Deputy Directors, without effective coordination. This division must be overcome for a coherent data and analytical framework to be developed and implemented.
    c. In many cases it appears that water use and other hydrologic data inputs to CALSIM II are based on data collection and analyses that took place during the 1960s when DWRSIM and PROSIM were being constructed. It is important to ensure that data used for CALSIM II are up-to-date and consistent with the best current information

- The expertise and insights of many in local agencies, system operators, and consulting firms have not been prominent in the development of CALSIM II. For such a system with many hundreds of local experts, this is somewhat unavoidable, especially early in model development. Periodic re-examinations of how each area in CALSIM II is represented, in consultation with local agency and consulting experts, might overcome these technical shortcomings, and create and maintain a broader technical, user, and credibility base for CALSIM II. Active involvement of local agencies in CALSIM II development and applications would be much easier with better data management, and would be rewarded with a broader base of CALSIM II expertise and enhanced model credibility.

- Compared to the current CALSIM II, any central operations planning model for California water management should be:
    a. Expanded in geographic scope to include major non-CVP-SWP areas, especially the Tulare Basin, the Colorado River, and southern California. Operations and demands in these regions seem increasingly important for CVP and SWP operations, and are important for the integrated operations of California's major local and regional water management agencies.
    b. Expanded in management scope to include local management options such as water conservation, reuse, water transfers, groundwater and conjunctive use management, etc. These additional water management options are important for local, regional, and statewide water policy, planning, and management efforts and can have significant effects on CVP and SWP water demands.
    c. Made regionally modular, so smaller regional models can be run independently and tested locally, with boundary conditions consistent with the larger model.
    d. Made modular in terms of hydrologic, water management, and water demand processes, allowing better development, comparison, and updating of hydrologic and water demand process models. Agricultural, urban, environmental, and other water demands should be represented more directly, and explicitly. Groundwater should be represented and operated more explicitly. Land use based local hydrology and water demand approaches might be implemented in such standardized modules.
    e. Subject to a systematic model and data testing regime and continuous quality improvement program. As the problems of California water change, different and greater demands will be placed on analytical capability, requiring an essentially continuous testing, re-testing, and improvement of data and models. This might parallel a continuous review of local representations and data involving local agency and consulting experts.
    f. Financed on a broader base, by more than the CVP and SWP projects. Increasing use of CALSIM II is being made by local, regional, State, and Federal agencies interested in developing bilateral or multi-lateral water transfers or projects, which incidentally involve the CVP and SWP. To develop inter-regional modeling capability needed to integrate these activities at local, regional, and inter-regional scales, more sustained funding and involvement from local and regional agencies is needed. In effect, local and regional agencies have been "free riders" on CALSIM

II's analytical capabilities, and it is not necessarily a good bargain for them. Everyone should benefit from broader technical and financial participation.

g. Capable of analyzing a wide range of scenarios. More capability is needed to examine various long-term scenarios with respect to hydrologic, water demand, and operational uncertainties in the future. There also needs to be a better capacity to accommodate other approaches to representing hydrologic uncertainty and variability besides simply simulating 70-plus years of record.

- Input data and its development. Important aspects of CALSIM II rest upon the representations of other models of Delta hydrodynamics and water quality, water demands, and groundwater. The credibility of CALSIM II also rests on testing these models that send important data/representations to CALSIM II, and documenting them adequately. These models include:

  a. CU Model and SIMETAW: The consumptive use model and the newer SIMETAW model, used to develop hydrologic inputs and estimate return flows, also require testing and more explicit documentation. The underlying data for these models also need more systematic, standardized, and transparent treatment.

  b. DSM2: Representation of the Sacramento-San Joaquin Delta will always be important and prone to controversy, given the prominent importance of Delta flows and water quality for the operation and planning of California's water system. The difficulties of representing the Delta in operations and planning models are compounded by the tidal nature of the Delta, which usually implies a need for shorter time-steps. Representation of Delta water quality constraints currently falls heavily on an ANN method within CALSIM II. This ANN is calibrated (trained) based on a hydrodynamics model, DSM2. Thus, controversies regarding Delta representation in CALSIM II are likely to lead to questions of the adequacy of DSM2. The transparency and testing procedures valuable for establishing the credibility and limitations of a Central Valley operations model would also seem to apply to DSM2, or any other Delta hydrodynamics-water quality model. Tests of methods used to represent small-time step phenomena with larger time-steps (e.g., "partial month standards") should be tested in a forum that would give the approach credibility and where its limits could be developed, discussed, and documented.

  c. CVPM/CALAG/LCPSIM/IWR-MAIN: Representations of water demands in CALSIM II rely heavily on other models, particularly CVPM and eventually CALAG for agricultural water demands and LCPSIM and eventually IWR-MAIN for urban water demands. Thus, these models also will attract attention, and will probably require the same types of testing, transparency, and documentation suggested for DSM2 and CALSIM II. Many water contractors of the CVP and SWP also have internal water sources (groundwater, water conservation, and water reuse) and side contracts with other agencies to supply water that can increase or decrease (at different times) their water demands from the CVP and SWP contracts and from the demands estimated from CALAG and IWR-MAIN types of models.

  d. IGSM /CVGSM: Water users in California rely on groundwater as a water source and as the major source of over-year drought storage. Groundwater is also being increasingly used and looked-towards as a source of storage as part of conjunctive use schemes, and water transfer and market schemes. Thus, representation of

groundwater in the system is important, and probably should be expanded considerably. The representation of groundwater quantities, storage, and recharge and pumping capability will also attract attention from interested and critical parties. Thus, the IGSM/CVGSM modeling efforts of DWR and USBR should include the same types of transparency, documentation, and testing suggested for CALSIM II.

e. Agricultural demands: _Agricultural demands in the model are estimated by an external modeling system (CU model). Staff noted that the estimation methods being used are include out of date information on agricultural cropping patterns and irrigation technology, both of which result in inaccurate estimates of agricultural water demands. This estimation process needs to be revised and updated to include current information on an ongoing basis. The methodology needs to be improved to include economic factors in the estimation of cropping decisions and water demands. In many case, the preferred spatial scale for the economic modeling of agricultural water demand is going to be the individual irrigation district rather than very broad areas containing multiple quite heterogeneous districts.

- CALSIM II is currently awkward to apply for broader State and CVP-SWP policy questions. Practically, the time needed to complete analyses is too long and CALSIM II does not explicitly represent many of the management options which policy makers are interested in investigating, evaluating, and orchestrating.

- More CALSIM II modelers are needed. Many water managers and policy makers across California look to CALSIM II for many purposes, and there is near-universal consensus that the application of CALSIM II is currently limited by a dearth of knowledgeable modelers. Current training by DWR and USBR on CALSIM software is useful, but clearly insufficient. To be a functioning and credible CALSIM II modeler one must understand both CALSIM software and the operational complexities of the system (which probably no one can know in its entirety). Improved model and data documentation is also essential here.

- Stakeholders and policy makers are poorly guided in how to interpret CALSIM II results. Not only must CALSIM II become more responsive to current planning and policy concerns and management options, but current policy makers must receive some education in the benefits and limits of such modeling for their purposes. This is a very difficult problem that will often involve the role assigned to modeling and model results within larger politically-driven policy making processes.

- Non-interpretation of model results is not helpful. Several recent DWR reports based on CALSIM II results have been considerable improvements over past practices in terms of presenting model results, discussion of the model, and examination of model performance in a historical context. However, often the studies have not contained the kind of written discussion and interpretation of results that would demonstrate that the authors have thought about the results and drawn conclusions in a realistic and self-critical manner. This detracts from the perceived credibility of the work and makes the study less informative for readers (most of who surely do not have the modeling background of the authors).

- Some needs exist to improve CALSIM software. These are well-known to the model developers and include:
  a. Elimination of the need for the FORTRAN compiler,
  b. A public-domain mixed integer-linear programming (MIP) solver,
  c. A graphical user interface, including ties to databases and GIS display if possible,
  d. Post-processing tools for users to help new users and broader application and scrutiny of CALSIM II results,
  d. Version control software and system (also a problem for model administration),
  e. Better data and database management software and protocols (this has great data management and administration implications),
  f. An ability to more systematically set objective function weights,
  g. More automated input and output data checking is needed to improve productivity in model application and quality control of modeling output. This would also facilitate use of CALSIM II by a broader range of modelers,
  h. Ability to access and employ sensitivity analysis information coming from the MIP solver to identify possible multiple optima and identify binding constraints and slacks,
  i. A debug version of the code where water can be added or subtracted at any location and time (at a great penalty) to quickly identify locations and times of model infeasibilities. (Prof. J. Lund has had great success with this approach to correcting infeasibilities in the CALVIN model of California for a network flow algorithm.),
  j. Time-step issues should be explored and evaluated comparatively. There are major drawbacks to shortening time-steps system-wide (run-time, data development, interpretability of results, etc.), but short time-step components within the model or other approaches might adequately represent short-period aspects of the system for many purposes.

There will be some who argue that CALSIM II is and should remain a model of only the CVP and SWP system. While this would be simpler administratively and financially, it seems technically and politically untenable. California's water system is being asked to operate in an increasingly integrated manner across local and regional scales, with multiple local water demands, supplies, and aquifers being coordinated with the operations of major aqueduct and storage infrastructure. Any model of the CVP and SWP systems must be responsive to this operational integration, either implicitly through better parameterization of local supplies and demands, or explicitly by widening the geographic and functional scope of the model.

## 3. Limitations, Uncertainties, and Impediments

### 3.1 Removal of Unnecessary Ties to DWRSIM and PROSIM

Much of the spatial detail employed in CALSIM II is a carryover from the previous DWRSIM model. This is particularly evident in the coarse delineation of watersheds and sub-areas, which may no longer be relevant for future applications of CALSIM II. It is recommended that all unnecessary ties to the previous DWRSIM and PROSIM models be removed in further development of CALSIM II.

### 3.2 Relative vs. Absolute Predictions

As noted in the Executive Summary, we are skeptical of the usefulness of the distinction between comparative and absolute predictions. To declare that CALSIM II is intended for comparative predictions and should not be used for absolute predictions is not a helpful or desirable strategy. Rather than embracing this limited view of what CALSIM II can be expected to accomplish, we recommend that model developers recognize the requirement for CALSIM II to provide absolute values. To satisfy this purpose, additional calibration of the model will be required to ensure that it provides a reasonably reliable depiction of how the California water system operates. In addition, data on model accuracy and the outcome of the calibration runs should be made available so that users can gauge the likely errors involved in using the model for their own particular purposes. Some methods for doing this and performing sensitivity and uncertainty analyses are contained in Appendix H.

Model uses should realize that model calibration and validation exercises can illustrate only how well the model can reproduce historical decisions and system behavior. Our ability to predict future policy decisions and the emergency responses to water shortages is clearly limited, thus decreasing the absolute precision of any model's predicted values of various system performance measures. Thus it is useful to distinguish between the ability of the model to reproduce correctly the physical operations of the water systems in California (which should be good), its ability to reproduce and anticipate decisions by the agricultural sector that determine the quantities of water the consume, and its ability to mimic historical and current water operation decisions by the CVP, SWP and other water management agencies.

In general, it appears that the developers of CALSIM II do not have a clear idea of how to define the scope of CALSIM II use and many of the applications are evolving in a reactionary manner. Model developers should identify clearly the desired uses for CALSIM II and then determine acceptable approaches for satisfying those desires. Developers should seek to improve data accuracy and overcome unrealistic assumptions to improve confidence in model results.

### 3.3 Hydropower

CALSIM II is currently greatly lacking in hydropower computations, which is an important of the federal CVP system. This should include risk-based power capacity evaluation, and possible incorporate the ISM (indexed sequential hydrologic modeling) method that the Bureau has used for many years in hydropower capacity analysis. Also, hydropower should not simply be an after-the-fact calculation, but explicitly included in the system objectives.

### 3.4 Daily operations

A great challenge awaits the developers as they attempt to adapt CALSIM II to daily operations. These challenges are primarily related to the impacts of routing on distribution of flows and scheduling of reservoir releases. Under the current period-by-period optimization structure over daily time increments, without appropriate consideration of routing there is the

danger that the model will allow diversion of upstream flows to lower priority users, resulting in injury to higher priority downstream users in the following days where travel times exceed 1 day. The proper inclusion of routing in the daily operations requires some kind of look-ahead capability in CALSIM II, which is currently lacking. In addition, scheduling of reservoir releases on a daily basis creates difficult timing issues in order to minimize unnecessary downstream spills or shortages caused by routing and attenuation of upstream reservoir releases. Another complexity in moving into daily operations is that reservoir discharges now become head-dependent, whereas this can usually be ignored on a monthly time scale. This means that the maximum reservoir release in any day will be dependent on the head, and should be based on the average head over the day, which introduces the potential for time consuming iterative processes to deal with nonlinear relationships in discharge-head curves for any reservoir.

### 3.5 Groundwater model

Groundwater has only limited representation in CALSIM II. This resource is modeled as a series of inter-connected lumped-parameter basins. Groundwater pumping, recharge from irrigation, stream-aquifer interaction and inter-basin flow are calculated dynamically by the model.

The purpose of the multi-cell groundwater model is to better represent groundwater levels in the vicinity of the streams to better estimate stream gains and losses to aquifers.

In the Sacramento Valley floor, groundwater is explicitly modeled in CALSIM II using a multiple-cell approach based on DSA boundaries. For the Sacramento Valley, there are a total of 14 groundwater cells.

Currently no multi-cell model has been developed for the San Joaquin Valley. Instead stream-aquifer interaction is estimated from historical stream gage data. These flows are fixed and are not dynamically varied according to stream flows or groundwater elevation.

The approach to modeling groundwater in CALSIM II, a lumped-parameter "tank" model seems to be a reasonable approach. However, few details of this implementation were provided to the review panel, that it is not possible to assess its accuracy or reliability. Details of the calibration and verification activities performed to date should be carried out and reported for the groundwater tank model. The effect of using large size tanks should be assessed and the level of uncertainty in computed results reported. In addition, the effect of these uncertainties on CALSIM II calculations should also be assessed. The San Joaquin valley aquifers are not well represented in the tank model, but it is in the CVGSWM. The San Joaquin valley groundwater should also be modeled in CALSIM II.

Groundwater availability from aquifers is poorly represented in the model. This results from the fact that aquifers in the northern part of the state (Sacramento Valley) have not been investigated regarding storage and recharge characteristics. Thus, in the model, upper bounds on potential pumping from aquifers are undefined. This does not represent reality, since, if CALSIM II is used for statewide planning, it would allow pumping of vast quantities of water for export to southern parts of the state, something which agency staff claim is unrealistic.

Realistic upper bounds to pumping from any of the aquifers represented in the model need to be developed and implemented.

In addition, historical groundwater pumping is used to estimate local groundwater sources in the model. However, the information on the historical pumping is very limited, causing these pumping rates to be very uncertain. Better pumping information is needed and an analysis of the effect of this uncertainty on model results needs to be conducted.

In general, the level of representation of groundwater in CALSIM II is not reasonable from the point of view of the reviewers. This is due to several factors, perhaps the most important being the lack of information presented to the reviewers for their assessment. Another factor is the lack of data collected and analyzed by the State of California to properly account for groundwater resources in the Central Valley. These data are critical to an understanding of the availability of water in the state and the operation of the major water systems that supply water to agriculture and small municipalities in the Central Valley. Assumptions of unlimited groundwater resources in the Sacramento Valley are unfounded and unbelievable. Efforts should be taken to make reasonable estimates of these resources.

There are other approaches that provide reasonably accurate estimates of river-aquifer interactions and groundwater basin response, while not sacrificing computer time. The response function approach is a good example, whereby the CVGSM model is used to develop kernel functions describing this response. A similar approach is described in Fredericks, et al. (1998). These kernels may require readjustment as head conditions change in the basin, but they provide a more accurate prediction tool and are easily incorporated in the MIP model since they apply a linear superposition assumption and retain the linearity of the constraints in the model. A dynamically linked CALSIM-CVGSM configuration is not necessary for reasonably accurate solutions. If computer run time for CALSIM II is considered excessive now, it could only considerably worsen if this type of linkage is incorporated.

Soil moisture is not dealt with in a realistic manner and needs to be improved in applications where the model output might be sensitive to these assumptions.

### 3.6 Dynamic Variation of Priority Weights

A severe restriction in CALSIM II is the inability to dynamically vary the weights used to prioritize flow allocation in the system. It should not only be possible to dynamically vary these weights, but this variation should be conditional on the current system state, however that state (or states) is defined. In addition to dynamic variation of weights, more explanation is needed of the reservoir operating rules and how these rules are incorporated into CALSIM II. The description of operating rules used in the system is not very clear. For example, what kinds of hedging or shortage rules are used to mitigate the effects of drought?

### 3.7 Expanding Scope of CALSIM II

CALSIM II is a considerable advance on earlier models in that it fully incorporates both the State Water Project run by the Department of Water Resources and the Central Valley Project

operated by the Bureau of Reclamation. However to be able to examine the full range of Californian water issues, it would be desirable that all components of the linked system should be incorporated in the model including the Friant system, the larger Tulare Basin, and southern California and its links to the Colorado River. Also because of the very important linkage between surface water and groundwater use, improvements should be made in this area particularly with regard to how that linkage affects demand for surface water and how access to groundwater reduces the economic impact of surface water restrictions.

When expanding the geographical scope of the model to include non CVP-SWP areas, as well as Southern California, a hierarchical, decomposition approach would allow development of separate models for these areas that can then be linked together through iterative processes. Otherwise, the CALSIM II model can become extremely unwieldy. Again, integration can still be achieved through appropriate iterative interaction between the regional models. In the same vein, it is also unnecessary to explicitly integrate water quality and detailed water demand/consumptive use models into the model structure. Iterative schemes involving successive estimation of water quality and other parameters can produce comparable accuracy at reduced computer run times, while reducing the complexity of the model.

The replacement of DSM2 with a neural network is consistent with reinforcement or machine learning methods which are increasingly being used to replace complex, computationally time consuming models employed in decision support systems. The complex models are only used to provide the data sets used for training the neural network. Current research at Colorado State University and elsewhere is using neural networks for groundwater surface water interaction and return flow computation to replace computationally expensive groundwater models.

### 3.8 Key Model Outputs

In the past, the primary purpose behind the development of CALSIM II and its predecessors has been the examination of the reliability of water supplied to the State Water and the Central Valley Projects. However it is clear that there is now a demand for a model that will provide a wider range of outputs including:

- Water supply reliability for all water users
- Demand for water by existing users
- Outflows to Delta
- Use of groundwater and the rate of depletion of aquifers
- Water quality in the Delta and in the San Joaquin River
- Indicators of ecological health in particular with regard to key fish species
- The value of hydroelectric generation.

Although the modules in the CALSIM II package currently address many of these areas, the recognition that all these outputs are important may necessitate some further model development and a greater degree of testing and calibration of these parameters.

### 3.9 Modeling Allocation, Accounting and Operating Rules

CALSIM II uses a system of weights and constraints to define the water allocation process and the operating rules for storage reservoirs. Unfortunately these do not accurately reflect how operators of the state and federal water projects behave in managing their complex systems. Ideally, CALSIM should both reflect how the operators behave and be accepted by them as a useful tool when considering their management alternatives. The failure to achieve this limits the usefulness of CALSIM to investigate the specific operating or accounting rules that are of interest to those operators. For example, CALSIM II was not used to test changes to the accounting and allocation rules that have recently been proposed by the Department of Water Resources and the US Bureau of Reclamation because the rules that were changed do not exist in CALSIM II.

## 4. Options for Improving CALSIM

### 4.1 Optimization Model and Run Times

Many of the complaints regarding using of CALSIM II relate to long run times, which is not conducive to sensitivity or uncertainty analyses. Since CALSIM II employs a mixed integer linear programming (MIP) solver, the usual sensitivity information available in linear programming solvers, such as dual variables and right-hand-side ranging, are not available. The problem is that small changes in right-hand-side constants or objective coefficients (i.e., weights on water allocation priorities) can produce large abrupt changes in model solutions. In this case, dual variables do not provide useful information for MIP problems. Sensitivity analysis can only be conducted through trial and error processes involving incremental adjustment of important weights, coefficients, and uncertain data inputs with subsequent repetitive execution of the model. In light of this, it is crucial that the MIP solver employed in CALSIM II is upgraded. Significant advances have been made in MIP solvers, as described by Bixby, et al. (2000), which are not reflected in the current XA solver utilized in CALSIM II. There have been many recent improvements to the branch and bound method which should be incorporated, and the LP solver itself can be improved with better sparse matrix analysis. As planned by the CALSIM II developers, removal of the need for use of the FORTRAN 90 compiler will also improve run times when changes in optimization model structure are required.

### 4.2 Confidence in the model

The usefulness of a computer model in water resource management is only as good as the confidence that the stakeholders have in the accuracy and reliability of the model and the trust that they have in the modelers. There are several factors that affect that confidence and a number of ways that confidence can be improved.

- **Documentation**

Producing documentation of models requires considerable resources to do properly and ongoing resources to maintain especially when model development is continuing. Typically documentation of any water resource model is poorly done. However, where there are external model users, as is the case with CALSIM II, it is important. The survey conducted by Ferreira et al (2003) indicated that many users of the model thought that documentation of CALSIM II was poor.

- **Seminars**

In the Murray-Darling Basin, seminars with key users and interest groups in which the operation of the model is described and discussed have proved to be useful in increasing confidence in models. The practicality of this approach will depend on the number and location of the prospective participants and the resources available to support the process.

- **Data**

A model can only be as good as the data that is used to develop and calibrate it. The agreement over an acceptable set of hydrologic data that occurred during the development of CALSIM II is a considerable advance. However, there appears to be a need to improve the collection and use of data on water diversions and return flows. Because of the close links between the surface water use and groundwater use there also is a need to have better information on the use of groundwater.

The models used to calculate the Local Water Supplies in the Depletion Study Areas depend on estimates of surface water use, crop evapotranspiration rates and water use efficiencies developed using data from the 1970's. Confidence would be improved if more recent data were available to check these estimates.

- **Calibration**

A very good way to improve confidence in a model is to calibrate it against historical data to ensure that the model output is able to reproduce the observed data. Calibration is the process of using the model to reproduce the historical behavior of the system and then fine-tuning the model so that the match between modeled and observed values improves. The calibration of the model assists in detecting errors in the model and the input data. It also enables a comparison to be made between the way that the operators actually manage the system and the way that the model assumes that the system is managed.

A further consequence of the calibration process is that the statistics of the match between modeled and observed values can be used as a reasonable estimate of the absolute accuracy of the model output.

It is legitimate in a calibration/validation run to incorporate changes to infrastructure, institutional or operational rules as they occurred especially if these changes are specified as

input parameters to the model. This was done to a limited extent in the CALSIM II validation run with three regulatory periods modeled related to decisions made by the State Water Resources Control Board. It is also legitimate to incorporate growth in demand especially if that growth is described in a manner that is consistent with the way that demand is specified in the production run. Demand north of the Delta was specified in the validation run by inputting the historical crop areas.

A Calibration/Validation report should be very useful in demonstrating the accuracy of the model. However there are a number of elements in the CALSIM II validation run and the validation report which reduce that confidence including:

- State Water Project (SWP) demands south of the Delta were set at historical deliveries in years with no restriction and at the contractor's request level in restricted years. Neither of these pieces of information is available to a production run which calculates demand based on crop areas. Therefore the validation run does not provide reliable information on how well the model can represent these demands.
- The validation run omitted Article 21 deliveries. Although this omission will not affect the delivery of 'Table A' volumes south of the Delta, it will affect flow in the Delta and Delta water quality. Also, in the example model run presented in the paper by Draper A.J. et al (2003) which was supplied as part of the review, changes to Article 21 deliveries constituted the largest impact resulting from a change to the allowable pumping capacity at Banks between March and December. This suggests that the modeling of these demands is important.
- The DWR (2003) report produces estimates of SWP and Central Valley Project (CVP) deliveries south of the Delta but then adjusts them for changes in storage before presenting comparisons of those results with observed deliveries. This process merely checks that the model is preserving a water balance and does not present a legitimate validation of model deliveries.
- The report provides statistics on long term average deliveries and flows but no statistics on the fit for individual years. Additional analysis of the output would assist stakeholders to assess whether the estimate of water supply reliability and in particular the modeled volumes of water available in the most restricted years are accurate.
- In some instances, such as the examination of water quality in the Delta, the ability to accurately model monthly flows and deliveries will be important. The validation report contains no information that would enable the ability to model monthly flows to be assessed.
- A key model output is the water quality in the Delta. It would assist the validation of the model if a comparison of parameters such as the location of the X2 boundary was provided.

The users of CALSIM should recognize that models are a summary of what one believes to be true and important about a system. Validation is then an exercise to test how good that summary and understanding really is.

Appendix I contains brief descriptions of calibration modeling in the Murray-Darling Basin in Australia and in the State of Texas.

### 4.3 Assessment of the reliability of "delivered" water

An important recent application of CALSIM II which has drawn widespread attention is the "State Water Project Delivery Reliability Report. While this is an important step forward in the use of CALSIM for policy purposes, it highlights a number of issues, both conceptual and empirical, that need to be resolved in order to provide a more adequate assessment of the reliability of water supply in California.

First, it illustrates the need for sound calibration of CALSIM. The question being asked is not a comparative one – What are the consequences of changing some aspect of the system from X to Y? – but rather an absolute one – How does the system function at present? How often can users expect a shortage in deliveries of Z%?

Second, it highlights the fact any water system model such as CALSIM requires a blend of hydrology and behavioral analysis. To conduct a water balance, the model needs to know what deliveries are required by the customers of the given project, and what are the diversions by other user groups who extract water from the same surface or groundwater sources. These are fundamentally questions of economic and institutional behavior, not matters of hydrology. Therefore they cannot be dealt with by hydrologists alone. Like its predecessors, CALSIM tends to treat these as black boxes. The diversions by water users outside the CVP-SWP are taken as exogenously given, based on an assumed "level of development" and simplistic assumptions about the patterns of water use associated with that level of development. The deliveries required by the water users who are served by CVP-SWP are generally taken as given. For reasons explained below, both of these treatments are simplistic and unsatisfactory.

In CALSIM modeling exercises the level of development plays two different roles depending upon the context. In a simulation context, the level of development is used to represent hydrologic variability and uncertainty; in a calibration/validation context, it is used to reflect the actual historical demand for water withdrawals. These are very different purposes and it is important to keep them distinct. In most applications of CALSIM prior to the recent reliability study, the main focus was simulation and the representation of hydrologic variability. The chief purpose served by using 73 years of adjusted streamflow records was to represent the variability and uncertainty in the streamflow that one can expect to observe in any single year. Therefore, the calendar date of the record has no substantive significance, the (adjusted) streamflows for 1952 or 1982 are not being used to represented what happened historically in 1952 or 1982, but rather as an indication of the variation in streamflow that could be expected to occur next year, or any other year. In this context of simulating hydrologic variability, it makes good sense to apply the *same* level of development (i.e. the same pattern of water use) to every year in the sequence, rather than a series of different levels of development that vary with calendar time, because the streamflows represent alternative hydrologies that can occur in any given year.[1] The situation is different when one is conducting a calibration or validation

[1] This could be modified to allow for the fact that local weather conditions have a significant impact on irrigation (and urban) demands – e.g., farmers plant fewer acres of crops in a drought year. In that case, one could have different levels of water demand and extraction in different year *types;* but, these would all be keyed to the same overall level of economic development (e.g. the California economy in the 1990s). CALSIM II does not presently

exercise. In that case, one wants to represent the historical demands in 1952 or 1982 in order to compare what the model predicts with what actually happened. Therefore, in a calibration or validation exercise one wants the level of development to change each year in order to reflect the demand that occurred historically.

Both simulation and calibration/validation raise some other important technical issues. In the context of simulation, there are several different ways to generate a hydrologic sequence that is calibrated to a fixed level of development. One can use all 73 years for which data are available. One could use a subset of those years chosen either according to some deterministic rule or randomly. The subset could be oriented, for example, towards the extremes of the 73 sequence of annual records. However, the drawback of any approach based on sampling from the observed historical record is that it *understates* the full variability in streamflow that could be experienced in the future. The 73 years of record are drawings from a probability distribution the extremes of which extend beyond the minimum and maximum flows observed in the historical record. Relying on this record, therefore, understates the true minimum and maximum flows that might be encountered. In a reliability assessment exercise, one might want to take some steps to minimize the potential understatement of streamflow uncertainty. This could be accomplished by fitting a (parametric) probability model to the historical streamflow record and then sampling from the tails of the fitted distribution (Stedinger, 1981). The use of statistical models of streamflow variability could be considered in future applications of CALSIM to assess delivery reliability.

The assessment of delivery reliability requires that particular attention be given to the definition and measurement of the water users' demands. In this context, the user's demands play two roles: they affect the definition of "deliveries" and they influence the assessment of "reliability". With respect to deliveries, CALSIM II considers water to be delivered whenever it has the water irrespective of the ability of a contractor to use the water or to store it; The reality is that, if the contractor does not have a demand for the full quantity of water and is not able to store the excess, that amount will not be delivered. Therefore, the calculation of deliveries would be flawed. Furthermore, reliability cannot be assessed without reference to demand. Stating that a water supply system can deliver 100 acre feet in a wet year but only 70 acre feet in a dry year is useful only if one knows what the demands will be in wet and dry years. The implications are quite different if the user needs 105 acre feet per year than if he or she needs 65 acre feet per year. Thus, the users' demands should serve as the norm against which reliability is assessed. Instead, the recent reliability report uses the so-called 'Table A' water amounts as the norm for assessing deliveries to SWP contractors. This does not seem to be a satisfactory approach because there is no presumption that the Table A amounts, negotiated in 1960, measure the actual demands of SWP contractors in any particular year. The actual demands of the individual contractors will be influenced by how much storage they have, what access they have to other surface water or groundwater, and the demands of the farmers they serve to plant crops and apply water. Without accounting for these factors, it is difficult to generate a meaningful assessment of supply reliability.

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consider the impact of annual weather conditions on demands. In order to model water demands accurately in a year, the climate conditions would be linked to the flow conditions to provide an input set for a particular year.

The assessment of reliability should ideally go beyond a comparison with quantities demanded to incorporate the notion of a loss function. If a user has a demand for 100 acre feet and can only receive 90 acre feet in one scenario and 80 acre feet in another, while the shortfall is twice as large in the second scenario the actual *consequences* of the shortfall to the user, in terms of lost profit or higher cost, might be more than twice as large. To assess the economic value of reliability, or the economic cost of a lack of reliability, one needs to be able translate shortages into monetary losses. To accomplish this, the warning time provided and the delivery shortfalls from CALSIM would need to be processed through an economic model of the value of water to different SWP contractors.

Because water users face difference demands and have access to different sources of supply, when assessing reliability it is unhelpful to aggregate all contractors and simply present the results in terms of total annual project deliveries, as was done in the report. Precisely because of the potential non-linearity of the loss function, a given aggregate shortfall can have different consequences when distributed differently among the individual contractors. A similar observation applies to the temporal distribution of delivery shortfalls across the year. It is unhelpful to aggregate supply system deliveries into an annual total, as done in the report. For a user to be able to obtain 100% of his or her demands in the period from March to May but only 60% in the next three-month period from June to August has different consequences than being able to obtain 80% in each of the six months. Furthermore, for both agricultural users and many urban users, major decisions affecting water use have to be made in the spring. They are based on the expectation around March about the amount of water that will subsequently be available for delivery during the summer months. What matters to these users when assessing supply reliability is the amount of water they can expect around March to be delivered over the summer, rather than the ultimate total delivery.

For both reliability assessment and also model calibration/validation, it is important to avoid excessive aggregation when describing shortfalls between demand and supply, or deviations between model predictions and actual outcomes. In regression analysis, it is the convention to measure the goodness of fit of a regression equation not by the average deviation but rather by the sum of the squared deviations. In ordinary least squares regression, by definition the average deviation is always zero (that is to say, the average of the predicted values of the dependent variable always equals the average of the actual values) regardless of how well or badly the regression equation fits the data. The average deviation thus provides *no* information regarding the goodness of fit; by contrast, the sum of squared deviations or the sum of the absolute values of the deviations are sensitive measures of goodness of fit. Although the calibration of CALSIM is not an exercise in least squares regression, the same general principle applies. To judge whether the model is doing a good job, the goodness of fit should be measured by reference to the disaggregate results and not simply by the overall average deviation.

Additional comments on the 2003 CALSIM II Validation Report are contained in Appendix F.

## 5. Managing CALSIM Development and Applications

The costs of not continuously and substantially improving our analytical capabilities are political (in terms of continued controversy and diminished agency credibility), economic (as inferior system performance for agricultural and urban water users), environmental (in terms of inferior environmental system performance), and financial (lawyers and policy consultants are more expensive than engineers and scientists).

CALSIM II is a substantial improvement over its predecessor models, DWRSIM and PROSIM, with a great deal more flexibility, transparency, and potential than these earlier models. The modeling team for CALSIM has identified an exciting and relevant vision of how modeling should be done for this complex and difficult system in the coming years. However, implementation of this vision in a coherent technical manner that leads to both technical and stakeholder credibility will be a difficult process, requiring financial and institutional support if this kind of capability is to be developed and sustained.

To accomplish these objectives CALSIM II developers need to be in an institutional position where they can see the model more as "outsiders" view it. This would allow them to be more responsive in supporting the credibility of their work and the relevancy of their tools and results to the broad range of current water management problems. As such CALSIM II should no longer be solely responsible to CVP-SWP managers, but should be responsible to a broader range of technical managers from additional interests, reflecting its current and prospective uses.

It would be imprudent to manage a state's finances, a business, or a retirement plan without quantification – quantification in such matters is necessarily imperfect, but necessary nonetheless. While shortcomings have been identified in CALSIM II, it would be similarly irresponsible to manage California's water budget without carefully-interpreted quantification. Progressive and continuous improvement in our quantitative understanding of California's water system provides a common basis for improving its performance for all interests.

One possible means of maintaining control of the quality of particular versions of CALSIM II and accompanying models used for SWP-CVP planning and management decisions is to create an interagency modeling consortium (IMC) consisting of DWR, USBR, and persons from other stakeholder organizations if they are interested and want to participate. This consortium would be responsible for maintaining a toolbox of 'acceptable' models for 'official' use by the agencies and contractors.

IMC responsibilities and authority could include:

- Prioritize, coordinate, and provide consistency, technical guidance and oversight for all modeling applications,
- Approve model selection and insure that each requested application is carried out using the most appropriate model(s) and input data,
- Provide or otherwise insure documentation of the modeling process itself as well as the modeling results,

- Insure that the results are expressed and made available in a way such that others can understand and benefit from that modeling application, as applicable.
- Implement peer reviews of models and their applications as deemed appropriate.

To help meet their responsibilities the IMC will need to establish, publish and implement some procedures for insuring the quality of the entire model development and application process. They will need to identify among all the models that might be used, which are the most appropriate to address each of these separate groups of model applications. They must identify various models, i.e., establish a model toolbox, from which clients can choose the one that best meets their needs (or perhaps argue that another model should be added to the toolbox). The IMC will also need to maintain model documentation and provide for peer reviews of any model, its documentation, and/or its use in a project.

Further suggestions and discussion on the creation and operation of a possible IMC for model development and application, as well as for managing peer reviews of both the models and their applications, are contained in Appendix E.

# 6. Recommendations for Future Use, Development, and Application of CALSIM II

The most concise recommendation we might make would be to fix the shortcomings beginning with what are considered the most serious, and proceeding to those that are less serious, taking into account the time and other resources needed to address each weakness. However, we believe it is more useful to suggest ideas on how to systematically address both present shortcomings and those likely to emerge as stakeholders' quantitative understanding of California's water system and its problems continue to evolve.

## 6.1 Model development and support consortium

As discussed in the previous section and in Appendix E, it might be useful to explore creation of a broader interagency modeling consortium for developing operations planning models for California. The joint DWR-USBR development strategy used for CALSIM II has shown some notable successes, and should be expanded to include additional parties and sources of expertise. Such a consortium might include staffs from several agencies (DWR and USBR, as well as potential members from MWD, KCWA, CCWD, and other agencies), NGOs, some consultants, and universities. Such a model development forum would:

a. Bring a wider range of expertise to bear on model development problems.
b. Facilitate having more agencies involved in supporting model development with expertise and financial resources.
c. Better enable model developers to see the model as "outsiders" see it.
d. Potentially improve contracting for model development and testing.

e. Take model development and testing outside of the explicit agency framework; a broader consortium should be more conducive to self-critical and transparent technical practices.
f. Provide a common training ground for agency, NGO, and consulting staffs to become effective modelers, broadening the talent base for technical work in California.
g. Reduce impediments to model development and testing arising from current State budgetary and personnel hiring problems.

Many of the questions, concerns, and problems mentioned in the user community interviews could be addressed well in such a distributed model development, testing, and support framework. It would still be necessary for each stakeholder group and agency to maintain its own modeling staff, but these would be partially shared in an interagency modeling consortium.

The governance and finance of such a consortium would be difficult and would probably require a steering committee or governing board, but any resulting model(s) would have broader credibility and a broader and deeper technical base.

In the immediate term, a users' group should be formed and the formal listing of model development activities should be posted on the web, including short descriptions of each development activity and contact information.

### 6.2 Quality Control Program

The DWR and USBR modeling team (or a broader model development consortium) need an explicit quality control program. Such a program should include a variety of activities:

a. periodic external reviews on the broad modeling program
b. specialized external reviews of model products and applications
c. a standing (or sitting) external technical advisory body
d. software engineering and maintenance
e. a regime of model testing
f. model and data documentation
g. data development and management
h. user group activities
i. local agency and interest involvement
j. model, data, and documentation accessibility (including web site use).
k.

Such a quality control program would benefit from deep consultation with stakeholders and the broad community of water technical people, perhaps via the California Water and Environment Modeling Forum (www.cwemf.org).

### 6.3 A Training Program

DWR, USBR, and assorted agencies and consultants should establish a more formal common regimen to train new CALSIM II users in both CALSIM software and the complexities of actual system operation. All these groups currently rely on a relatively small pool of perhaps a

dozen knowledgeable CALSIM II users and all proclaim a need for many more capable users. A training regimen consisting of current CALSIM II training classes, supplemented by additional training in software application and system operation and apprenticeships or rotations through operations and model development shops would be useful to all concerned. The entire water community would benefit from having such expertise being widespread. Having widespread CALSIM II modeling expertise also makes explaining CALSIM II and its results easier. This might be an appropriate activity for a model development consortium.

### 6.4 Extend Improvements in Modeling Practice to Supporting Models

CALSIM II is at the center of a web of additional models used by DWR, USBR, and other agencies to prepare inputs for CALSIM II and post-process outputs from CALSIM II.

Delta controversies and difficulties of representation seem endemic to problems of modeling Central Valley operations. The technical basis for representations of Delta operations and water quality performance requires a similar level of transparency and testing to avoid this becoming a "weak link" in the Valley-wide operations planning model. Since so much is based on the DSM2 Delta model, documentation of fairly strenuous tests of the DSM2 model are highly desirable. This would provide a firm foundation for the use of ANN or other approaches for summarizing DSM2 behavior in an operations model. Similar documentation, testing, and development are desirable for the other models mentioned above which provide data for CALSIM II (CVGSM/IGSM, CVPM/CALAG, IWR-MAIN, LCPSIM, CU model, and SIMETAW).

### 6.5 Hydrologic Data and Data Development

An effort should be made to step back and perhaps re-define a more systematic and solid basis for developing hydrology for water management models of California's inter-tied water system. Currently, several efforts exist to develop surface or groundwater hydrologies for parts of the Central Valley (sponsored by DWR-USBR, USACE-Sacramento District, USEPA, USGS, CALFED, local agencies, etc.). An effort should be made to broaden the range of hydrologic expertise involved in hydrology data development for management modeling of California's inter-tied water system, and establish a consistent and high, but reasonable, standard of documentation and testing for developed data and any underlying hydrologic models. Establishing such a standard of documentation and testing would make existing hydrologic studies more accessible and useful for future studies and encourage the comparison and further development of existing representations of the system's hydrology.

### 6.7 Performance-Based Optimization

Performance-based optimization should be added to CALSIM's capabilities; it would not be difficult in terms of software or data, and would add much greater ability to explore and seek improvements in management within a complex system. The multi-period optimization approach being developed (CAM) is an operations-oriented first step in this direction, but could be expanded without great difficulty.

For large-scale water resource systems of great complexity and many options for system management, it is often difficult to find "optimal" operations with simulation modeling. There are simply many myriads of decision options and combinations of options, which theoretically each require a simulation model run – which would be prohibitive in terms of analysis cost and time. In such situations, performance-based optimization models, such as those seeking maximum economic performance, can offer useful insights as to where to look for improving system operations and management. Metropolitan Water District of Southern California (MWD) and San Diego County Water Authority (SDCWA) employ performance-based optimization modeling of parts of California's water system to gain strategic insights for planning and management. An economic-engineering optimization model has been developed for California and, despite significant limitations, shows several insights for California (CALVIN), suitable for identifying promising operational and management strategies worthy of more detailed analysis (Jenkins et al. 2001; Draper et al. 2003; Jenkins et al. 2004). The CALSIM II modeling approach could easily be adapted to provide greater functionality to this type of performance optimization. Having performance-based optimization capability together with a compatible simulation model for more detailed analysis and trade-off evaluation could greatly improve the capability of California's water community to explore and develop promising and creative options for improving operations, facilities, and overall system management.

### 6.8 Modular and Layered Versions of CALSIM II

Speedier versions of CALSIM II are needed for operations planning and integrated water planning studies. Such versions would be regional modules of CALSIM II (for regional studies) or explicitly aggregated system-wide models from the most detailed CALSIM II schematic for system-wide or statewide studies. Both approaches would simplify the model for particular purposes, yet be tied to a common detailed schematic and detailed hydrologic, operations, and water demand data sets.

Geographically modular or aggregated system-wide versions would allow additional local and regional water management options to be represented for particular operations and policy planning purposes and allow users to more quickly explore and develop operating policies. The final runs from such integrated or exploratory studies could then be evaluated using a more detailed and complete version of CALSIM II.

Modular regional models might represent regions with relatively few inter-ties, such as: Sacramento Valley, Delta and eastside streams, San Joaquin Valley, San Francisco Bay Area, Tulare Basin, and Southern California (DWR's South Coast and Colorado River hydrologic regions). (We have had good success with the CALVIN model of California with 5 modular regional models, which combine to form a system-wide model. These geographic sub-models greatly improved quality control in model development, work flow and data checking, and identification of problems in the model.)

### 6.9 Model Calibration and Testing

Many approaches exist for model calibration and testing (Modeling Forum 2000). Calibrating a planning model oriented to operations in an uncertain and distant future is always challenging. For a model that serves many uses (including policy-urgent uses unforeseen by developers), use-specific testing will often be impossible within a responsive time frame and budget. Such unavoidable situations call for more thorough, general, and well-documented model calibration and testing than would otherwise be needed.

For the model to have technical credibility, stakeholder credibility, and to serve the kind of training and reference function needed for the water management community, a systematic and coherent means of setting parameter values in the model and documenting these values is needed. Similarly, a systematic self-critical means of testing is needed for a model to establish and retain credibility, and have defined limitations, for a range of applications.

A potentially excellent resource for model testing is comparisons of seasonal operations planning CALSIM II model runs with recent years' seasonal operations, as done by actual operators. Similarly, system operators could scrutinize historical simulations, such as those in the recent November report, for systematic differences from operating practice. Such comparison with operator policies and philosophy could also be performed with SWP or CVP delivery reliability estimates. Such comparative analyses would both help define the likely (and unavoidable) differences between actual and modeled operations and water deliveries and identify potential opportunities to narrow such differences.

Credibility arises, in part, from demonstration that problems and limitations are systematically identified and addressed or considered in model development and in making and interpreting model runs. This can be accomplished by use of documentation, metadata, written guidance, and protocols and logs for identifying model problems and recording model improvements.

Given present and anticipated uses of CALSIM II, the model should be calibrated, tested, and documented for "absolute" or non-comparative uses. This is what many applications require today and will be increasingly desired and required in the future. Maintaining the traditional "comparative-only" use of CALSIM II is undesirable if the model is to be useful for the CVP and SWP systems, the operations of water contractors, or for statewide planning purposes.

### 6.10 Documentation of Model Improvements

Along with better documentation of model versions, logs of data and model improvements and "bug fixes" should be maintained. Explicit protocols and records for identifying and correcting modeling errors and problems would enhance the credibility of the modeling effort with technical people and policy makers. Such protocols also provide an internal aid to staff and staff development in modeling. I understand that this kind of record-keeping is done, but the precise form of, nature, and extent of this record-keeping is unclear. It would be useful and reassuring to stakeholders and policy makers to know that this kind of record-keeping of the software and data was being done.

### 6.11 Better Model Integration in Decision-Processes and Stakeholder Education

Greater aid should be given to interested parties and decision-makers who must work with the unavoidable limitations of any model. If possible, a document should be prepared for stakeholders and interested parties outlining the model, summarizing the model's primary limitations, and providing guidelines for interpreting model results. Those developing policy-making forums and processes should thoughtfully incorporate computer models in these processes in ways that do not assume model omniscience, or otherwise place too great or exclusive a reliance on model results.

Models and model results will never be perfect. If models are to be important for planning and policy-making, they be must be presented and used in ways that enlighten policy-makers more than they add confusion and controversy to already difficult situations, if possible.

## 7. References


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# A Strategic Review of CALSIM II and its Use for Water Planning, Management, and Operations in Central California

## Appendices


| | | Page |
|---|---|---|
| Appendix A: | CALSIM II Science Review Schedule | 45 |
| Appendix B: | Briefing Material for CALSIM II Peer Review | 47 |
| Appendix C: | CALSIM II Review Process and Timeline | 49 |
| Appendix D: | Peer Review Panel | 50 |
| Appendix E: | Managing Model Development, Application, Documentation and Communication. | 51 |
| Appendix F: | Analysis of the November 2003 CALSIM II Validation Report | 68 |
| Appendix G: | Some Principles for Strategic Water Analysis | 70 |
| Appendix H: | Model Sensitivity and Uncertainty Analysis | 71 |
| Appendix I: | Model Calibration Examples | 129 |

# Appendix A: CALSIM II Science Review

Dates: Nov 13-14th
Location: Bay-Delta Room, CBDA Offices
650 Capitol Mall, 5th Floor
Sacramento, CA

**Day 1: The Management Context, Model and Application Details**

9:00 Welcome – Kim Taylor
- Overview of the CALFED Bay Delta Program -
- Introduction of the Panel

9:15 Water issues in California – Francis Chung
- General Hydrology
- SWP/CVP
- Operational challenges
- Sacramento-San Joaquin Delta – Ron Ott (5 min.)

9:35 Panel Q&A

9:45 Planning Models – Andy Draper
- CALSIM software
- CALSIM II application overview
- Interaction with other models

10:10 Panel Q&A

10:20 Break

10:30 Summary of CALSIM Applications
- DPLA/CalFed/US Bureau of Reclamation: Integrated Storage Investigations – Steve Roberts
- Bay Delta Office (DWR): SWP Delivery Reliability Report - Kathy Kelly
- USBR: Multi-layered modeling to simulate CVPIA (b)(2) water and Environmental Water Account Operations – Nancy Parker
- Operations Control Office (DWR): Oroville Relicensing, SWP Allocation decision procedure – Curtis Creel
- Department of Planning and Local Assistance (DWR): California Water Plan Update – Kamyar Guivetchi/Ken Kirby

12:15 Panel Q&A

12:30 Lunch

1:15 Summary of User and Stakeholder Interviews
- 1:15 Interview Summary and Findings – UC Davis
- 1:35 Panel Q&A
- 1:50 Public Comment

2:15 CalSim II Details
- Development philosophy – Francis Chung
- Operation priorities, constraints, common assumptions – Erik Reyes
- Hydrology development – Andy Draper
- Delta water quality constraints – Ryan Wilbur

3:15 CalSim Evaluation
- Historical Operations Study / Sensitivity Analysis – Sushil Arora

3:30 Panel Q&A

3:45 Break

4:00 Future Directions
- Data Structure / Version Control / Multi-Period Prescriptive Optimization – Ryan Wilbur
- Daily Time Step - Dan Easton
- CalSim II – CVGSM Integration – Tariq Kadir
- Water Quality / Upstream Models – Nancy Parker

5:00 Panel organizational meeting (additional information needs, questions of specific staff, discussion plan)

**Day 2—Panel Deliberations and Preliminary Report**

8:30 Panel Q&A with specific DWR and USBR staff on request

9:30 Panel *in camera* discussions

11:00 Panel presentation of draft main findings—Pete Loucks

12:00 Wrap up and next steps - Kim Taylor

i

# Appendix B: Briefing Material for CALSIM II Peer Review

**California Water**
*Averting a California Water Crisis (3 pages)*
*California Water Today, Bulletin 160-0, Chapter 2 (20 pages)*
*Water Supplies, California Water Plan Update, Bulletin 160-98, Chapter 3 (11pages)*
*Urban, Agricultural and Environmental Water Use, California Water Plan Update, Bulletin 160-98, Chapter 4 (17 pages)*
*California's Major Water Projects (map) (1 page)*

**CVP and SWP**
*State Water Project Operations (6 pages)*
*Central Valley Project Operations (16 pages)*

**CalSim and CalSim II Overview**
*CalSim: A Generalized Model for Reservoir System Analysis (19 pages)*

**CalSim Software Details**
*CalSim water resources simulation model: Users guide (18 pages)*
*CalSim water resources simulation model: Wresl language reference (11 pages)*

**CalSim II Details**
*Network Representation (1 page)*
*Sacramento-San Joaquin Delta Operations (9 pages)*
*Coordinated Operating Agreement (3 pages)*
*Reservoir Rule Curves (2 pages)*
*CalSim ANN Implementation (8 pages)*
*CVPIA (b)(2) Management and Operations (6 pages).*ii
*EWA Management and Operations (8 pages)*
*Multi-Cell Groundwater Model (2 pages)*
*SWP and CVP Delivery Allocation Logic (3 pages)*

**Hydrology Development**
*Surface Water Hydrology Development for CalSim II (8 pages)*

**Supporting Computer Models**
*Model Interaction (1 page)*
*CALAG (2 pages)*
*CU Model (2 pages)*
*DSM2 (2 pages)*
*IGSM2 – CVGSM (4 pages)*
*LCPSIM (5 pages)*

**CalSim II Evaluation**
*Planned Sensitivity Analysis (7 pages)*
*CalSim II Simulation of Historical SWP-CVP Operations - Extracts (61 pages)*

**CalSim II Applications**
*CalSim II Project Applications Summary (not completed)*
*SWP Delivery Reliability Report – Extracts (25 pages)*
*North of Delta Offstream Storage Investigations (3 pages)*
*In-Delta Storage Investigations (3 pages)*
*California Water Plan Update 2003 (3 pages)*
*CalSim II and SWP Operations Control Office (1 page).*iii

**Future Model Development**

**(a) CalSim Software**
*CalSimMulti-period Prescriptive Optimization (not completed)*
*CalSim Daily Time Step Model (not completed)*
*CalSim Water Quality Module (not completed)*
*Data Structure / Version Control (not completed)*
*CalSim Graphical User Interface (not completed)*

**(b) CalSim II Applications**
*CalSim II – CVGSM Integration (not completed)*
*CalSim II Geographical Expansion (not completed)*
*Global Climate Change (not completed)*
*Refined Spatial Resolution (not completed)*
*Expansion of Land Use Based Demands (not completed)*
*CalSim II – CALVIN Integration (not completed)*
*Revision of Urban Water Demands (not completed)*

**(c) Supporting Models**
*Replacement of Consumptive Use Model (not completed)*

# Appendix C: CALSIM II Review Process and Timeline

Establishing the Peer Review Panel

Dr. Pete Loucks (Cornell University and South Florida Water Management District) has accepted the CALFED Science Program's invitation to chair the panel. Other members are being currently being contacted by the Science Program staff

Organization of Briefing Material

Science Program and key agency staff, in consultation with the review panel chair, are identifying and organizing briefing material for panel members. Target date for completion is Sept 1, 2003. (This was extended to December 8, 2003)

Public Meeting of Review Panel

Target: 2-day session in November, 2003 in Sacramento area

Review workshop structure will include:

- Presentation overviews of California hydrology, water management, current issues, and the development of CALSIM II
- Presentations on the range of different current and potential applications of CALSIM for planning, operations, and supply reliability projects
- A summary of an independent interview project by Dr. Jay Lund of users and stakeholders explaining the major questions people are trying to answer with CALSIM II and other models
- Public comment to the panel
- Detail discussion of the model, including assumptions used in different applications, verification studies, and sensitivity analyses
- Opportunity for panel members to ask follow up questions of CALSIM developers and users
- An in camera session for panelists to discuss and begin compiling review comments
- A public presentation of the panel's draft findings

Panel Chair Provides Final Report to CALFED Lead Scientist

The panelists will be asked to finalize their review comments within 3 weeks of the public meeting and to transmit those directly to the Lead Scientist. The Science Program will transmit the completed review to CBDA and the CALFED community.

## Appendix D: Panelists CALSIM II Review, Nov. 13-14, 2003

| Name | Affiliation | Position | Address/Phone/E-mail |
|---|---|---|---|
| Andy Close | Murray Darling Basin Commission | Lead Modeler and System Manager | GPO Box 409 Canberra ACT 2601, AUSTRALIA<br>(02)62790102<br>andy.close@mdbc.gov.au |
| Michael Haneman | UC Berkeley | "Senior Economist, Professor" | 327 Giannini Hall,<br>Berkeley, CA 94720-3310<br>(510)642-2670<br>hanemann@are.berkeley.edu |
| John Labadie | Colorado State University | Professor | B211 Engineering, Fort Collins, CO 80523<br>(970)491-6898<br>John.Labadie@colostate.edu |
| Pete Loucks | Cornell University | Professor | "Civil and Environmental Engineering, 311 Hollister Hall, Ithaca, NY 14853 "<br>(607) 255-4896 DPL3@cornell.edu |
| Jay Lund | UC Davis | Professor | Civil and Environmental Engineering<br>3109 Engineering III, Davis, CA 95616"<br>(530)752-5671 jrlund@ucdavis.edu |
| Daene McKinney | University of Texas at Austin | Professor | Civil and Environmental Engineering<br>Campus Mail Code: C1786,<br>Austin, TX 78712<br>(512)471-8772<br>daene_mckinney@mail.utexas.edu |
| Jery Stedinger | Cornell University | Professor | Civil and Environmental Engineering, Hollister Hall, Ithaca, NY 14853<br>(607) 255 2351 JRS5@Cornell.edu |

# Appendix E: Managing Model Development, Application, Documentation and Communication.

One possible means of maintaining control of the quality of particular versions of CALSIM II and accompanying models used for SWP-CVP planning and management decisions is to create an interagency modeling consortium (IMC) consisting of DWR, USBR, and persons from other stakeholder organizations, including NGOs and universities, if they are interested and want to participate. This consortium would be responsible for maintaining a toolbox of 'acceptable' models for 'official' use by the agencies and contractors.

IMC responsibilities and authority could include:

- Prioritize, coordinate, and provide consistency, technical guidance and oversight for all modeling applications,
- Approve model selection and insure that each requested application is carried out using the most appropriate model(s) and input data,
- Provide or otherwise insure documentation of the modeling process itself as well as the modeling results,
- Insure that the results are expressed and made available in a way such that others can understand and benefit from that modeling application, as applicable.
- Implement peer reviews of models and their applications as deemed appropriate.

To help meet their responsibilities the IMC will need to establish, publish and implement some procedures for insuring the quality of the entire model development and application process. They will need to identify among all the models that might be used, which are the most appropriate to address each of these separate groups of model applications. They must identify various models, i.e., establish a model toolbox, from which clients can choose the one that best meets their needs (or perhaps argue that another model should be added to the toolbox). The IMC will also need to maintain model documentation and provide for peer reviews of any model, its documentation, and/or its use in a project.

**CMM Level 3 Performance Expectations**

Firms that develop professional software are typically required to meet certain software standards. One such standard is defined in a book from Carnegie Mellon University. These so called Capability Maturity Model (CMM 1994) standards have various levels. For example, the South Florida Water Management District, that develops hydrologic models used as inputs to major investment decisions, strives to meet Level 3 standards. To meet such standards in software development and peer review, one needs to show that

- Modeling related problems are anticipated and prevented

- Model development and application groups work together as an integrated product team.
- Model use training is planned and provided as is needed.
- New modeling methodologies are identified and evaluated for possible implementation on a qualitative basis.
- Data are collected and used in all defined processes.
- Data are systematically shared across various projects.
- Both the models and their applications are evaluated and judged satisfactory by independent reviewers.

It seems to this panel that CALFED could without too much difficulty meet such standards if it chose to. Clearly planning for, conducting, and documenting these activities will require additional time and money. The expectation is that in the long run, such documentation and review will save time and money by redirecting misguided initiatives, identifying alternative approaches, or providing valuable technical support for a potentially controversial decision.

**Model Toolbox**

The IMC in collaboration with all agencies involved in water resources planning could be responsible for creating and maintaining a collection of models that agencies can use to meet their needs. As shown in Figure 1, this collection of models might be called the model toolbox. The criteria to be used as a basis for deciding whether a proposed model should or should not be included in the toolbox will depend in part on an assessment of the attributes of that model compared to alternative models and the suitability of the model to meet the needs of the project. Associated with the model toolbox is a library of completed model application documents and data bases for use by anyone who could benefit from them.

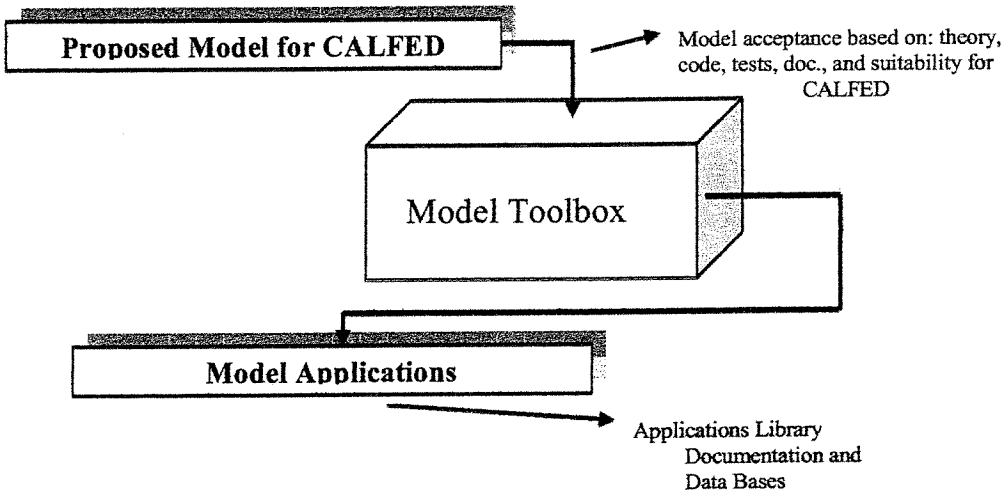


Figure 1. Model Toolbox consisting of approved models for use and Applications Library consisting of documentation and model data bases.

Everyone would agree that all modeling applications should be performed with the 'best' models available. But 'best' does not mean that all models used should be the most detailed, complex, realistic and thus usually the most expensive models available. The decision regarding the 'best' or most appropriate model should be based on the particular issues or questions being addressed, on the quantity and quality of the available input data, and on the time, personnel, and money available to perform the modeling application. The central question to be answered before initiating any modeling application is just what model output information (and precision) is needed to meet the needs of the decision making process. Expressed in other words, just how sensitive will the decision be to the type, amount and precision of the model output?

IMC in consultation with the other agencies could provide guidance on the adequacy of a particular version of CALSIM II or other associated model requested by each client with respect to the theory upon which it is based, its data requirements, its spatial and temporal resolutions, its documentation and status with respect to peer reviews, its capabilities, and its limitations. Similar considerations must be given to the proposed input data. To provide these services to each client requesting services from the IMC would require IMC to be staffed with personnel acquainted with the models in the toolbox, as well as be able to perform or review the simulations requested by various agencies.

There will likely be requests to use models not yet included in the model toolbox. IMC together with others from the DWR and/or USBR will need to judge the merits of such requests and if deemed beneficial, consider including such models in the toolbox. Undoubtedly the extent and quality of the documentation, testing, and peer review of various models in the toolbox will vary. However, a model's inclusion in the toolbox should signify that the model has been judged to be the best available for meeting the goals for which it was designed and is applicable to conditions in California.

### Information Flows and Documentation

The IMC will probably be devoting a substantial amount of time giving guidance to clients and, when applicable, to the public. They will need to be working with the clients who are requesting model applications, and in situations where they are not doing this work, they will need to be reviewing and approving the work of the agencies or contractors who are performing the modeling services. IMC would provide technical assistance as well as oversight and coordination among all CALSIM II modeling activities.

Requests for modeling are easy to make, and time and money are required to carry them out. Requests sent to this proposed IMC should reflect some thought by those requesting such model runs as to just why the model application is desired, and just how the results are to be used. We would propose that requests include such items as:

- Reason for modeling,

- Type of modeling (e.g., event based or continuous),
- Particular model preference if any, and why, and possible alternatives,
- Model output information (data) needed and why and when it is needed,
    - What questions are the model results going to answer?
    - What issues are being studied?
    - What decisions are to be made, or at least to be informed, based on these model results?
    - When are the model results needed?
    - What formats are desired for presenting the model results?
- Location or site being modeled and the spatial and temporal scales desired,
- Particular input data assumptions, boundary conditions and other regional assumptions required,
- Source of input data, and format required or desired for the output data,
- Model calibration and verification needs and preferred procedures if any,
- Money and time available for modeling,
- Extent (duration) of the simulations to be performed,
- Desired performance measures, other than variables being simulated, if any,
- Alternative scenarios to be modeled (i.e., number of simulation runs needed),
- Other analyses or model applications that may or will need the output from this model application,
- Sensitivity and uncertainty analyses needed, and for which decision variables and why,
- Client contact person,
- Requirements for intermediate reviews of results or needs for periodic review of modeling application process logs and documents, and
- Other particular requirements or needs.

The use of a model nearly always takes place within a broader context. The model itself can also be part of a larger whole, such as a network of models in which some are using the outputs of other models. These conditions may impose constraints on the simulation modeling project. All these considerations need to be specified in the modeling application request.

Along with the proposal, there should also be a simple order-of-magnitude estimate of the expected values of all relevant decision variables based on simple mass-balance analytical solution methods that can be used without requiring a computer. These estimated values should be used to validate (check the reasonableness of) selected portions of the model runs. If there are any serious discrepancies, it may signify a major problem in the model output.

Is all this paperwork useful? It is to the extent it leads to a more effective and efficient use of personnel, money and time. Preparing a formal modeling application request requires some serious thought as to just why this is necessary and just what information is needed to further the project or analysis. It involves defining the objectives that are to be accomplished. Writing this down in some detail helps reduce the differences in perception that can exist between those who need information and those who are going to provide that information (IMC or a contractor). The problem as stated is often not the problem as understood, by either

the client or the model user. In addition, problem perceptions and modeling objectives can change over the duration of a project. One should ask and answer the question of whether or not modeling in general is the right way to obtain the needed information. What are the alternatives to modeling?

The objective of any modeling project should be clearly understood with respect to the domain and the problem area, the reason for using a particular model, the questions to be answered by the model, the model assumptions and limitations, and the scenarios to be modeled. Throughout the project these objective components should be checked to see if any have changed and if they are being met.

If IMC is to serve as a central point to coordinate CALSIM II-related modeling activities, and to provide modeling services, it needs to have the authority to do so. This authority extends to giving advice on issues related to model and input data selection, and for reviewing, approving and prioritizing requests for services. Should contractors be involved in particular model applications, IMC must be authorized to specify the technical terms to be met and oversee the work done by the contractor. Finally IMC will need the financial and human resources needed to do this in a timely manner.

### Modeling Application Documentation

One common problem of model studies once they are underway occurs when one wishes to go back over a series of simulation results to see what was changed or why a particular simulation was made or what was learned. It is also commonly difficult if not impossible for third parties to continue from the point at which any previous modeling project was terminated, especially if some time has passed. These problems are caused by a lack of information on how the study was carried out. What was the pattern of thought that took place? Which actions and activities were carried out? Who carried out what work and why? What choices were made? How reliable are the end results? These questions should be answerable if a model journal is kept. Just like computer programming documentation, modeling project documentation is often neglected under the pressure of time and perhaps because writing it is not as interesting as running the models themselves.

The paper trail of what has happened, what assumptions have been made, how calibration and verification were carried out, what results were obtained, why changes, if any, were made, what sensitivity analysis procedures were used and their results, and so on, could be contained in a modeling application documentation (MAD). Once the model application is completed, a copy of the MAD should be given to the requesting agency, as applicable and a copy should remain in IMC. These reports, or at least a summary of them, should be available for downloading from the web. Should further model applications be requested and approved, the requester as well as the IMC can refer to this previously prepared documentation to better understand what was done previously that pertains to the current request.

### Model Calibration

Once a model is tested satisfactorily, it can be calibrated. Calibration of models such as CALSIM II are difficult because there are no historical observations of future scenarios to compare with model results. Historical runs, such as have been made, can provide some basis for calibration. In general the smaller the deviation between the calculated model results and the field observations, the better the model. This is true to a certain extent, as the deviations in a perfect model are only due to measurement errors. In practice, however, a good fit is by no means a guarantee of a good model.

The deviations between the model results and the field observations can be due to a number of factors. These factors include possible software errors, inappropriate modeling assumptions such as the (conscious) simplification of complex structures, neglecting certain processes, errors in the mathematical description or in the numerical method applied, inappropriate parameter values, errors in input data and boundary conditions, and measurement errors in the field observations.

To determine whether or not a calibrated model is a 'good' predictor, it should be validated or verified. Calibrated models should be able to reproduce field observations not used in calibration. Validation can be carried out for calibrated models if an independent data set has been kept aside for this purpose. If all available data are used in the calibration process in order to arrive at the best possible results, validation will not be possible. A decision to leave out validation may be a justifiable one especially when data are limited.

Philosophically it is impossible to know if a simulation model of a complex system is 'correct'. There is no way to prove it. Experimenting with a model, such as by carrying out multiple validation tests, can increase confidence in that model. After a sufficient number of successful tests, one might be willing to state that the model is 'good enough', based on the modeling project requirements. The model can then be regarded as having been validated, at least for the ranges of input data and field observations used in the validation.

If model predictions are to be made for situations or conditions for which the model has been validated, there may be some confidence in the reliability of those predictions. Yet one cannot be certain. Much less confidence can be placed on model predictions for conditions outside the range for which the model was validated.

While a model should not be used for extrapolations as commonly applied in predictions and in scenario analyses, this is often exactly the reason for the modeling project. What is likely to happen given events we have not yet experienced? A model's answer to this question should also include the uncertainties attached to these predictions. Depending on the type of model selected and used, one might end up predicting an incorrect future with great accuracy, or predicting the correct future with great uncertainty'. We don't yet know how to predict the correct future with great accuracy – so we do 'what ifs'. One can then argue about what scenarios – the ifs – are the most reasonable or probable, or about the impacts from improbable scenarios that you want to avoid should such scenarios occur.

### Use the model

Once the model has been judged 'good enough,' the model may be used to obtain the information desired. Close communication between the client and the modeler during the modeling application process is essential to avoid any unnecessary misunderstandings about what information is wanted and the assumptions on which that information is to be based.

Before the end of this model-use step one should determine whether all the necessary simulations have been performed and whether they have been performed well. Questions to ask include

- did the model fulfill its purpose?
- are the results valid?
- are the quality requirements met?
- was the discretization of space and time chosen well?
- was the choice of the model restrictions correct?
- was the correct model and/or model program chosen?
- was the numerical approach appropriate?
- was the implementation performed correctly?
- what are the sensitive parameters (and other factors)?
- was an uncertainty analysis performed?

If any of the answers to these questions is no, then the situation should be corrected. If it cannot, the reason(s) for why it cannot be corrected should be documented in the model application document (MAD).

### Interpret model results

Interpreting the information resulting from models is a crucial step in the modeling application process, especially in situations in which the client may only be interested in those results and not the way they were obtained. The model results can be compared to those of other similar studies. Are the results consistent? IMC must make that judgment. Any unanticipated results should be discussed and explained. The results should be judged with respect to the modeling project objectives.

The results of any modeling project typically include large files of time-series data. Only the most dedicated of clients will want to read those files. Thus these data must be presented in a more concise form. Statistical summaries should explicitly include any restrictions and uncertainties in the results. They should identify any gaps in the domain knowledge, thus generating new research questions or identifying the need for more field observations and measurements.

### Report model results

Once the modeling application is completed, the organization doing the modeling will be responsible for preparing a report. The contents of this report should conform to the agreement

made between modeling organization and the client prior to the initiation of the modeling application (see above). Although the results of a model are very rarely used as the sole basis for policy decisions, those requesting model applications may have a responsibility to translate their model results into policy recommendations. Policymakers, managers, and indeed the participating stakeholders typically want simple and clear unambiguous answers to complex questions. Much of the scientifically justified discussion, say regarding the uncertainties associated with some of the data, included in the main body of a report are not included in the executive summary of that report. This executive summary is often the only part read by those responsible for making decisions. Therefore, the conclusions of the model study must not only be scientifically correct, but also concisely formulated, without jargon, and fully understandable by managers and policymakers. When preparing or reviewing contractor model results reports, the IMC should consider this need.

These model application and model results reports should include sufficient detail to allow others to reproduce the model study (including its results) and/or to proceed from the point where this study ended. The report therefore requires a clear indication of the validity, usability and any restrictions of the model results.

**Data Management**

CALSIM II and its associated or linked models will require data. They will also produce data. Many of these data will have spatial and temporal dimensions. This information must be documented (meta data), preserved, and made accessible to IMC customers, coordination agencies and others. IMC should participate in data management strategic development, storage, documentation and dissemination. It should work with data base managers of various agencies to help them satisfy the IMC's data management requirements.

The availability of quality assured data is a critical dependency that must be met to facilitate timely completion of model development, implementation and application. To mitigate the impact of the availability of data on the timeline for the major model completion deadlines, the following issues should be addressed. :

- Updating land use / land cover data at regular and timely intervals.
- Developing and maintaining a common modeling database. This data base should include infrastructure design and operating policy data as well as water quality, ecological, land use, economic and of course hydrological data. Many of these data sets will have spatial as well as temporal dimensions. Each data set should have an associated metadata file.
- Pre-processed and post-processed datasets from previous model runs should be archived along with its metadata file in a central location for ease of access and availability.
- Measures to insure the consistency and quality of the input data.
- Measures to insure adequate communication among model developers, users and stakeholders. This includes measures to assist in developing documentation appropriate for each type of stakeholder.

### Support of IMC activities

Common failures of IMC type organizations are typically due to:

- Insufficient staff to enable cross-training. This may lead to the dependency on one person or a very small group of employees for each sub module or the overall effort.
- Inadequate funding to institute good project management discipline.
- Inadequate funding to contract for technical writers and software engineers.
- Inadequate funding to contract for peer reviews.

### Risk assessments

A risk assessment of CALSIM II and its associated models and data should be completed. The timely availability of quality assured data for example, is a risk. Project risk management includes the processes concerned with identifying, analyzing, and responding to uncertainties. Risk management attempts to minimize the results of adverse events. As a guide, the template, such as shown at the end of this Appendix, may be used to facilitate the assessment of risks.

### Problem Management

Given the high visibility and criticality of the CALSIM II modeling effort an issue or problem management process should be developed within IMC. Issue/problem management includes the process for identifying, communicating, and resolving issues and problems.

The purpose of this procedure is to ensure that:

- Issues are identified, reported, managed, and resolved in a timely and effective manner. Responsibility is assigned to an owner for reporting, managing and resolving each issue
- All affected stakeholders are aware of the status of the issues
- Escalation of unresolved issues take place according to a defined procedure

In order to ensure that project issues and problems are appropriately managed various issue/problem management steps should be identified and followed to track the actions taken to resolve the issue or problem throughout the life of a modeling project.

## B. Managing Peer Reviews

One means of quality control involves peer reviews of the models, their associated software, and their applications. One possible means of facilitating the peer review processes and for maintaining control on the particular versions of CALSIM II and accompanying models used for SWP-CVP planning and management decisions is another reason to create an interagency modeling consortium (IMC) consisting of DWR, USBR, and other stakeholder organization personnel if they are interested and want to participate. As suggested above, this consortium could be responsible for maintaining a toolbox of 'acceptable' peer-reviewed models for use by the agencies and contractors. The peer reviews should be of the theory underlying each

model, the model's software, the documentation of that software, the model's functions and capabilities including those pertaining to model data input and output, model calibration and verification, sensitivity analyses, uncertainty analyses, user control (GUIs), spatial and temporal resolutions, limiting assumptions, and on the model (as opposed to code) documentation.

Just having evidence of published articles about a particular model in peer reviewed journals is not a substitute for a peer review of the model software and its applicability or suitability for certain types of analyses for SWP-CVP. Peer reviews of all models, their software, and their use should be accomplished by experts both within and outside of the originating agencies. 'Inside' agency (or internal) reviews may uncover some needed changes and identify other issues or problems that external reviewers could be asked to specifically examine and address. Internal reviews can make the external review process more effective, less costly and less time consuming.

Peer reviews are considered a key process area for Level 3 and higher of the Capability Maturity Model guidelines for improving the software process (Carnegie Mellon University, 1994). The purpose of peer review evaluations is to find defects in the model formulation and software and in its use, i.e., model application. Peer reviewers can also identify possible ways of correcting those defects, if any. If there are no defects, or after all known defects have been corrected, both the developers and users of any model and its software can have a stronger basis for believing that their product and its output are reliable.

Peer reviews serve the same function as accountants. Once a firm's financial records have been peer reviewed by accountants (assuming they are qualified, objective and honest) the board of directors as well as the stockholders will have more assurance of the liabilities and net worth of their firm, and just how well it is being managed. In this case it is the assurance of the quality of the models, their software, and on their use in project evaluations, that actual and potential users of the model results depend upon.

The types of problems and issues for which a model, its software, and its documentation are designed to address are called the model's 'application niche'. Peer review of model development should include the evaluation of the intended application niche along with consideration of other aspects of model performance. Users of any model should be aware of the types of analyses for which the model is best suited and those for which the model is not well suited. This, along with the results of a peer review of any model application, should help the potential model user, or the user of the model results, better understand the limitations of the scientific basis of the model and just how much confidence can be placed on the model output.

### Peer review triggers

Clearly judgment will have to be exercised as to just when and in what detail a peer review needs to be implemented. However the triggers on when a decision about a peer review needs to be made can be defined.

As shown in Figure 2, decisions regarding peer review are needed when models are proposed for the tool box and when model applications are completed. Should IMC decide a peer review is warranted when either of those events takes place, they will have to decide on the type of review and its level of detail. They will also need to identify the individuals to be asked to carry out that peer review.

Peer reviews are going to take time and cost money. They will also require IMC time to prepare the documentation needed for the peer reviewers and to read and act on reports prepared by the peer reviewers. This will apply if the peer review is internal or external.

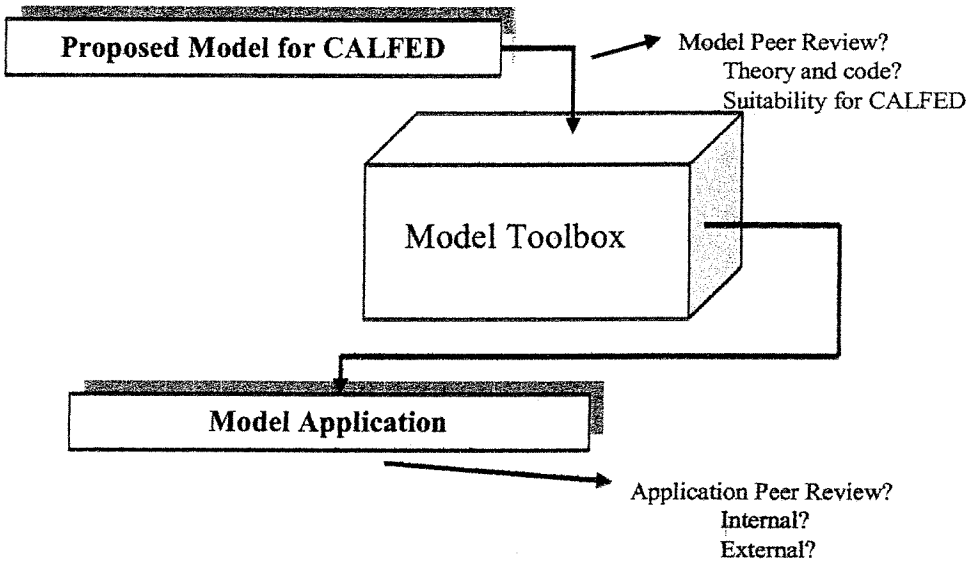


Figure 2. Schematic showing events where a peer review decision can be made.

The particular models and their associated software and documentation to be peer reviewed should be identified by the individuals or departments or agencies. This can include model process descriptions, software source code, documents, test results, and other supporting materials, as needed, for an adequate peer review of the entire model and its software. These products to be reviewed should be identified in writing and a written history of the review of different versions of each item should be maintained.

Events that take place in the progression of model development and use and subsequent modifications that warrant a peer review should be identified and specified in a written document. (This fits in to the model development and use documentation that should be maintained for Level 3 or higher CMM) When these events take place a peer review process should be considered, and if warranted, implemented. Depending on the event, the review can be solely internal, or it can involve an independent external review team as well.

Model application reviews should include an evaluation of the intended model application niche, and its applicability to current needs. Peer review may be appropriate for existing models when new information becomes available that could negate some or all of the conclusions of previous reviews or suggest a change in the currently specified application niche. Peer review of a model's applicability to a particular study should be planned well in advance of when model results are needed. The results of application reviews can influence the decisions made based on the model outputs. Once a peer review has been conducted for a particular model and its input data, peer reviews of subsequent applications of a model with similar inputs might be unnecessary. However, any time the model results may be controversial, or end up in litigation, another peer review may be justified.

**Peer Review Process**

The extent and process of performing and responding to peer reviews can vary in any organization. The ones discussed in this section attempt to follow the processes recommended by the Capability Maturity Model Level 3 guidelines.

Project peer review process should be specified in writing. A first step in this process should be to identify the particular modeling products and processes that will undergo peer review. This includes the models (i.e. the processes being modeled and the assumptions built into the models for describing these processes), their supporting software, the documentation of the model and its software, as well as all the written guidelines on how the models are to be used.

A second step is to perform an internal peer review prior to a model's use for project evaluation. It should be peer reviewed for accuracy, its suitability for use, and for identifying any possible errors in its logic, its coding, or in its documentation. Following an internal review, an external peer review can be performed.

Following the successful conclusion of internal and external peer reviews of a model and its documentation, the model can be applied to evaluate alternative projects. After the model has been applied to a particular project, the modeling process and its results should be peer reviewed to insure that the model has been applied properly, that the input data were appropriate, and that the conclusions drawn were valid.

Peer review teams should be selected, along with a peer review team leader. The particular personnel on the team will depend on the particular model and its software and documentation being reviewed. CALFED should have a list of qualified peer reviewers representing all applicable disciplines, both internal and external, that it can call upon to perform these reviews. The peer reviews are to be of the models and their use, not of the people who developed or used them. The reviews are to be used to evaluate the quality of modeling products and processes, not of the personnel involved.

Establishing and carrying out ongoing peer review processes costs money. Adequate funding must be made available to

1. identify and recruit a peer review team and team leader
2. prepare and distribute the peer review materials to the peer review team
3. support the time required for the team to review the materials prior to a team meeting
4. support the team meeting and to participate in it as appropriate (e.g., answering questions, conducting model experiments and sensitivity analyses, etc. )
5. reproduce and distribute the team report and to take actions as needed
6. monitor the modifications or changes being made to the model, its software, and its documentation, or redoing the model application, as needed.
7. prepare and distribute to model developers and potential users a report on the results of the peer review and the actions taken.

The particular peer review process may depend on just what is being peer reviewed and the resources and time available to perform the review. In general, however, the steps of a peer review could include the following:

1. DWR or CALFED should identify and establish a pool of possible reviewers representing various disciplines, with sufficient redundancy to allow for scheduling conflicts when ever some subset of those reviewers are needed. This includes both internal as well as external reviewers. What ever administrative work is need to establish this pool should be completed prior to when these reviewers will be needed.

2. At particular milestones in any new model development or in model application an internal peer review process could be initiated, to examine the modeling assumptions, the software that implements those assumptions in the case of model development or the data being used for model inputs in the case of model applications, and the documentation being prepared to describe the processes, to document the software code, and to document the tests that were run to test the code, or to document the results of the model application. If deemed appropriate, an external peer review could also be performed. If an external review is to take place, the particular reviewers need to be selected, notified, sent supporting documents, and be scheduled for one or more meetings, as needed. They should be issued contracts specifying the requirements (the checklist of items to be reviewed) and products expected.

3. Recommendations made by the peer review team need to be addressed and the actions taken along with the rationale for those actions should be documented.

4. The peer review team should review the actions taken and the results obtained from these actions. If not judged acceptable new recommendations should be made and submitted. A final report should be prepared by the peer review team when all recommendations have been successfully implemented or addressed, or if no further actions based on review team's recommendations will be taken by the model developers or users.

The time and effort required for various levels of review should also be assessed and provided to the review team so that they can carry out the level of review requested of them. Otherwise the reviews may be superficial and while appearing to be peer reviewed, a model and its

associated products may in fact be inadequately reviewed. Peer review teams have the responsibility to specify in writing the scope and limitations of their reviews.

As was the case for this peer review panel, the materials to be sent to the review team to allow them to prepare for their meeting should include the statement of review objectives and the level of detail desired, the applicable requirements and standards upon which to judge the adequacy of the products being reviewed, and of course the material that is to be reviewed. There should be a list of questions for the reviewers to address. Each review team member should be assigned and given responsibility for answering specific questions and for completing specific aspects of the overall review. All team members should be given specific review standards or requirements, including the expected completion dates. Checklists should be provided the review team that are applicable to the specific type of product being reviewed and the level of detail to be examined. These checklists will contain the criteria for judging the product, such as compliance with any standards and procedures, completeness, correctness, rules of construction, and maintainability.

**Peer Review Issues and Questions**

Each model development or application review will dictate its own special set of questions to be addressed. Some of these questions could relate to:

- Model Purpose and Objective
  - Use of model related to decisions being considered.
  - Model application niche, and why.
  - Model strengths and weaknesses –is it the best model?
- Model Processes and Limitations
  - Model processes, spatial and temporal scales, grid resolution.
  - Model variables and level of aggregation.
- Model Theoretical Basis
  - Model algorithms, numerical or analytical methods,
  - Model process formulation
  - Modeling approach in comparison with other models
  - Any shortcomings in relation to application niche
- Model Parameter Estimation
  - Methods used
  - Data available for parameter estimation
  - Parameter estimate reliabilities
  - Boundary conditions and appropriateness.
- Model Input Data Quantity/Quality
  - Data used in design of model
  - Data adequacy (quantity, quality, resolution) for model purpose and application
  - Data necessary for application of model
  - Key data gaps in model application
  - Additional data needs and why
- Model Key Assumptions
  - Basis for major assumptions

    - Sensitivity of model outputs to key assumptions
    - Sensitivity of potential decisions to key assumptions
    - Ease in modifying key assumptions
- Model Performance Measures
    - Criteria for assessing model performance
    - Correspondence of model output with measured observed data
    - Any model bias throughout range of model predictions
    - Variability and uncertainty analyses and representations in model results
    - What determines model's variability and uncertainty.
    - Model performance relative to others in application niche
- Model Documentation and User's Guide
    - Clarity of documentation, comprehensiveness of user's guide
    - Model applicability and limitations
    - Input data requirements for calibration, verification, model runs
    - Post modeling analyses, display and interpretation of results
    - Model code documentation
    - Model application documentation examples for prospective users.
- Review Retrospective
    - How well model and its application meet objectives and needs of project
    - Possible changes in the model to improve model performance
    - Robustness of model solutions to small changes in uncertain parameters, etc.
    - Ease of including uncertainty analyses associated with uncertain input data.
    - Key research needs for model improvement.

**Peer Review Completion Reports**

Procedures need to be established to track and confirm actions based on suggested changes or modifications in the material being reviewed. Once these actions are taken and completed, and documented, the peer review process for that particular product is completed. Peer review completion reports should contain data on what was reviewed and the results of the review. These data should include a description of the products that were reviewed, the level of detail of the review, any review limitations or qualifications, the number and backgrounds of the reviewers, the time spent preparing for and during review team meetings, the defects found and recommendations made, and the actions taken to address these recommendations.

**Overall Peer Review Evaluations**

The IMC or initiating agency should document the planning for and scheduling of peer reviews. The products to be reviewed and the level of detail to be examined also need to be specified. The procedures to be followed for selecting peer review team members, and the team leader, should also be determined and documented. Procedures for training potential reviewers, if such training is needed, should be identified and implemented, as required.

Periodically the IMC or applicable agency should assess just how well the plan described in the preceding paragraph is being carried out, and just how beneficial these peer reviews are to the overall modeling effort. Measures should be identified and used to determine the status of the

peer review activities. These measures could include the number of completed peer reviews performed compared to the number expected to be performed, the overall effort expended on peer reviews compared to that expected, and the number and extent of peer review recommendations requiring actions.

At a minimum these periodic reviews should verify that

1. The planned peer reviews and/or audits are conducted.
2. The peer review leaders are adequately trained for their roles.
3. The reviewers are properly trained or experienced in their roles.
4. The processes for preparing for and conducting peer reviews, and for following up on reviewer's recommendations are adequate and are being followed.
5. The reporting of peer review results is complete, accurate, timely and is being made available to model users.

## Risk Management Template

| | |
|---|---|
| Risk Definition Name | Enter a short name that uniquely defines the risk |
| Risk # | Enter a unique number assigned to the risk. Range starts with 1 and continues. |
| Date Risk Identified | Enter the date the risk was identified |
| Risk Identification Source | Enter the source of the risk identification. In example, meeting name, group, or person. |
| Risk Owner | Enter the name of the person who will be responsible for ensuring the risk is approved, managed, periodically assessed, communicated, and tracked through closed or transfer. |
| Risk Detailed Description | Enter a detailed description of the risk so that a reader clearly understands the risk. |
| Probable Impact of Risk on Project (H, M, L) | Enter the impact on the project.<br>o High = the risk will most likely occur and the impact could prevent the project from achieving its purpose.<br>o Medium = there is a 50/50 change the risk would occur and the impact is serious but the project could still achieve its purpose if appropriately managed.<br>o Low = there is a low probability that the risk would occur and minimal impact to the project's purpose. |
| Probable Impact of Risk on Project Costs | Enter the impact on the project in dollars. Determine what the potential cost to the project would be if the risk occurs. |
| Probable Impact of Risk on Project Schedule | Enter the schedule impact on the project. Determine how the schedule would be potentially impacted if the risk occurs. |
| Probable Impact of Risk on Project Results | Enter the impact on the project. Determine how the overall project purpose and results will be potentially impacted if the risk occurs. |
| Detailed Plan to Mitigate or Transfer Risk | Enter the detailed plan to mitigate the risk or a statement that the risk will be accepted. Mitigation could include ways to minimize, avoid, or transfer the risk to another party or group. Risk transfer would include evidence of agreement by the accepting party. |
| Detailed Project Action Items Required to Mitigate or Transfer Risk | Enter the detailed action items required to mitigate the risk. These items will be summarized and assigned within the project Action Log, along with an action item owner, and target completion date. |
| Detailed Project Plan Tasks Required to Mitigate Risk | Enter the detailed project plan task required to mitigate the risk. These items will be summarized and contained within the MS Project Schedule along with the effort, duration, schedule, and assigned resources. |
| Comments | Enter any permanent comments that cannot be included in the above items. |
| Referenced Documents | Enter any documents that a reader should consider in understanding, analyzing, mitigating, or accepting this risk. |
| Date Risk Closed | Enter the date this risk was closed. This would include when all action items or project tasks were completed, or the risk was transferred to another party or group. |

# Appendix F: Analysis of the November 2003 CALSIM II Validation Report

The following comments come from an analysis of the model results presented in the validation report *'CALSIM II Simulation of Historical SWP/CVP Operations'*, DWR (2003). The observations relate to the formulation of the model at November 2003. Changes might be made to that formulation which could resolve these issues.

*Overestimation of Project Deliveries*

The validation run suggests that the modeled demands included in CALSIM II overestimate the actual demands. CVP demands south of the Delta are assumed to be always equal to the contract entitlement whereas the observed deliveries in unrestricted years are consistently less than this amount. The modeled North of Delta deliveries are also consistently higher than observed. The modeled and observed CVP deliveries from the validation report are listed in Table 1.

**Table 1. Comparison of modelled and observed CVP deliveries (1975-1998)**

| Project | Simulated Delivery (Taf/yr) | Historical Delivery (taf/yr) | Difference (taf/yr) | % Difference |
|---|---|---|---|---|
| CVP North of Delta | 1960 | 1750 | 210 | 12 |
| CVP South of Delta | 2650 | 2490 | 160 | 6.4 |

Because the SWP south of delta demands were set to historical deliveries in many years, comparison with the historical deliveries in the validation report is of limited validity. However the fact that the historical SWP deliveries over the last ten years have averaged only 2385 taf/year while the modeled 'year 2001 development' SWP Delta deliveries reported in the 2002 State Water Project Delivery Reliability Report average 3090 taf/year, suggests that modeled SWP deliveries may also be too high.

*Allocations to Project Contractors*

Seasonal allocations to SWP and CVP contractors are made on the basis of water in storage, forecast inflows, projected carryover storage requirements and in-Basin and Delta regulatory requirements. The allocation processes used by the operators and those used by CALSIM II, are not identical. An examination of the way that CALSIM II has restricted project deliveries during the dry period of 1987-1992 (Figures 10, 16, 17 and 24 of the validation report) suggests that CALSIM II has allocated less water in the early years of the dry sequence than occurred in practice and consequently had more water available in 1991 and 1992 when the most severe restrictions were experienced. The carryover storage rules adopted can have a significant impact on the expected frequency and severity of water supply restrictions. The

model rules need to be examined to ensure that the accurately reflect the way the system will be managed in the future.

*San Luis Reservoir Operation*

The rules used by the system operators for transferring water from headwater storages to the San Luis Reservoir can have a significant impact on:

- the pattern of flow in the Delta,
- the operation of accounting rules between the SWP and the CVP and
- opportunities for SWP wheeling of CVP water and possibly the availability of Article 21 water to SWP contractors.

A comparison of the modeled and observed storage behavior of the SWP component of San Luis (Figure 15) reveals that the model consistently underestimates the volume in storage. A comparison of the CVP component of the storage (Figure 23) indicates that the actual storage is filled earlier in the season and that the actual storage is also slightly higher than the modeled.

Users of CALSIM II output need to be confident that the rules adopted by the model for determining these transfers reflect the way this component of the system will be operated in the future.

# Appendix G: Some Principles for Strategic Water Analysis for the California Water Plan Bulletin 160-03 (from the stakeholder review Draft, Sept. 30, 2003)

**Strategy:**

1) A frequently amended strategic document will lay out DWR's strategic analysis framework and identify the technical objectives, roles, and responsibilities of major DWR data collection efforts and analytical tools and their interactions and their responsible managers.

**Transparency:**

2) All data and models should be in the public domain and available on the web.
3) All data and models should have significant documentation.
4) Known limitations should be documented.

**Longer-term viability:**

5) Modularity: Major analytical tools will be designed and implemented to fit modularly and explicitly within the larger strategic analysis framework.
6) Adaptive data management framework: Major data efforts will fall within a larger data management framework, including protocols for data documentation and updating, and documentation of limitations.
7) A frequently-updated document will outline short-term and long-term efforts, budgets, and responsibilities for continuous improvement of analytical tools and data, with policy for continued user, local agency, and stakeholder involvement.

**Coverage:**

8) Spatial coverage for the basic data and analytical framework will be statewide.
9) Local and regional water management and resources will be explicitly represented.

**Accountability and Quality Control:**

10) In developing analytical tools, systematic efforts should be made to involve local agencies and stakeholders.
11) Major analytical products will undergo external review by a) external unaffiliated experts and b) local agencies whose systems are included in the model. User groups will exist for all major analytical products.
12) DWR's strategic analysis framework will undergo periodic internal and external review.

# Appendix H: Model Sensitivity and Uncertainty Analysis

(This is a draft of a book chapter by DPL/JRS that may be useful for CALSIM II developers)


1. **Introduction**
2. **Issues, concerns, and terminology**
3. **Variability and uncertainty in model output**
   - 3.1 **Natural variability**
   - 3.2 **Knowledge uncertainty**
   - 3.3 **Decision uncertainty**
4. **Sensitivity and uncertainty analyses**
   - 4.1 **Sensitivity Analyses**
   - 4.2 **Uncertainty Analyses**
5. **Performance indicator uncertainties**
   - 5.1 **Performance measure target uncertainty**
   - 5.2 **Distinguishing differences between performance indicator distributions**
6. **Communicating model output uncertainty**
7. **Conclusions**
8. **References**


**The usefulness of any model is in part dependent on the accuracy and reliability of its output data. Yet, because all models are imperfect abstractions of reality, and because precise input data are rarely if ever available, all output values are subject to imprecision. The input data and modeling uncertainties are not independent of each other. They can interact in various ways. The end result is imprecision and uncertainty associated with model output. This chapter focuses on ways of identifying, quantifying, and communicating the uncertainties in model outputs.**

## 1. Introduction

Models are the primary way we have to estimate the multiple affects of alternative water resource system design and operating policies. Models predict the values of various system performance indicators. Model outputs are based on model structure, hydrologic and other time-series inputs and a host of parameters whose values describe the system being simulated. Even if these assumptions and input data reflect, or are at least representative of, conditions believed to be true, we know they will be wrong. Our models are always simplifications of the

real systems we are studying. Furthermore, we simply cannot forecast the future with precision. So we know the model outputs of future conditions are uncertain estimates, at best.

Some prediction uncertainties can be reduced by additional research and data collection and analysis. Before undertaking expensive studies to gather and analyze additional data it is reasonable to ask what improvement in estimates of system performance or what reduction in the uncertainty associated with those estimates would result if all data and model uncertainties could be reduced. Such information helps determine how much one would be willing to 'pay' to reduce prediction uncertainty. If prediction uncertainty on average is costing a lot, it may pay to invest in additional data collection, more studies, or in better models all aimed at reducing that prediction uncertainty. If that uncertainty has no, or only a very modest, impact on the likely decision that is to be made, one should find other issues to worry about.

If it appears that reducing prediction uncertainty is worthwhile, then one should consider how best to do it. If doing this involves obtaining additional information, then it is clear that the value of this additional information, however measured, should exceed the cost of obtaining it. The value of such information will be the increase in system performance, or the reduction in its variance, that one can expect from obtaining such information. If additional information is to be obtained, it should be that information which reduces the uncertainties considered important, not the unimportant ones.

This chapter reviews some methods for identifying and communicating model prediction uncertainty. The discussion begins with a review of the causes of risk and uncertainty in model output. It then examines ways of measuring or quantifying uncertainty and model output sensitivity to model input imprecision, concentrating on methods that seem most relevant or practical for large-scale regional simulation modeling. It builds on some of the statistical methods reviewed in Chapter III and the modeling of risk and uncertainty in Chapter VI.

## 2. Issues, concerns, and terminology

Outcomes or events that cannot be predicted with certainty are often called risky or uncertain. Some individuals draw a special and interesting distinction between risk and uncertainty. In particular, the term risk is often reserved to describe situations for which probabilities are available to describe the likelihood of various events or outcomes. If probabilities of various events or outcomes cannot be quantified, or if the events themselves are unpredictable, some would say the problem is then one of uncertainty, and not of risk. In this chapter what is not certain is considered uncertain, and uncertainty is often described by a probability distribution. When the ranges of possible events are known and their probabilities are measurable, risk is called objective risk. If the probabilities are based solely on human judgment, the risk is called subjective risk.

Such distinctions between objective and subjective risk, and between risk and uncertainty, rarely serve any useful purpose to those developing and using models. Likewise the distinctions are often unimportant to those who should be aware of the risks or uncertainties associated with system performance indicator values.

Uncertainty in information is inherent in future-oriented planning efforts. Uncertainty stems from inadequate information and incorrect assumptions, as well as from the variability of natural processes. Water managers often need to identify both the uncertainty as well as the sensitivity of, or changes in, system performance indicator values due to the any changes in possible input data and parameter values from what were predicted. They need to reduce this level of uncertainty to the extent practicable. Finally, they need to communicate the residual uncertainties clearly so that decisions can be made with this knowledge and understanding.

Sensitivity analysis can be distinguished from uncertainty analysis. Sensitivity analysis procedures explore and quantify the impact of possible errors in input data on predicted model outputs and system performance indices. Simple sensitivity analysis procedures can be used to illustrate either graphically or numerically the consequences of alternative assumptions about the future. Uncertainty analyses employing probabilistic descriptions of model inputs can be used to derive probability distributions of model outputs and system performance indices. Figure 1 illustrates the impact of both input data sensitivity and input data uncertainty on model output uncertainty.

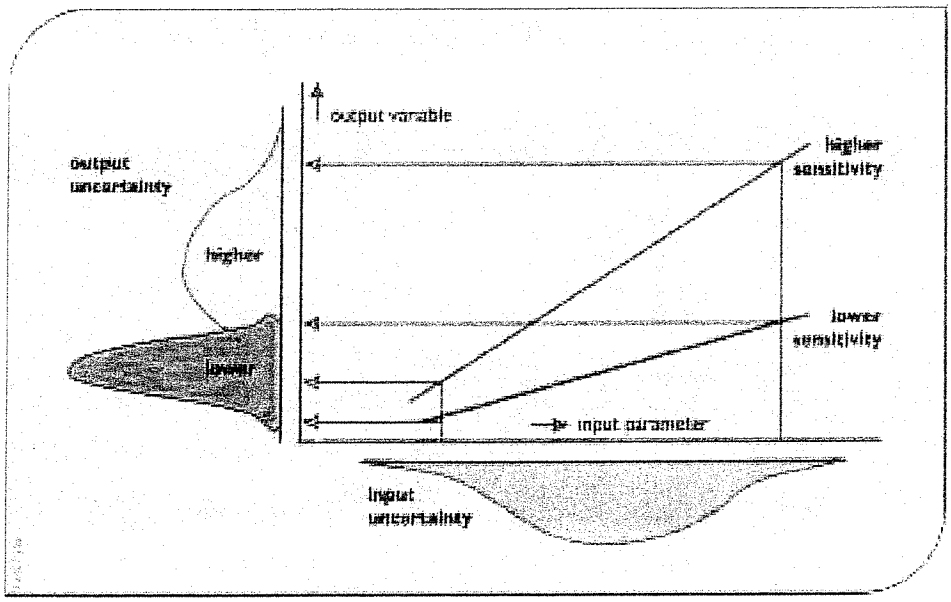


Figure 1. Schematic diagram showing relationship among model input parameter uncertainty and sensitivity to model output variable uncertainty (Lal, 1995).

It is worthwhile to explore the transformation of uncertainties in model inputs and parameters into uncertainty in model outputs when conditions differ from those reflected by the model inputs. Historical records of system characteristics are typically used as a basis for model inputs. Yet conditions in the future may change. There may be changes in the frequency and

amounts of precipitation, changes in land cover and topography, and changes in the design and operation of control structures, all resulting in changes of water stages and flows, and their qualities, and consequently changes in the impacted ecosystems.

If asked how the system would operate with inputs similar to those in the historical database, the model should be able to interpolate within the available knowledge base to provide a fairly precise estimate. Still that estimate will not be perfect. This is because our ability to reproduce current and recent operations is not perfect, though it should be fairly good. If asked to predict system performance for situations very different from those in the historical knowledge base, or when the historical data are not considered representative of what might happen in the future, say due to climate change, such predictions become much less precise. There are two reasons why. First, our description of the characteristics of those different situations or conditions may be imprecise. Second, our knowledge base may not be sufficient for calibrating model parameters in ways that would enable us to reliably predict how the system will operate under conditions unlike those that have been experienced historically. The more conditions of interest are unlike those in the historical knowledge base, the less confidence we have that the model is providing a reliable description of systems operation. Figure 2 illustrates this issue.

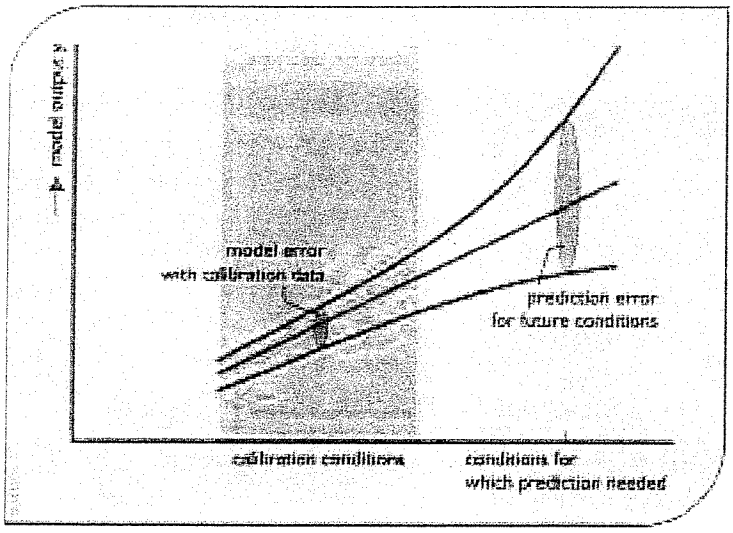


Figure 2. The precision of model predictions is affected by the difference between the conditions or scenarios of interest and the conditions or scenarios for which the model was calibrated.

Clearly a sensitivity analysis needs to consider how well a model can replicate current operations, and how similar the target conditions or scenarios are to those described in the

historical record. The greater the required extrapolation from what has been observed, the greater will be the importance of parameter and model uncertainties.

The relative and absolute importance of different parameters will depend on the system performance indicators of interest. Seepage rates may have a very large local effect, but a small global effect. Changes in system-wide evapotranspiration rates will likely impact system-wide flows. The precision of model projections and the relative importance of errors in different parameters will depend upon the:

(1) precision with which the model can reproduce observed conditions,
(2) difference between the conditions predicted and the historical experience included in the knowledge base, and the
(3) system performance characteristics of interest.

Errors and approximations in input data measurement, parameter values, model structure and model solution algorithms, are all sources of uncertainty. While there are reasonable ways of quantifying and reducing these errors and the resulting range of uncertainty of various system performance indicator values they are impossible to eliminate. Decisions will still have to be made in the face of a risky and uncertain future. Decisions can be modified as new data and knowledge are obtained in a process of adaptive management.

There is also uncertainty with respect to human behavior and reaction related to particular outcomes and their likelihoods, i.e., to their risks and uncertainties. As important as risks and uncertainties associated with human reactions are to particular outcomes, they are not usually part of the models themselves. Social uncertainty may often be the most significant component of the total uncertainty associated with just how a water resource system will perform. For this reason we should seek designs and operating policies that are flexible and adaptable.

When uncertainties associated with system operation under a new operating regime are large, one should anticipate the need to make changes and improvements as experience is gained and new information accumulates. When predictions are highly unreliable, responsible managers should favor actions that are robust (e.g., good under a wide range of situations), gain information through research and experimentation, monitor results to provide feedback for the next decision, update assessments and modify policies in the light of new information, and avoid irreversible actions and commitments.

## 3. Variability and uncertainty in model output

Differences between model output and observed values can result from either natural variability, say caused by unpredictable rainfall, evapotranspiration, water consumption, and the like, and/or by both known and unknown errors in the input data, the model parameters, or the model itself. The later is sometimes called knowledge uncertainty but it isn't always due to a lack of knowledge. Models are always simplifications of reality and hence 'imprecision' can result. Sometimes imprecision occurs because of a lack of knowledge, such as just how a

particular species will react to various environmental and other habitat conditions. Other times known errors are introduced simply for practical reasons.

Imperfect representation of processes in a model constitutes model structural uncertainty. Imperfect knowledge of the values of parameters associated with these processes constitutes model parameter uncertainty. Natural variability includes both temporal variability and spatial variability, to which model input values may be subject.

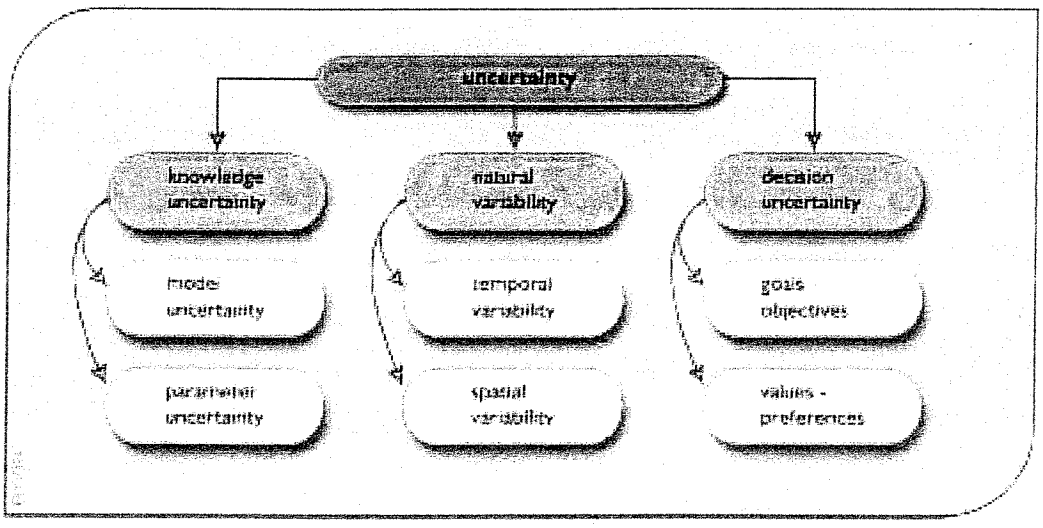


Figure 3. One way of classifying types of uncertainty.

Figure 3 illustrates these different types of uncertainty. For example, the rainfall measured at a weather station within a particular model grid cell may be used as an input value for that cell, but the rainfall may actually vary at different points within that cell and its mean value will vary across the landscape. Knowledge uncertainty can be reduced through further measurement and/or research. Natural variability is a property of the natural system, and is usually not reducible at the scale being used. Decision uncertainty is simply an acknowledgement that we cannot predict ahead of time just what decisions individuals and organizations will make, or even just what particular set of goals or objectives will be considered and the relative importance of each.

Rather than contrasting 'knowledge' uncertainty vs. natural variability vs. decision uncertainty, one can classify uncertainty in another way based on specific sources of uncertainty, such as those listed below, and address ways of identifying and dealing with each source of uncertainty.

Informational Uncertainties:

- imprecision in specifying the boundary and initial conditions that impact the output variable values
- imprecision in measuring observed output variable values

Model Uncertainties:

- uncertain model structure and parameter values
- variability of observed input and output values over a region smaller than the spatial scale of the model
- variability of observed model input and output values within a time smaller than the temporal scale of the model. (e.g., rainfall and depths and flows within a day)
- errors in linking models of different spatial and temporal scales

Numerical Errors:

- errors in the model solution algorithm

### 3.1 Natural variability

The main source of hydrologic model output value variability is the natural variability in hydrological and meteorological input series. Periods of normal precipitation and temperature can be interrupted by periods of extended drought and intense meteorological events such as hurricanes and tornadoes. There is no reason to think such events will not continue to occur and become even more frequent and extreme. Research has demonstrated that climate has been variable in the past and concerns about anthropogenic activities that may increase that variability increase each year. Sensitivity analysis can help assess the affect of errors in predictions if those predictions are based only on past records of historical time-series data describing precipitation, temperature and other exogenous forces across and on the border of the regions being studied.

Time series input data are often actual, or at least based on, historical data. The time-series values typically describe historical conditions including droughts and wet periods. What is distinctive about natural uncertainty, as opposed to errors and uncertainty due to modeling limitations, is that natural variability in meteorological forces cannot be reduced by improving the model's structure, increasing the resolution of the simulation, or by better calibration of model parameters.

Errors result if meteorological values are not measured or recorded accurately, or if mistakes are made in the generation of computer data files. Furthermore, there is no assurance the statistical properties of historical data will accurately represent the statistical properties of future data. Actual future precipitation and temperature scenarios will be different from those in the past, and this difference in many cases may have a larger affect than the uncertainty due to incorrect parameter values. However, the affects of uncertainties in the parameter values

used in stochastic generation models are often much more significant than the affects of using different stochastic generation models (Stedinger and Taylor, 1982).

While variability of model output is a direct result of variability of model input (e.g., hydrologic and meteorological data), the extent of the variability, and the lower and upper limits of that variability, may also be affected by errors in the inputs, the values of parameters, initial boundary conditions, model structure, processes and solution algorithms.

Figure 4 illustrates the distinction between the variability of a system performance indicator due to input data variability, and the extended range of variability due to the total uncertainty associated with any combination of the causes listed in the previous section. This extended range is what is of interest to water resource planners and managers.

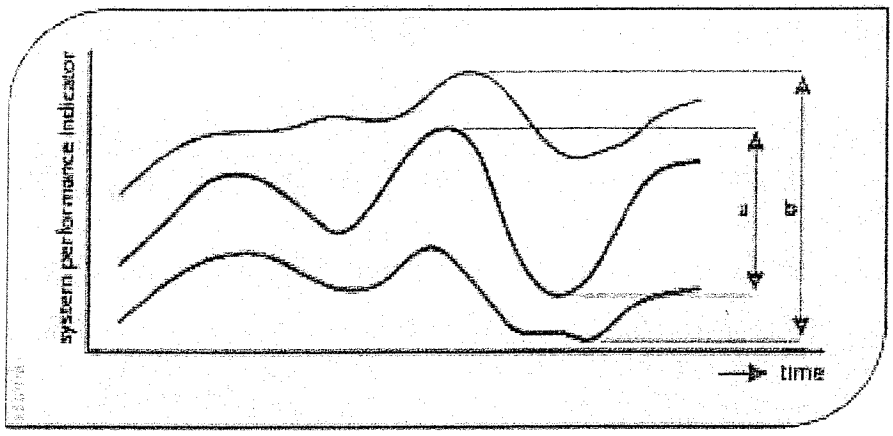


Figure 4. Time-series of model output or system performance showing variability over time. Range "a" results from the natural variability of input data over time. The extended range "b" results from the variability of natural input data as well as from imprecision in input data measurement, parameter value estimation, model structure and errors in model solution algorithms. The extent of this range will depend on the confidence level associated with that range.

What can occur in practice is a time-series of system performance indicator values that can range anywhere within or even outside the extended range, assuming the confidence level of that extended range is less than 100%. The confidence one can have that some future value of a time series will be within a given range is dependent on two factors. The first is the number of measurements used to compute the confidence limits. The second is on the assumption that those measurements are representative of - come from the same statistical or stochastic process yielding - future measurements. Figure 5 illustrates this point. Note that the time series may even contain values outside the range "b" defined in Figure 4 if the confidence level of that range is less than 100%. Confidence intervals associated with less than 100% certainty will not include every possible value that might occur.

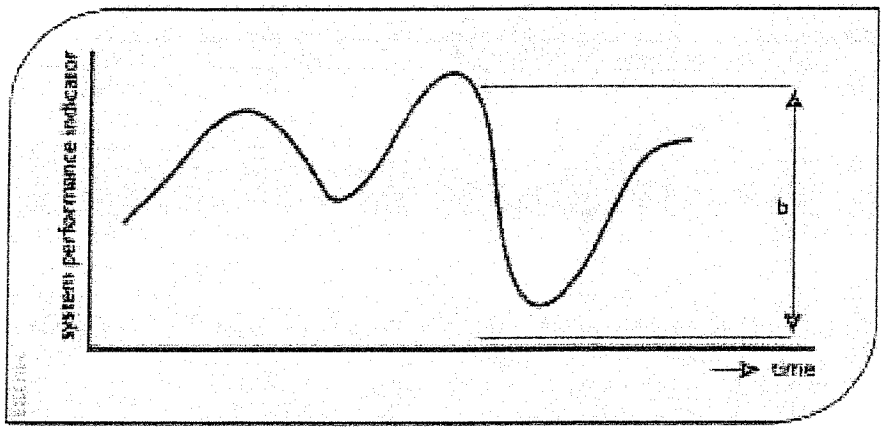


Figure 5. Typical time series of model output or system performance indicator values that are the result of input data variability and possible imprecision in input data measurement, parameter value estimation, model structure and errors in model solution algorithms.

### 3.2 Knowledge uncertainty

Referring to Figure 3, knowledge uncertainty includes model structure and parameter value uncertainties. First we consider parameter value uncertainty including boundary condition uncertainty, and then model and solution algorithm uncertainty.

#### 3.2.1 Parameter value uncertainty

A possible source of uncertainty in model output results from uncertain estimates of various model parameter values. If the model calibration procedure were repeated using different data sets, different parameter values would result. Those values would yield different simulated system behavior, and thus different predictions. We can call this parameter uncertainty in the predictions because it is caused by imprecise parameter values. If such parameter value imprecision were eliminated, then the prediction would always be the same and so the parameter value uncertainty in the predictions would be zero. But this does not mean that predictions would be perfectly accurate.

In addition to parameter value imprecision, uncertainty in model output can result from imprecise specification of boundary conditions. These boundary conditions can be either fixed or variable. However, because they are not being computed based on the state of the system, their values can be uncertain. These uncertainties can affect the model output, especially in the vicinity of the boundary, in each time step of the simulation.

### 3.2.2 Model structural and computational errors

Uncertainty in model output can also result from errors in the model structure compared to the real system, and approximations made by numerical methods employed in the simulation. No matter how good our parameter value estimates, our models are not perfect and there is a residual model error. Increasing model complexity to more closely represent the complexity of the real system may not only add to the cost of data collection, but also introduce even more parameters, and thus even more potential sources of error in model output. It is not an easy task to judge the appropriate level of model complexity, and to estimate the resulting levels of uncertainty associated with various assumptions regarding model structure and solution methods. Kuczera (1988) provides an example of a conceptual hydrologic modeling exercise with daily time steps where model uncertainty dominated parameter value uncertainty.

## 3.3 Decision uncertainty

Uncertainty in model predictions can result from unanticipated changes in what is being modeled. These can include changes in nature, human goals, interests, activities, demands, and impacts. An example of this is the deviation from standard or published operating policies by operators of infrastructure such as canal gates, pumps, and reservoirs in the field, as compared to what is specified in documents and incorporated into the water systems models. Comparing field data with model data for model calibration may yield incorrect calibrations if operating policies actually implemented in the field differ significantly from those built into the models. What do operators do in times of stress? And can anyone identify a place where deviations from published policies do not occur?

What humans will want to achieve in the future may not be the same as what they want today. Predictions of what people will want in the future are clearly sources of uncertainty. A perfect example of this is in the very flat Greater Everglades region of south Florida in the US. Fifty years ago folks wanted the swampy region protected from floods and drained for agricultural and urban development. Today many want just the opposite at least where there are no human settlements. They want to return to a more natural hydrologic system with more wetlands and unobstructed flows, but now for ecological restoration objectives that were not a major concern or much appreciated some half a century ago. Once the mosquitoes return and if the sea level continues to rise, future populations who live there may want more flood control and drainage again. Who knows? Complex changing social and economic processes influence human activities and their demands for water resources and environmental amenities over time. Some of these processes reflect changes in local concerns, interests and activities, but population migration and many economic activities and social attitudes can also reflect changing national and international trends.

Sensitivity scenarios that include human activities can help define the affects of those activities within an area. It is important that careful attention go into the development of these alternative scenarios so that they realistically capture the forces or stresses that the system may face. The history of systems studies are full of examples where the issues studied were rapidly

overwhelmed by much larger social forces resulting from, for example, the relocation of major economic activities, an oil embargo, changes in national demand for natural resources, economic recession, sea-level rise, an act of terrorism, or even war. One thing is sure; the future will be different than the past, and no one is certain just how.

### 3.3.1 Surprises

Water resource managers may also want to consider how vulnerable a system is to undesirable environmental surprises. What havoc might an introduced species like the zebra mussel invading the Great Lakes of North America have in a particular watershed? Might some introduced disease suddenly threaten key plant or animal species? Might management plans have to be restructured to address the survival of some species such as salmon in the Rhine River in Europe or in the Columbia River in North America? Such uncertainties are hard to anticipate when by their nature they are truly surprises. But surprises should be expected. Hence system flexibility and adaptability should be sought to deal with changing management demands, objectives, and constraints.

## 4. Sensitivity and uncertainty analyses

An uncertainty analysis is not the same as a sensitivity analysis. An uncertainty analysis attempts to describe the entire set of possible outcomes, together with their associated probabilities of occurrence. A sensitivity analysis attempts to determine the relative change in model output values given modest changes in model input values. A sensitivity analysis thus measures the change in the model output in a localized region of the space of inputs. However, one can often use the same set of model runs for both uncertainty analyses and sensitivity analyses. It is possible to carry out a sensitivity analysis of the model around a current solution and then use it as part of a first order uncertainty analysis.

This discussion begins by focusing on some methods of uncertainty analysis. Then various ways of performing and displaying sensitivity analyses are reviewed.

### 4.1 Uncertainty Analyses

Recall that uncertainty involves the notion of randomness. If a value of a performance indicator or performance measure, or in fact any variable, like the phosphorus concentration or the depth of water at a particular location varies and this variation over space and time cannot be predicted with certainty, it is called a random variable. One cannot say with certainty what the value of a random variable will be but only the likelihood or probability that it will be within some specified range of values. The probabilities of observing particular ranges of values of a random variable are described or defined by a probability distribution. There are many types of distributions and each can be expressed in several ways as presented in Chapter III.

Suppose the random variable is $X$. If the observed values of this random variable can be only discrete values, the probability distribution of $X$ can be expressed as a histogram, as shown in Figure 6a. The sum of the probabilities for all possible outcomes must equal 1. If the random variable is a continuous variable that can assume any real value over a range of values, the probability distribution of $X$ can be expressed as a continuous distribution as shown in Figure 6b. The shaded area under the density function for the continuous distribution is 1. The area between two values of the continuous random variable, such as between u and v in Figure 6c, represents the probability that the observed value $x$ of the random variable value $X$ will be within that range of values.

The probability distribution, $P_X(x)$ shown in Figure 6 (a) is called a probability mass function. The probability distributions shown in Figure 6 (b and c) are called a probability density functions (pdf) and are denoted by $f_X(x)$. The subscript $X$ of $P_X$ and $f_X$ represents the random variable, and the variable $x$ is some value of that random variable $X$.

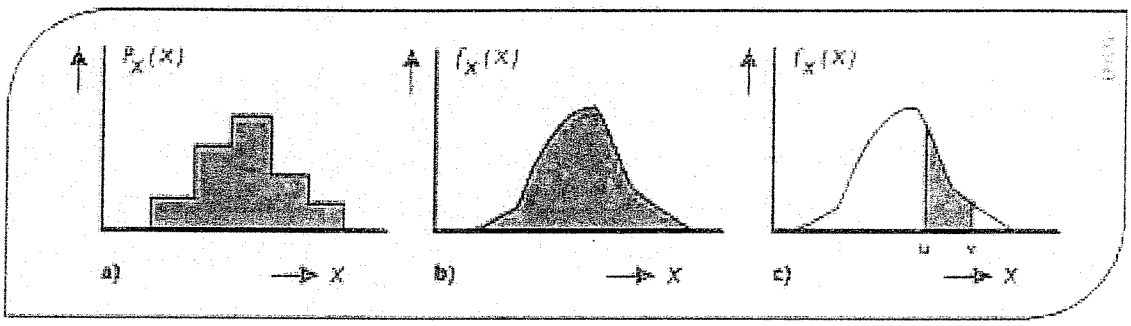


Figure 6. Probability distributions for a discrete or continuous random variable $X$. The area under the distributions (shaded areas in a and b) is 1, and the shaded area in c is the probability that the observed value x of the random variable $X$ will be between u and v.

Uncertainty analyses involve identifying characteristics of various probability distributions of model input and output variables, and subsequently functions of those random output variables that are performance indicators or measures. Often targets associated with these indicators or measures are themselves uncertain.

A complete uncertainty analysis would involve a comprehensive identification of all sources of uncertainty that contribute to the joint probability distributions of each input or output variable. Assume such analyses were performed for two alternative project plans, $A$ and $B$, and that the resulting probability density distributions for a specified performance measure were as shown in Figure 7. Figure 7 also identifies the costs of these two projects. The introduction of two performance criteria, cost and probability of exceeding a performance measure target (e.g., a pollutant concentration standard) introduces a conflict where a tradeoff must be made.

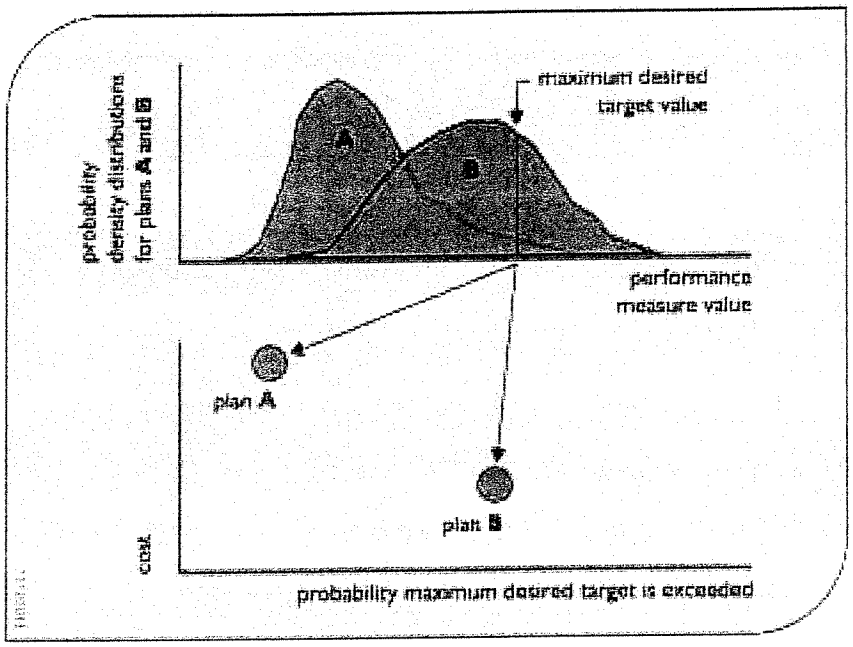


Figure 7. Tradeoffs involving cost and the probability that a maximum desired target value will be exceeded. In this illustration we want the lowest cost (*B* is best) and the lowest probability of exceedance (*A* is best).

### 4.1.1 Model and model parameter uncertainties

Consider a situation as shown in Figure 8, in which for a specific set of model inputs, the model outputs differ from the observed values, and for those model inputs, the observed values are always the same. Here nothing randomly occurs. The model parameter values or model structure needs to be changed. This is typically done in a model calibration process.

Given specific inputs, the outputs of deterministic models are always going to be the same each time those inputs are simulated. If for specified inputs to any simulation model the predicted output does not agree with the observed value, as shown in Figure 8, this could result from imprecision in the measurement of observed data. It could also result from imprecision in the model parameter values, the model structure, or the algorithm used to solve the model.

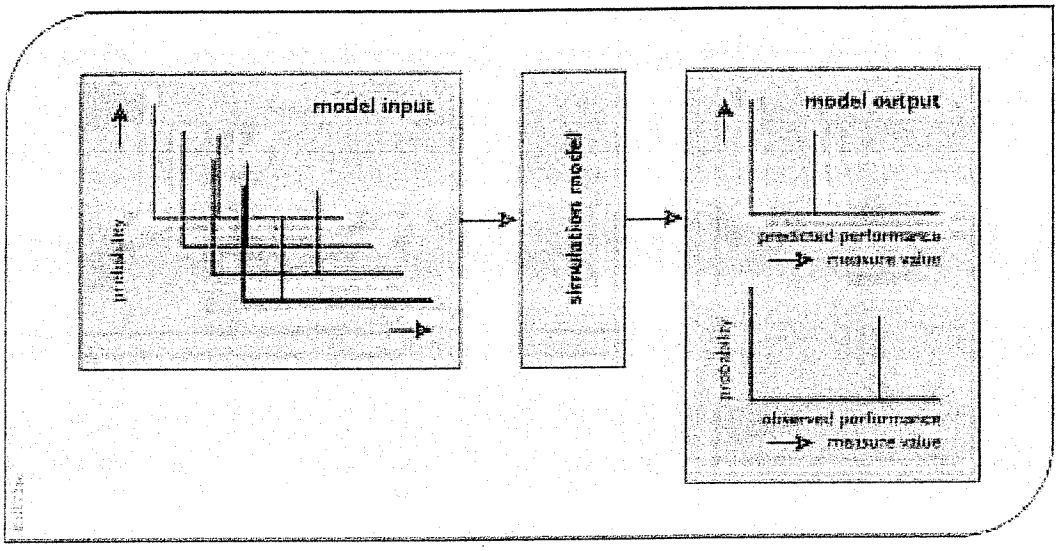


Figure 8. A deterministic system and a simulation model of that system needing calibration or modification in its structure. There is no randomness, only parameter value or model structure errors to be identified and corrected.

Next consider the same deterministic simulation model but now assume at least some of the inputs are random, i.e., not predictable, as may be case when random outputs of one model are used as inputs into another model. Random inputs will yield random outputs. The model input and output values can be described by probability distributions. If the uncertainty in the output is due only to the uncertainty in the input, the situation is similar to that shown in Figure 8. If the distribution of performance measure output values does not fit or is not identical to the distribution of observed performance measure values, then calibration of model parameter values or modification of model structure may be needed.

If a model calibration or 'identification' exercise finds the 'best' values of the parameters to be outside reasonable ranges of values based on scientific knowledge, then the model structure or algorithm might be in error. Assuming the algorithms used to solve the models are correct and observed measurements of system performance vary for the same model inputs, as shown in Figure 9, it can be assumed that the model structure does not capture all the processes that are taking place that impact the value of the performance measures. This is often the case when relatively simple and low-resolution models are used to estimate the hydrological and ecological impacts of water and land management policies. However, even large and complex models can fail to include or adequately describe important phenomena.

In the presence of informational uncertainties there may be considerable uncertainty about the values of the "best" parameters during calibration. This problem becomes even more pronounced with increases in model complexity.

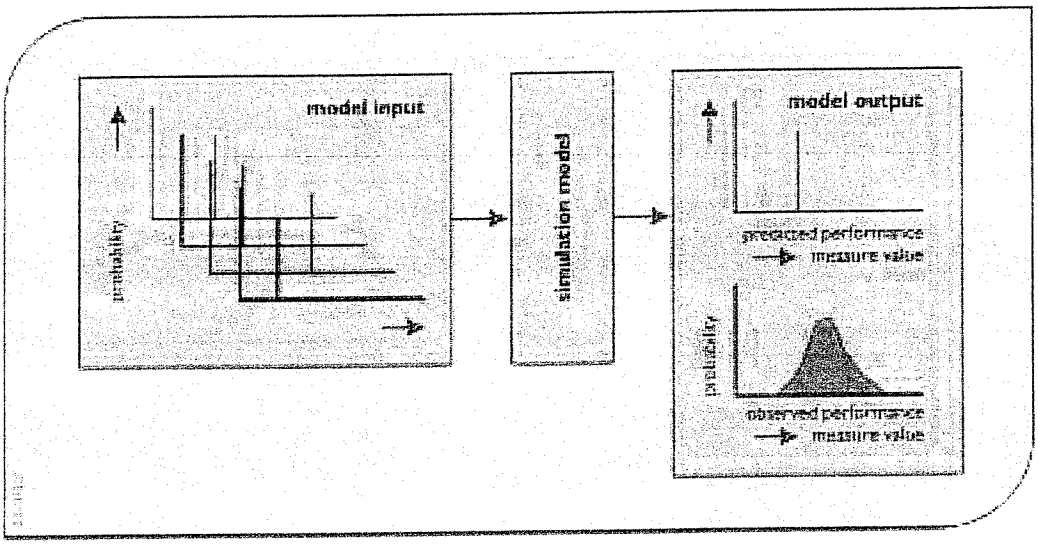


Figure A deterministic simulation model of a 'random or stochastic' system. To produce the variability in the model output that is observed in the real system, even given the same input values, the model's parameter values may need to vary over distributions of values and/or the model structure may need modification along with additional model inputs.

**An example**: Consider the prediction of a pollutant concentration at some site downstream of a pollutant discharge site. Given a streamflow $Q$ (in units of 1000 $m^3$/day), the distance between the discharge site and the monitoring site, $X$ (m), the pollutant decay rate constant $k$ ($day^{-1}$), and the pollutant discharge W (Kg/day), we can use the following simplified model to predict the concentration of the pollutant $C$ ($g/m^3$ = mg/l) at the downstream monitoring site:

$$C = (W/Q)\exp\{-k(X/U)\}$$

In the above equation assume the velocity $U$ (m/day) is a known function of the streamflow $Q$.

In this case the observed value of the pollutant concentration $C$ may differ from the computed value of $C$ even for the same inputs of $W$, $Q$, $k$, $X$, and $U$. Furthermore, this difference varies in different time periods. This apparent variability, as illustrated in Figure 9, can be simulated using the same model but by assuming a distribution of values for the decay rate constant $k$. Alternatively the model structure can be modified to include the impact of streamflow temperature $T$ on the prediction of $C$.

$$C = (W/Q)\exp\{-k\theta^{T-2}(X/U)\}$$

Now there are two model parameters, the decay rate constant $k$ and the dimensionless temperature correction factor □and an additional model input, the streamflow temperature, $T$. It could be that the variation in streamflow temperature was the sole cause of the first

equation's 'uncertainty' and that the assumed parameter distribution of $k$ was simply the result of the distribution of streamflow temperatures on the term $k\theta^{T-20}$.

If the output were still random given constant values of all the inputs, then another source of uncertainty exists. This uncertainty might be due to additional random loadings of the pollutant, possibly from non-point sources. Once again the model could be modified to include these additional loadings if they are knowable. Assuming these additional loadings are not known, a new random parameter could be added to the input variable $W$ or to the right hand side of the equations above that would attempt to capture the impact on $C$ of these additional loadings. A potential problem, however, might be the likely correlation between those additional loadings and the streamflow $Q$.

While adding model detail removed some 'uncertainty' in the above example, increasing model complexity will not always eliminate or reduce uncertainty in model output. Adding complexity is generally not a good idea when the increased complexity is based on processes whose parameters are difficult to measure, the right equations are not known at the scale of application, or the amount of data for calibration is small compared to the number of parameters.

Even if more detailed models requiring more input data and more parameter values were to be developed, the likelihood of capturing all the processes occurring in a complex system is small. Hence those involved will have to make decisions taking this uncertainty into account. Imprecision will always exist due to less than a complete understanding of the system and the hydrologic processes being modeled. A number of studies have addressed model simplification, but only in some simple cases have statisticians been able to identify just how one might minimize modeling related errors in model output values.

The problem of determining the "optimal" level of modeling detail is particularly important when simulating the hydrologic events at many sites over large areas. Perhaps the best approach for these simulations is to establish confidence levels for alternative sets of models and then statistically compare simulation results. But even this is not a trivial or costless task. Increases in the temporal or spatial resolution typically require considerable data collection and/or processing, model recalibrations, and possibly the solution of stability problems resulting from the numerical methods used in the models. Obtaining and implementing alternative hydrologic simulation models will typically involve considerable investments of money and time for data preparation and model calibration.

What is needed is a way to predict the variability evident in the system shown in Figure 9. Instead of a fixed output vector for each fixed input vector, a distribution of outputs are needed for each performance measure based on fixed inputs (Figure 9) or a distribution of inputs (Figure 10.). Furthermore the model output distribution for each performance measure should 'match' as well as possible the observed distribution of that performance measure.

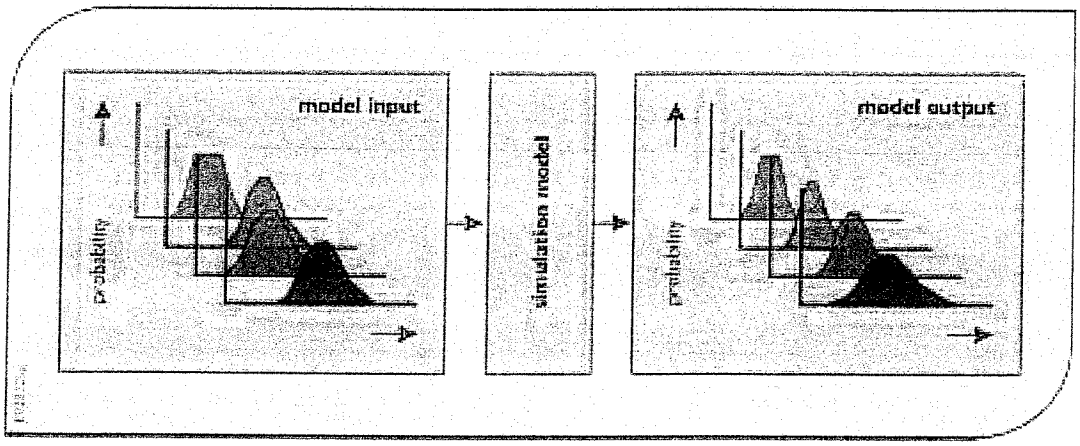


Figure 10. Simulating variable inputs to obtain probability distributions of predicted performance indices that match the probability distributions of observed performance values.

### 4.1.2 What uncertainty analysis can provide

An uncertainty analysis takes a set of randomly chosen input values (that can include parameter values), passes them through a model (or transfer function) to obtain the distributions (or statistical measures of the distributions) of the resulting outputs. As illustrated in Figure 11, the output distributions can be used to

- Describe the range of potential outputs of the system at some probability level.
- Estimate the probability that the output will exceed a specific threshold or performance measure target value.

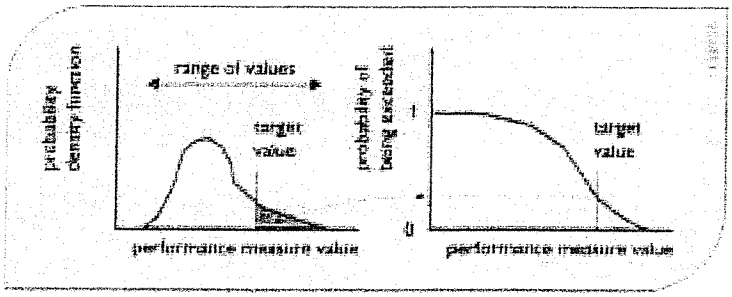


Figure 11. The distribution of performance measures defines range of potential values and the likelihood that a specified target value will be exceeded. The shaded area under the density function on the left represents the probability that the target value will be exceeded. This probability is shown in the probability of exceedance plot on the right.

Common uses for uncertainty analyses are to make general inferences, such as the following:

- Estimating the mean and standard deviation of the outputs.
- Estimating the probability the performance measure will exceed a specific threshold.
- Putting a reliability level on a function of the outputs, e.g., the range of function values that is likely to occur with some probability.
- Describing the likelihood of different potential outputs of the system.

Implicit in any uncertainty analysis are the assumptions that statistical distributions for the input values are correct and that the model is a sufficiently realistic description of the processes taking place in the system. Neither of these assumptions is likely to be entirely correct.

### 4.2 Sensitivity analyses

"Sensitivity analysis" is aimed at describing how much model output values are affected by changes in model input values. It is the investigation of the importance of imprecision or uncertainty in model inputs in a decision making or modeling process. The exact character of sensitivity analysis depends upon the particular context and the questions of concern. Sensitivity studies can provide a general assessment of model precision when used to assess system performance for alternative scenarios, as well as detailed information addressing the relative significance of errors in various parameters. As a result, sensitivity results should be of interest to the general public, federal and state management agencies, local watershed planners and managers, model users, and model developers.

Clearly, upper level management and the public may be interested in more general statements of model precision, and should be provided such information along with model predictions. On the other hand, detailed studies addressing the significance and interactions among individual parameters would likely be meaningful to model developers and some model users. They can use such data to interpret model results and to identify where efforts to improve models and their input values should be directed.

Initial sensitivity analysis studies could focus on two products:

(1) detailed results to guide research and assist model development efforts, and
(2) calculation of general descriptions of uncertainty associated with model predictions so that policy decisions can reflect both the modeling efforts best prediction of system performance and the precision of such predictions.

In the first case, knowing the relative uncertainty in model projections due to possible errors in different sets of parameters and input data should assist in efforts to improve the precision of model projections. This knowledge should also contribute to a better understanding of the relationships between model assumptions, parameters, data and model predictions.

For the second case, knowing the relative precision associated with model predictions should have a significant effect on policy development. For example, the analysis may show that, given data inadequacies, there are very large error bands associated with some model variables. When such large uncertainties exist, predictions should be used with appropriate skepticism.

Incremental strategies should be explored along with monitoring so that greater experience can accumulate to resolve some of those uncertainties.

Sensitivity analysis features are available in many linear and nonlinear programming (optimization) packages. They identify the changes in the values of the objective function and unknown decision variables given a change in the model input values, and a change in levels set for various constraints (Chapter V). Thus sensitivity analysis addresses the change in "optimal" system performance associated with changes in various parameter values, and also how "optimal" decisions would change with changes in resource constraint levels, or target output requirements. This kind of sensitivity analysis provides estimates of how much another unit of resource would be worth, or what "cost" a proposed change in a constraint places on the optimal solution. This information is of value to those making design decisions.

Various techniques have been developed to determine how sensitive model outputs are to changes in model inputs. Most approaches examine the affects of changes in a single parameter value or input variable assuming no changes in all the other inputs. Sensitivity analyses can be extended to examine the combined effects of multiple sources of error, as well.

Changes in particular model input values can affect model output values in different ways. It is generally true that only a relatively few input variables dominate or substantially influence the values of a particular output variable or performance indicator at a particular location and time. If the range of uncertainty of only some of the output data is of interest, then undoubtedly only those input data that significantly impact on the values of those output data need be included in the sensitivity analysis.

If input data estimates are based on repeated measurements, a frequency distribution can be estimated that characterizes natural variability. The shorter the record of measurements, the greater will be the uncertainty regarding the long-term statistical characteristics of that variability. If obtaining a sufficient number of replicate measurements is not possible, subjective estimates of input data ranges and probability distributions are often made. Using a mixture of subjective estimates and actual measurements does not affect the application of various sensitivity analysis methods that can use these sets or distributions of input values, but it may affect the conclusions that can be drawn from the results of these analyses.

It would be nice to have available accurate and easy-to-use analytical methods for relating errors in input data to errors in model outputs, and to errors in system performance indicator values that are derived from model output. Such analytical methods do not exist for complex simulation models. However methods based on simplifying assumptions and approximations can be used to yield useful sensitivity information. Some of these are reviewed in the remainder of this chapter.

### 4.2.1 Sensitivity coefficients

One measure of sensitivity is the sensitivity coefficient. This is the derivative of a model output variable with respect to an input variable or parameter. A number of sensitivity

analysis methods use these coefficients. First-order and approximate first-order sensitivity analyses are two such methods that will be discussed later. The difficulty of

1. obtaining the derivatives for many models,
2. needing to assume mathematical (usually linear) relationships when obtaining estimates of derivatives by making small changes of input data values near their nominal or most likely values, and
3. having large variances associated with most hydrologic process models have motivated the replacement of analytical methods by numerical and statistical approaches to sensitivity analysis.

Implicit in any sensitivity analysis are the assumptions that statistical distributions for the input values are correct and that the model is a sufficiently realistic description of the processes taking place in the system. Neither of these assumptions is likely to be entirely correct.

The importance of the assumption that the statistical distributions for the input values are correct is easy to check by using different distributions for the input parameters. If the outputs vary significantly, then the output is sensitive to the specification of the input distributions and hence they should be defined with care. A relatively simple deterministic sensitivity analysis can be of value here (Benaman, 2002). A sensitivity coefficient can be used to measure the magnitude of change in an output variable $Q$ per unit change in the magnitude of an input parameter value $P$ from its base value $P_o$. Let $SI_{PQ}$ be the sensitivity index for an output variable $Q$ with respect to a change $\Delta P$ in the value of the input variable $P$ from its base value $P_o$. Noting that the value of the output $Q(P)$ is a function of $P$, the sensitivity index could be defined as

$$SI_{PQ} = [\, Q(P_o + \Delta P) - Q(P_o - \Delta P) \,] / 2\, \Delta P \qquad (1)$$

Other sensitivity indices could be defined (McCuen 1973). Letting the index $i$ represent a decrease and $j$ represent an increase in the parameter value from its base value $P_o$, the sensitivity index $SI_{PQ}$ for parameter $P$ and output variable $Q$ is could be defined as

$$SI_{PQ} = \{ \,|\, (Q_o - Q_i) / (P_o - P_i) \,|\, + \,|\, (Q_o - Q_j) / (P_o - P_j) \,|\, \} / 2 \qquad (2)$$

or

$$SI_{PQ} = \max \{ \,|\, (Q_o - Q_i) / (P_o - P_i) \,|\,,\ |\, (Q_o - Q_j) / (P_o - P_j) \,|\, \} \qquad (3)$$

A dimensionless expression of sensitivity is the elasticity index, $EI_{PQ}$, that measures the relative change in output $Q$ for a relative change in input $P$ could be defined as

$$EI_{PQ} = [P_o / Q(P_o)]\, SI_{PQ} \qquad (4)$$

### 4.2.2 A simple deterministic sensitivity analysis procedure

This deterministic sensitivity analysis approach is very similar those most often employed in the engineering economics literature. It is based on the idea of varying one uncertain parameter value, or set of parameter values, at a time. The ideas are applied to a water quality example to illustrate their use.

The output variable of interest can be any performance measure or indicator. Thus one does not know if more or less of a given variable is better or worse. Perhaps too much and/or too little is undesirable. The key idea is that, whether employing physical measures or economic metrics of performance, various parameters (or sets of associated parameters) are assigned high and low values. Such ranges may reflect either the differences between the minimum and maximum values for each parameter, the 5 and 95 percentiles of a parameters distribution, or points corresponding to some other criteria. The system model is then run with the various alternatives, one at a time, to evaluate the impact of those errors in various sets of parameter values on the output variable.

Table 1 illustrates the character of the results that one would obtain. Here $Y_0$ is the nominal value of the model output when all parameters assume the estimated best values, and $Y_{i,L}$ and $Y_{i,H}$ are the values obtained by increasing or decreasing the values of the $i^{th}$ set of parameters.

Table 1. Sensitivity of model output $Y$ to possible errors in four parameter sets containing a single parameter or a group of parameters that vary together.

| parameter set | low value | nominal | high value |
|---|---|---|---|
| 1 | $Y_{1,L}$ | $Y_0$ | $Y_{1,H}$ |
| 2 | $Y_{2,L}$ | $Y_0$ | $Y_{2,H}$ |
| 3 | $Y_{3,L}$ | $Y_0$ | $Y_{3,H}$ |
| 4 | $Y_{4,L}$ | $Y_0$ | $Y_{4,H}$ |

A simple water quality example is employed to illustrate this deterministic approach to sensitivity analysis. The analysis techniques illustrated here are just as applicable to complex models. The primary difference is that more work would be required to evaluate the various alternatives with a more complex model, and the model responses might be more complicated.

The simple water quality model is provided by Vollenweider's empirical relationship for the average phosphorus concentration in lakes (Vollenweider, 1976). He found that the phosphorus concentration, $P$ (mg/m$^3$), is a function of the annual phosphorus loading rate, $L$ (mg/m$^2$•a), the annual hydraulic loading, $q$ (m/a or more exactly m$^3$/m$^2$•a), and the mean water depth, $z$ (m).

$$P = (L/q) / [\, 1 + (z/q)^{0.5} \,] \qquad (5)$$

$L/q$ and $P$ have the same units; the denominator is an empirical factor that compensates for nutrient recycling and elimination within the aquatic lake environment.

Data for Lake Ontario in North America would suggest that reasonable values of the parameters are $L = 680$ mg/m$^3$; $q = 10.6$ m/a; and $z = 84$ m, yielding $P = 16.8$ mg/m$^3$. Values of phosphorus concentrations less than 10 mg/m$^3$ are considered oligotrophic, whereas values greater than 20 mg/m$^3$ generally correspond to eutrophic conditions. Reasonable ranges reflecting possible errors in the three parameters yield the values in Table 2.

Table 2. Sensitivity of estimates of phosphorus concentration (mg/m$^3$) to model parameter values. The two right most values in each row correspond to the Low and High values of the parameter, respectively

| | parameter value | | phosphorus concentration | |
|---|---|---|---|---|
| | low | high | $P_{low}$ | $P_{high}$ |
| [illegible] | 500 | 900 | 12.4 | 22.3 |
| [illegible] | 8 | 13.5 | 20.0 | 14.4 |
| [illegible] | 81 | 87 | 17.0 | 16.6 |

One may want to display these results so they can be readily visualized and understood. A tornado diagram (Eschenbach, 1992) would show the lower and upper values of $P$ obtained from variation of each parameter, with the parameter with the widest limits displayed on top, and the parameter having smallest limits on the bottom. Tornado diagrams (Figure 12) are easy to construct and can include a large number of parameters without becoming crowded.

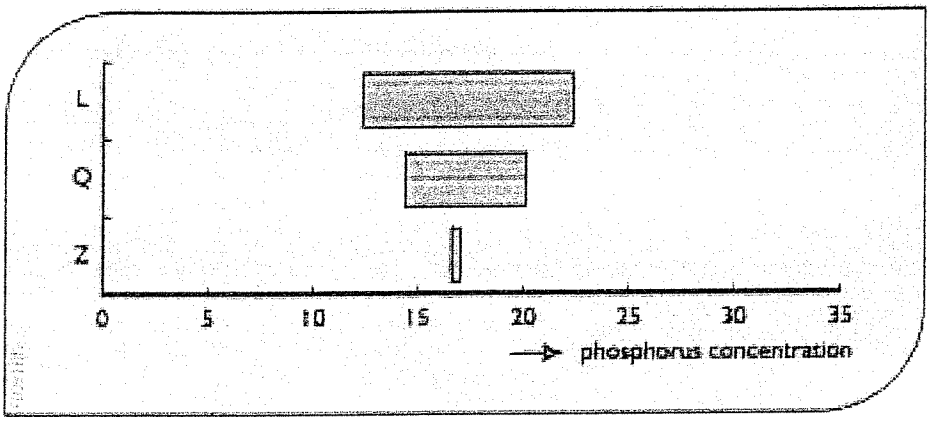


Figure 12. A Tornado diagram showing the range of the output variable representing phosphorus concentrations for high and low values of each of the parameter sets. Parameters are sorted so that the largest range is on top, and the smallest on the bottom.

An alternative to tornado diagrams is a Pareto chart showing the width of the uncertainty range associated with each variable, ordered from largest to smallest. A Pareto chart is illustrated in Figure 13.

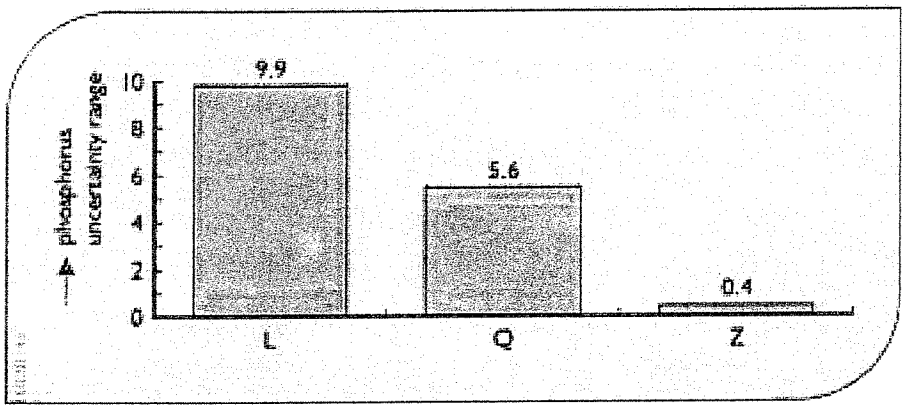


Figure 13. A Pareto Chart showing the range of the output variable representing phosphorus concentrations resulting from high and low values of each parameter set considered.

Another visual presentation is a spider plot showing the impact of uncertainty in each parameter on the variable in question, all on the same graph (Eschenback, 1992; DeGarmo, 1993, p. 401). A spider plot, Figure 14, shows the particular functional response of the output to each parameter on a common scale, so one needs a common metric to represent changes in all of the parameters. Here we use percentage change from the nominal or best values.

Spider plots are a little harder to construct than tornado diagrams, and can generally include only 4 - 5 variables without becoming crowded. However, they provide a more complete view of the relationships between each parameter and the performance measure. In particular, a spider plot reveals nonlinear relationships and the relative sensitivity of the performance measure to (percentage) changes in each variable.

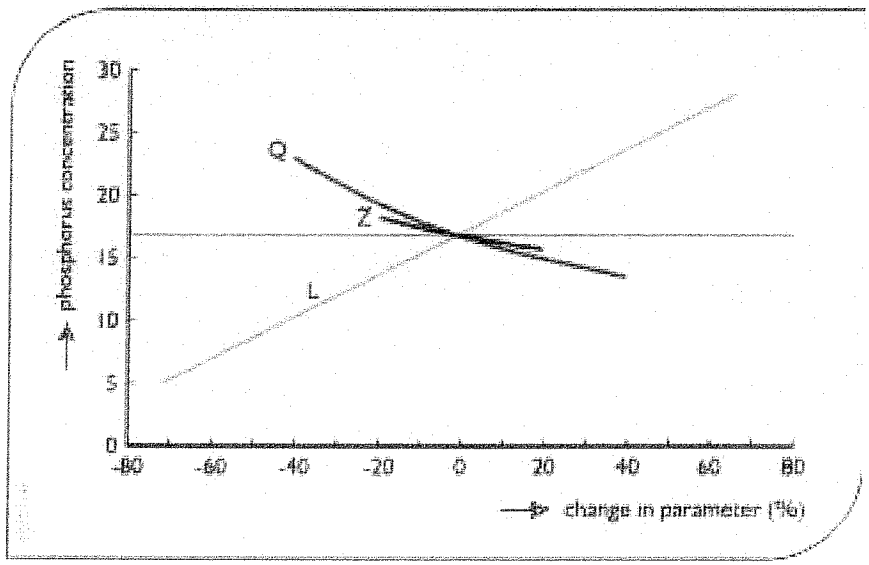


Figure 14. Spider Plot illustrates the relationships between model output describing phosphorus concentrations and variations in each of the parameter sets, expressed as a percentage deviation from their nominal values.

In the spider plot, the linear relationship between $P$ and $L$ and the gentle nonlinear relationship between $P$ and $q$ is illustrated. The range for $z$ has been kept small given the limited uncertainty associated with that parameter.

### 4.2.3 Multiple errors and interactions

An important issue that should not be ignored is the impact of simultaneous errors in more than one parameter. Probabilistic methods directly address the occurrence of simultaneous errors, but the correct joint distribution needs to be employed. With simple sensitivity analysis procedures, errors in parameters are generally investigated one at a time, or in groups. The idea of considering pairs or sets of parameters is discussed here.

*Groups of factors.* It is often the case that reasonable error scenarios would have several parameters changing together. For this reason, the alternatives have been called parameter sets. For example, possible errors in water depth would be accompanied with corresponding variations in aquatic vegetation and chemical parameters. Likewise, alternatives related to changes in model structure might be accompanied with variations in several parameters. In other cases, there may be no causal relationship among possible errors (such as model structure

versus inflows at the boundary of the modeled region), but they might still interact to effect the precision of model predictions.

*Combinations.* If one or more non-grouped parameters interact in significant ways, then combinations of one or more errors should be investigated. However, one immediately runs into a combinatorial problem. If each of m parameters can have 3 values (high, nominal, and low) there are $3^m$ combinations, as opposed to 2m + 1 if each parameter is varied separately. [For m = 5, the differences are $3^5 = 243$ versus 2(5)+1 = 11.] These numbers can be reduced by considering instead only combinations of extremes so that only $2^m + 1$ cases need be considered [$2^5 + 1 = 33$], which is a more manageable number. However, all of the parameters would be at one extreme or the other, and such situations would be very unusual.

*Two factors at a time.* A compromise is to consider all pairs of two parameters at a time. There are m(m-1)/2 possible pairs of m parameters. Each parameter has a high and low value. Since there are 4 combinations of high and low values for each pair, there are a total of 2m(m-1) combinations. [For m = 5 there are 40 combinations of two parameters each having two values.]

The presentation of these results could be simplified by displaying for each case only the maximum error, which would result in m(m-1)/2 cases that might be displayed in a Pareto diagram. This would allow identification of those combinations of two parameters that might yield the largest errors and thus are of most concern.

For the water quality example, if one plots the absolute value of the error for all four combinations of high (+) and low (-) values for each pair of parameters, they obtain Figure 15.

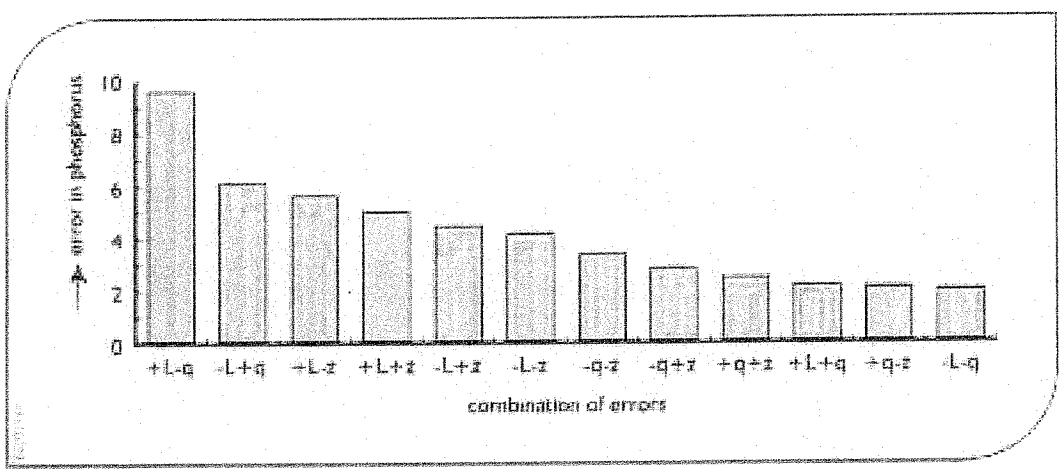


Figure 15. Pareto diagram showing errors in phosphorus concentrations for all combinations of pairs of input parameters errors. A + indicates a high value, and a - indicates a low value for indicated parameter. *L* is the phosphorus loading rate, *q* is the hydraulic loading, and *z* is the mean lake depth.

Considering only the worst error for each pair of variables yields Figure 16.

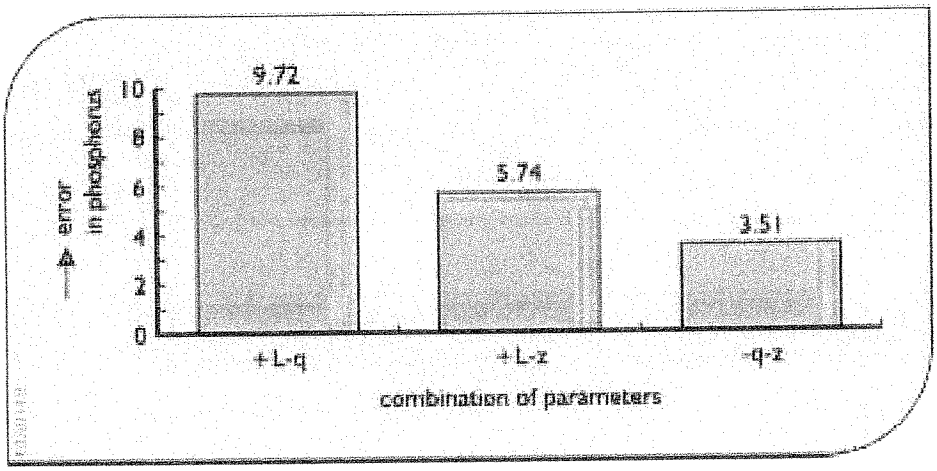


Figure 16. Pareto diagram showing worst error combinations for each pair of input parameters. A '+' indicates a high value, and a '–' indicates a low value for indicated parameter.

Here we see, as is no surprise, that the worst error results from the most unfavorable combination of $L$ and $q$ values. If both parameters have their most unfavorable values, the predicted phosphorus concentration would be 27 mg/m$^3$.

*Looking for non-linearities.* One might also display in a Pareto diagram the maximum error for each pair as a percentage of the sum of the absolute values of the maximum error from each parameter separately. The ratio of the joint error to the individual errors would illustrate potentially important nonlinear interactions. If the model of the system and the physical measure or economic metric were strictly linear, then the individual ratios should add to one.

### 4.2.4 First-order sensitivity analysis

The above deterministic analysis has trouble representing reasonable combinations of errors in several parameter sets. If the errors are independent, it is highly unlikely that any two sets would actually be at their extreme ranges at the same time. By defining probability distributions of the values of the various parameter sets, and specifying their joint distributions, a probabilistic error analysis can be conducted. In particular, for a given performance indicator, one can use multivariate linear analyses to evaluate the approximate impact on the performance indices of uncertainty in various parameters. As shown below, the impact depends upon the square of the sensitivity coefficients (partial derivatives) and the variances and covariances of the parameter sets.

For a performance indicator $I = F(Y)$, which is a function $F(\bullet)$ of model outputs $Y$, that are in turn a function $g(P)$ of input parameters $P$, one can use a multivariate Taylor series approximation of $F$ to obtain the expected value and variance of the indicator:

$$E[I] = F(\text{ based on mean values of input parameters}) + (1/2)\ \{\Sigma_i\Sigma_j\ [\partial F^2/\partial P_i \partial P_j]\ \mathrm{Cov}\ [P_i, P_j]\ \} \tag{6}$$

and

$$\mathrm{Var}[I] = \Sigma_i\Sigma_j\ (\partial F/\ \partial P_i)(\partial F/\ \partial P_j)\ \mathrm{Cov}\ [P_i, P_j] \tag{7}$$

where $(\partial F/\partial P_i)$ are the partial derivative of the function $F$ with respect to $P_i$ evaluated at the mean value of the input parameters $P_i$, and $\partial F^2/\partial P_i \partial P_j$ are the second partial derivatives. The covariance of two random input parameters $P_i$ and $P_j$ is the expected value of the product of differences between the values and their means.

$$\mathrm{Cov}[P_i, P_j] = E[(P_i - E[P_i])(\ P_j - E[P_j])] \tag{8}$$

If all the parameters are independent of each other, and the second-order terms in the expression for the mean $E[I]$ are neglected, one obtains

$$E[I] = F(\text{ based on mean values of input parameters}) \tag{9}$$

and

$$\mathrm{Var}\ [I] = \Sigma_i\ [\partial F/\ \partial P_i]^2\ \mathrm{Var}\ [P_i] \tag{10}$$

(Benjamin and Cornell, 1970). Equation 6 for $E[I]$ shows that in the presence of substantial uncertainty, the mean of the output from nonlinear systems is not simply the system output corresponding to the mean of the parameters (Gaven and Burges, 1981, p. 1523). This is true for any nonlinear function.

Of interest in the analysis of uncertainty is the approximation for the variance $\mathrm{Var}[I]$ of indicator $I$. In Equation 10 the contribution of $P_i$ to the variance of $I$ equals $\mathrm{Var}[P_i]$ times $[\partial F/\ \partial P_i]^2$, which are the squares of the sensitivity coefficients for indicator $I$ with respect to each input parameter value $P_i$.

#### 4.2.4.1 An example of first-order sensitivity analysis

It may appear that first-order analysis is difficult because the partial derivatives of the performance indicator $I$ are needed with respect to the various parameters. However, reasonable approximations of these sensitivity coefficients can be obtained from the simple sensitivity analysis described in Table 3, as shown below. In that table, three different parameter sets, $P_i$, are defined in which one parameter of the set is at its high value, $P_{iH}$, and one is at its low value, $P_{iL}$, to produce corresponding values (called high, $I_{iH}$, and low, $I_{iL}$) of a system performance indicator $I$.

Table 3. Approximate parameter sensitivity coefficients.

| parameter set | value: low | value: high | sensitivity coefficient |
|---|---|---|---|
| 1 | $I_{1L}$ | $I_{1H}$ | $[I_{1H}-I_{1L}]/[P_{1H}-P_{1L}]$ |
| 2 | $I_{2L}$ | $I_{2H}$ | $[I_{2H}-I_{2L}]/[P_{2H}-P_{2L}]$ |
| 3 | $I_{3L}$ | $I_{3H}$ | $[I_{3H}-I_{3L}]/[P_{3H}-P_{3L}]$ |

It is then necessary to estimate some representation of the variances of the various parameters with some consistent procedure. For a normal distribution, the distance between the 5 and 95 percentiles is 1.645 standard deviations on each side of the mean, or 2(1.645) = 3.3 standard deviations. Thus, if the high/low range is thought of as approximately a 5-95 percentile range for a normally distributed variate, a reasonable approximation of the variance might be

$$\mathrm{Var}[P_i] = \{ [P_{iH}-P_{iL}]/3.3 \}^2. \qquad (11)$$

This is all that is needed. Use of these average sensitivity coefficients is very reasonable for modeling the behavior of the system performance indicator $I$ over the indicated ranges.

As an illustration of the method of first-order uncertainty analysis, consider the lake quality problem described above. The "system performance indicator" in this case is the model output, the phosphorus concentration $P$, and the input parameters, now denoted as $X = L$, $q$, and $z$. The standard deviation of each parameter is assumed to be the specified range divided by 3.3. Average sensitivity coefficients $\partial P/\partial X$ were calculated. The results are reported in the table below.

Table 4. Calculation of approximate parameter sensitivity coefficients.

| variable $X$ | units | $\delta P/\delta X$ | St Dev[$X$] | $(\delta P/\delta X)^2$ Var[$X$] | % |
|---|---|---|---|---|---|
| $L$ | mg/m$^2$, a | 0.025 | 121.21 | 9.18 | 75.7 |
| $q$ | m/a | -1.024 | 1.67 | 2.92 | 24.1 |
| $z$ | m | -0.074 | 1.82 | 0.02 | 0.2 |

Assuming the parameter errors are independent:

$$\mathrm{Var}[P] = 9.18 + 2.92 + 0.02 = 12.12 \tag{12}$$

The square root of 12.12 is the standard deviation and equals 3.48. This agrees well with a Monte Carlo analysis reported below.

Note that 100*(9.18/12.12), or about 76% of the total parameter error variance in the phosphorus concentration $P$ is associated in the phosphorus loading rate $L$ and the remaining 24% is associated with the hydrologic loading $q$. Eliminating the uncertainty in $z$ would have a negligible impact on the overall model error. Likewise, reducing the error in $q$ would at best have a modest impact on the total error.

Due to these uncertainties, the estimated phosphorus concentration has a standard deviation of 3.48. Assuming the errors are normally distributed, and recalling that ± 1.645 standard deviations around the mean define a 5-95 percentile interval, the 5-95 percentile interval would be about

$$16.8 \pm 1.645\ (3.48)\ \mathrm{mg/m^3} = 16.8 \pm 5.7\ \mathrm{mg/m^3} = 11.1 \text{ to } 22.5\ \mathrm{mg/m^3}. \tag{13}$$

These error bars indicate there is substantial uncertainty associated with the phosphorus concentration $P$, primarily due to uncertainty in the loading rate $L$.

The upper bound of 22.6 mg/m$^3$ is considerably less than the 27 mg/m$^3$ that would be obtained if both $L$ and $q$ had their most unfavorable values. In a probabilistic analysis with independent errors, such a combination is highly unlikely.

#### 4.2.4.2 Warning on accuracy.

First-order uncertainty analysis is indeed an approximate method based upon a linearization of the response function represented by the full simulation model. It may provide inaccurate estimates of the variance of the response variable for nonlinear systems with large uncertainty in the parameters. In such cases Monte Carlo simulation (discussed below and in Chapter VII) or the use of higher-order approximation may be required. Beck (1987, p. 1426) cites studies that found that Monte Carlo and first-order variances were not appreciably different, and a few studies that found specific differences. Differences are likely to arise when the distributions used for the parameters are bimodal (or otherwise unusual), or some rejection algorithm is used in the Monte Carlo analysis to exclude some parameter combinations. Such errors can result in a distortion in the ranking of predominant sources of uncertainty. However, in most cases very similar results were obtained.

### 4.2.5 Fractional factorial design method

An extension of first-order sensitivity analysis would be a more complete exploration of the response surface using a careful statistical design. First consider a complete factorial design. Input data are divided into discrete "levels'. The simplest case is two levels. These two levels can be defined as a nominal value, and a high (low) value. Simulation runs are made for all combinations of parameter levels. For $n$ different inputs, this would require $2^n$ simulation runs. Hence for a three-input variable or parameter problem, 8 runs would be required. If 4 discrete levels of each input variable or parameter were allowed to provide a more reasonable description of a continuous variable, the three-input data problem would require $4^3$ or 64 simulation runs. Clearly this is not a useful tool for large regional water resources simulation models.

A fractional factorial design involves simulating only a fraction of what is required from a full factorial design method. The loss of information prevents a complete analysis of the impacts of each input variable or parameter on the output.

To illustrate the fractional factorial design method, consider the two-level with three-input variable or parameter problem. Table 5 below shows the 8 simulations required for a full factorial design method. The '+' and the '–' show the upper and lower levels of each input variable or parameter $P_i$ where $i = 1, 2, 3$. If all 8 simulations were performed, seven possible effects could be estimated. These are the individual effects of the three inputs $P_1$, $P_2$, and $P_3$, the three two-input variable or parameter interactions, $(P_1)(P_2)$, $(P_1)(P_3)$, and $(P_2)(P_3)$, and the one three-input variable or parameter interaction $(P_1)(P_2)(P_3)$.

Table 5. A three-input factorial design.

| simulation run | value of input | | | value of output - variable Y |
|---|---|---|---|---|
| | $P_1$ | $P_2$ | $P_3$ | |
| 1 | - | - | - | $Y_1$ |
| 2 | + | - | - | $Y_2$ |
| 3 | - | + | - | $Y_3$ |
| 4 | + | + | - | $Y_4$ |
| 5 | - | - | + | $Y_5$ |
| 6 | + | - | + | $Y_6$ |
| 7 | - | + | + | $Y_7$ |
| 8 | + | + | + | $Y_8$ |

Consider an output variable $Y$, where $Y_j$ is the value of $Y$ in the jth simulation run. Then an estimate of the effect, denoted $\delta(Y|P_i)$, that input variable or parameter $P_i$ has on the output variable $Y$, is the average of the four separate effects of varying $P_i$:

For i = 1:

$$\delta(Y \mid P_1) = 0.25\ [\ (Y_2-Y_1)+(Y_4-Y_3)+(Y_6-Y_5)+(Y_8-Y_7)\ ] \tag{14}$$

Each difference in parentheses is the difference between a run in which $P_1$ is at its upper level and a run in which $P_1$ is at its lower level, but the other two parameter values, $P_2$ and $P_3$, are unchanged. If the effect is equal to 0, then, in this case, $P_1$ has no impact on the output variable $Y$.

Similarly the effects of $P_2$ and $P_3$, on variable $Y$ can be estimated as:

$$\delta(Y \mid P_2) = 0.25\ \{\ (Y_3-Y_1)+(Y_4-Y_2)+(Y_7-Y_5)+(Y_8-Y_6)\ \} \tag{15}$$

and

$$\delta(Y \mid P_3) = 0.25\ \{\ (Y_5-Y_1)+(Y_6-Y_2)+(Y_7-Y_3)+(Y_8-Y_4)\ \} \tag{16}$$

Consider next the interaction effects between $P_1$ and $P_2$. This is estimated as the average of the difference between the average $P_1$ effect at the upper level of $P_2$, and the average $P_1$ effect at the lower level of $P_2$. This is the same as the difference between the average $P_2$ effect at the upper level of $P_1$ and the average $P_2$ effect at the lower level of $P_1$:

$$\begin{aligned}\delta(Y \mid P_1, P_2) &= (1/2)\ \{\ [\ (Y_8-Y_7) + (Y_4-Y_3)]/2 - [\ (Y_2-Y_1) + (Y_6-Y_5)]/2\ \} \\ &= (1/4)\ \{\ [\ (Y_8-Y_6)+(Y_4-Y_2)] - [\ (Y_3-Y_1) + (Y_7-Y_5)]\ \}\end{aligned} \tag{17}$$

Similar equations can be derived for looking at the interaction effects between $P_1$ and $P_3$, and between $P_2$ and $P_3$ and the interaction effects among all three inputs $P_1$, $P_2$, and $P_3$.

Now assume only half of the simulation runs were performed, perhaps runs 2, 3, 5 and 8 in this example. If only outputs $Y_2$, $Y_3$, $Y_5$, and $Y_8$ are available, for our example:

$$\delta(Y \mid P_3) = \sqcup(Y \mid P_1, P_2) = 0.5\ \{\ (Y_8 - Y_3) - (Y_2 - Y_5)\ \} \tag{18}$$

The separate effects of $P_3$ and of $P_1P_2$ are not available from the output. This is the loss in information resulting from fractional instead of complete factorial design.

### 4.2.6 Monte Carlo sampling methods

The Monte Carlo method of performing sensitivity analyses, illustrated in Figure 16, first selects a random set of input data values drawn from their individual probability distributions. These values are then used in the simulation model to obtain some model output variable values. This process is repeated many times, each time making sure the model calibration is

valid for the input data values chosen. The end result is a probability distribution of model output variables and system performance indices that results from variations and possible errors in all of the input values.

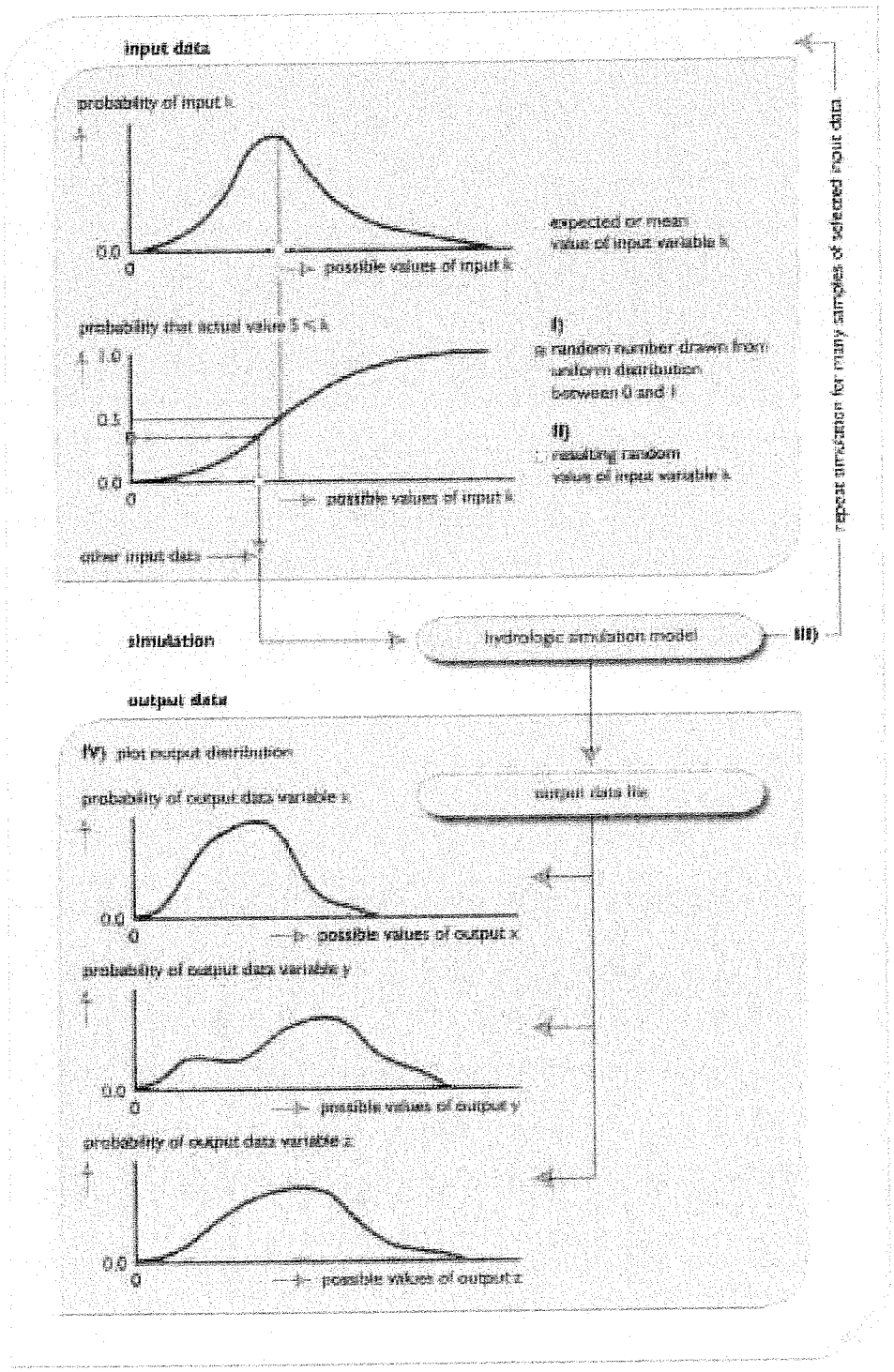

Figure 16. Monte Carlo sampling and simulation procedure for finding distributions of output variable values based on distributions, for specified reliability levels, of input data values. This technique can be applied to one or more uncertain input variables at a time. The output distributions will reflect the combined effects of this input uncertainty over the specified ranges.

Using a simple Monte Carlo analysis, values of all of the parameter sets are selected randomly from distributions describing the individual and joint uncertainty in each, and then the modeled system is simulated to obtain estimates of the selected performance indices. This must be done many times (often well over 100) to obtain a statistical description of system performance variability. The number of replications needed is generally not dependent on the number of parameters whose errors are to be analyzed. One can include in the simulation the uncertainty in parameters as well as natural variability. This method can evaluate the impact of single or multiple uncertain parameters.

A significant problem that arises in such simulations is that some combinations of parameter values result in unreasonable models. For example, model performance with calibration data sets might be inconsistent with available data sets. The calibration process places interesting constraints on different sets of parameter values. Thus, such Monte Carlo experiments often contain checks that exclude combinations of parameter values that are unreasonable. In these cases the generated results are conditioned on this validity check.

Whenever sampling methods are used, one must consider possible correlations among input data values. Sampling methods can handle spatial and temporal correlations that may exist among input data values, but the existence of correlation requires defining appropriate conditional distributions.

One major limitation of applying Monte Carlo methods to estimate ranges of risk and uncertainty for model output variable values, and system performance indicator values based on these output variable values, is the computing time required. To reduce the computing times needed to perform sensitivity analyses using sampling methods, some tricks and as well as stratified sampling methods are available. The discussion below illustrates the idea of a simple modification (or trick) using a "standardized" Monte Carlo analysis. The more general Latin Hypercube Sampling procedure is also discussed.

#### 4.2.6.1 Simple Monte Carlo sampling

To illustrate the use of Monte Carlo sampling methods consider again Vollenweider's empirical relationship, Equation 5, for the average phosphorus concentration in lakes (Vollenweider, 1976). Two hundred values of each parameter were generated independently from normal distributions with the means and variances as shown in Table 6.

The table contains the specified means and variances for the generated values of $L$, $q$ and $z$, and also the actual values of the means and variances of the 200 generated values of $L$, $q$, $z$ and also of the 200 corresponding generated output phosphorus concentrations, $P$. Figure 17 displays the distribution of the generated values of $P$.

Table 6. Monte Carlo analysis of lake phosphorus levels.

| parameter | L | q | z | P |
|---|---|---|---|---|
| | specified means and standard deviations | | | |
| mean | 680.00 | 10.60 | 84.00 | — |
| standard deviations | 121.21 | 1.67 | 1.82 | — |
| | generated means and standard deviations | | | |
| mean | 674.18 | 10.41 | 84.06 | 17.07 |
| standard deviations | 130.25 | 1.73 | 1.82 | 3.61 |

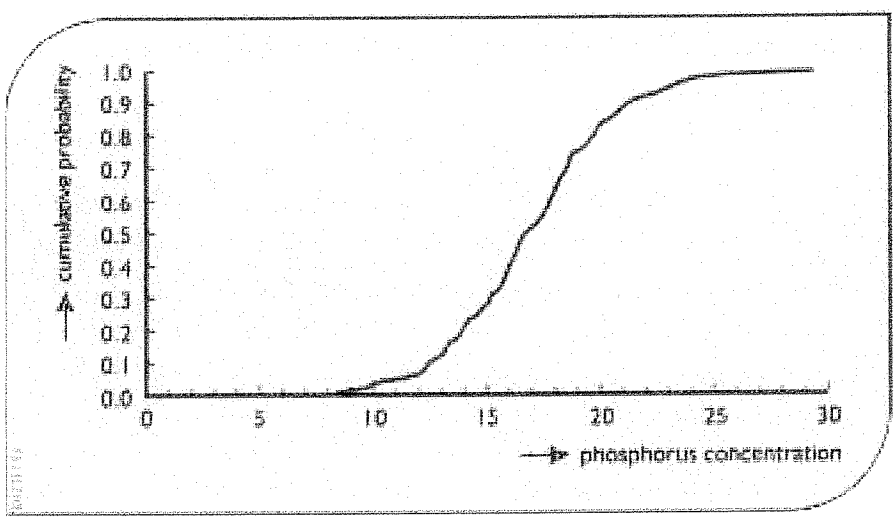


Figure 17. Distribution of lake phosphorus concentrations from Monte Carlo analysis

One can see that given the estimated levels of uncertainty, phosphorus levels could reasonably range from below 10 to above 25. The probability of generating a value greater than 20 mg/m$^3$ was 12.5%. The 5% to 95 percentile range was 11.1 to 23.4 mg/m$^3$. In the figure, the cumulative probability curve is rough because only 200 values of the phosphorus concentration were generated, but these are clearly enough to give a good impression of the overall impact of the errors.

#### 4.2.6.2 Sampling uncertainty.

In this example, the mean of the 200 generated values of the phosphorus concentration, *P*, was 17.07. However a different set of random values would have generated a different set of *P* values as well. Thus it is appropriate to estimate the standard error, SE, of this average. The standard error equals the standard deviation $\sigma$ of the *P* values divided by the square root of the sample size *n*:

$$SE = \sigma/(n)^{0.5} = 3.61/(200)^{0.5} = 0.25. \qquad (19)$$

From the central limit theorem of mathematical statistics, the average of a large number of independent values should have very nearly a normal distribution. Thus, 95% of the time, the true mean of *P* should be in the interval 17.1 ± 1.96 (0.25), or 16.6 to 17.6 mg/m$^3$. This level of uncertainty reflects the observed variability of *P* and the fact that only 200 values were generated.

#### 4.2.6.3 Making sense of the results.

A significant challenge with complex models is to determine from the Monte Carlo simulation which parameter errors are important. Calculating the correlation between each generated input parameter value and the output variable value is one way of doing this. As Table 7 below shows, based upon the magnitudes of the correlation coefficients, errors in *L* were most important, and those in *q* second in importance.

Table 7. Correlation analysis of Monte Carlo results.

| variable | L | q | s | P |
|---|---|---|---|---|
| L | 1 | | | |
| q | 0.079 | 1 | | |
| s | 0.1297 | -0.139 | 1 | |
| P | 0.851 | -0.434 | 0.144 | 1 |

One can also use regression to develop a linear model defining variations in the output based on errors in the various parameters. The results are shown in the Table 8. The fit is very good, and $R^2 = 98\%$. If the model for $P$ had been linear, a $R^2$ value of 100% should have resulted. All of the coefficients are significantly different from zero.

Note that the correlation between $P$ and $z$ was positive in Table 7, but the regression coefficient for $z$ is negative. This occurred because there is a modest negative correlation between the generated $z$ and $q$ values. Use of partial correlation coefficients can also correct for such spurious correlations among input parameters.

Table 8. Results of Regression Analysis on Monte Carlo Results

| | coefficient | standardized error | ratio t |
|---|---|---|---|
| intercept | 18.605 | 1.790 | 10.39 |
| L | 0.025 | 0.000 | 85.36 |
| q | -1.068 | 0.022 | -48.54 |
| z | -0.085 | 0.021 | - 4.08 |

Finally we display a plot, Figure 18, based on this regression model illustrating the reduction in the variance of $P$ that is due to dropping each variable individually. Clearly $L$ has the biggest impact on the uncertainty in $P$, and $z$ the least.

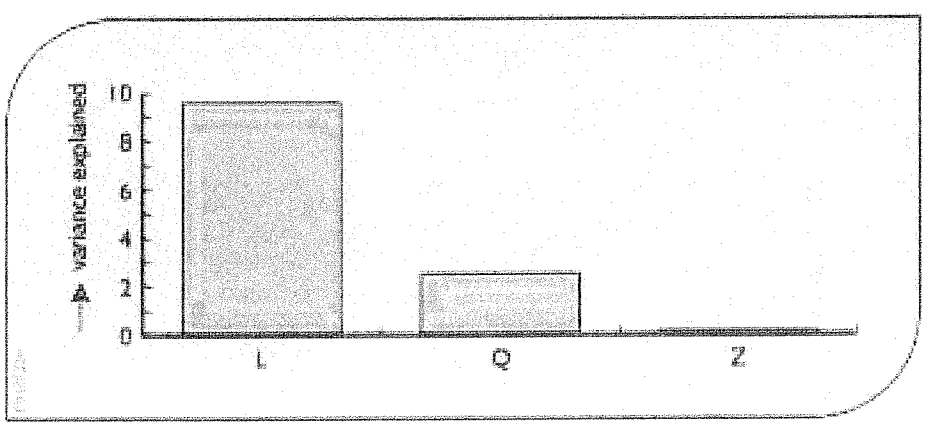

Figure 18. Reduction in the variance of $P$ that is due to dropping from the regression model each variable individually. Clearly $L$ has the biggest impact on the uncertainty in $P$, and $z$ the least.

#### 4.2.6.4 Standardized Monte Carlo analysis

Using a "standardized" Monte Carlo analysis, one could adjust the generated values of $L$, $q$ and $z$ above so that the generated samples actually have the desired mean and variance. While making that correction, one can also shuffle their values so that the correlations among the generated values for the different parameters are near zero, as is desired. This was done for the 200 generated values to obtain the statistics shown in Table 9.

Table 9. Standardized Monte Carlo analysis of lake phosphorus levels

| parameter | L | q | z | P |
|---|---|---|---|---|
| | specified means and standard deviations | | | |
| Mean | 680.00 | 10.60 | 84.00 | --- |
| Standard deviations | 121.21 | 1.67 | 1.82 | --- |
| | generated means and standard deviations | | | |
| Mean | 680.00 | 10.60 | 84.00 | 17.03 |
| Standard deviations | 121.21 | 1.67 | 1.82 | 3.44 |

Repeating the correlation analysis from before (shown in Table 10) now yields much clearer results that are in agreement with the regression analysis. The correlation between $P$ and both $q$ and $z$ are now negative as they should be. Because the generated values of the three parameters have been adjusted to be uncorrelated, the signal from one is not confused with the signal from another.

Table 10. Correlation analysis of standardized Monte Carlo results

| variable | L | q | z | P |
|---|---|---|---|---|
| L | 1.00 | | | |
| q | 0.01 | 1.00 | | |
| z | 0.02 | 0.00 | 1.00 | |
| P | 0.85 | -0.50 | -0.02 | 1.00 |

The mean phosphorus concentration changed very little. It is now 17.0 instead of 17.1 mg/m$^3$.

Using control variates with a linear predictive model in conjunction with the standardized Monte Carlo variates, the standard deviation of the errors associated with the 200 observations is only 0.45. Thus the standard error for this estimate of the mean of $P$ is $0.45/(200)^{0.5}$ or just 0.03. Thus this is a highly accurate result. The regressions were also repeated and yielded very similar results. The only real difference was that the parameter estimates had small standard errors and were more significant because of the elimination of correlation between the generated parameters.

#### 4.2.6.5 Generalized likelihood estimation

Beven (1993) and Binley and Beven (1991) suggest a Generalized Likelihood Uncertainty Estimation (GLUE) technique for assessment of parameter error uncertainty using Monte Carlo simulation. It is described as a "formal methodology for some of the subjective elements of model calibration" (Beven, 1989, p. 47). The basic idea is to begin by assigning reasonable ranges for the various parameters and then to draw parameter sets from those ranges using a uniform or some similar (and flat) distribution. These generated parameter sets are then used on a calibration data set so that unreasonable combinations can be rejected, while reasonable values are assigned a posterior probability based upon a likelihood measure which may reflect several dimensions and characteristics of model performance.

Let $L(P_i) > 0$ be the value of the likelihood measure assigned to the $i^{th}$ parameter set's calibration sequence. Then the model predictions generated with parameter set/combination $P_i$ are assigned posterior probability, $p(P_i)$.

$$p(P_i) = L(P_i)/\Sigma_j L(P_j) \qquad (20)$$

These probabilities reflect the form of Bayes theorem, which is well supported by probability theory (Devore, 1991). This procedure should capture reasonably well the dependence or correlation among parameters, because *reasonable* sequences will all be assigned larger probabilities, whereas sequences that are unable to reproduce the system response over the calibration period will be rejected or assigned small probabilities.

However, in a rigorous probabilistic framework, the $L$ would be the likelihood function for the calibration series for particular error distributions. (This could be checked with available goodness-of-fit procedures; for example, Kuczera, 1988.) When relatively ad hoc measures are adopted for the likelihood measure with little statistical validity, the $p(P_i)$ probabilities are best described as pseudo probabilities or "likelihood" weights.

Another concern with this method is the potential efficiency. If the parameter ranges are too wide, a large number of unreasonable or very unlikely parameter combinations will be generated. These will either be rejected or else will have small probabilities and thus little effect on the analysis. In this case the associated processing would be a waste of effort. A compromise is to use some data to calibrate the model and to generate a prior or initial distribution for the parameters that is at least centered in the best range (Beven 1993, p. 48). Then use of a different calibration period to generate the $p(P_i)$ allows an updating of those initial probabilities to reflect the information provided by the additional calibration period with the adopted likelihood measures.

After the accepted sequences are used to generate sets of predictions, the likelihood weights would be used in the calculation of means, variances and quantiles, rather than the customary procedure of giving all the generated realizations equal weight. The resulting conditional distribution of system output reflects the initial probability distributions assigned to parameters, the rejection criteria, and the likelihood measure adopted to assign "likelihood" weights.

### 4.2.7 Latin hypercube sampling

For the simple Monte Carlo simulations described above, with independent errors, a probability distribution is assumed for each input parameter or variable. In each simulation run, values of all input data are obtained from sampling those individual and independent distributions. The value generated for an input parameter or variable is usually independent of what that value was in any previous run, or what other input parameter or variable values are in the same run. This simple sampling approach can result in a clustering of parameter values and hence both redundancy of information from repeated sampling in the same regions of a distribution and lack of information from no sampling in other regions of the distributions.

A stratified sampling approach ensures more even coverage of the range of input parameter or variable values with the same number of simulation runs. This can be accomplished by dividing the input parameter or variable space into sections and sampling from each section with the appropriate probability.

One such approach, Latin hypercube sampling (LHS), divides each input distribution into sections of equal probability for the specified the probability distribution, and draws one observation randomly from each range. Hence the ranges of input values within each section actually occur with equal frequency in the experiment. These values from each interval for each distribution are randomly assigned to those from other intervals to construct sets of input values for the simulation analysis. Figure 19 shows the steps in constructing a LHS for six simulations involving three inputs $P_j$ ($P_1$, $P_2$, and $P_3$) and six intervals of their respective normal, uniform and triangular probability distributions.

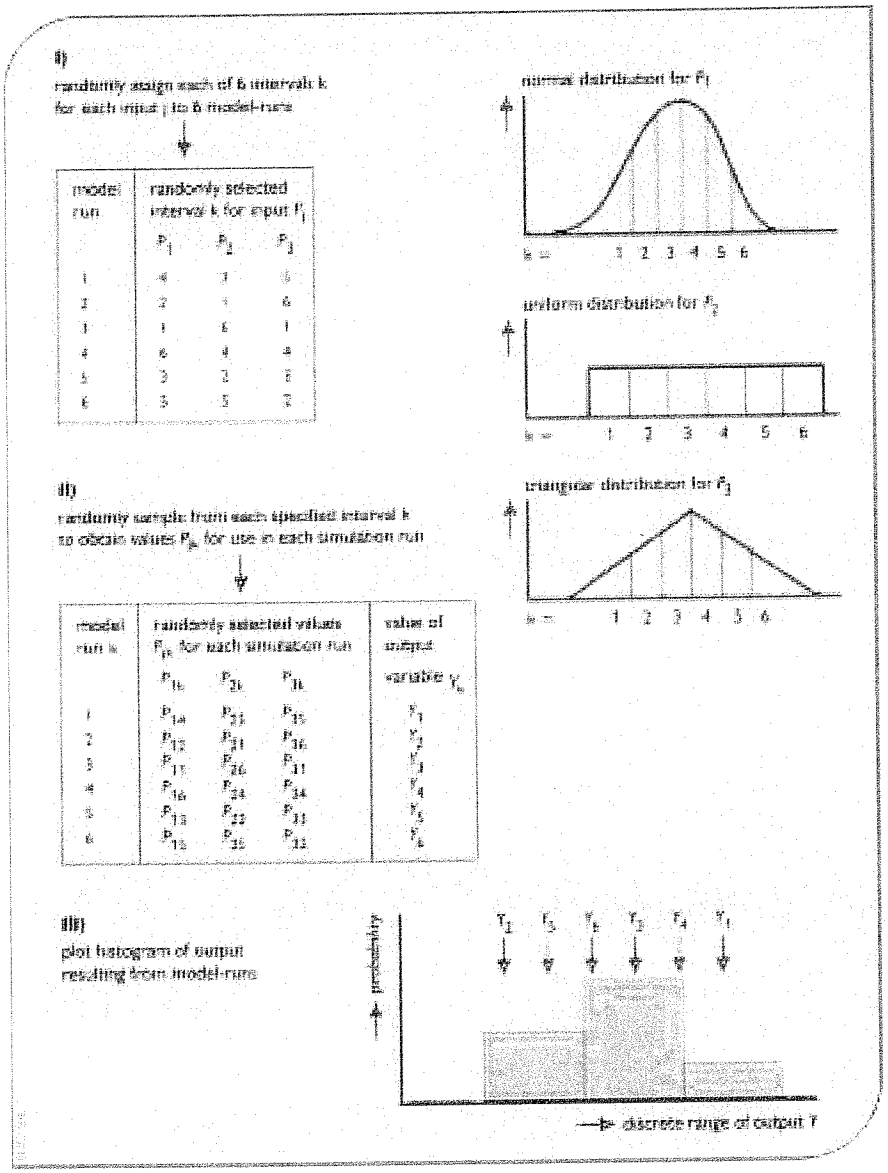


Figure 19. Schematic representation of a Latin hypercube sampling procedure for six simulation runs.

# 5. Performance indicator uncertainties

## 5.1 Performance measure target uncertainty

Another possible source of uncertainty is the selection of performance measure target values. For example, consider a target value for a pollutant concentration based on the effect of exceeding it in an ecosystem. Which target value is best or correct? When this is not clear, there are various ways of expressing the uncertainty associated with any target value. One such method is the use of fuzzy sets (Chapter VI). Use of 'grey' numbers or intervals instead of 'white' or fixed target values is another. When some uncertainty or disagreement exists over the selection of the best target value for a particular performance measure it seems to us the most direct and transparent way to do this is to subjectively assume a distribution over a range of possible target values. Then this subjective probability distribution can be factored into the tradeoff analysis, as outlined in Figure 20.

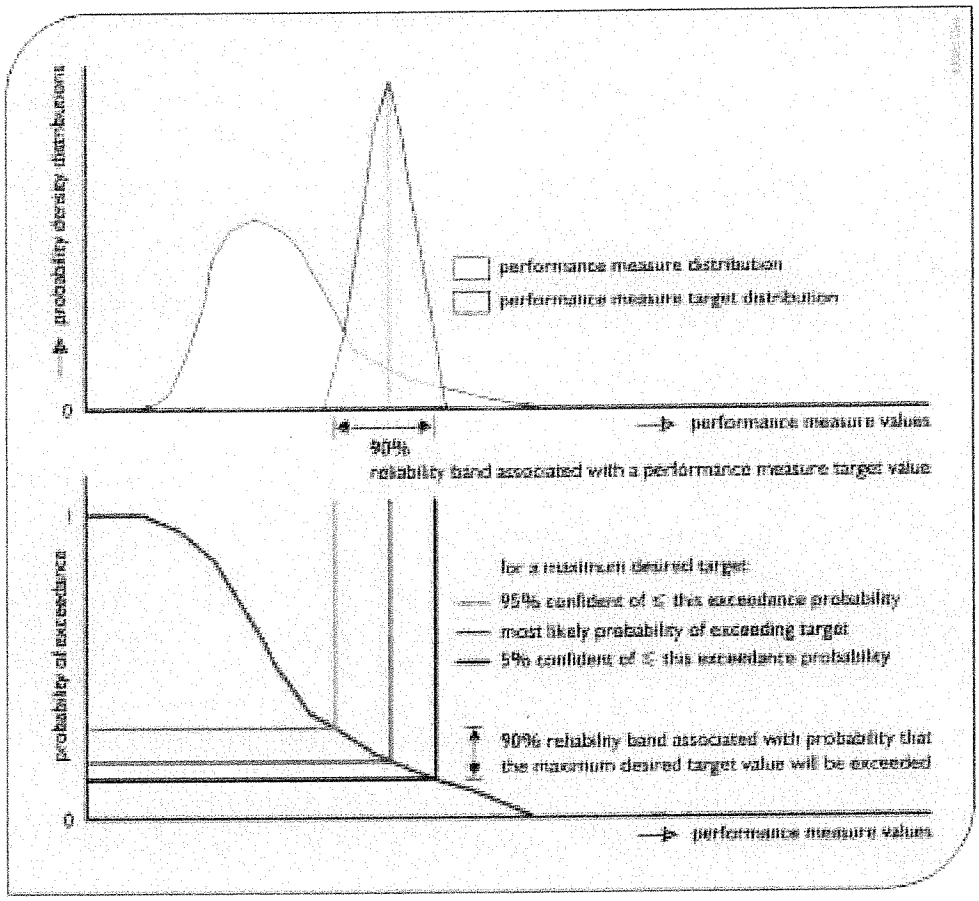


Figure 20. Combining the probability distribution of performance measure values with the probability distribution of performance measure target values to estimate the confidence one has in the probability of exceeding a maximum desired target value.

One of the challenges associated with defining and including in an analysis the uncertainty associated with a target or threshold value for a performance measure is that of communicating just what the result of such an analysis means. Referring to Figure 20, suppose the target value represents some maximum limit of a pollutant, say phosphorus, concentration in the flow during a given period of time at a given site or region, and it is not certain just what that maximum limit should be. Subjectively defining the distribution of that maximum limit, and considering that uncertainty along with the uncertainty (probability of exceedance function) of pollutant concentrations – the performance measure – one can attach a confidence to any probability of exceeding the maximum desired concentration value.

The 95% probability of exceedance shown on Figure 20, say $P_{0.95}$, should be interpreted as "we can be 95% confident that the probability of the maximum desired pollutant concentration being exceeded will be no greater than $P_{0.95}$." We can be only 5% confident that the probability of exceeding the desired maximum concentration will be no greater than the lower $P_{0.05}$ value. Depending on whether the middle line through the subjective distribution of target values in Figure 20 represents the most likely or median target value, the associated probability of exceedance is either the most likely, as indicated in Figure 20, or that for which we are only 50% confident.

Figure 21 attempts to show how to interpret the reliabilities when the uncertain performance targets are

- minimum acceptable levels that are to be maximized,
- maximum acceptable levels that are to be minimized or
- optimum levels.

An example of a minimum acceptable target level might be the population of wading birds in an area. An example of a maximum acceptable target level might be, again, the phosphorus concentration of the flow in a specific wetland or lake. An example of an optimum target level might be the depth of water most suitable for selected species of aquatic vegetation during a particular period of the year.

For performance measure targets that are not expressed as minimum or maximum limits but that are the 'best' values, referring to Figure 21, one can state that one is 90% confident that the probability of achieving the desired target is no more than B. The 90% confidence level probability of not achieving the desired target is at least A+C. The probability of the performance measure being too low is at least A and the probability of the performance measure being too high is at least C, again at the 90% confidence levels. As the confidence level decreases the bandwidth decreases, and the probability of not meeting the target increases.

Now, clearly there is uncertainty associated with each of these uncertainty estimations, and this raises the question of how valuable is the quantification of the uncertainty of each additional component of the plan in an evaluation process. Will plan evaluators and decision makers

benefit from this additional information, and just how much additional uncertainty information is useful?

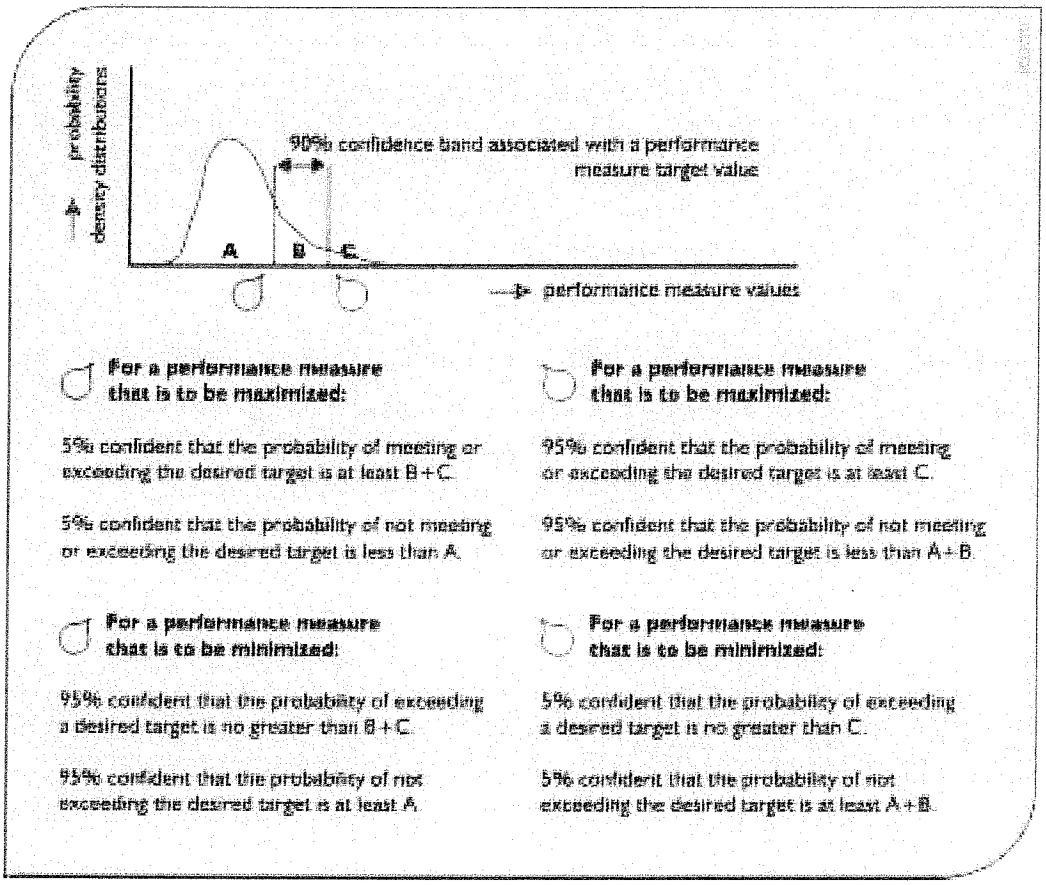


Figure 21. Interpreting the results of combining performance measure probabilities with performance measure target probabilities depends on the type of performance measure. The letters A, B, and C represent proportions of the probability density function of performance measure values. (Hence probabilities A + B + C = 1.)

Now consider again the tradeoffs that need to be made as illustrated in Figure 7. Instead of considering a single target value as shown on Figure 7, assume there is a 90% confidence range associated with that single performance measure target value. Also assume that the target is a maximum desired upper limit (e.g., of some pollutant concentration).

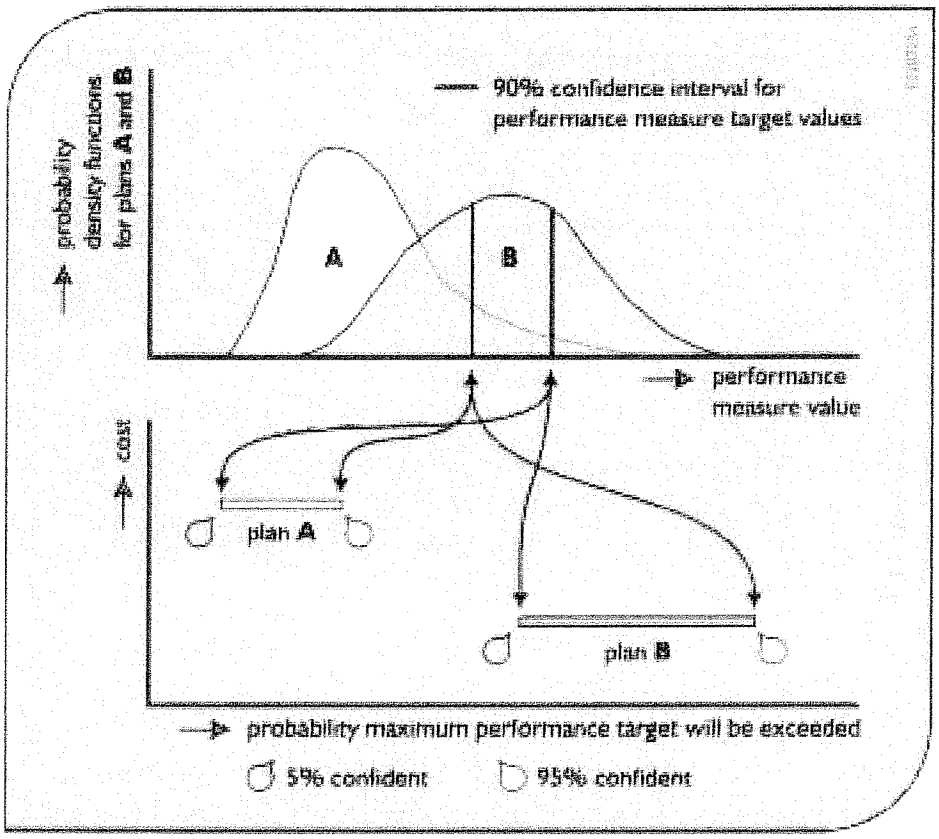


Figure 22. Two plans showing ranges of probabilities, depending on one's confidence, that an uncertain desired maximum (upper limit) performance target value will be exceeded. The 95% confidence levels are associated with the higher probabilities of exceeding the desired maximum target. The 5% confident levels are associated with the more desirable lower probabilities of exceeding the desired maximum target. Plan A with reduced probabilities of exceeding the upper limit costs more than Plan B.

In the case shown in Figure 22, the tradeoff is clearly between cost and reliability. In this example, no matter what confidence one chooses, Plan A is preferred to Plan B with respect to reliability, but Plan B is preferred to Plan A with respect to cost. The tradeoff is only between these two performance indicators or measures.

Consider however a third plan, as shown in Figure 23. This situation adds to the complexity of making appropriate tradeoffs. Now there are three criteria: cost, probability of exceedance (reliability) and the confidence in those reliabilities or probabilities. Add to this the fact that there will be multiple performance measure targets, each expressed in terms of their maximum probabilities of exceedance and the confidence in those probabilities.

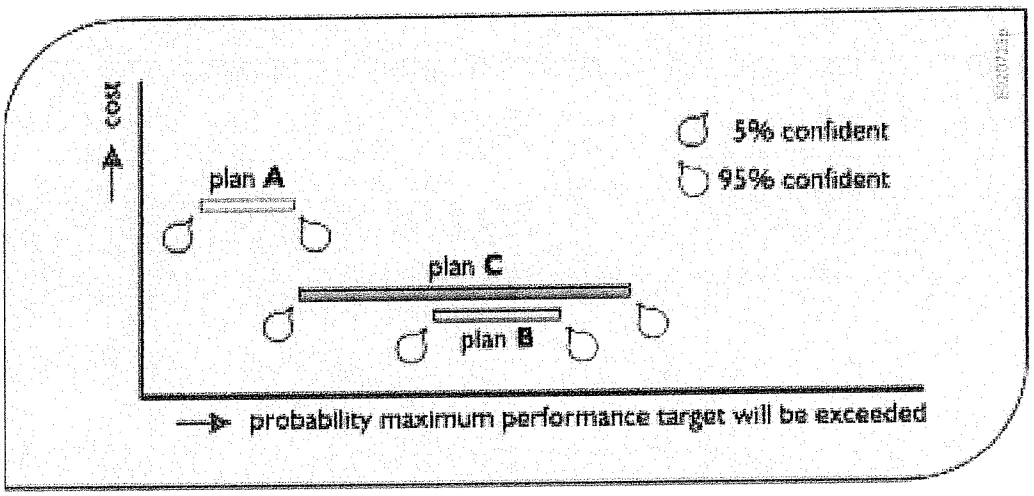


Figure 23. Tradeoffs among cost, reliabilities, and the confidence level of those reliabilities. The relative ranking of plans with respect to the probability of exceeding the desired (maximum limit) target may depend on the confidence given to that probability.

In Figure 23, in terms of cost the plans are ranked, from best to worst, B, C, and A. In terms of reliability at the 90 percent confidence level, they are ranked A, B, and C but at the 50 percent confidence level the ranking is A, C and B.

If the plan evaluation process has difficulty handling all this it may indicate the need to focus the uncertainty analysis effort on just what is deemed important, achievable, and beneficial. Then when the number of alternatives has been narrowed down to only a few that appear to be the better ones, a more complete uncertainty analysis can be performed. There is no need nor benefit in performing sensitivity and uncertainty analyses on all possible management alternatives. Rather one can focus on those alternatives that look the most promising, and then carry out additional uncertainty and sensitivity analyses only when important uncertain performance indicator values demands more scrutiny. Otherwise the work is not likely to affect the decision anyway.

### 5.2 Distinguishing differences between performance indicator distributions

Simulations of alternative water management infrastructure designs and operating policies require a comparison of the simulation outputs – the performance measures or indicators – associated with each alternative. A reasonable question to ask is are the observed differences statistically significant. Can one really tell if one alternative is better than another or are the observed differences explainable by random variations attributable to variations in the inputs and how the system responds?

This is a common statistical issue that is addressed by standard hypothesis tests (Devore, 1991; Benjamin and Cornell, 1970). Selection of an appropriate test requires that one first resolve what type of change one expects in the variables. To illustrate, consider the comparison of two

different operating policies. Let $Y_1$ denote the set of output performance variable values with the first policy, and $Y_2$ the set of output performance variable values of the second policy. In many cases, one would expect one policy to be better than the other. One measure might be the difference in the mean of the variables; for example is $E[Y_1] < E[Y_2]$?. Alternatively one could check the difference in the median (50 percentile) of the two distributions.

In addition, one could look for a change in the variability or variance, or a shift in both the mean and the variance. Changes described by a difference in the mean or median often make the most sense and many statistical tests are available that are sensitive to such changes. For such investigations parametric and non-parametric tests for paired and unpaired data can be employed.

Consider the differences between "paired" and "unpaired" data. Suppose that the meteorological data for 1941-1990 is used to drive a simulation model generating data as described in Table 11:

Table 11. Possible flow data from a 50-year simulation

| | | |
|---|---|---|
| 1941 | $Y_1$ ( 1) | $Y_2$ ( 1) |
| 1942 | $Y_1$ ( 2) | $Y_2$ ( 2) |
| 1943 | $Y_1$ ( 3) | $Y_2$ ( 3) |
| 1944 | $Y_1$ ( 4) | $Y_2$ ( 4) |
| 1989 | $Y_1$ (49) | $Y_2$ (49) |
| 1990 | $Y_1$ (50) | $Y_2$ (50) |

Here there is one sample, $Y_1(1)$ through $Y_1(50)$, for policy 1, and another sample, $Y_2(1)$ through $Y_2(50)$, for policy 2. However, the two sets of observations are not independent. For example, if 1943 was a very dry year, then we would expect both $Y_1(3)$ for policy 1 in that year and $Y_2(3)$ for policy 2 to be unusually small. With such paired data, one can use a paired hypothesis test to check for differences. Paired tests are usually easier than the corresponding unpaired tests that are appropriate in other cases. (For example, if one were checking for a difference in average rainfall depth between 1941-1960, and 1961-1990, they would have two sets of independent measurements for the two periods. With such data, one should use a two-sample unpaired test.)

Paired tests are generally based on the differences between the two sets of output, $Y_1(i) - Y_2(i)$. These are viewed as a single independent sample. The question is then are the differences

positive (say $Y_1$ tends to be larger then $Y_2$), or negative ($Y_1$ tends to be smaller), or are positive and negative differences are equally likely (there is no difference between $Y_1$ and $Y_2$).

Both parametric and non-parametric families of statistical tests are available for paired data. The common parametric test for paired data (a one-sample t test) assumes that the mean of the differences

$$X(i) = Y_1(i) - Y_2(i) \tag{21}$$

are normally distributed. Then the hypothesis of no difference is rejected if the t statistic is sufficiently large, given the sample size $n$.

Alternatively, one can employ a nonparametric test and avoid the assumption that the differences $X$(i) are normally distributed. In such a case, one can use the Wilcoxon Signed Rank test. This nonparametric test ranks the absolute values $|X(i)|$ of the differences. If the sum $S$ of the ranks of the positive differences deviates sufficiently from its expected value, $n(n+1)/4$ (were there no difference between the two distributions), one can conclude that there is a statistically significant difference between the $Y_1(i)$ and $Y_2(i)$ series. Standard statistical texts have tables of the distribution of the sum $S$ as a function of the sample size $n$, and provide a good analytical approximation for $n > 20$ (for example, Devore, 1991). Both the parametric t test and the nonparametric Wilcoxon Signed Rank test require that the differences between the simulated values for each year be computed.

## 6. Communicating model output uncertainty

Spending money on reducing uncertainty would seem preferable to spending it on ways of calculating and describing it better. Yet attention to uncertainty communication is critically important if uncertainty analyses and characterizations are to be of value in a decision making process. In spite considerable efforts by those involved in risk assessment and management, we know very little about how to ensure effective risk communication to gain the confidence of stakeholders, incorporate their views and knowledge, and influence favorably the acceptability of risk assessments and risk-management decisions.

The best way to communicate concepts of uncertainty may well depend on what the audiences already know about risk and the various types of probability distributions (e.g., density, cumulative, exceedance) based on objective and subjective data, and the distinction between mean or average values and the most likely values. Undoubtedly graphical representations of these ways of describing uncertainty considerably facilitate communication.

The National Research Council (NRC 1994) addressed the extensive uncertainty and variability associated with estimating risk and concluded that risk characterizations should not be reduced to a single number or even to a range of numbers intended to portray uncertainty. Instead, the report recommended managers and the interested public should be given risk characterizations that are both qualitative and quantitative and both verbal and mathematical.

In some cases communicating qualitative information about uncertainty to stakeholders and the public in general may be more effective than quantitative information. There are, of course, situations in which quantitative uncertainty analyses are likely to provide information that is useful in a decision-making process. How else can tradeoffs such as illustrated in Figures 10 and 27 be identified? Quantitative uncertainty analysis often can be used as the basis of qualitative information about uncertainty, even if the quantitative information is not what is communicated to the public.

One should acknowledge to the public the widespread confusion regarding the differences between variability and uncertainty. Variability does not change through further measurement or study, although better sampling can improve our knowledge about variability. Uncertainty reflects gaps in information about scientifically observable phenomena.

While it is important to communicate uncertainties and confidence in predictions, it is equally important to clarify who or what is at risk, possible consequences, and the severity and irreversibility of an adverse effect should a target value, for example, not be met. This qualitative information is often critical to informed decision-making. Risk and uncertainty communication is always complicated by the reliability and amounts of available relevant information as well as how that information is presented. Effective communication between people receiving information about who or what is at risk, or what might happen and just how severe and irreversible an adverse effect might be should a target value not be met, is just as important as the level of uncertainty and the confidence associated with such predictions. A two-way dialog between those receiving such information and those giving it can help identify just what seems best for a particular audience.

Risk and uncertainty communication is a two-way street, It involves learning and teaching. Communicators dealing with uncertainty should learn about the concerns and values of their audience, their relevant knowledge, and their experience with uncertainty issues. Stakeholders' knowledge of the sources and reasons for uncertainty needs to be incorporated into assessment and management and communication decisions. By listening, communicators can craft risk messages that better reflect the perspectives, technical knowledge, and concerns of the audience.

Effective communication should begin before important decisions have been made. It can be facilitated in communities by citizen advisory panels. Citizen advisory panels can give planners and decision makers a better understanding of the questions and concerns of the community and an opportunity to test its effectiveness in communicating concepts and specific issues regarding uncertainty.

One approach to make uncertainty more meaningful is to make risk comparisons. For example, a ten parts per billion target for a particular pollutant concentration is equivalent to 10 seconds in over 31 years. If this is an average daily concentration target that is to be satisfied "99 percent," of the time, this is equivalent to an expected violation of less than one day every three months.

Many perceive the reduction of risk by an order of magnitude as though it were a linear reduction. A better way to illustrate orders of magnitude of risk reduction is shown in Figure 24, in which a bar graph depicts better than words that a reduction in risk from one in a 1,000 ($10^{-3}$) to one in 10,000 ($10^{-4}$) is a reduction of 90% and that a further reduction to one in 100,000 ($10^{-5}$) is a reduction 10-fold less than the first reduction of 90%. The percent of the risk that is reduced by whatever measures is a much easier concept to communicate than reductions expressed in terms of estimated absolute risk levels, such as $10^{-5}$.

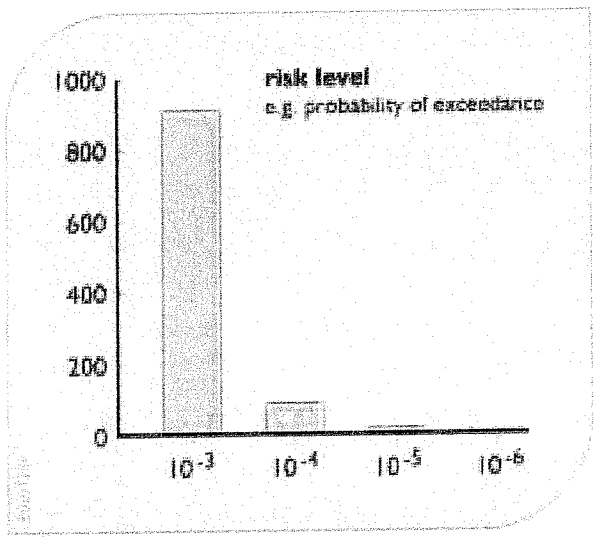


Figure 24. Reducing risk by orders of magnitude is not equivalent to linear reductions.

Risk comparisons can be helpful, but they should be used cautiously and tested if possible. There are dangers in comparing risks of diverse character, especially when the intent of the comparison is seen as minimizing a risk (NRC 1989). One difficulty in using risk comparisons is that it is not always easy to find risks that are sufficiently similar to make a comparison meaningful. How is someone able to compare two alternatives having two different costs and two different risk levels, for example, as is shown in Figure 7? One way is to perform an indifference analysis (Chapter X), but that can lead to different results depending who performs it. Another way is to develop utility functions using weights, where, for example reduced phosphorus load by half is equivalent to a 25 percent shorter hydroperiod in that area, but again each person's utility or tradeoff may differ.

At a minimum, graphical displays of uncertainty can be helpful. Consider the common system performance indicators that include:

- Time-series plots for continuous time-dependent indicators (Figure 25 upper left)
- Probability exceedance distributions for continuous indicators (Figure 25 upper right),
- Histograms for discrete event indicators (Figure 25 lower left), and
- Overlays on maps for space-dependent discrete events (Figure 25 lower right).

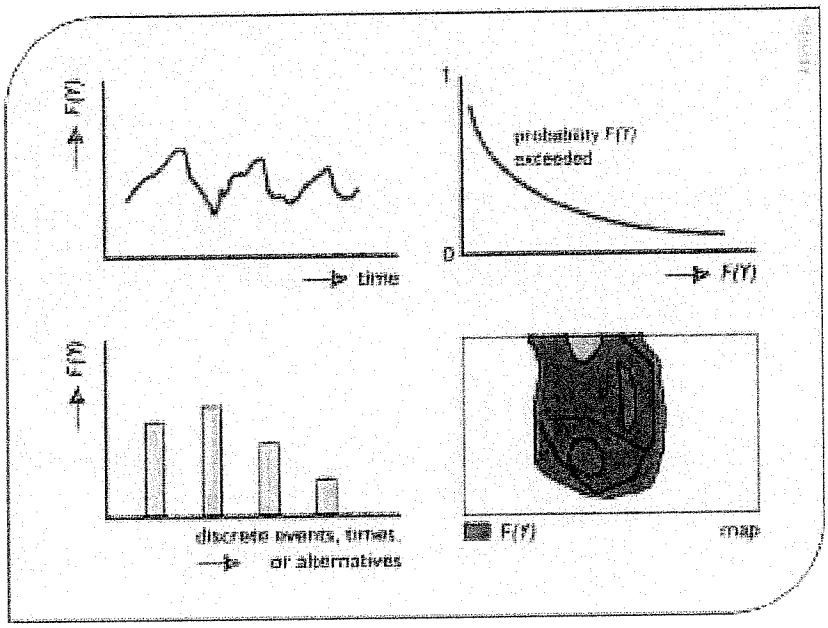


Figure 25. Different types of displays used to show model output $Y$ or system performance indicator values $F(Y)$.

The first three graphs in Figure 25 could show, in addition to the single curve or bar that represents the most likely output, a range of outcomes associated with a given confidence interval. For overlays of information on maps, different colors could represent the spatial extents of events associated with different ranges of risk or uncertainty. Figure 26, corresponding to Figure 25, illustrates these approaches for displaying these ranges.

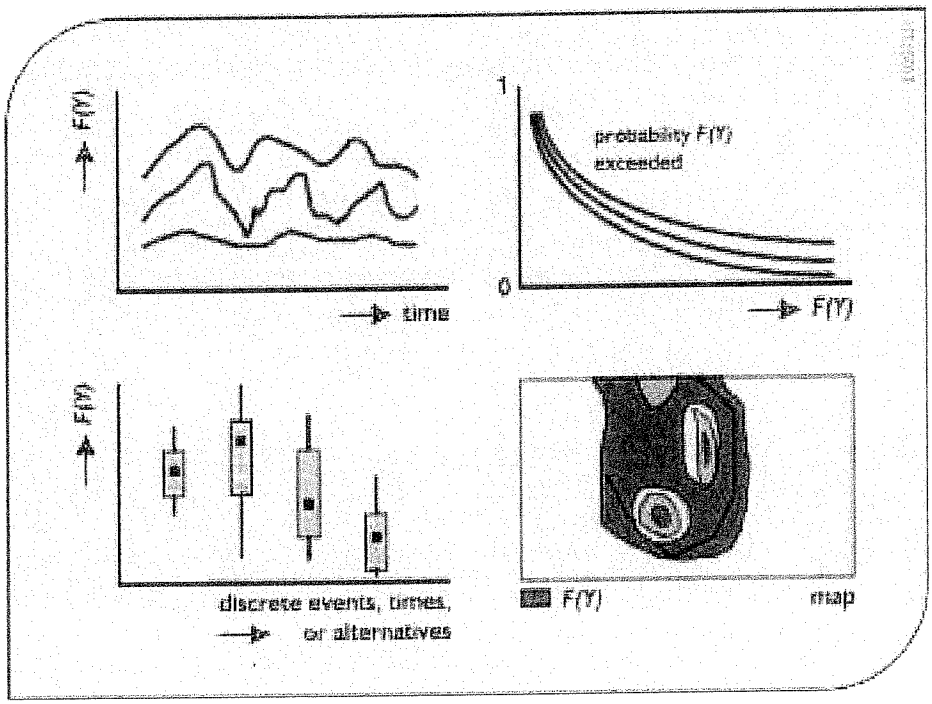


Figure 26. Plots of ranges of possible model output $Y$ or system indicator values $F(Y)$ for different types of displays.

## 7. Conclusions

This chapter provides an overview of uncertainty and sensitivity analyses in the context of hydrologic or water resources systems simulation modeling. A broad range of tools are available to explore, display, and quantify the sensitivity and uncertainty in predictions of key output variables and system performance indices with respect to imprecise and random model inputs and to assumptions concerning model structure. They range from relatively simple deterministic sensitivity analysis methods to more involved first-order analyses and Monte Carlo sampling methods.

Because of the complexity of many watersheds or river basins, Monte Carlo methods for uncertainty analyses may be a very major and unattractive undertaking. Therefore it is often prudent begin with the relatively simple deterministic procedures. This coupled with a probabilistically based first-order uncertainty analysis method can help quantify the uncertainty in key output variables and system performance indices, and the relative contributions of uncertainty in different input variables to the uncertainty in different output variables and system performance indices. These relative contributions may differ depending upon which output variables and indices are of interest.

A sensitivity analysis can provide a systematic assessment of the impact of parameter value imprecision on output variable values and performance indices, and of the relative contribution of errors in different parameter values to that output uncertainty. Once the key variables are identified, it should be possible to determine the extent to which parameter value uncertainty can be reduced through field investigations, development of better models, and other efforts.

Model calibration procedures can be applied to individual catchments and subsystems, as well as to composite systems. Automated calibration procedures have several advantages including the explicit use of an appropriate statistical objective function, identification of those parameters that best reproduce the calibration data set with the given objective function, and the estimations of the statistical precision of the estimated parameters.

All of these tasks together can represent a formidable effort. However, knowledge of the uncertainty associated with model predictions can be as important to management decision and policy formulation as are the predictions themselves.

No matter how much attention is given to quantifying and reducing uncertainties in model outputs, uncertainties will remain. Professionals who analyze risk, managers and decision makers who must manage risk, and the public who must live with risk and uncertainty, have different information needs and attitudes regarding risk and uncertainty. It is clear that information needs differ among those who model or use models, those who make substantial investment or social decisions, and those who are likely to be impacted by those decisions. Meeting those needs should result in more informed decision making. But it comes at a cost that should be considered along with the benefits of having this sensitivity and uncertainty information.

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- *Use of models for Allocating Water in Texas*

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ASSOCIATION OF CALIFORNIA WATER AGENCIES • SINCE 1910

# ACWA NEWS

A Biweekly Newsletter for ACWA Members • Vol. 32, No. 12 • June 14, 2004

## Levee Break Floods 12,000 Acres; State, Federal Officials Move to Protect Water Supplies

Governor Schwarzenegger on June 4 declared a state of emergency in San Joaquin County following a major levee failure in the Sacramento-San Joaquin River Delta. Hundreds of people were evacuated, up to 12,000 acres — nearly 20 square miles of agricultural land — were flooded, and ACWA members as well as state and federal water officials began monitoring water quality and water supply issues. Cost estimates related to the levee break are now estimated at $18 million. Repairs could take 45-60 days.

Continued on page 3

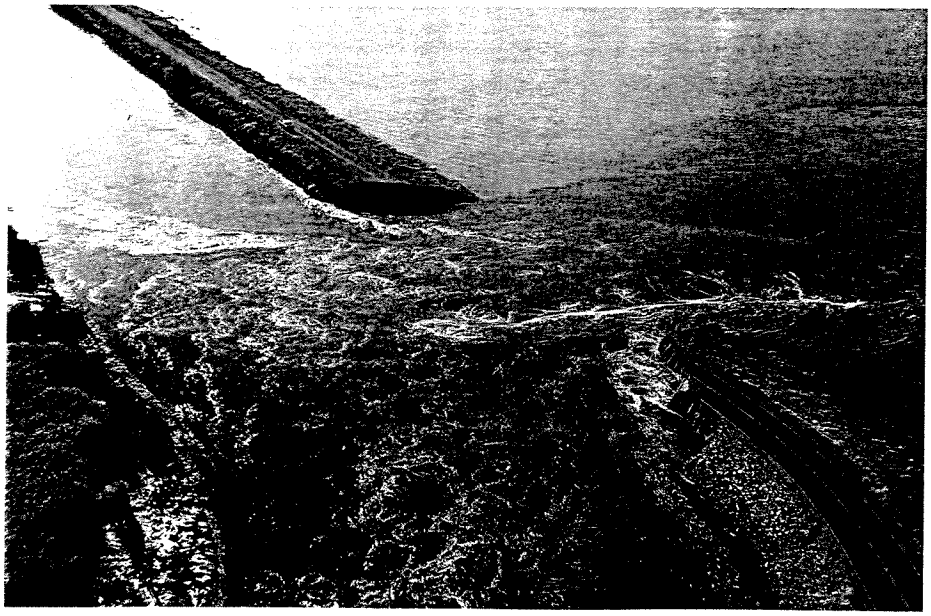

Photo by California Department of Water Resources

**After a major levee gave way June 3 in the Sacramento-San Joaquin River Delta, Governor Schwarzenegger declared a state of emergency in San Joaquin County, and state and federal water officials, along with ACWA members, began coordinating efforts to ensure the maximum protection of water supplies for the State Water Project and Central Valley Project.**

### What's Inside:

LOCAL Initiative Qualifies for November Ballot ..... 7

ACWA Joins Flex Your Power at the Pump Campaign ..... 8

ACWA Board of Directors Meets in Sacramento ... 9

www.acwanet.com

## Special District Community Issues Letters of Support to Legislators, Governor for Local Government Accord

In an unprecedented move to support Governor Schwarzenegger's local government financing reform package, the special district community has joined forces in a series of letters urging support for the package. The special district community issued a letter to legislative leadership, the Schwarzenegger Administration, and each association's membership outlining the importance of the package, stating that despite the short-term

Continued on page 7

*continued from front page*

ACWA members and others have been warning lawmakers and local, state and federal water officials for years that the fragile levee system in the Delta was an accident waiting to happen. "California has not made the investment needed to properly secure these levees that are vital to the hub of the state's water system," said ACWA Executive Director Steve Hall. The Delta is the source of drinking water for two-thirds of the state's residents and irrigates thousands of acres of farmland.

On Thursday June 3, the state's San Joaquin Office of Emergency Services reported a levee break of 200-300 feet on the Middle River Levee, which protects the Delta island known as Jones Tract. The levee failed between the Woodward Island Ferry crossing and the railroad. The break, which soon grew to 500 feet wide and 20 feet deep, occurred in a privately owned levee that protects an island used to grow corn, asparagus and other crops. The levee is in Reclamation District 2039.

The failure point was approximately two miles northeast of Contra Costa Water District's Old River Pumping Station. As soon as the levee failed, the district began monitoring the Delta water quality.

Lower Jones Tract is described as a very large island, and is hydraulically connected to Upper Jones, another very large island. East Bay Municipal Utility District (EBMUD) has three aqueducts that cross this five-mile-wide island located just north of Highway 4 and about 10 miles west of Interstate 5 near Stockton. The aqueducts are large pipelines that deliver water from the Sierra Foothills to water treatment plants in the East Bay. The breach is about one mile south of EBMUD's aqueducts and the aqueducts do not appear to be in danger. Except for flooding around the aqueducts, the district anticipated no immediate impacts. EBMUD water quality is not affected by the flooding.

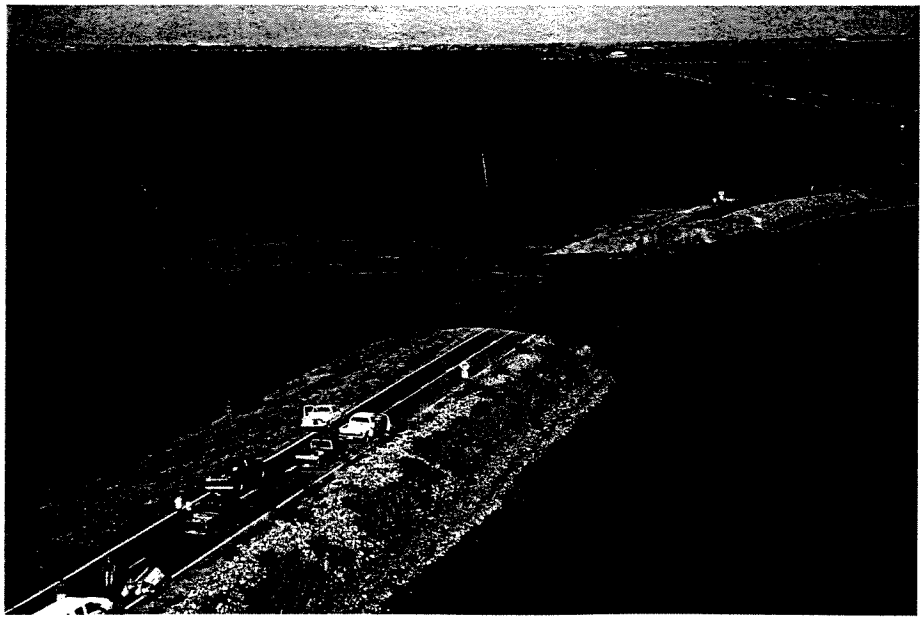

*Photo by California Department of Water Resources*

**The San Joaquin Office of Emergency Services June 3 reported a levee break of 200-300 feet in the Sacramento-San Joaquin River Delta. Officials estimated the breach widened to as much as 500 feet.**

State and federal water officials are coordinating efforts to ensure the maximum protection of water supplies for the State Water Project and Central Valley Project. After the break, the U.S. Bureau of Reclamation decreased water exports from the Sacramento-San Joaquin River Delta by 80% and increased freshwater flows from the Sacramento River. The state's pumps were down for maintenance.

Ronald R. Gastelum, chief executive officer of Metropolitan Water District of Southern California, said Southern California is expected to withstand the levee break. "Fortunately, Southern California has sufficient water supplies south of the Bay-Delta in Central Valley groundwater storage projects and state project facilities, including San Luis Reservoir, Castaic Lake and Lake Silverwood," Gastelum said.

As *ACWA News* went to press, the state was pumping at Banks Pumping Plant at 2,000 cubic feet per second (cfs) and the Bureau was pumping at 1,600 cfs at its Tracy Pumping Plant. The U.S. Fish and Wildlife Service reported that no major fish species were impacted yet. The U.S. Army Corps of Engineers is in charge of the levee repair work.

### Governor's Proclamation

"I'm deeply concerned for those San Joaquin County farmers that have lost farmland as a result of this unfortunate flood," said Governor Schwarzenegger. "The state of California will work with local agencies to ensure that the levee is repaired and the water is removed from the Upper and Lower Jones Tracts.

"I've directed the Office of Emergency Services (OES) to ensure that all necessary state resources are brought to

Continued on next page

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bear in both the response to and recovery from this emergency."

The governor's action will provide financial relief to the local governments and reclamation districts for the costs of repairing the levee and removing the water that has flowed through. At the governor's direction, OES will also be working with the U.S. Department of Agriculture's Farm Service Agency to see if farmers impacted by this flood may be eligible for emergency loans to help recover from production or physical losses.

### Statement From State Water Resources Director

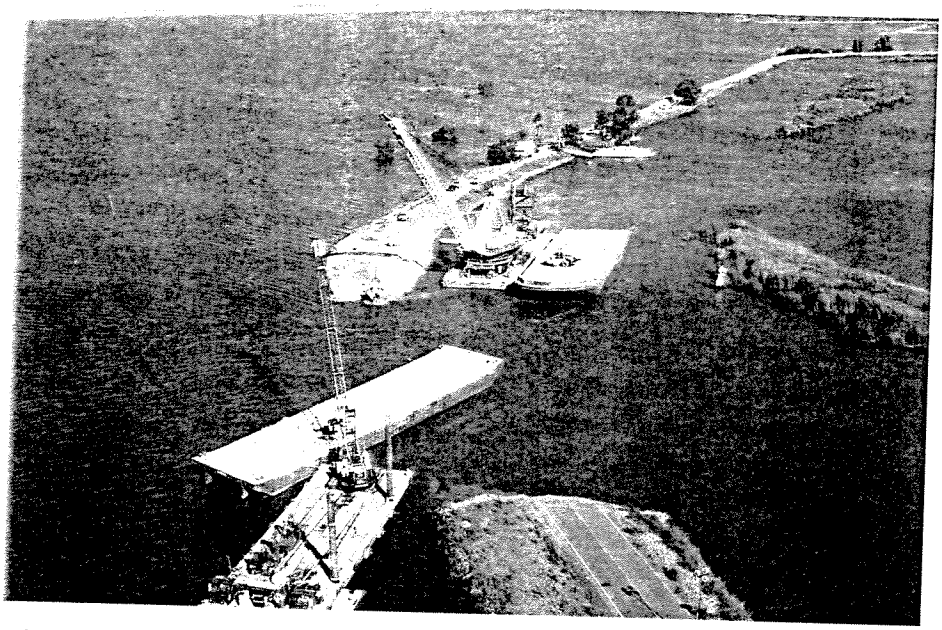
California Department of Water Resources Director Lester A. Snow June 4 issued a statement addressing water quality in the Delta following the levee break:

"I want to assure the public that receives water from the Delta that the Department of Water Resources and the U.S. Bureau of Reclamation are coordinating efforts to ensure the maximum protection of water supplies for the State Water Project (SWP) and the federal Central Valley Project (CVP).

"We are taking additional steps to closely monitor water quality conditions in the Delta. While recent high tides have likely caused a slight increase in salinity, we expect conditions to stabilize soon.

## Actions Taken to Protect Water Quality

- The U.S. Bureau of Reclamation has increased releases of fresh water from Shasta Dam to help control salinity.
- The California Department of Water Resources and Bureau of Reclamation have reduced pumping at their South Delta export pumps to reduce the intrusion of seawater.
- Gates at the Delta Cross Channel have been opened to move Sacramento River water into the central Delta to repel seawater intrusion.
- The Department of Water Resources is monitoring Delta water quality at more than 20 sites.
- The Department of Water Resources is monitoring channel velocity changes in the Jones Tract area of the Delta.



**The U.S. Army Corps of Engineers is heading the levee repair effort.**

## Levee System Integrity Among CALFED's Major Program Elements

The Bay-Delta Plan is a balanced, comprehensive approach to reduce conflicts over limited water supplies and to address the program's four objectives through 11 major program elements. Levee system integrity is among the major program elements. With its focus on improving Bay-Delta levees, CALFED is acting to protect water supplies needed for the environment, agriculture and urban uses by reducing the threat of levee failure and seawater intrusion. Delta levees also protect major interstates, roadways, cities, towns, agricultural lands, and environmental and aquatic habitat.

### Goals

- Improve levees to a higher standard for greater flood protection
- Improve emergency response capabilities
- Ensure levee maintenance and habitat needs are met
- Improve coordination of permit processes
- Develop adequate and reliable funding for levee maintenance.

*Source: CALFED Bay-Delta Program Web site at http://calwater.ca.gov*

"The water projects are expected to return to normal operations next week. We will continue working around the clock to assure that CVP and SWP contractors can meet their needs while avoiding unnecessary reliance upon water in storage south of the Delta."

### CALFED

Levee system integrity is among the major program elements of the CALFED Bay-Delta Program. As *ACWA News* went to press, the California Bay-Delta Authority was beginning a two-day meeting in Sacramento. Look for coverage from the meeting in the next *ACWA News* and also updates on the levee situation. www.acwanet.com will also feature updates.

*Photo by California Department of Water Resources*

**The levee break in San Joaquin County flooded 12,000 acres in the Delta.**

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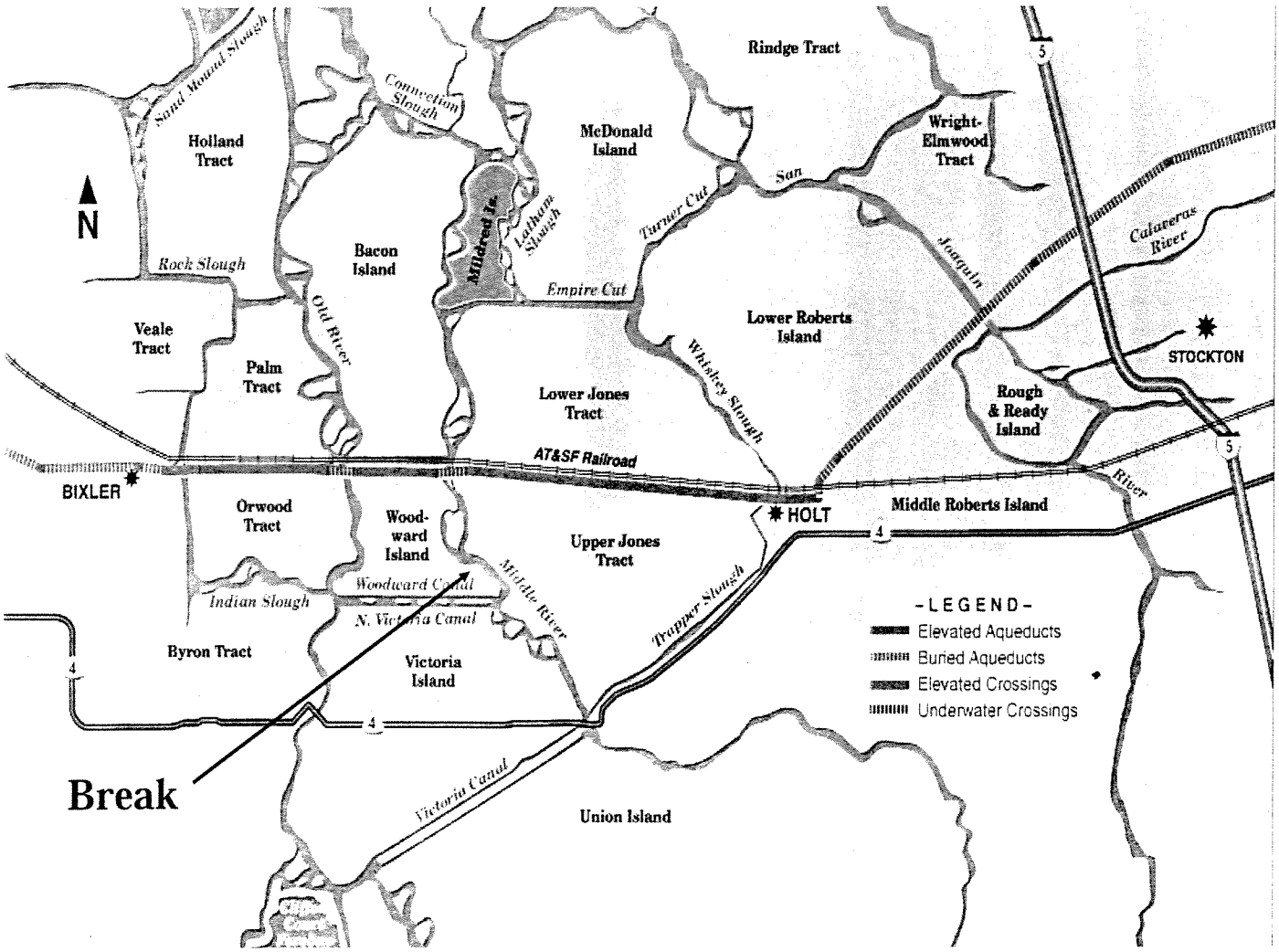


*Map courtesy of East Bay Municipal Utility District's Web site*

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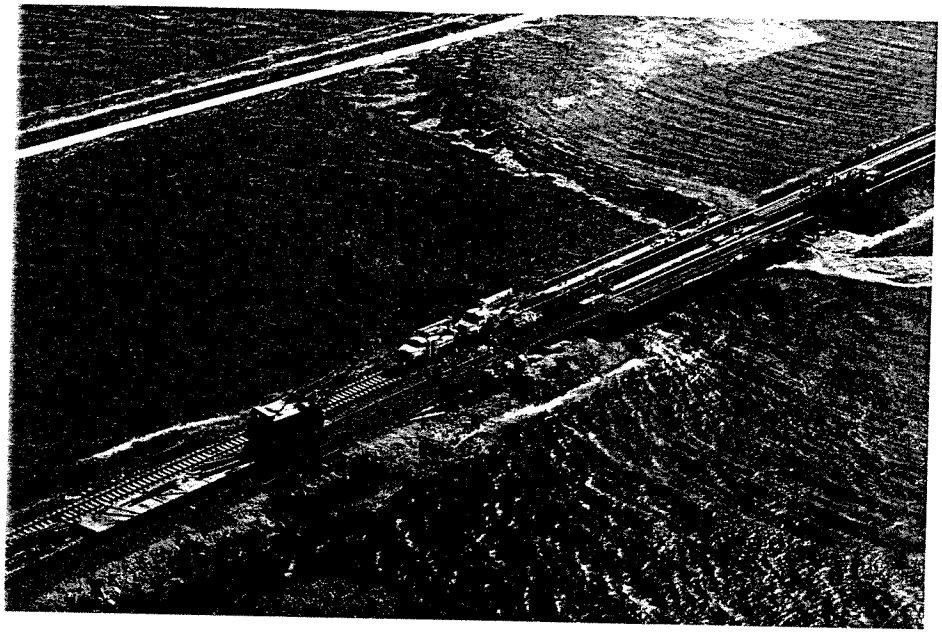

*Photo by California Department of Water Resources*

**Flood waters lap against railroad tracks.**

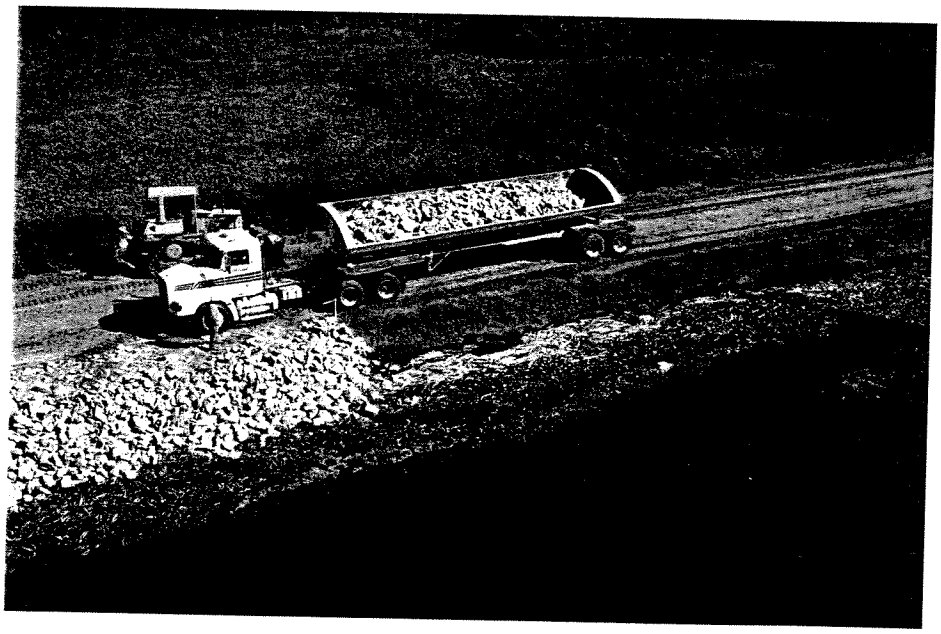

*Photo by California Department of Water Resources*

**Repair work began quickly after a levee failed in the Sacramento-San Joaquin River Delta. The U.S. Army Corps of Engineers is in charge of the levee repair work. The latest cost estimate to repair the break is $18 million. Repairs are now estimated to take 45-60 days.**

## EBMUD Efforts to Protect Aqueduct System

East Bay Municipal Utility District provided the following information on its Web site at www.ebmud.com:

Delta area levees were constructed in a non-engineered manner in the late 1800s and their vulnerability to failure is well known. Lower Jones Tract levees failed and both Upper and Lower Jones Tracts flooded in 1980. EBMUD efforts to protect the aqueduct system include ongoing funding for levee maintenance projects and the $39 million Mokelumne Aqueduct Seismic Upgrade Project currently underway.

The aqueduct seismic upgrades not only protect the aqueduct in the event of an earthquake affecting the Delta region, but also mitigates the hazards associated with a levee breach. The key hazard posed by a breach is fast-moving water eroding the foundation of the aqueducts (scour).

In 1999, EBMUD reinforced the levees where the aqueducts cross under the rivers and that work included both locations where the aqueducts enter and exit Upper Jones Tract. This strengthening substantially reduces the risk of a breach near the aqueduct thereby reducing the potential of scour to aqueduct foundations.

When a breach occurs away from the aqueduct, as it did on June 3, the flooding causes no hazard to the aqueduct other than to limit accessibility.

TriCounty Watchdogs

Tri-County Watchdogs

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www.tcwdogs.org

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August 13, 2004

Castaic Lake Water Agency
attn. Marylou Cotton
27234 Bouquet Canyon Rd.
Saugus, CA 91350

About: 41,000 Acre Foot Water Transfer SCH# 1998041127

Dear Ms. Cotton:

It is our understanding that this environmental document is being re-circulated by Court Order because the program EIR on which it was based was set aside in the decision PCL v. DWR, 2000. In that decision the Court found that an individual contractor (Central Coast Water Agency) could not be the lead agency for a state wide project that had impacts to a wide geographical and social group of people. The decision found that the Department of Water Resources should be the correct lead agency. We would like to express our dismay that your agency is now proceeding once again in a manner contrary to law by circulating this document as the lead agency and before the Monterey Agreement EIR has been completed. We note that the same General Manager of Central Coast Water Agency, Dan Masnada, that was found to be in violation of CEQA for proceeding as the wrong lead agency, is now the general manager of Castaic Lake Water Agency. In that capacity, he is once again directing his agency to proceed as lead agency in violation of the law. **88**

We believe that the Department of Water Resources must be the lead agency for the discussion of the statewide impacts of water transfers for the following reasons.

1. The published appellate decision in PCL v. DWR, 2000 stated "We agree with the trial court that DWR, not CCWA, has the statutory duty of assessing environmental consequences of projects involving the SWP [State Water Project]." (Pg. 1 of decision). We incorporate this decision by reference into the administrative record.
2. DWR is best suited to ensure that widespread notification of interested parties occur.
3. DWR is best suited to recognize environmental impacts that might be incurred to a wide spread area of the state as a result of this water transfer and to properly asses such impacts.
4. DWR, in its capacity as operations manager of the SWP, will be acquainted with other state projects that would affect or be affected by this transfer.

Many anomalies in the CEQA process have already occurred because the general Manager of Castaic lake Water Agency has chosen to proceed contrary to law and to the published appellate court decision in a case to which he was a party. This includes the fact that we were not notified of the circulation of this draft EIR, nor were others in water districts including Berenda Mesa and in other areas statewide. Further, it has recently come to our attention that Berenda Mesa has published a draft EIR to withdraw/divert approximately 70,000AF from local streams and ground water sources. Since the transfer of SWP surface water will affect ground water pumping sources, this EIR and its impacts must be included and addressed during the water transfer review process. We therefore believe this document must be included in the review process and incorporate it by reference. **89** **90**

The original purpose of the state water project was to provide a supplementary water source so that ground water would not be pumped in excess of sustainable levels. Now it appears that this water transfer will bring about the very situation one sought to avoid. We believe it is imperative that CLWA notify all interested parties in Berenda Mesa and other areas proposing increased ground water pumping, of their intention to make this transfer, because pumping **91**

of ground water sources to replace state water transferred to other areas will have significant impacts on the Public Trust and the viability of farming operations. **91**

Such impacts to ground water that affect both public trust surface flows and water for farming, should be addressed in the program EIR. It is therefore improper for CLWA to proceed before the completion of the Monterey Agreement EIR. **92**

In conclusion we request that this document be withdrawn, that the document not be re-submitted for circulation until the Monterey agreement EIR is completed and certified and that all parties whose ground water may be impacted are properly notified when re-circulation occurs. **93**

Thank you for your time.
Sincerely Yours,

Jan de Leeuw, Ph.D.

cc: Kern County Water Agency,
Wheeler Ridge Maricopa Water Storage District,
Department of Water Resources

Castaic Lake Water Agency
attn. Marylou Cotton
27234 Bouquet Canyon Rd.
Saugus, CA 91350

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# UNITED WATER CONSERVATION DISTRICT

"Conserving Water Since 1927"

July 26, 2004

Ms Mary Lou Cotton
Water Resources Manager
Castaic Lake Water Agency
27234 Bouquet Canyon Road
Santa Clarita, CA 91350

Re: Draft Environmental Impact Report California State Clearinghouse No. 4998041127 Castaic Lake Water Agency Supplemental Water Project Transfer of 41,000 Acre-Feet of State Water Project Table A Amount

Dear Mary Lou,

United Water Conservation District has reviewed the Draft EIR for the proposed transfer of 41,000 acre-feet of State Water Project Table A Amount water from the Kern County Water Agency's member unit Wheeler Ridge-Maricopa Water Storage District to Castaic Lake Water Agency. This proposed transfer of SWP water is beneficial to the Santa Clara River Watershed and is fully endorsed by United Water. **94**

The permanent transfer of 41,000 acre-feet of SWP water to the Castaic Lake Water Agency provides a valuable additional source of water for the Santa Clarita Valley. This additional water improves the potential for conjunctive-use of water within the valley. This is especially important given the urbanization of this area. Increased surface water supplies should provide water managers throughout the basin more flexibility with respect to the magnitude of additional groundwater pumping needed to meet the escalating M&I demand for water within the basin. **95**

Although discussed in various sections within the Draft EIR, it should be reemphasized here that 41,000 acre-feet of SWP Table A Amount water doesn't guarantee this amount can be delivered every year. Hydrologic conditions and storage carryover in any particular year primarily dictate the annual allocation of water to the SWP Contractors. Historic deliveries to M&I Contractors should not be used to project future deliveries. The adoption of the Monterey Amendment (following the principles of the Monterey Agreement) will require that M&I Contractors and Agricultural Contractors more equitably share the pain of future water shortages. During the previous drought, allocations, as a percentage of Table A Amount (Entitlement), to Agriculture Contractors were significantly less than allocations to the M&I Contractors. **96**

106 N. 8th Street • Santa Paula, California 93060 • Phone (805) 525-4431 • FAX: (805) 525-2661

UNITED WATER CONSERVATION DISTRICT

As an ongoing general comment to all water purveyors within the Santa Clarita Valley, United Water has a very real interest in the continued health of the Santa Clarita Groundwater Basin and the flow of the Santa Clara River. United Water represents the collective interests of downstream residents that depend on the flow of the Santa Clara River for recharge to groundwater, surface water diversions, and environmental mandates. United Water's goal is that the quantity and water quality associated with the flow of the Santa Clara River into Ventura County not be diminished. The development and implementation of the inter-Agency regional monitoring program of groundwater levels, groundwater quality, surface water flows, and surface water quality should provide ongoing data with respect to the relative health of the Santa Clarita and downstream basins as well as surface water. In the event that surface water flow into Ventura County is diminished in either quantity or quality, and can be reasonably linked to over pumping of the aquifer systems and/or surface water discharges to the river within Santa Clarita Valley, United Water would seek to remedy the problem. 97

We appreciate the efforts of CLWA to appropriately plan and augment the water supplies of our watershed as represented by this water transfer project. If you should have questions please contact either Ken Turner or myself at (805) 525-4431.

Sincerely,

Dana L. Wisehart

Dana L. Wisehart
General Manager

Cc: BDRF
Ron Calkins, P.E., Public Works Director, City of San Buenaventura
Cliff Finley, P.E., Public Works Director, City of Santa Paula
Carrie Mattingly, Director of Utilities Services, City of Port Hueneme
Mike Miller, General Manager, Pleasant Valley County Water District
Ken Ortega, P.E., Water Superintendent, City of Oxnard
Lowell Preston Ph.D., Manager, Water Resources Division, Ventura County
Bert Rapp, P.E., City Engineer, City of Fillmore
Robert Sawyer, Santa Paula Basin Pumpers Association

File: Castaic Lake Water Agency
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FAX to (661) 297 1611

Mary Lou Cotton
Water Resources Manager
Castaic Lake Water Agency
27234 Bouquet Canyon Rd.
Santa Clarita, CA 91350

Dear Ms. Cotton:

Please accept these comments with the attachments in opposition to the proposed transfer. Besides being an arrogation of power by CLWA unto itself, it flies in the face of the present process at the State level to properly assess the environmental impacts of the Monterey Amendments as mandated by the Court of Appeals. What is particularly troubling is the adoption of material developed by DWR on SWP reliability which is demonstrably in-correct. As a member of the plaintiff committee presently engaged with DWR to fashion a new Monterey EIR, I am quite aware of the issues involved with the CALSIM II model, which is the model used to generate the incorrect information on SWP reliability. The attached analysis shows why the reliability information is incorrect and argues that until the CALSIM II model can correct its fundamental deficiencies it cannot be relied upon. Without this model's results the CLWA EIR is without any foundation for the claims made concerning the reliability of supplies that CLWA attaches to the SWP. In fact, one can make the argument on the same basis that present CLWA SWP supplies are already overtaxed. 98

Sincerely,

Arve R. Sjovold
186 Sierra Vista
Santa Barbara, CA
93108

# ON THE ADEQUACY OF CALSIM II FOR ENVIRONMENTAL IMPACT ANALYSIS AND SWP RELIABILITY ANALYSIS

**By: Arve R. Sjovold**

**August 12, 2004**

## Introduction:

The matter of application of CALSIM II to a variety of analyses has been questioned by many in water resources analyses, most notably by the scientific peer review team recently convened by the California Bay Delta Authority Science Program, Association of Bay Governments whose comments have been documented in a report dated December 4, 2003. In that report the peer review panel made many comments on the adequacy of CALSIM II which have yet to be acted upon. Several of the comments are directly related to the adequacy of CALSIM II to address the applications of environmental impact analyses and delivery reliability analyses of the SWP. The peer review was broad in reach and not directed toward any specific application. However, its comments regarding the applications cited above are very pertinent now that the Department of Water Resources (DWR) is moving ahead to use this model for purposes of assessing the environmental impacts of the Monterey Amendments to the SWP contracts and because the Castaic Lake Water Agency (CLWA) is also using the same model outputs for justifying its Urban Water Management Plan and a controversial action to claim as lawful a 41,000 acre-foot transfer of SWP entitlement from the Kern County Water Agency.

Because DWR has not acted on any of the peer review recommendations regarding deficiencies in CALSIM II, it is important that a clear statement be made regarding CALSIM II's adequacy to pursue both the environmental impact analysis of the Monterey Amendments and the CLWA proposed action. Because both environmental impact analysis and delivery reliability analyses require some measure of accuracy in their assessments it is vitally important to assess the accuracy of the CALSIM II calculated estimates. We and the peer review panel agree that calibration of the model is paramount if we are to make any confident statements of accuracy for this model. To date DWR has refused to do a timely calibration of the model even though they have been asked on many occasions over the past several years to do so. It is disingenuous on their part now to move ahead with production runs from this model arguing that they have insufficient time to do a proper calibration. Nevertheless, there are some definitive statements that can be made at this time based on the information made available by DWR in various documents.

## Accuracy

Both the preliminary outputs for the environmental impact analysis and the documented outputs from the reliability assessment performed by DWR show levels of export from the Delta that average 50% higher than any estimates of actual average

exports evident to date. These predicted levels of export are not qualified by any statements of how accurate they may be based on comparisons to the historical record. In responses to comments received on their final report on delivery reliability they did include some comparisons to predicted and actual deliveries during the most recent drought (1987-1992). That report also reported actual delivery history through 2003. Although the comparison during the drought seems quite good, that same comparison shows that the SWP could not come close to requested deliveries (Demands) over that period. Additional information supplied by DWR in the appendices of that report also shows that even after the drought, actual deliveries showed large shortfalls below requests. Table 1 shows the data extracted from the DWR reports. (These data are for Table A requests and Table A deliveries.)

**Table 1**

**COMPARISONS OF ACTUAL DELIVERIES AND REQUESTED DEMANDS (maf/yr) 1987 to 2002**

| Year | Requested Demands | Actual Deliveries |
|---|---|---|
| 1987 | 2.7 | 2.14 |
| 1988 | 2.6 | 2.32 |
| 1989 | 3.0 | 2.71 |
| 1990 | 3.1 | 2.45 |
| 1991 | 3.5 | 0.55 |
| 1992 | 3.6 | 1.38 |
| 1993 | 2.75 | 2.10 |
| 1994 | 2.7 | 1.75 |
| 1995 | 3.15 | 1.87 |
| 1996 | 2.7 | 2.21 |
| 1997 | 3.0 | 2.29 |
| 1998 | 3.2 | 1.62 |
| 1999 | 3.2 | 2.52 |
| 2000 | 3.6 | 2.71 |
| 2001 | 4.05 | 1.39 |
| 2002 | 3.9 | 2.52 |

It is apparent that throughout this period the SWP had difficulty meeting requests. It is significant to note that the last several years bracket the year 2001, which is one of the parametric levels of development for which CALSIM II calculates expected deliveries. It is also noteworthy that the average delivery for the last 6 years in this series is virtually the same as the first 6 years, the acknowledged period of the drought. The series shows a trend whereby the requests slowly increase over time but in the last 6 years of the series the contractor requests are virtually at the same level as that parametrized for the CALSIM II 2001 run. Accordingly, it is difficult to see how DWR can state that the primary reason that past deliveries are not as high as the model now predicts for the 2001

run is "..that the contractors did not ask for enough in the past." These data clearly show that the SWP has difficulty averaging more than 2.0 maf independent of request levels. It also demonstrates why it is important to calibrate this model so that we can deduce why it fails to accurately reproduce the historical record by any ordinary accounting. We may conclude that the CALSIM II model, absent calibration, is inadequate for any application relying on the accuracy of its calculations. One may state that, based on the data record of requests and deliveries, that the CALSIM II model overestimates deliveries by at least 50% on average. We can further state that the SWP based on the history of actual deliveries can not be relied upon for more than 2.0 maf of total delivery, approximately 48% of Table A entitlements. The record also clearly shows that in the depths of a prolonged 6 year drought that the average reliable delivery is not more than 38%(See my analysis of the statistical analysis of the CALSIM II calculations; "ANALYSIS OF SWP RELIABILITY OF DELIVERY", November 11, 2003.) We may further state that without a peer reviewed calibration and appropriate documentation, that CALSIM II cannot be relied upon for the accuracy of its calculations. These are all important conclusions regarding the adequacy of CALSIM II to support environmental impact analysis or for estimating SWP delivery reliability.

We also note that the charts presenting the results of the CALSIM II runs in support of the Monterey EIR seem to predict even higher deliveries overall than was shown in the DWR reliability report for ostensibly the same conditions and constraints. The reliability report presents 73 year average deliveries of approximately 3.1 to 3.2 maf for the 2020 scenario while the more recent runs are reporting 3.4 maf for the same scenario. A difference of this amount needs to be explained as to where the additional water is coming from.

Another factor affecting the accuracy and utility of CALSIM II calculations is the reconciliation of its optimal outputs with feasible SWP operational scenarios. It is a characteristic of an optimization methodology as used in CALSIM II to substitute the optimization algorithm for the detailed simulation of all the decision operations that properly depict the real system. In the particular optimization used in CALSIM II the set of solution weights is the surrogate for all the decision criteria that would ordinarily be simulated. In order to render the results of the optimization calculations useful, the set of solution weights must be reduced to a realistic, feasible set of decision criteria that can be implemented. Otherwise, there is no assurance that the optimization results are realizable.

**Environmental Impact analysis**

DWR has recently presented draft presentations of CALSIM II outputs in support of environmental impact analysis for the Monterey Amendments EIR. These calculations are performed on the same basis as those used in the SWP reliability of delivery analysis in that the model is not calibrated and the methodology is the same. However, the impact analysis proceeds on assumptions that may or may not be applied to previous calculations for reliability delivery. Most important, beyond the fundamental deficiency of an uncalibrated model, are the assumptions made on the priority of exports.

One of the fundamental scenarios in effect mandated by the Court of Appeals is to study the "no project alternative." This is the scenario where it is envisioned that DWR invokes Article 18(b) to address the chronic deficiency to deliver full entitlement

amounts as articulated in the SWP contracts. If Article 18(b) is invoked it requires that DWR reduce uniformly the stated Table A entitlements of all the contractors down to a level that reasonably conforms to the ability of the project to deliver those entitlements reliably. The data in Table 1 above suggest that this new level of aggregate entitlement should be about 2.0 maf or less compared to the original 4.23 maf of the original contracts. This represents a uniform lowering of contractor entitlements of approximately 47%. If DWR were to take this action, it would raise the question of how water exports would be managed when there is more water coming into the Delta than would seem necessary to meet entitlements, the so-called "surplus" water.

The calculations performed by DWR with CALSIM II assume that all the water that arrives in the Delta is available after meeting regulatory requirements in the Delta and after providing for Delta uses. The regulatory requirements that are assumed are those prevailing today. Therefore, the calculations simply treat the surplus water created by invoking Article 18(b) as water to be freely exported as before. In consequence, the amounts shown in the preliminary runs show nearly similar totals to those without invoking Article 18(b). The only significant difference between runs with and without Article 18(b) invoked is the label put on the water exported; the amounts are the same.

There are several things wrong with this assumption regarding surplus water. If indeed there is water that is surplus to regulatory constraints it does not necessarily mean that it is in the same entitlement category as entitlement water (i.e. Table A water). This is especially true when one considers that present operations have not redressed nor restored the Delta environment. If water is surplus beyond entitlement water its use to redress environmental damage in the Delta must be given priority over exports as surplus. At the very least, CALFED should not be required to pay for water to put in the environmental water account to offset costs to would-be entitlement exports when the SWP is mandated to stop pumping for protection of endangered species. In fact, export of so-called surplus water should be accorded lower priority than any watershed of origin claims. In other words, surplus water should be dedicated to protection of the environment in the watershed of origin before consideration is given to export to what are recognized as junior water rights holders. We cannot accept that export water has superior claim to water originating in the Sacramento and Trinity watersheds in analyzing environmental impacts of this project. The environmental impact analysis must consider the use of surplus water in fashioning an environmentally superior alternative to the assumed no-project alternative used in developing CALSIM II estimates. Furthermore, we must acknowledge that regulatory constraints established on the basis of existing operations, especially when considering the adversarial nature of the process of water rights hearings, cannot be considered as fixed limits on future operations that on their face propose to export at least 50% more water than the conditions that led to those constraints. Calculations that purport to show that 50% more water can be exported than present operations must be subjected to careful scrutiny as to the likelihood of even more damage to the environment than has already been sustained. We cannot simply assume that the existing constraints are satisfactory to de-limit environmental impacts in the face of increased exports. The calculations must reflect real considerations of more stringent constraints with increasing exports if they are to be used for environmental impact assessments.

In previous meetings of the EIR sub-committee on modeling, flow charts of the simulation network that is modeled were presented. At those meetings objections were raised concerning the lack of any fidelity in network representation for south-of-Delta operations. This especially concerns operations of the San Joaquin and Stanislaus rivers as well as the operations of the Kern Water Bank. We have since learned that detailed networks for the San Joaquin and Stanislaus systems have indeed been developed for other analyses. We see no reason why this detail should not be included in the CALSIM II model used for the Monterey Amendments EIR. We also note that even in this additional detail, no distinction is made between exports of entitlement and surplus water as far as priority of uses in the model calculations. We request that in all CALSIM II simulated systems in either the Sacramento or San Joaquin valleys carefully reflect that surplus water flows, where ever they may occur, should be represented as lower priority than water shed of origin uses, whether in-stream or diversions for beneficial use.

We have also learned that SWP and CVP contractor demand functions are used on their face to establish the amounts of exports that guide the optimization of the CALSIM II model, while the settlement contractors in the area-of-origin are modeled by simulation of actual applied water requirements based on land use. Since the water rights of export are necessarily junior to those of the settlement contractors we see no reason why export contractor demand, at a minimum, should not be modeled to the same degree as the settlement contractors. In fact, the modeling of settlement contractor demands based on land uses in the Sacramento and Feather River areas show that these diversions are approximately 1maf less than the maximum under the settlement contracts. This means that export amounts calculated by CALSIM II include in effect a "borrowing" of water that by right belongs to settlement contractors. Is it proper to include such water as entitlement water to exporters when it may in fact be taken by senior rights holders at some unspecified time?

We also note the export demand functions are assumed at Table A levels for all but the two largest contractors, MWD and KCWA, even though most of the contractors do not have sufficient storage to balance wet year deliveries with dry year deliveries. (See my analysis of the reliability report previously cited.) We also note that the SWP contractor demand functions for each contractor must be developed consistent with the ability of the contractor to accept SWP water when it is available. In many cases, without equalizing storage, a contractor cannot even accept his full annual entitlement because of capacity constraints. Our calculations on this limitation could limit the effective delivery of entitlement water to about 60% of the full Table A annual entitlement in some cases. The degree to which a specified contractor can avail himself of SWP deliveries depends critically on how he structures his priority of use of his different sources of supply. To maximize SWP entitlement deliveries, a contractor may often have to forego the use of a cheaper, local source and instead pay a little more to secure a higher reliability of delivery of SWP water. To our knowledge none of these considerations have been factored in to the assumptions of contractor demand and the preliminary calculations produced by CALSIM II cannot be taken as realistic.

**Reliability of Delivery Analysis**

For reliability of SWP deliveries it should be clear that only deliveries against Table A amounts can be accounted. Since the majority of SWP deliveries are designated as M&I, those uses, which entail fixed structures dependent on firm water supplies, cannot be tied to speculative deliveries associated with so-called "surplus" water. The calculations supplied by CALSIM II to date do not distinguish the importance of the delivery categories to the reckoning of reliability of supply. Even those contractors that have some level of equalizing storage by which they can store surplus wet year deliveries to be used in times of drought should have to demonstrate and implement a plan to use the deliveries in that way before any surplus deliveries can be accounted as firm supply, and the amounts of surplus delivery to be expected must meet all the requirements for environmental protection in the watersheds of origin as cited above.

We must also state that DWR's continued use of frequency charts to present the results of its calculations on reliability of delivery is unwarranted. There is no statistical basis presented by DWR to show why drought deliveries should be lumped with normal and wet year deliveries in a single frequency diagram. (Again see my analysis of delivery reliability cited above.) This flagrant misuse of statistics is now being seized upon by local planning authorities who adopt SWP reliabilities that cannot in fact be sustained. The consequence is that in all probability local land use plans are being based on erroneously high deliveries that are the epitome of "paper water." Irrespective of the accuracy and deficiencies of CALSIM II, DWR must provide more robust statistical analyses of CALSIM II outputs if they are to be useful to anyone.

The assessment of SWP delivery reliability must depend on calculations that meet stringent requirements of accuracy and proper statistical practice. Neither requirement is presently met by the CALSIM II model.

**Conclusions**

Because of the necessity of having accurate estimates of SWP deliveries under the scenarios cast for the EIR impact analyses, it is absolutely required that this model be calibrated and peer reviewed for that calibration. Based on the record to date of SWP operations there is no reason to believe that the CALSIM II calculations have any utility for EIR impact analyses.

The scenarios that have been cast must be reformulated to consider uses of so-called "surplus" water for environmental restorations and enhancement in the water sheds of origin. It cannot be taken as given that water identified by the SWP contracts as surplus to whatever level of Table A entitlements is free to be exported solely to the contractors.

The calculations of CALSIM II must be reported in more detail to deduce environmental impacts. At a minimum, estimates for delivery to each contractor must be reported by month and arrayed against each contractor's monthly requests. DWR must ascertain the validity of each contractor's water supply plan insofar as the use of SWP water is involved. Of particular concern is the availability of equalizing storage in each contractor's service area. This is to assure that no contractor is taking water for beneficial use that can be claimed by a superior right holder in the watersheds of origin.

DWR must provide for a more thorough and robust statistical analysis of CALSIM II's calculated outputs. The present portrayals are simply improper and not

deserving of the effort that has gone in to generating the outputs. The present outputs cannot be used to make any useful estimates of reliability of delivery.

DWR must show that the optimization results represent a feasible solution of realistic decision criteria by which the project can be operated.

# ANALYSIS OF SWP RELIABILITY OF DELIVERY

**(Based on the DWR Report:**
**"The State Water Project Delivery Reliability Report,**
**2002, Final)**

BY ARVE R. SJOVOLD

**November 11, 2003**

## Introduction

The California Department of Water Resources (DWR) released its final draft of a report presenting its analyses of the reliability of delivery of State Water Project (SWP). The analyses are based on a series of simulations performed with its CALSIM II model, which is a combination of two previously independent models, DWRSIM developed by DWR for the SWP, and PROSIM developed by the Bureau of Reclamation (BOR) for the Central Valley Project. It was deemed necessary to merge these two models because the joint operations in the Delta from which the water is exported have become very integrated.

The CALSIM II model is also being proposed as the primary analytic tool to evaluate the impacts of the SWP under the Monterey Amendments in an EIR now underway. The adequacy of this model is now under scrutiny as part of this EIR process and questions have been raised as to how accurate its calculations are and how well those calculations have been verified by model calibrations.

This analysis of SWP reliability is based on the calculations done with CALSIM II as reported in DWR's report as stated above. This analysis does not assume that those calculations are necessarily accurate but there still is much to be learned from those results even if their accuracy is in question.

This analysis first explores the character of the statistical output of the CALSIM II published results. Then we explore the kinds of interpretations that can be deduced from these results once we understand their statistical character. Some conclusions are then drawn about SWP delivery reliability in general and under varying circumstances that can be expected among the several SWP contractors receiving this water and what they can truly rely on. However, we must stress that even these conclusions are preliminary and still subject to change once the CALSIM II model has been properly calibrated and peer reviewed.

## CALSIM Calculations

The basis for the statistical analysis in this report is the CALSIM II output record presented in the referenced report as Table B-3, "Study 2001 SWP Delta water delivery," which provides calculations of the annual export of SWP water over the 73-year period from 1922 to 1994. The reference to 2001 in the Table title refers to the condition that all actual hydrologic records for this period have been adjusted to reflect 2001 conditions of development. That is, the withdrawals of water in the Sacramento Valley are based on the level of development evident or reasonably expected to prevail at that time and the

system of dams and diversions are those expected to be in place at that time. The calculations also assume the level of State Water Resources Control Board (SWRCB) constraints that will exist at that time except for variable restrictions that may be imposed by the Endangered Species Act (ESA) to protect targeted species in the Delta.

The calculations also make assumptions about the level of demands from the SWP contractors to be supplied by water exported from the Delta by the project. The explicit demand functions for each contractor are not presented in the report but it is evident in Table B-3 that the demands are variable and near the maximum. The Table B-3 calculations present for each year, the level of demand sought by the contractors in the aggregate, the calculated deliveries against those demands (explained in the report to be the "Table A" demands called for in the contracts), the calculated percentage of the full "Table A" demands that the estimated delivery represents, and the calculated delivery of Article 21 water that would be expected to be delivered. (Article 21 water is essentially "surplus" water that is available only on certain conditions and cannot be assumed to be reliably available.) The Table B-3 is reproduced here as Table 1 for reference except the column for the percentage calculation in the original table was not included.

This statistical analysis deals only with the deliveries of Table A water that DWR is obligated to deliver when it is available to meet contractor requests. Reliability of delivery should be related solely to that water that DWR is obligated to deliver.

**How is Reliability defined?**

Reliability is not a precisely calculated attribute. It involves considerations of risk. For water supply, one normally establishes the level of risk for shortfalls in the supply at some level of probability. For "Safe Yield" calculations for reservoirs like Cachuma in Santa Barbara County, a reservoir dedicated primarily to urban supply, the risk level is established at a 5% chance of not delivering the stated "safe yield" in any given year if the worst drought of record is repeated. This is a relatively prudent choice if the record of runoff supplying the reservoir is sufficiently lengthy to provide confidence in the calculation. For Cachuma, the worst drought is probably the late 40s and early 50s and it establishes a six year period that the reservoir must carry-over water before it is refilled and spilling.

For SWP contractors, it is apparent that no one level can be chosen that will provide the same risks to all. Each contractor has different capabilities to withstand a drought depending on his particular mix of other water supplies. So it is important for each contractor to be able to deduce what level of deliveries he can utilize and rely on from the SWP so that he may be able to efficiently operate all of his sources in conjunction. Since the SWP is not operated to carry-over significant amounts of water for more than a year, it is important to characterize the level of deliveries that can be expected over a variety of conditions. In this manner, each contractor can deduce the reliable level of SWP deliveries appropriate to his system of water supplies.

Since periods of drought are the ones that stress water supplies, the calculation of reliability must focus strongly on the project's capability to deliver water in those periods. Contractors that have significant storage means may be able to take delivery of more water in preceding wet periods to be held in reserve for use in droughts. Thus such a contractor can improve his capability to serve demand during droughts. However, that

TABLE 1

CALSIM RESULTS, TOTAL SAMPLE=73

| | OBSERVATION | MODEL_DEM | CALSIM_DE | ART_21 | *KEYWORDS |
|---|---|---|---|---|---|
| 1 | 1922 | 3407 | 3389 | 175 | |
| 2 | 1923 | 3717 | 3727 | 143 | |
| 3 | 1924 | 3961 | 1014 | 0 | |
| 4 | 1925 | 3940 | 1502 | 0 | |
| 5 | 1926 | 3777 | 2951 | 0 | |
| 6 | 1927 | 3543 | 3504 | 220 | |
| 7 | 1928 | 3897 | 3337 | 155 | |
| 8 | 1929 | 3952 | 1037 | 0 | |
| 9 | 1930 | 3922 | 2697 | 92 | |
| 10 | 1931 | 3971 | 1141 | 0 | |
| 11 | 1932 | 3673 | 1620 | 199 | |
| 12 | 1933 | 3938 | 1663 | 134 | |
| 13 | 1934 | 3981 | 1689 | 0 | |
| 14 | 1935 | 3697 | 3439 | 81 | |
| 15 | 1936 | 3769 | 3638 | 0 | |
| 16 | 1937 | 3451 | 3297 | 87 | |
| 17 | 1938 | 3418 | 3438 | 470 | |
| 18 | 1939 | 3673 | 3475 | 227 | |
| 19 | 1940 | 3713 | 3544 | 102 | |
| 20 | 1941 | 3013 | 3036 | 100 | |
| 21 | 1942 | 3583 | 3599 | 513 | |
| 22 | 1943 | 3632 | 3545 | 447 | |
| 23 | 1944 | 3563 | 3449 | 0 | |
| 24 | 1945 | 3612 | 3479 | 136 | |
| 25 | 1946 | 3710 | 3724 | 3 | |
| 26 | 1947 | 3954 | 2652 | 0 | |
| 27 | 1948 | 3959 | 2681 | 2 | |
| 28 | 1949 | 3864 | 2568 | 2 | |
| 29 | 1950 | 3812 | 2909 | 0 | |
| 30 | 1951 | 3779 | 3794 | 311 | |
| 31 | 1952 | 3078 | 3108 | 103 | |
| 32 | 1953 | 3790 | 3801 | 272 | |
| 33 | 1954 | 3833 | 3803 | 98 | |
| 34 | 1955 | 3761 | 1694 | 0 | |
| 35 | 1956 | 3639 | 3649 | 261 | |
| 36 | 1957 | 3759 | 3331 | 96 | |
| 37 | 1958 | 3481 | 3492 | 441 | |
| 38 | 1959 | 4055 | 3506 | 265 | |
| 39 | 1960 | 4115 | 1795 | 0 | |
| 40 | 1961 | 4115 | 2873 | 0 | |
| 41 | 1962 | 3689 | 3158 | 21 | |
| 42 | 1963 | 3634 | 3630 | 223 | |
| 43 | 1964 | 3907 | 3262 | 5 | |
| 44 | 1965 | 3586 | 3256 | 98 | |
| 45 | 1966 | 3722 | 3731 | 147 | |
| 46 | 1967 | 3439 | 3424 | 497 | |
| 47 | 1968 | 3792 | 3548 | 402 | |
| 48 | 1969 | 3157 | 3151 | 100 | |
| 49 | 1970 | 3714 | 3727 | 406 | |
| 50 | 1971 | 3837 | 3845 | 0 | |
| 51 | 1972 | 4012 | 3057 | 2 | |
| 52 | 1973 | 3611 | 3592 | 261 | |
| 53 | 1974 | 3649 | 3664 | 287 | |
| 54 | 1975 | 3720 | 3737 | 415 | |
| 55 | 1976 | 4014 | 3150 | 110 | |

CALSIM RESULTS, TOTAL SAMPLE=73 (Cont.)

| | OBSERVATION | MODEL_DEM | CALSIM_DE | ART_21 | *KEYWORDS |
|---|---|---|---|---|---|
| 56 | 1977 | 3948 | 804 | 0 | |
| 57 | 1978 | 3126 | 3036 | 100 | |
| 58 | 1979 | 3527 | 3509 | 140 | |
| 59 | 1980 | 3197 | 3208 | 100 | |
| 60 | 1981 | 3834 | 3532 | 124 | |
| 61 | 1982 | 3451 | 3471 | 386 | |
| 62 | 1983 | 3007 | 3036 | 200 | |
| 63 | 1984 | 3692 | 3706 | 408 | |
| 64 | 1985 | 3753 | 3540 | 0 | |
| 65 | 1986 | 3345 | 3023 | 51 | |
| 66 | 1987 | 3904 | 2894 | 0 | |
| 67 | 1988 | 4026 | 967 | 0 | |
| 68 | 1989 | 4097 | 2902 | 0 | |
| 69 | 1990 | 3961 | 1101 | 0 | |
| 70 | 1991 | 3957 | 983 | 0 | |
| 71 | 1992 | 3880 | 1199 | 0 | |
| 72 | 1993 | 3559 | 3505 | 133 | |
| 73 | 1994 | 3739 | 3272 | 9 | |
| 74 | *VARIABLES | DEM | DELKAF | ARTKAF | |
| 75 | *KEYWORDS | | | | |

capability for that contractor does not necessarily improve the prospects of those contractors without much storage who must rely on SWP.

The first step then is to examine the CALSIM II calculated output record in Table 1 to establish the temporal variations in expected deliveries.

**Statistical Character of the 73 year record**

Table 1 presents the results of the CALSIM II model for the 73 year period, 1922 to 1994. This record was analyzed using standard statistical techniques available in a software package called "COSTAT," which includes a variety of standard calculational routines for multiple regression as well as simple univariate data sets. Only the univariate capability was necessary to apply here.

The results of a univariate analysis of the entire 73 year sample are presented in Table 2 and in Figure 1. Table 2 shows the sample mean, variance, standard deviation, and other attributes of the data set. Figure 1 shows the histogram of the frequency of different levels of delivery. Figure 1 is most interesting in that it shows the sample to comprise two distinct domains, one constituting most of the sample showing the deliveries for what can be called normal or wet years and the other constituting the collection of dry years. There is a region in between these two domains, between 2100 and 2540 taf (thousands of acre-feet) for which there are no calculated deliveries. According to Table 2 the average of this 73 sample is 2961.8 taf which is not within the main mode of the normal/wet year data. Thus the sample average is not representative of any particular attribute of this bi-modal distribution.

Statistical tests were performed to determine whether or not these two subsets of the data, normal/wet and dry, can be considered to come from the same population. The answer is most definitely not. To perform this test the 73 year period was separated into the two nominal populations for which means and variances were calculated and tested for significant differences using a standardized "t-test." The probability that such a bi-modal distribution could be drawn from one population by chance is infinitesimally small. Accordingly, no confident statements can be made about probabilities of delivery by assuming the sample to come from one population. **As a consequence, the reported average and the use of the frequency charts in DWR's report are without statistical validity. No probabilistic statement of delivery reliability can be derived solely from the frequency charts presented in the report.**

If we examine the record of calculated deliveries shown in Table 1, it is quite evident that there are extensive dry periods, the worst of which is shown as that from 1929 through 1934. In fact, this is referred to as the historic worst drought. The drought most recently experienced, 1987 through 1992, also 6 years in duration, was almost as severe from a hydrologic standpoint. Each of these two periods has embedded one decent year that if it were not part of the drought episode would not be so significant. The fact that it is embedded is important because following a dry year or dry sequence the embedded year is not good enough to refill the two big SWP reservoirs, Oroville and San Luis, for the following year. Hence it is part of the drought sequence. (It would have been helpful to understanding SWP operations if the calculated record showed the end of water year storage levels for these two reservoirs.)

TABLE 2
ANALYSIS, TOTAL SAMPLE

Data Set: SWP_REL.cst
Date & Time: 01-04-80 09:37 am

UNIVARIATE DATA ANALYSIS : ( DELKAF )

| Data Description | | Descriptive Measures | |
|---|---|---|---|
| # of observations | : 73 | Mean | : 2961.781 |
| # of missing values | : 0 | Std Dev(Sample) | : 878.175 |
| Maximum | : 3845.000 | RMS(Population) | : 872.139 |
| Minimum | : 804.000 | Median | : 3297.000 |
| Range | : 3041.000 | 1st Quartile | : 2785.000 |
| | | 3rd Quartile | : 3544.500 |
| | | Skewness | : -1.269 |

Inferential Values

| Measures | | Confidence Interval (95%) | |
|---|---|---|---|
| Mean | : 2961.781 | Lower | : 2760.327 |
| Std Error | : 102.783 | Upper | : 3163.235 |

FIGURE 1

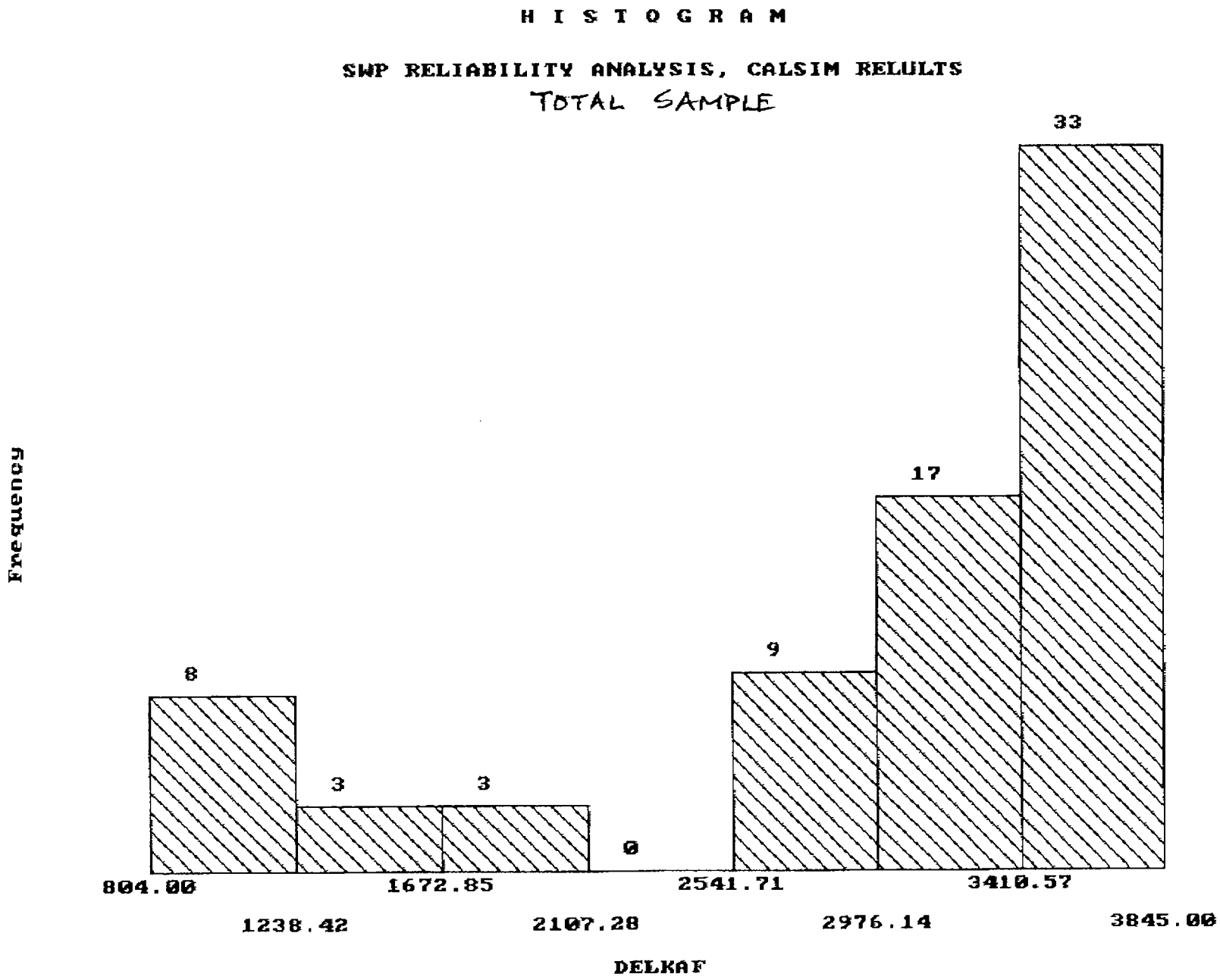

HISTOGRAM
SWP RELIABILITY ANALYSIS, CALSIM RELULTS
TOTAL SAMPLE
Frequency
8
3
3
0
9
17
33
804.00
1238.42
1672.85
2107.28
2541.71
2976.14
3410.57
3845.00
DELKAF

TABLE 3

SWP RELIABILITY ANALYSIS, DROUGHT YEARS

| | OBSERVATION | MODEL_DEM | CALSIM_DE | ART_21 | *KEYWORDS |
|---|---|---|---|---|---|
| 1 | 1929 | 3952 | 1037 | 0 | |
| 2 | 1930 | 3922 | 2697 | 92 | |
| 3 | 1931 | 3971 | 1141 | 0 | |
| 4 | 1932 | 3673 | 1620 | 199 | |
| 5 | 1933 | 3938 | 1663 | 134 | |
| 6 | 1934 | 3981 | 1689 | 0 | |
| 7 | 1988 | 4026 | 967 | 0 | |
| 8 | 1989 | 4097 | 2902 | 0 | |
| 9 | 1990 | 3961 | 1101 | 0 | |
| 10 | 1991 | 3957 | 983 | 0 | |
| 11 | 1992 | 3880 | 1199 | 0 | |
| 12 | *VARIABLES | DEM | DELKAF | ARTKAF | |
| 13 | *KEYWORDS | | | | |

TABLE 4
ANALYSIS, DROUGHT YEARS

Data Set: SWP_REL4.cst
Date & Time: 01-04-80 09:18 am

UNIVARIATE DATA ANALYSIS : ( DELKAF )

| Data Description | | Descriptive Measures | |
|---|---|---|---|
| # of observations | : 11 | Mean | : 1545.364 |
| # of missing values | : 0 | Std Dev(Sample) | : 678.004 |
| Maximum | : 2902.000 | RMS(Population) | : 646.452 |
| Minimum | : 967.000 | Median | : 1199.000 |
| Range | : 1935.000 | 1st Quartile | : 1037.000 |
| | | 3rd Quartile | : 1689.000 |
| | | Skewness | : 1.069 |

Inferential Values

| Measures | | Confidence Interval (95%) | |
|---|---|---|---|
| Mean | : 1545.364 | Lower | : 1089.903 |
| Std Error | : 204.426 | Upper | : 2000.825 |

FIGURE 2

HISTOGRAM

SWP RELIABILITY ANALYSIS, CALSIM RELULTS

DROUGHT YEARS

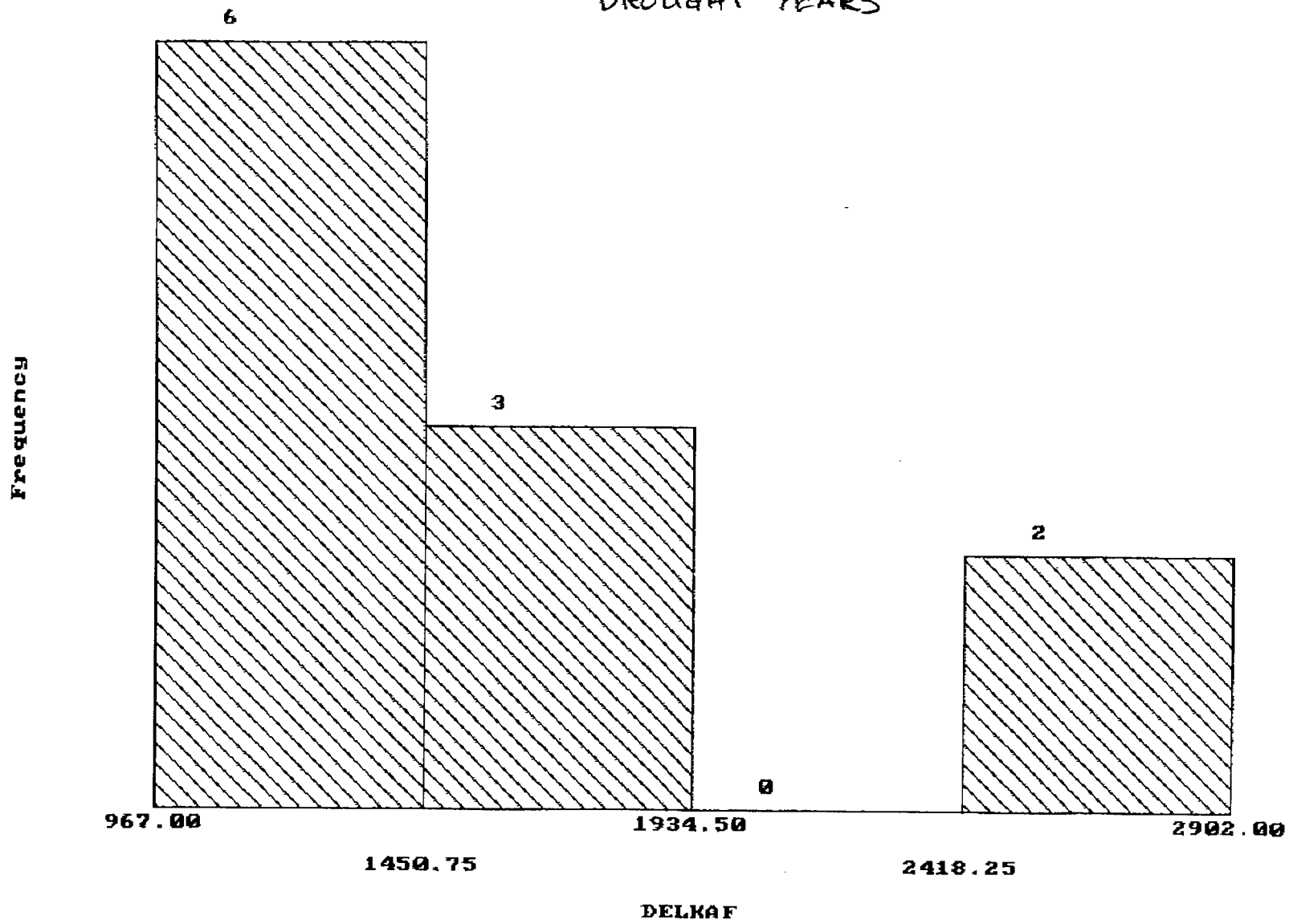


TABLE 3

SWP RELIABILITY ANALYSIS, NORMAL_WET YEARS

| | OBSERVATION | MODEL_DEM | CALSIM_DE | ART_21 | *KEYWORDS | W |
|---|---|---|---|---|---|---|
| 1 | 1922 | 3407 | 3389 | 175 | | 1 |
| 2 | 1923 | 3717 | 3727 | 143 | | 1 |
| 3 | 1926 | 3777 | 2951 | 0 | | 1 |
| 4 | 1927 | 3543 | 3504 | 220 | | 1 |
| 5 | 1928 | 3897 | 3337 | 155 | | 1 |
| 6 | 1930 | 3922 | 2697 | 92 | | 1 |
| 7 | 1935 | 3697 | 3439 | 81 | | 1 |
| 8 | 1936 | 3769 | 3638 | 0 | | 1 |
| 9 | 1937 | 3451 | 3297 | 87 | | 1 |
| 10 | 1938 | 3418 | 3438 | 470 | | 1 |
| 11 | 1939 | 3673 | 3475 | 227 | | 1 |
| 12 | 1940 | 3713 | 3544 | 102 | | 1 |
| 13 | 1941 | 3013 | 3036 | 100 | | 1 |
| 14 | 1942 | 3583 | 3599 | 513 | | 1 |
| 15 | 1943 | 3632 | 3545 | 447 | | 1 |
| 16 | 1944 | 3563 | 3449 | 0 | | 1 |
| 17 | 1945 | 3612 | 3479 | 136 | | 1 |
| 18 | 1946 | 3710 | 3724 | 3 | | 1 |
| 19 | 1947 | 3954 | 2652 | 0 | | 1 |
| 20 | 1948 | 3959 | 2681 | 2 | | 1 |
| 21 | 1949 | 3864 | 2568 | 2 | | 1 |
| 22 | 1950 | 3812 | 2909 | 0 | | 1 |
| 23 | 1951 | 3779 | 3794 | 311 | | 1 |
| 24 | 1952 | 3078 | 3108 | 103 | | 1 |
| 25 | 1953 | 3790 | 3801 | 272 | | 1 |
| 26 | 1954 | 3833 | 3803 | 98 | | 1 |
| 27 | 1956 | 3639 | 3649 | 261 | | 1 |
| 28 | 1957 | 3759 | 3331 | 96 | | 1 |
| 29 | 1958 | 3481 | 3492 | 441 | | 1 |
| 30 | 1959 | 4055 | 3506 | 265 | | 1 |
| 31 | 1961 | 4115 | 2873 | 0 | | 1 |
| 32 | 1962 | 3689 | 3158 | 21 | | 1 |
| 33 | 1963 | 3634 | 3630 | 223 | | 1 |
| 34 | 1964 | 3907 | 3262 | 5 | | 1 |
| 35 | 1965 | 3586 | 3256 | 98 | | 1 |
| 36 | 1966 | 3722 | 3731 | 147 | | 1 |
| 37 | 1967 | 3439 | 3424 | 497 | | 1 |
| 38 | 1968 | 3792 | 3548 | 402 | | 1 |
| 39 | 1969 | 3157 | 3151 | 100 | | 1 |
| 40 | 1970 | 3714 | 3727 | 406 | | 1 |
| 41 | 1971 | 3837 | 3845 | 0 | | 1 |
| 42 | 1972 | 4012 | 3057 | 2 | | 1 |
| 43 | 1973 | 3611 | 3592 | 261 | | 1 |
| 44 | 1974 | 3649 | 3664 | 287 | | 1 |
| 45 | 1975 | 3720 | 3737 | 415 | | 1 |
| 46 | 1976 | 4014 | 3150 | 110 | | 1 |
| 47 | 1978 | 3126 | 3036 | 100 | | 1 |
| 48 | 1979 | 3527 | 3509 | 140 | | 1 |
| 49 | 1980 | 3197 | 3208 | 100 | | 1 |
| 50 | 1981 | 3834 | 3532 | 124 | | 1 |
| 51 | 1982 | 3451 | 3471 | 386 | | 1 |
| 52 | 1983 | 3007 | 3036 | 200 | | 1 |
| 53 | 1984 | 3692 | 3706 | 408 | | 1 |
| 54 | 1985 | 3753 | 3540 | 0 | | 1 |
| 55 | 1986 | 3345 | 3023 | 51 | | 1 |

SWP RELIABILITY ANALYSIS, NORMAL_WET YEARS (Cont.)

| | OBSERVATION | MODEL_DEM | CALSIM_DE | ART_21 | *KEYWORDS | W |
|---|---|---|---|---|---|---|
| 56 | 1987 | 3904 | 2894 | 0 | | 1 |
| 57 | 1993 | 3559 | 3505 | 133 | | 1 |
| 58 | 1994 | 3739 | 3272 | 9 | | 1 |
| 59 | *VARIABLES | DEM | DELKAF | ARTKAF | *KEYWORDS | * |
| 60 | | | | | | |
| 61 | *KEYWORDS | | | | | |

ANAYSIS, NORMAL_WET YEARS

Data Set: SWP_REL2.cst
Date & Time: 01-04-80 09:21 am

UNIVARIATE DATA ANALYSIS : ( DELKAF )

| Data Description | | Descriptive Measures | |
|---|---|---|---|
| # of observations | : 58 | Mean | : 3363.776 |
| # of missing values | : 1 | Std Dev(Sample) | : 324.661 |
| Maximum | : 3845.000 | RMS(Population) | : 321.850 |
| Minimum | : 2568.000 | Median | : 3460.000 |
| Range | : 1277.000 | 1st Quartile | : 3139.500 |
| | | 3rd Quartile | : 3606.750 |
| | | Skewness | : -0.659 |

Inferential Values

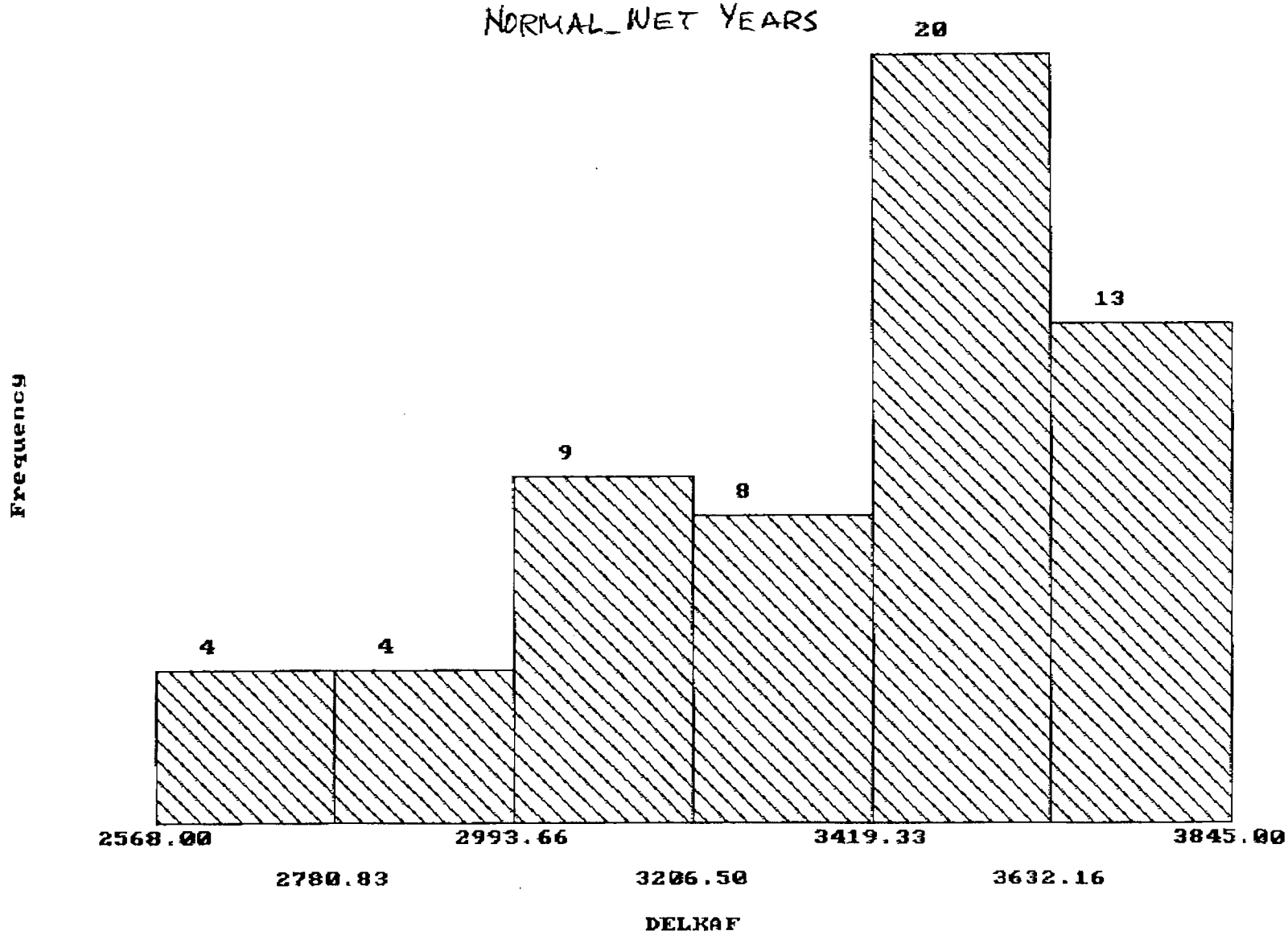
| Measures | | Confidence Interval (95%) | |
|---|---|---|---|
| Mean | : 3363.776 | Lower | : 3278.516 |
| Std Error | : 42.630 | Upper | : 3449.036 |

FIGURE 3

H I S T O G R A M

SWP RELIABILITY ANALYSIS, CALSIM RELULTS

NORMAL_WET YEARS



Further analyses were undertaken treating the two domains as independent populations. Because the dry year set comprises both the dry sequences of drought and several individual dry years sprinkled throughout the record, we have focused the dry year analyses on the drought periods. The two periods are combined into one population for analysis since their means and variances are reasonably consistent. However, we did exclude the beginning year, 1987, for the second period as it was not embedded in the sequence and could easily be classified as a fair to good year. Thus, we ended with a sample of 11 years, 6 years between 1929 and 1934 and 5 years between 1988 and 1992. The data set is shown in Table 3 and the resulting statistics are shown in Table 4.

Table 4 shows an average delivery of 1545 taf and a standard deviation of 678 taf. If the year 1987 were included the average would increase to approximately 1657 taf with not much change in the standard deviation. If the two embedded decent years, 1930 and 1989, are eliminated from the sample the average is decreased to 1267 taf with a standard deviation of 302 taf. These changes suggest that judged as separate occurrences these two years may not be statistically representative of the dry population. However, we will assume that the results shown in Table 4 are representative of the expectation for drought periods.

Lastly, we analyze the population for the normal/wet periods, a record of 58 years, not all in sequence. The years 1930 and 1987 were included in this sample and the individual dry years not part of either of the extended drought periods were excluded. Table 5 presents the data set used in the analysis and Table 6 shows the calculated statistics. Figure 2 shows the frequency histogram for this data set which clearly depicts a central maximum but still with some skewness. (Skewness is a term used to identify distributions that are not symmetric, that is distributions whose sample mean and median are significantly different.) Table 6 shows an average delivery of 3364 taf with a standard deviation of 325 taf. This then represents what is typical of periods of non-drought, an average that is about 81% of the full Table A value of delivery. The standard deviation represents 9.66% of the average delivery, showing a very consistent delivery for normal and wet periods.

**How much delivery can we rely on?**

As we stated before, what each contractor can rely on depends on the circumstances of his other sources of supply. However, we now have some valid statistical analyses upon which to base the level of delivery that can be relied on for specific circumstances.

First, we note that for any contractor without significant storage availability, the reliable level of delivery is dictated almost solely by drought conditions. If a particular contractor had no other supply to tap and wanted to pick a confident level of supply from the SWP, he would have to select from among the lowest individual years on record which could be as low as 804 taf, or 19.5% of the full Table A value. However, we assume that most SWP contractors have other sources available with which to operate conjunctively with SWP deliveries and the appropriate level of delivery would be the average value during a drought episode, approximately 38% of the full Table A value. If the average level is to be relied on, the other sources must make up the variation within the drought period. In other words, SWP deliveries would have to be taken at the

available level shown in the CALSIM II output and the other sources of supply available to the contractor would have to made dependent on the SWP deliveries. This might cause a rearrangement of priorities of when all the other local sources are brought in to play in a given year. Ordinarily, local purveyors operate on a least cost basis meaning that sources are used in the order of increasing marginal cost. Since SWP marginal costs are likely in some instances to be greater than some local sources, the requirement to use SWP as available may require it to supersede the priority of some local sources in order that the notion of a reliable average delivery is indeed fact. This switch in priorities would entail some cost increases depending on the differences in marginal costs.

If a contractor has significant storage available, he may be able to store some wet year deliveries to be held in reserve for drought periods thereby increasing his reliance on SWP during droughts. The normal/wet period deliveries at an average of 81% could be relied on with high confidence (95%) at the average minus 1.6 times the standard deviation. This 95% confidence level would then be 69% of the full Table A value. In other words, such a contractor could state with high confidence that in normal or wet periods he can rely on 69% of full Table A deliveries with the strong likelihood that in many years he could receive more if it can be utilized. Whether or not it can be utilized depends again on his willingness to reorder the priorities of use of all his sources with the expectation that such a reordering will increase overall costs of supply slightly.

Even if a highly confident 69% can be relied on for normal and wet periods, that leaves the question of what to do in drought periods. Clearly, there will be sufficient excess delivery from all the years greater than 69% that can be stored for drought use, but the level depends critically on the magnitude of storage. If it was desired to bring the drought level of SWP use up to the normal/wet year reliable level, 69%, enough storage would have to provided to make up the 31% of the Table A value represented by the difference between the drought period average and the 69% level. Thus, 31% per year for 6 years (the worst drought on record) of the contractor's Table A value would have to be kept in storage. This amounts to 1.86 times the contractor's Table A amount and there would have to be some allowance for storage losses, such that 2.5 times would be reasonable. Thus, for such a contractor to rely on 69% deliveries from the SWP through wet and dry periods, he would have to have available in magnitude 2.5 times or so his Table A amount dedicated to SWP storage. For the entire SWP contract in the aggregate, this amounts to 2.5 times 4130 taf or approximately 10 million acre-feet. This would have to be storage south of the Delta since the CALSIM already takes maximum advantage of the pumping capability of the project.

Clearly, the right level of reliance on SWP deliveries depends on the circumstances for each contractor. Because it is highly unlikely that the storage requirement to reach 69% can be achieved for many contractors, especially the larger ones, a level lower than 69% will have to be calculated. Each contractor will have to do so independently.

**Some Conclusions**

We have shown that the values for SWP delivery reliability presented in DWR's report are not statistically valid. The level of 76%, which represents the average calculated by CALSIM over the 73 year record, cannot be assumed without question by

any contractor and it is highly unlikely that such a level can be substantiated by any contractor. The DWR report does acknowledge that during the two 6 year drought periods, a level of only 39% to 40% can be relied on. However, that is the average for a six year drought period and still requires each contractor to analyze how he will adjust his priorities of use among all his sources. Even levels in wet years may stretch an individual contractor's capabilities given that there are capacity constraints in the aqueducts that prevent taking full deliveries in low demand months without significant means for equalizing storage between low and high demand periods. In all of this it is important to recognize that seizing on an "average" value implies that deliveries will follow the project's capability to pump the amounts calculated in the CALSIM II model. This means that in wet years the water must be taken and either used or stored if the average is to have any meaning. The DWR report is not candid on this aspect.

The Swans

P. O. Box 1689
17409 Lockwood Valley Road
Frazier Park, CA 93225-1689
(661) 245-1011 or (818) 523-1461-Mobile
(661) 245-4119-Fax swan4us@home-ink.com

August 13, 2004

Castaic Lake Water Agency
Attn. Marylou Cotton
27234 Bouquet Canyon Rd.
Saugus, CA 91350

RE: 41,000 Acre Foot Transfer SCH# 1998041127

Dear Ms. Cotton,

It has come to our attention the Castaic Lake Water Agency is possibly planning to affect a position on the above captioned matter which, in our opinion, will gravely impact the Monterey Agreement EIR process. 99

We also wish to comment that we see a direct conflict of interest and possible injustice to the public and interference with the CEQA process by your agency's spearheading any effort to circumvent, delay, interfere, or otherwise impede the more appropriate participation of the Department of Water Resources, the agency we believe entitled to administrate on behalf of the general public of the State of California in this matter.

We, the below listed voters and community members raise our voices in writing in complete objection to any and all interference by the Castaic Lake Water Agency and formally request the immediate withdrawal of any and all past, present or future water transfer documents until the EIR is complete. Furthermore, we wish to be added to the list of mailings for any matters regarding this subject.

Thanking you in advance for acknowledging our request, we remain,

Sincerely,

Arnold D. Swan (etal)

Mr. & Mrs. Arnold D. Swan
Mr. & Mrs. Darrel Wildman
Mrs. Suzanne Spahn

(signed on behalf of parties listed)

Cc: TriCounty Watchdogs
P. O. Box 2458, Frazier Park, CA 93225-2458

Tangerine Man, LLC
POB 426
Ojai, CA 93024

Aug 14th, 2004

Attn: Marylou Cotton

Castaic Lake Water Agency
27234 Bouquet Canyon Rd.
Saugus, Ca 91350
Fax 661 297-1611

Re: 41,000 AF Transfer of water from farmland to Santa Clarita, Northern LA County for urban expansion SCH#19908041127

Dear Ms Cotton:

Water transfers are a statewide issue that induce growth and reduce water for farming. Therefore I believe that your agency is the wrong lead agency for this project; I believe the correct lead agency is the Department of Water Resources, which is both indicated and qualified under state law to address statewide impacts. DWR will also notify all interested parties to the extent of their knowledge. **100**

If such a major transfer is allowed to proceed under the lead agency status of a small regional water agency, it will set a precedent that will affect many major water decisions throughout the state of California. I believe it is imperative that such a major change in state policy receive full environmental review and comments from all affected parties. I therefore request that this project be re-noticed by the Dept. of Water Resources acting as lead agency as a project of statewide concern so that all impacts may be disclosed and properly addressed.

Sincerely,

Jim Churchill, Owner

10.300

Stephan C. Volker
Joshua A.H. Harris

Law Offices of
**STEPHAN C. VOLKER**
436 14th Street, Suite 1300
Oakland, California 94612
TEL: 510/496-0600 ❖ FAX: 510/496-1366
e-mail: svolker@volkerlaw.com

August 16, 2004

Via Facsimile & Mail

(661)297-1611

Castaic Lake Water Agency
Attention: Marylou Cotton
27234 Bouquet Canyon Road
Saugus, CA 91350

Re: Comment on Draft EIR for 41,000 acre-foot water transfer (State Clearinghouse #1998041127)

Dear Ms. Cotton:

On behalf of California Water Impact Network and Friends of the Santa Clara River, we wish to incorporate by reference the comments submitted on the above DEIR by the Sierra Club. We wish to emphasize, in particular, that Castaic Lake Water Agency is not the correct "lead agency" for this project under the California Environmental Quality Act. As the Third District Court of Appeal made clear in *Planning and Conservation League v. Department of Water Resources*, 83 Cal.App.4th 892, 920 (2000), "DWR, with its expertise on the statewide impacts of water transfers," is the proper lead agency under CEQA for decisions regarding transfers of State Water Project water between SWP water contractors. **101**

We also wish to incorporate by reference our Opening Trial Memorandum (filed August 21, 2003) and Reply Trial Brief (filed May 3, 2004) in the matter *California Water Network and Friends of the Santa Clara River v. Castaic Lake Water Agency*, Ventura Superior Court No. 215327. These memoranda point out the importance of recognizing DWR's lead agency status regarding transfers of State Water Project water.

Thank you for considering our comments on this important matter.

Very truly yours,

Stephan C. Volker
Attorney for California Water Impact Network and Friends of the Santa Clara River

SCV:taf

Castaic Lake Water Agency Meeting,)
July 28th, 2004. )
)

Meeting of Castaic Lake Water Agency, Public Comment Section, at 27234 Bouquet Canyon Road, Santa Clarita, California, Public Comment Section commencing at 7:12 p.m., Wednesday, July 28, 2004, before Lisa DiGiovanni, RPR, Certified Shorthand Reporter No. 11969.

I N D E X

ATTACHMENTS FOR IDENTIFICATION

1 2-page Letter to Marylou Cotton from Dana Wisehart from United Water Conservation District dated July 26, 2004

2 1-page Letter to Dan Masnada from Ray Pearl and Terra Donion from BIA dated July 28, 2004

SANTA CLARITA, CALIFORNIA

WEDNESDAY, JULY 28, 2004; 7:12 P.M.

MR. KAVOUNAS: Next item on our agenda is Item 3.1, a public hearing of the draft EIR for the Agency's supplemental water transfer of 41,000 acre-feet of State Water Project Table A amount.

The purpose of this hearing is to give the public an additional opportunity to comment on this project and its environmental impacts for consideration by the board. As you will be advised by the staff and the presentation before the hearing, there will be further board proceedings on this draft EIR in the future.

The primary purpose of tonight's hearing is to give the public time to make comments on the draft EIR. The board and staff are not required to ask questions nor make comments or responses to the public's comments.

There will be time for the board's questions, comments and responses in future proceedings. The staff will prepare written responses to comments for the board's review and approval after the comment period ends. I will now turn the item over to Marylou Cotton, the Agency's

1 water resources manager.

2 Marylou.

3 MS. COTTON: Good evening, everyone. Thanks for

4 coming. We have a team of people that are going to

5 be making the presentations tonight on the EIR and

6 setting up the public hearing process. We'll be

7 having our general counsel, Russ Behrens, as one of

8 the speakers. From SAIC, which is the Agency's

9 environmental consultant, we'll have Rob Thomson,

10 who is program manager for the EIR and Lorraine

11 Woodman who's the EIR project manager, and Lorraine

12 will be doing the bulk of the speaking tonight and

13 then there will be me. I have a couple items to

14 cover.

15 But next I'll turn it over to Russ.

16 MR. BEHRENS: Thank you, Marylou. I'm just

17 going to give you a little background. As you

18 recall, the previous EIR on the 41,000 acre-foot

19 transfer was certified in 1999. And because that

20 EIR mentioned and related to the Monterey EIR, the

21 court held that because the PCL decision required

22 the Monterey EIR to be decertified, the appellate

23 court on our case held that since we were deemed to

24 have tiered off that EIR, we had to decertify our

25 EIR as well, even though the court stated in some

1 dictum in the case that and all other respects our
2 EIR was appropriate.
3 Then after we finished that process on
4 remand, there was a request by the plaintiffs in the
5 case to enjoin us from utilizing in any way the
6 41,000 acre-foot transfer contracts. And the court,
7 Judge Yaffie, refused to enjoin our use of the
8 41,000 contracts, but reserved jurisdiction to
9 determine whether or not in the future we were using
10 the 41,000 acre-foot contracts for any improper
11 purpose.
12 No action was ever filed in front of Judge
13 Yaffie in that regard, but the plaintiffs filed an
14 appeal of Judge Yaffie's order on remand, and it
15 went up to the appellate court and, again, the
16 appellate court refused to enjoin the use by the
17 Agency of the 41,000 acre-foot transfer. And this
18 was further confirmed recently in the Network
19 Groundwater Storage Project because one of the ways
20 we do use our 41,000 acre-foot contract is we get an
21 allocation of water from the State Water Project,
22 which if we don't need, we have the opportunity to
23 store in outside basins outside the agency such as
24 the semitropic.
25 That case was challenged by Network and

1 recently the Superior Court of Ventura County
2 refused to enjoin that project and held that it was
3 properly processed with a negative declaration.
4 So we are now in the process of completing
5 our current EIR. It's being prepared in accordance
6 with all the requirements of law and the court
7 judgments.
8 I'll now turn it over to Lorraine -- or to
9 Rob to talk about how we process this EIR.
10 MR. THOMSON: Good evening. This is just a very
11 quick reminder of the CEQA process, where we've been
12 and where we are and where we're going.
13 Starting up here in the upper left, we --
14 this agency, following the decertification order,
15 developed a new project description following the
16 directives of the court and developed a new project,
17 published a notice of preparation and a new initial
18 study, and did that in January of 2003, held the
19 30-day requisite comment period, received comments.
20 Both the NOP and those comments are in Appendix A of
21 the document in total.
22 Those provided us the scope of the document
23 and provided us with some direction towards the
24 approach. From that we prepared the technical
25 analyses and the administrative drafts of this

1 document, very complex with multiple iterations and
2 baselines and so on.
3 After extensive review and analysis, we
4 have now in front of you the draft EIR, and that
5 comment period opened on June 17th. Because of the
6 complexity of this document, the agency determined
7 that it should have a 60-day review period rather
8 than the statutorily mandated 45 days. Comment
9 period will close on August 16th.
10 From there we'll take the comments that are
11 received and provide responses and develop a final,
12 which then your board will consider, and should you
13 find it to be adequate and certify it and move
14 forward.
15 With that, I think we go to Lorraine to do
16 a quick review of the EIR itself.
17 MS. WOODMAN: Good evening.
18 MR. KAVOUNAS: Good evening.
19 MS. WOODMAN: The purpose of the project
20 evaluated in this EIR is to meet the existing water
21 demand in the CLWA service area and a portion of
22 future water demand from anticipated growth. This
23 would be accomplished by transferring an existing
24 41,000 acre-feet of State Water Project Table A
25 amount to CLWA.

1 The term Table A amount refers to the
2 annual maximum amount of water the State Water
3 Project contractor can request. The Table A amount
4 would be transferred to CLWA from the Kern County
5 Water Agency and its member unit, the Wheeler
6 Ridge-Maricopa Water Storage District.
7 Project water would be delivered to CLWA
8 through existing State Water Project facilities
9 located between the southern delta and Castaic Lake.
10 No new construction would be required as a result of
11 this project.
12 This EIR is being prepared by CLWA, which
13 as the lead agency will evaluate and, if
14 appropriate, exercise its discretion to certify the
15 EIR, make findings, and approve the project.
16 CLWA has assumed the role of lead agency
17 for a number of reasons: The water would be used by
18 CLWA in its service area; it is the major project
19 proponent; it is leading State Water Project water
20 supply contract amendment efforts; it has the
21 expertise to implement the project; and the project
22 impacts only involve a limited geographic area, not
23 the entire state.
24 Three responsible agencies have been
25 identified. These are agencies other than the lead

1 agency that have the responsibility for carrying out
2 or approving a project.
3 The responsible agencies for this EIR are
4 the Department of Water Resources, because State
5 Water Project water and facilities are involved, and
6 the Kern County Water Agency and the Wheeler
7 Ridge-Maricopa Water Storage District, because their
8 Table A amount would be transferred to CLWA.
9 In compliance with CEQA requirements, these
10 agencies have been active participants in preparing
11 the EIR, and they will use the EIR in making
12 decisions on this project.
13 This EIR is related to several other EIRs.
14 As Russ noted, this project previously was evaluated
15 in the supplemental water project EIR, which was
16 certified in 1999 and decertified in 2002.
17 The 1999 EIR tiered from the Monterey
18 Amendment Program EIR which also was decertified.
19 Because the Monterey Amendment is once more
20 undergoing environmental review, the present EIR
21 considers impacts both with and without the Monterey
22 Amendment in place.
23 The project also is evaluated
24 programmatically in CLWA's capital program and water
25 plan EIR.

1 The description of the environmental
2 setting is usually based on conditions that are
3 present at the time that the notice of preparation
4 is issued. This project, however, was the subject
5 of an earlier EIR and the transfer already has been
6 implemented.
7 In order to capture any changes that could
8 have resulted from the transfer, this EIR considers
9 both the conditions that were present at the time
10 that the original notice of preparation was issued,
11 around 1998, as well as current conditions.
12 Information is provided for all three
13 geographic areas evaluated in this EIR, including
14 those associated with State Water Project facilities
15 and the Wheeler Ridge and CLWA service areas.
16 No significant direct impacts were
17 identified in the EIR. It was determined that the
18 project would remove an obstacle to growth and that
19 significant, indirect, growth-related impacts on all
20 resources could occur in the CLWA service area.
21 Most of these impacts would be mitigable to
22 less than significant, although impacts to
23 aesthetics, air quality, biology, transportation,
24 and solid waste disposal may be unavoidable.
25 This EIR looks at the cumulative impacts of

1 this project when added to other closely related
2 projects in all three geographic areas. No
3 significant cumulative impacts were associated with
4 the State Water Project or the Wheeler Ridge service
5 area.
6 Cumulative impacts in the CLWA service area
7 were the same as the growth-related impacts since
8 they would result from the same types of land
9 development.
10 This EIR considers a variety of
11 alternatives to the project, including: No project,
12 increasing groundwater extractions, exchanging
13 desalinated water for State Water Project water,
14 transferring a smaller Table A amount, and
15 transferring a larger Table A amount.
16 With the exception of transferring a
17 smaller Table A amount, all of the alternatives
18 would have greater direct impact than the proposed
19 project. Transferring a smaller Table A amount
20 would lessen the project's growth-related impacts,
21 but would not meet the project objective related to
22 augmenting CLWA's water supply to meet existing
23 demand and a portion of future demand.
24 Thus, the proposed project is identified as
25 the environmentally superior alternative.

1 Several areas of controversy have been
2 identified. As mentioned earlier, the Monterey
3 Amendment EIR is being revised. Because of the
4 uncertainty surrounding this action, the present EIR
5 evaluates impacts both with and without the Monterey
6 Amendment in place.
7 Additionally, the potential for growth
8 inducement from increased water supply is an area of
9 known controversy, as is the amount of groundwater
10 available to the Santa Clarita Valley.
11 I'm going to turn to back to Marylou
12 Cotton.
13 MS. COTTON: As Lorraine mentioned and Rob
14 mentioned, this is a extremely complex EIR, and has
15 a couple of special features that we don't commonly
16 find in other EIRs.
17 There are two additional appendices in the
18 EIR. Appendix C is a study that was done by
19 Northwest Economic Associates on the agricultural
20 resources in the Wheeler Ridge-Maricopa Water
21 Storage District service area. It explains the
22 economic rationale for why certain member units of
23 the Kern County Water Agency wish to sell part of
24 their SWP Table A amounts in the first place, the
25 reasons they wanted to do that. It discusses how

1 they came to that conclusion and any impacts that
2 might be caused by that.
3 Appendix D is something I'll just say that
4 we are rather proud up of. It's a technical data
5 for hydrologic analysis appendix. It was done by a
6 person named Nancy Clemm, who is a professional
7 engineer. Very well known in the State Water
8 Project family. It is a very complex analysis, as
9 Lorraine mentioned, with and without the terms of
10 the Monterey Amendment of the reliability of CLWAs
11 (inaudible) supplies, the project in general and
12 Wheeler Ridge's -- impacts of Wheeler Ridge's
13 supplies. That appendix is something that is the
14 underpain for some of the conclusions that are
15 present in the EIR.
16 MR. BEHRENS: As you know, the public comment
17 period ends August 16th. It opened on June 17th.
18 We're going to be receiving these comments tonight.
19 We have a court reporter here that's taking all
20 these comments down that we receive. And the staff
21 will then consider the responses to those comments
22 and report to the board at a later time after the
23 comment period ends, so we can collect not only the
24 comments we received tonight, but those in writing
25 that we receive prior to August 16th.

1 That report will then be put together, the
2 comments analyzed, and responses to the comments
3 formulated, a matrix prepared for you to review with
4 the staff in a presentation at a future board
5 meeting. We anticipate that the process will be
6 completed, according to the staff's schedule anyway,
7 in November and then for final consideration for
8 certification in December.
9 That concludes our presentation,
10 Mr. Chairman. And it would be appropriate at this
11 time now to open up the public hearing.
12 MR. KAVOUNAS: Very well, Mr. Behrens. Thank
13 you. And thank you to all the staff that worked to
14 to prepare this presentation.
15 I now open the public hearing. I have
16 cards from three speakers that wish to address the
17 agency and the board. If anybody else would like to
18 address the agency, please feel free to fill out a
19 public comment card that is located on the table by
20 the door.
21 I'd like to call a Ms. Lynne Plambeck.
22 MS. PLAMBECK: Hi. I'm here speaking as an **102**
23 individual citizen tonight. I'd just like to
24 express my concern that this EIR is proceeding
25 without completion of the Monterey Agreement. I

1 think the court was fairly concise about the need 102
2 for the programmatic EIR in both legal decisions,
3 and they were also very -- very concerned about the 103
4 lead agency, and Castaic Lake Water Agency is not 104
5 the right lead agency. It was my understanding
6 prior to this that the two EIRs were moving forward
7 in tandem and they would be completed
8 simultaneously.
9 And I just think that -- that the folks up 105
10 north that challenged the EIR will probably continue
11 to challenge the EIR and that they're going to be
12 very concerned that this is proceeding in a manner
13 that's not consistent with an appellate court
14 decision that they won, and that means that even
15 though you know that's there and you're going ahead
16 and doing this anyway, and it sort of seems like a
17 waste of taxpayer's money since there's already a
18 published appellate court decision on it.
19 And so I would just ask you to keep that in
20 mind and that it might be the better part of valor
21 to move the two EIRs forward in tandem as I
22 understood had been originally planned. Thank you.
23 MR. KAVOUNAS: Thank you, Ms. Flambeck.
24 Mr. Vince Bertoni for the City of Santa
25 Clarita.

1 MR. BERTONI: Thank you. Vince Bertoni, interim
2 director of planning and building services for the
3 City of Santa Clarita here on behalf of the City of
4 Santa Clarita.
5 First, I'd like to thank the board for **106**
6 providing us this opportunity to comment on the
7 project, on the EIR. You have extended the public
8 comment period beyond the normal 45 days to 60 days.
9 You have also held the public hearing during your
10 comment period, which is not required under CEQA, so
11 you've gone above what's the minimum under CEQA and
12 the City appreciates that and also appreciates being
13 provided with all the documentation very quickly and
14 promptly throughout the whole process. So first
15 off, we'd like to thank you for that.
16 Second off, I noticed that by sharing on **107**
17 EIR for water transfer, it's not really the water
18 transfer itself. In regards to the water transfer,
19 I would just say that as we reviewed the EIR it
20 appears that this EIR was prepared for water
21 transfer that would allow to you a few things. One
22 of them would be to provide more reliability in the
23 existing water supply. The other would be to allow
24 for growth that's already been anticipated under
25 existing general plans for both of the City of Santa

1 Clarita and the County of Los Angeles. 107

2 So to that extent, the City is supportive

3 of that. The City has always been supportive of

4 additional water reliability and also to make sure

5 that as we plan for our future growth, we will have

6 water supplied for that.

7 This city has a couple very high-profile

8 projects that it is very important to the City and

9 the point being the City to have adequate water

10 supply for that.

11 As you know, we're very -- a housing rich

12 city. We are trying to balance that out to be as

13 equally jobs rich and so things such as our

14 employments such as the Center Point Business Park

15 to the south of you or the Gate (inaudible) project

16 in Newhall are very important for the City, very

17 important for the City's goals.

18 So to the extent that this would provide

19 water for that, that's an important City goal.

20 Also, things such as the redevelopment of downtown

21 Newhall and that revitalization would require some

22 additional water. So the supply part of it, the

23 City is supportive of that additional reliability of

24 water supply.

25 We reviewed the EIR at the City and we 108

1 reviewed it under the -- to see if it adequately 108
2 addressed the potential environmental impact to the
3 City of Santa Clarita, and our review indicated that
4 it has. So at this time we have no comment on the
5 EIR and would happy to answer any questions. Thank
6 you.
7 MR. KAVOUNAS: Thank you, Mr. Bertoni. Thank
8 you for taking the time.
9 Dana Wisehart, United Water Conservation
10 District.
11 MS. WISEHART: Good evening. And as you've
12 mentioned, I am Dana Wisehart, the general manager
13 of the United Water Conservation District. I
14 provided written comments, but if you don't mind,
15 I'd just like to read some excerpts of the comments
16 into the record.
17 MR. KAVOUNAS: Please.
18 MS. WISEHART: The United Water Conservation 109
19 District has reviewed the draft EIR for the
20 purpose -- for the proposed transfer of 41,000
21 acre-feet of state project water that will come from
22 the Kern County Water Agency's member unit Wheeler
23 Ridge-Maricopa Water Storage District to the Castaic
24 Lake Water Agency. This proposed transfer of State
25 Water Project water is beneficial to the Santa Clara

1 River Watershed and is fully endorsed by United 109
2 Water.
3 The permanent transfer of 41,000 acre-feet 110
4 of State Water Project water to the Castaic Lake
5 Water Agency provides a valuable additional source
6 of water for the Santa Clarita Valley. This
7 additional water improves the potential for
8 conjunctive use of water within the valley. This is
9 especially important given the urbanization of this
10 area. Increased surface water supplies should
11 provide water managers throughout the basin more
12 flexibility with respect to the magnitude of
13 additional groundwater pumping needed to meet the
14 escalating M&I demand for water within the basin.
15 As an ongoing general comment to all water
16 purveyors within the Santa Clarita Valley, United
17 Water has a very real interest in the continued
18 health of the Santa Clarita groundwater basin and
19 the flow of the Santa Clara River. United Water
20 represents the collective interests of downstream
21 residents that depend on the flow of the Santa Clara
22 River for recharge to groundwater, surface water
23 diversions, and environmental mandates.
24 United Water's goal is that the quantity 111
25 and quality of water associated with the flow of the

1 Santa Clara River into Ventura County not be 111
2 diminished. The development and implementation of
3 the inter-agency regional monitoring program of
4 groundwater levels, groundwater quality, surface
5 water flows, and surface water quality -- and you
6 know I am talking about the MOU agreement that we
7 all signed with your upstream purveyors -- should
8 provide ongoing data with respect to the relative
9 health of the Santa Clarita and downstream basins as
10 well as surface water.
11 In the event that surface water flow into
12 Ventura County is diminished in either quantity or
13 quality and can be reasonably linked to overpumping
14 of the aquifer systems and/or surface water
15 discharges to the river within the Santa Clarita
16 Valley, United Water would seek to remedy the
17 problem.
18 We appreciate the efforts of the Castaic
19 Lake Water Agency to appropriately plan and augment
20 the water supplies of our watershed as represented
21 by this water transfer project.
22 As I said, my comments do have additional 112
23 focus on the availability of the -- of the water,
24 but that is covered in your EIR, so I'm not going to
25 read it tonight. Thank you.

1 MR. KAVOUNAS: Thank you.

2 MR. BEHRENS: May the record show that the

3 letter dated the July 26th from United Water

4 Conservation District signed by Dana Wisehart is

5 made part of the record of the proceedings tonight.

6 MR. KAVOUNAS: Thank you, Mr. Behrens.

7 MR. BEHRENS: Thank you, Mr. Chairman.

8 MR. KAVOUNAS: Mr. Ed Dunn.

9 MR. DUNN: My name is Ed Dunn. For those that

10 don't know me, I was former I was former director of

11 the Newhall County Water District and former

12 director of this agency, and I remember when I was

13 on this agency there was urban water event or plan

14 that was done, and since then there have been

15 various EIRs and I listened to the lady speak on the

16 EIR tonight and she made mention that these

17 transfers would be transported to the Santa Clarita

18 Valley by way of the state aqueduct.

19 When talking to DWR and asking how that **113**

20 happened, because this agency used to have

21 originally a 23,000 acre-feet per year allocation

22 from the state, that the state DWR would transfer

23 and transport to Castaic Lake for Castaic Lake Water

24 Agency, but DWR also had allocations from many

25 farmers and other water users in the San Joaquin

113

1 Valley. DWR said that those allocations the CLWA
2 had been subsequently purchasing were designed to
3 take turn-outs in the San Joaquin Valley, and those
4 acre-feet were to get off in the San Joaquin Valley.
5 In other words, they were telling me that
6 the Tehachapi pumping station and the aqueduct, that
7 is I guess mostly owned for use by the Metropolitan
8 Water District, was not designed to transport those
9 farmers' allocations here.
10 So I have asked when I was on the agency
11 and I have asked as a public comment when I'm not on
12 the agency what contracts do you have with
13 Metropolitan Water District or DWR that says you can
14 transport that water that you are purchasing, those
15 additional purchases here? Doesn't matter if you've
16 banked them up there. Some day you will want to
17 transport them here, and I am told there are no such
18 contracts.
19 We know now that since the Arizona and
20 those people are cutting off MWD's allocations by
21 way of Colorado River, MWD now has to rely more
22 heavily on the DWR and their allocation in this
23 aqueduct and the capacity in the aqueduct. Many
24 unaware, even in our community, that Castaic Lake
25 Water Agency only has 5,000 acre-foot of storage in

113

1 the Castaic Lake. Many think we've got a real good
2 reservoir here, and we'll really high and dry.
3 And so with the demand that MWD is going to
4 have on the aqueduct now more so demand 'cause you
5 can't get it from the Colorado River, and with the
6 drought situations, and this agency has no contracts
7 that they can transfer those additional allocations
8 here, and I heard nothing in the words tonight just
9 like it was going to be transferred. Nothing was in
10 the Urban Water management plan. It kind of scares
11 me that we're going to sit here in the drought
12 situation and MWD is going to need their full
13 capacity of Castaic Lake and their full capacity of
14 the state aqueduct, and all this water you purchased
15 you can't bring here.
16 I would like to see that addressed in the
17 EIRs. I would like to see that addressed in the
18 urban water management plans that you can bring this
19 water here. Thank you.
20 MR. KAVOUNAS: Thank you, Mr. Dunn.
21 Next is Mr. Larry Manikin.
22 MR. MANIKIN: I have bolded my comment, and I
23 still have to put my glasses on.
24 Thank you for the opportunity to make
25 public comment on tonight's issue concerning the

1 transfer and ultimate storage of potentially 41,000
2 acre-feet of State Water Project water.
3 First, I am Larry Manikin, and president of
4 the Santa Clarita Valley Chamber of Commerce. Our
5 organization is the largest business association in
6 the region with, as of last week, nearly 1,700
7 business members. There is no issue more important **114**
8 in the future of this community than the
9 availability of water. Having available water
10 impacts almost every segment of this community
11 business and consumer marketplace. Having water, as
12 all of you know, is about planning. It's about,
13 again, as all of you know, it's about having local
14 agency being aggressive in the way they find and
15 bring new water into the valley, and most
16 importantly, it's about the economic future of the
17 Santa Clarita Valley.
18 My job as president of the Chamber achieved
19 spokesman of the business community is twofold.
20 First, I work with companies from outside of the
21 this market and try to encourage them to locate
22 their company or business here. I am heavily
23 involved in business recruitment.
24 Second, and probably more importantly, I am
25 actively involved with working with local companies

114

1 to assure that they have the right kind of
2 political, economic, and physical infrastructure in
3 place to make it possible for them to grow their
4 respective businesses.
5 Regional economic analysts have
6 predicted -- and I heard this at a meeting this
7 spring -- they predicted that we will generate some
8 4,700 new jobs here in the valley this year alone.
9 I suspect we're ahead of that pace already.
10 In looking at specific projects, one
11 project, Center Point Business Park which is now
12 under construction will generate an estimate --
13 estimated 8,000 new jobs over the next few years.
14 Many other such project are either now on
15 the books or have actually started development.
16 There is no issue more important to many of these
17 companies than knowing that one, two or ten years
18 from now they can turn on a water facet and actually
19 have water flow out of it.
20 The issue you are discussing this evening
21 will provide these companies with some sense of
22 security that water, in fact, can and will be
23 available to them during times of drought.
24 I highly encourage you to continue to make
25 the necessary decisions that can and will make these

1 new water resources available to both our existing 114
2 business community and to those businesses that will
3 soon call us home in the future. Thank you.
4 MR. KAVOUNAS: Thank you, Mr. Manikin.
5 The last comment card I have is from
6 Mr. Terra Donlon.
7 MS. DONLON: Good evening. My name is Terra
8 Donlon. I'm the director of government affairs for
9 the building industry association.
10 On behalf of approximately 400 companies
11 and their representative employees who make up the
12 Greater L.A./Ventura chapter the BIA, thank you for
13 your opportunity to comment this evening.
14 BIA is pleased to see that CLWA has 115
15 produced a new EIR for the litigation pending on the
16 transaction which can be resolved. The CLWA
17 transfer of 41,000 acre-feet of water from Kern
18 County in 1999 represented wise water planning at
19 the time for the Santa Clarita Valley. Such
20 planning and water management programs on the part
21 of CLWA ensures that its current users as well as
22 future users will be assured safe and reliable
23 drinking water.
24 BIA would like to commend CLWA and its
25 agency and staff for taking these preemptive actions

and we urge you to support and certify this EIR. **116**

MR. KAVOUNAS: Thank you very much, Ms. Donlon.

MR. BEHRENS: Mr. Chairman, we have a letter here dated July 28, 2004 to Mr. Dan Masnada from BIA signed by Terra Donlon and Ray Pearl. I'd like to make this part of the record.

MR. KAVOUNAS: Very good.

MR. BEHRENS: Thank you, Mr. Chairman.

MR. KAVOUNAS: I have no other requests from anyone to speak to the board to comment on this draft EIR. And I see no hands from the audience. At this time I will close the hearing. And I'd like to thank everybody for coming out and giving us their thoughts and opinions on the EIR.

(Hearing concluded at 7:44 p.m.)

# ENDANGERED HABITATS LEAGUE

DEDICATED TO ECOSYSTEM PROTECTION AND SUSTAINABLE LAND USE

EHL

August 19, 2004

*VIA FACSIMILE*

Marylou Cotton
Castaic Lake Water Agency
27234 Bouquet Canyon Rd.
Saugus, Ca 91350
Fax 661 297-1611

**Re: 41,000 AF Transfer of water from farmland to Santa Clarita (SCH#19908041127)**

Dear Ms. Cotton:

Endangered Habitats League is concerned that your agency is the wrong lead agency for this project. Water transfers are a statewide issue that induce growth and reduce water for farming. They should be addressed by an agency that is qualified under state law to address statewide impacts and will notify all interested parties. In this case, this is the Department of Water Resources. **117**

The impacts of this transfer are considerable and affect a wide variety of interest, yet sufficient notification has not occurred, for example to our group. **118**

If such a major transfer is allowed to proceed under the lead agency status of a small regional water agency, it will set a precedent that will affect many major water decisions throughout the state of California. It is imperative that this major change in state policy receive full environmental review and comments from all affected parties. We therefore request that this project be re-noticed by the Dept. of Water Resources acting as lead agency as a project of statewide concern so that all impacts may be disclosed and properly addressed. **119**

Sincerely,

Dan Silver, MD
Executive Director

8424-A SANTA MONICA BLVD., #592, LOS ANGELES, CA 90069-4267 ♦ WWW.EHLEAGUE.ORG ♦ PHONE 213.804.2750 ♦ FAX 323.654.1931

County of Los Angeles Public Library
7400 East Imperial Hwy., P.O. Box 7011, Downey, CA 90241-7011
(562) 940-8461, TELEFAX (562) 803-3032

Library

MARGARET DONNELLAN TODD
COUNTY LIBRARIAN

August 23, 2004

Mary Lou Cotton
Water Resources Manager
Castaic Lake Water Agency
27234 Bouquet Canyon Rd
Santa Clarita, CA 91350

**NOTICE OF COMPLETION FOR DRAFT ENVIRONMENTAL IMPACT REPORT CASTAIC LAKE WATER AGENCY SUPPLEMENTAL WATER PROJECT TRANSFER**

Dear Ms Cotton:

This is in response to the Notice of Completion for the Draft Environmental Impact Report for the Castaic Lake Water Agency Supplemental Water Project Transfer. The County of Los Angeles Public Library has reviewed the document and determined that this project will not have an impact on library services. 120

If you have any questions, or need additional information, please feel free to call Malaisha Hughes at (562) 940-8455.

Sincerely,

Malou Rubio

Malou Rubio
Head, Staff Services

MR:MH
U:\STAFFSERVICES\DEVELOPER FEE\EIR\Castaic Lake Water Agency.doc

c: David Flint. Assistant Director, Finance and Planning

SOUTHERN CALIFORNIA

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**Riverside County:** Marion Ashley, Riverside County • Thomas Buckley, Lake Elsinore • Bonnie Flickinger, Moreno Valley • Ron Loveridge, Riverside • Greg Pettis, Cathedral City • Ron Roberts, Temecula

**San Bernardino County:** Paul Biane, San Bernardino County • Bill Alexander, Rancho Cucamonga • Edward Burgnon, Town of Apple Valley • Lawrence Dale, Barstow • Lee Ann Garcia, Grand Terrace • Susan Longville, San Bernardino • Gary Ovitt, Ontario • Deborah Robertson, Rialto

**Ventura County:** Judy Mikels, Ventura County • Glen Becerra, Simi Valley • Carl Morehouse, San Buenaventura • Toni Young, Port Hueneme

**Orange County Transportation Authority:** Charles Smith, Orange County

**Riverside County Transportation Commission:** Robin Lowe, Hemet

**Ventura County Transportation Commission:** Bill Davis, Simi Valley

Printed on Recycled Paper 559-5/20/04

September 3, 2004

Ms. Mary Lou Cotton
Water Resources Manager
Castaic Lake Water Agency
27234 Bouquet Canyon Road
Santa Clarita, CA 91350

RE: **Comments on the Draft Environmental Impact Report for the Castaic Lake Water Agency Supplemental Water Project Transfer – SCAG No. I 20040379**

Dear Ms. Cotton:

Thank you for submitting the **Draft Environmental Impact Report for the Castaic Lake Water Agency Supplemental Water Project Transfer** to SCAG for review and comment. As areawide clearinghouse for regionally significant projects, SCAG reviews the consistency of local plans, projects, and programs with regional plans. This activity is based on SCAG's responsibilities as a regional planning organization pursuant to state and federal laws and regulations. Guidance provided by these reviews is intended to assist local agencies and project sponsors to take actions that contribute to the attainment of regional goals and policies.

It is recognized that the proposed Project considers the transfer of 41,000 acre feet of State Water Project Table A amount from Kern County Water Agency, and its member district the Wheeler Ridge-Maricopa Water Storage District, to the Castaic Lake Water Agency.

SCAG staff has evaluated the **Draft Environmental Impact Report for the Castaic Lake Water Agency Supplemental Water Project Transfer** for consistency with the Regional Comprehensive Plan and Guide and Regional Transportation Plan. The Draft EIR includes a discussion on the proposed Projects' consistency with SCAG policies and applicable regional plans, which were outlined in our February 19, 2003 letter on the Notice of Preparation (NOP) for this Draft EIR.

The Draft EIR, in Section 5.0, Consistency with Adopted Plans and Policies, cited SCAG policies and addressed the manner in which the proposed Project is consistent with applicable core policies and supportive of applicable ancillary policies. This approach to discussing consistency or support of SCAG policies is commendable and we appreciate your efforts. **121**

Based on the information provided in the Draft EIR, we have no further comments. A description of the proposed Project was published in the June 16-30, 2004 Intergovernmental Review Clearinghouse Report for public review and comment.

If you have any questions, please contact me at (213) 236-1867. Thank you.

Sincerely,

JEFFREY M. SMITH, AICP
Senior Regional Planner
Intergovernmental Review

# Section 3 – Responses to Comments

# 3.0 RESPONSES TO COMMENTS

This section includes excerpted comments from the letters and public meeting transcript included in Section 2 and corresponding responses in tabular format. For ease of cross-referencing, the comments in the table have been numbered sequentially in the left-hand column. The acronyms used to define the commenters are as indicated in Section 2; comments provided during the public meeting on July 28, 2004 are indicated by "PM," and the name of the commenter is shown in parentheses. This section also includes a Master Response, which addresses similar issues raised by a number of commenters.

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**Matrix of Comments on DEIR and Responses**
**CLWA - Supplemental SWP Table A Amount Transfer Project FEIR (41,000 AF)**

| No. | Commenter | Comment | Response |
|---|---|---|---|
| 1 | Caltrans | The Project would not involve construction or operational changes that could generate traffic or otherwise affect traffic conditions. Based on the information received, we have no comments at this time. Thank you for the opportunity to have reviewed this project. Any transportation of water which requires the use of oversize-transport vehicles on State highways will require a Caltrans transportation permit. We recommend that large size truck trips be limited to off-peak commute periods. Thank you for the opportunity to have reviewed this project. | This comment is noted; no text revisions are required. The Project does not involve the use of trucks to transport water. |
| 2 | DWR | The Department of Water Resources' (DWR) staff have reviewed the Draft Environmental Impact Report (DEIR) for the Castaic Lake Water Agency Supplemental Water Project Transfer of 41,000 Acre-Feet of Table A Amount (SCH No. 1998041127), and found that the document adequately and thoroughly discusses the proposed project and its impacts. The DEIR discusses the effects of the project on the environment and State Water Project (SWP) and uses baseline conditions consistent with those being considered for inclusion in the DEIR. DWR is currently preparing for the Monterey Amendment to the State Water Project Contracts (including Kern Water Bank Transfer and Other Contract Amendments and Associated Actions as Part of a Proposed Settlement Agreement in Planning and Conservation League v. Department of Water Resources (SCH No. 2003011118), referred to hereafter as "Monterey Plus." | This comment is noted; no text revisions are required. DWR, as a responsible agency for the DEIR and as lead agency for the new Monterey Amendment Program EIR, has reviewed the DEIR and has concluded that the DEIR adequately and thoroughly describes the Project and adequately analyzes all Project impacts on the environment and SWP system, using baseline conditions consistent with those DWR intends to use for its Monterey Amendment EIR. DWR's evidence refutes comments by members of the public which speculate that the DEIR will be inconsistent with the new Monterey Amendment Program EIR or that the DEIR fails to consider Project environmental effects which will be considered in the Monterey Amendment EIR. |
| 3 | DWR | The DEIR provides a good discussion of the relationship between the 41,000 acre-feet Table A transfer and the current Monterey Plus process. DWR will analyze the effects of all Table A transfers that were part of the Monterey Amendment to the SWP contracts in the Monterey Plus EIR. The proposed CLWA 41,000 acre-feet Table A transfer will be included in this analysis. | This comment is noted; no text revisions are required. DWR, as a responsible agency for the DEIR and as lead agency for the new Monterey Amendment Program EIR, has reviewed the DEIR and has concluded that the DEIR provides a good discussion of the relationship between the Project and the Monterey Amendment. |

| No. | Commenter | Comment | Response |
|---|---|---|---|
| 4 | DWR | One of the tools being used by DWR to assess potential impacts associated with these Table A transfers is the CALSIM II model. DWR acknowledges that CLWA used an earlier model, DWRSIM, to analyze the effect of the 41,000 acre-feet transfer; however, DWR will use the next generation model, CALSIM II, to assess potential impacts associated with all Table A transfers in its DEIR for Monterey Plus. The use of CALSIM II may cause slight changes in results, which may lead DWR to different conclusions than the conclusions made by Castaic Lake Water Agency in the current DEIR. | CLWA used DWRSIM model studies to assess potential future impacts of the Project because at the time the supply analyses were begun for the DEIR no CALSIM II studies were publicly available. At that time, the DWRSIM studies used in DEIR analyses were the most comprehensive studies that were publicly available. These studies were conducted by DWR for CALFED in 1998 and had received extensive public and technical review during the CALFED process. Additionally, these studies were consistent with the pre-Project baseline conditions in 1998 when CLWA approved the Project. (See DEIR Section 3.0 at p. 3.0-6, DEIR Section 3.15.2.2 at p. 3.15-31)<br><br>CLWA's use of the DWRSIM model did not result in significantly different SWP delivery reliability results than would have been obtained using the CALSIM II model. Overall, the SWP delivery reliability results from DWRSIM studies prepared for CALFED were slightly higher than delivery reliability results from the CALSIM II studies that subsequently became available in the DWR SWP Delivery Reliability Report. Therefore, from an environmental impact assessment standpoint, the DEIR analyzed the worst-case scenario; i.e., the scenario that would result in greater direct and indirect impacts in both the CLWA and WRMWSD service areas. (See DEIR Appendix D, Section 2.2 and Figures 2-1 and 2-2 at pp. D-19 to D-21)<br><br>A comparison of DWRSIM and CALSIM II results of total SWP deliveries shows a somewhat larger difference for the comparison at "existing" demand conditions than at 2020 demand conditions. (See DEIR Appendix D, Section 2.2 and Figures 2-1 and 2-2) The differences between the two model results at existing demand conditions are mainly attributable to the use of a different "existing" demand for each study. Both studies used DWR estimates of Contractor demands that were "existing" or current at the time the studies were conducted, i.e., 1998 for the DWRSIM study and 2001 for the CALSIM II study. The 2001 total SWP demand is higher than the 1998 total |

| No. | Commenter | Comment | Response |
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| 4 (cont) | DWR | | SWP demand due to increased M&I Contractor demands. Because the models only make deliveries up to Contractor demands (as opposed to making deliveries up to the Contractors' maximum Table A Amounts), the deliveries shown in the wetter years, when adequate supply is usually available, are limited by demands. Therefore, for current conditions, the DWRSIM study shows lower deliveries than the CALSIM II study in the wetter years, not because supplies are not available, but because the lower Contractor demands used in the DWRSIM study limit deliveries. In addition, the lower demand can also result in more water being delivered in some dry years, if more water was left in storage at the end of the preceding year. The differences between the two model results at 2020 demand conditions are much smaller because both studies use the same demands. Differences in SWP deliveries between these two model studies result from other factors such as changes in assumptions for regulatory standards and operating criteria, and differences in certain algorithms used in the models.<br><br>It should be noted that CLWA did use CALSIM II model results to estimate SWP water supplies for the current environmental setting. DWR's comment indicates that DWR will also use the CALSIM II model to assess potential impacts associated with Table A Amount transfers in its Monterey Amendment EIR. Thus, CLWA anticipates that the DEIR and the Monterey Amendment EIR will be consistent in their projections of impacts related to the Project. (See DEIR Section 3.15.2.2 at page 3.15-31 and DEIR Appendix D Section 6.1.2.2; See also DEIR Sections 6.3.1.5, 6.3.2.6 & 6.3.3.4) |
| 5 | DWR | As final comments, DWR notes that this DEIR adequately discusses the reliability of the SWP, pre- and post-Monterey Amendment conditions, future conditions, and SWP operations. | This comment is noted; no text revisions are required. DWR, as a responsible agency and as lead agency for the Monterey Amendments EIR, has reviewed the DEIR and has concluded that the DEIR adequately discusses SWP operations, SWP reliability, pre- and post-Monterey Amendment conditions, and future conditions as they relate to the Project. DWR's evidence refutes comments from other parties that speculate |

| No. | Commenter | Comment | Response |
|---|---|---|---|
| 5 (cont) | DWR | | that the DEIR fails to adequately discuss SWP operations, SWP reliability, pre- and post-Monterey Amendment conditions, and future conditions, and that speculate that such DEIR discussions are contrary to the discussions anticipated for the Monterey Amendment EIR. |
| 6 | DWR | Coordination between DWP and CLWA is essential to produce accurate environmental documentation that leads to informed decision-making and full public disclosure as the California Environmental Quality Act mandates. DWR appreciates inclusion and consultation in the early stages of preparation of this DEIR. Please ensure that DWR's Division of Environmental Services and SWP Analysis Office receive copies of the Final EIR. | DWR states that it was included and consulted in the early stages of preparation of the EIR in order to provide accurate environmental documentation leading to full public disclosure and informed decision-making. DWR's evidence refutes comments from other parties that speculate that, without DWR as the lead agency, the DEIR will not have the benefit of DWR statewide authority and expertise. As requested, CLWA will provide to DWR's Division of Environmental Services and to DWR's SWP Analysis Office copies of the FEIR for the Project. |
| 7 | CHP | In reviewing this project, our concern was what effect these projects will have on traffic. It is our opinion there should not have a significant impact. | This comment is noted and is consistent with the EIR analysis; no text revisions are required. |
| 8 | SWC | This letter provides comments on the Draft EIR entitled "Supplemental Water Project Transfer of 41,000 Acre-Feet of State Water Project Table A Amount," on behalf of the State Water Contractors ("SWC"). As you know, the SWC represents nearly all contractors that receive water from the State Water Project ("SWP"). Thus, the SWC is vitally interested in the proper application of CEQA to water transfers under Articles 41 and 53 of the SWP water service contracts and, in general, with respect to operations of the SWP.<br><br>The SWC commends Castaic Lake Water Agency ("Castaic") for going far beyond what is required by CEQA and the appellate court decision that invalidated Castaic's earlier EIR for the 41,000 acre foot water transfer. Both the trial court and the appellate court found that all of the environmental analyses contained in that first EIR complied with CEQA, except for reliance (through "tiering") on the original Monterey Amendment EIR which had later been found inadequate by the Third District Court of Appeal. Nevertheless, Castaic has taken | This comment is noted; no text revisions are required. |

| No. | Commenter | Comment | Response |
|---|---|---|---|
| 8 (cont) | SWC | a comprehensive, fresh look at the transfer's potential impacts in a single document, when arguably a short supplement eliminating the references to the Monterey Amendment would have sufficed. By so doing, you have provided decision makers with a complete picture of the transfer and its impacts so they can make new informed decisions related to the project. | |
| 9 | SWC | During scoping, several parties made suggestions that this Supplemental EIR should not move forward until the new EIR for the Monterey Amendment has been completed. The SWC suggests that Castaic should respond more directly to these contentions. Those contentions overlook or intentionally mischaracterize a central element of the Monterey EIR litigation Settlement Agreement. The Settlement Agreement explicitly states that the SWP will operate under the Monterey Amendment while the new EIR is prepared. This includes operation under Article 53, pursuant to which the Kern County Water Agency consented to up to 130,000 acre feet of agriculture to urban transfers. Suggestions that consideration of such transfers must await completion of the new Monterey Plus EIR would render this element of the Settlement Agreement a nullity, contrary to the clear understanding of the signatories to that document. | CLWA concurs with these comments. Please refer to the Master Response, particularly Section V thereof. |
| 10 | SWC | Further, nothing in the Settlement Agreement affects the rights of contractors and DWR to agree to and proceed with implementing long-term transfers of Table A Amounts. In this respect, the draft Supplemental EIR contains a confusing statement to the effect that certain terms in the Settlement Agreement constitute a "specific exclusion" of the 41,000 acre foot transfer from "any prohibitions against transfers of Table A amounts by the Settlement Agreement." The Settlement Agreement does not contain any such prohibitory language. Thus, specific exclusions are not necessary. The final Supplemental EIR for the 41,000 acre foot transfer should point out that several other Table A transfers have been consummated since the Settlement Agreement was executed and that the Settlement Agreement contains no language that | The comment correctly points out that the Monterey Amendment Settlement Agreement, approved by the Sacramento County Superior Court, allows the Monterey Amendment to remain in effect until certification of a new Monterey Amendment Program EIR. Monterey Amendment provisions allowing long-term transfers of Table A Amounts remain valid. (See DEIR 1.2.2 and 1.4.2) Thus, the language contained at DEIR Page ES-4, lines 20-31, and at DEIR Page 1-4, lines 13-23, should be deleted and replaced with the following:<br><br>"The Monterey Amendment Settlement Agreement does not require that the new Monterey Amendment Program EIR be certified before an EIR for this Project can be certified, nor does |

| No. | Commenter | Comment | Response |
|---|---|---|---|
| 10 (cont) | SWC | could be interpreted as prohibiting such transactions or the 41,000 acre foot transfer. | it require that the EIR for this Project tier off the new Monterey Amendment Program EIR. Also, the Monterey Amendment Settlement Agreement does not require that the new Monterey Amendment Program EIR serve as the EIR for this Project. Section III(C)(4) of the Monterey Amendment Settlement Agreement only requires DWR to analyze the potential impacts resulting from this Project and other transfers as they relate to the potential environmental impacts of approving the Monterey Amendment. Section III(E) of the Monterey Amendment Settlement Agreement clarifies that the Section III(C)(4) analysis is limited by remedies or other actions of the Los Angeles County Superior Court in *Friends I*, stating:<br><br>> With respect to Section III(C)(4)(b) regarding the Kern-Castaic Transfer, the Parties recognize that such water transfer is subject to pending litigation in the Los Angeles County Superior Court following remand from the second District Court of Appeal (*See Friends of the Santa Clara River v. Castaic Lake Water Agency 95 Cal.App.4th 1373, 116 Cal.Rptr.2d 54 (2002); review denied, April 17, 2002*). The Parties agree that jurisdiction with respect to that litigation should remain in that court and that nothing in this Settlement Agreement is intended to predispose the remedies or other actions that may occur in that pending litigation."<br><br>Several transfers have taken place since the Monterey Amendment Settlement Agreement. All of those transfers have been approved pursuant to Article 41 of the State Water Project Contract. Those transfers evidence that it was not the intent of the parties to the Monterey Amendment Settlement Agreement to require certification of the Monterey Amendment EIR before transfers not listed as final in Attachment E to the Settlement Agreement could take place. Among non- Attachment E transfers that have taken place |

| No. | Commenter | Comment | Response |
|---|---|---|---|
| 10 (cont) | SWC | | since the Monterey Amendment Settlement Agreement are the following:<br>• June 2, 2003: Tulare Lake Basin Water Storage District to Alameda County Flood Control and Water Conservation District, Zone 7, 400 acre-feet, effective 2003<br>• October 24, 2003: Metropolitan Water District of Southern California to Coachella Valley Water District, 88,100 acre-feet, effective 2005<br>• October 24, 2003: Metropolitan Water District of Southern California to Desert Water Agency, 11,900 acre-feet, effective 2005<br>• October 31, 2003: Belridge Water Storage District (KCWA) to Alameda County Flood Control and Water Conservation District, Zone 7, 2,219 acre-feet, effective 2004<br>• December 5, 2003: Tulare Lake Basin Water Storage District to County of Kings, 5,000 acre-feet, effective 2004<br>• February 23, 2004: Tulare Lake Basin Water Storage District to Coachella Valley Water District, 9,900 acre-feet, effective 2004 |
| 11 | SWC | The SWC suggests that the final Supplemental EIR reference the July 14, 2004 trial court opinion in *California Water Network v. Castaic Lake Water Agency*, which discusses the proper lead agency for projects similar to the 41,000 acre foot transfer. In that case, the Court held that Castaic was the proper lead agency for a water banking project, stating "Castaic is the agency most deeply involved in the planning, and execution of this project." The trial court rejected the argument that DWR was the only proper lead agency when actions concerning the | This information is included in the Master Response. The comment regarding the knowledge and role of local agencies regarding local land use planning and local water supply issues is noted; local land use plans and their relationship to the Project and local water supply are discussed in the DEIR in sections 4.1 and 4.2. |

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| 11 (cont) | SWC | SWP are involved. As in the *California Network Case*, Castaic is the agency promoting, planning, and primarily carrying out the 41,000 acre foot transfer. It is also the agency with the greatest knowledge about growth inducement and similar local issues. State government, including DWR, has no role in local land use planning and the local water supply issues that arise from planning decisions. The plenary role of local agencies in the land use arena should be pointed out in the final Supplemental EIR. | |
| 12 | SWC | The SWC has reviewed the water supply analysis set forth in the draft Supplemental EIR and believes it will provide valuable information for decision makers in determining how the 41,000 acre foot transfer will affect Castaic's ability to meet the future water needs engendered by Los Angeles County's and local cities' land use decisions. The SWC suggests that the final Supplemental EIR re-emphasize that urban water suppliers do not make the land use and growth decisions but instead, try to provide needed water supplies in the most economical and environmentally sound manner. From this standpoint, the draft Supplemental EIR provides the best information reasonably available from recognized scientific sources. More than that can not be asked of lead agencies dealing with highly complex natural and man made water systems. | CLWA concurs with these comments. The DEIR (sections 1.1 and 4.2) notes that CLWA is not a land use agency and does not control where and when growth will occur in its service area. |
| 13 | City SC | Thank you for allowing the City of Santa Clarita to comment on the Draft Environmental Impact Report for the Supplemental Water Project Transfer. At this time, the City of Santa Clarita has no comments on the draft document regarding the project. | This comment is noted; no text revisions are required. |
| 14 | LA DPR | Page 3.0-10 of the Draft EIR states that the "DWR's operation of these lakes (Quail, Pyramid, and Castaic) generally would not change with the Project, although the project would result in additional water transported through these lakes in about the same months the water is delivered to CLWA." Page 3.15-41 also confirms that "the amount of water stored at Castaic Lake would not be expected to change as a result of the Project." The | This comment is noted; no text revisions are required. As indicated, the Project would not change the operation of Castaic Lake. |

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| 14 (cont) | LA DPR | optimum operating level of Castaic Lake is 1515 above sea level. Scheduling of the release of the SWP water should be done so to maintain this level. Assuming that this operating criterion and the physical conditions of the lake do not change as a result of the project, adverse impacts to Department facilities are not anticipated. The Department requests that any future changes in the operating criteria of the lake be coordinated directly with Mr. Dana Robertson, Parks Superintendent. Contact information is provided below:<br>Mr. Dana Robertson, Parks Superintendent<br>Castaic Lake Recreation Area<br>32132 Castaic Lake Drive<br>Castaic, CA 91384<br>Phone (661) 257-4050/Fax (661) 257-3759 | |
| 15 | LA DPR | Section 3.12.3 of the Draft EIR states that the implementation of the project will have no direct or indirect impacts to recreation within the CLWA. However, the potential development (Page 4-2) for 106, 700 new residents and 35,600 new units to house them may impact future recreation opportunities for those within the CLWA, and in turn, to future Castaic Lake operations. | With respect to impacts to recreation within CLWA, Section 3.12.3.3 of the DEIR states: "No direct significant impacts to recreational resources would occur; therefore no mitigation measures are required. Mitigation measures for indirect impacts are addressed in Chapter 4, Growth-Inducing Effects and Growth-Related Impacts." (A direct impact is a direct physical change in the environment resulting from the Project; an indirect impact is a reasonably foreseeable physical change in the environment resulting from the Project. [See *Friends of the Eel River v. Sonoma County Water Agency* (2003) 108 Cal.App.4th 859, 876-877.]) Those mitigation measures are referenced in DEIR Section 4.2.12. DEIR Section 4.2.12 concludes that indirect significant impacts are avoidable with those mitigation measures. Sections 3.12.3.1 and 3.12.3.2 state that no direct or indirect impacts to recreational resources of the SWP or WRMWSD would occur as a result of the Project. Thus, DEIR Section 3.12.4 concludes that there are no unavoidable direct or indirect significant impacts to recreational resources resulting from the Project. |

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| 16 | LAFD | LAND DEVELOPMENT UNIT:<br>The County of Los Angeles Fire Department, Land Development Unit appreciates the opportunity to comment on this project. However, this project does not propose structures or any other improvements that appear to have a significant impact that requires a comment from the Land Development Unit.<br><br>Specific fire and life safety requirements for the construction phase will be addressed at the Building and Fire Safety plan check. There may be additional fire and life safety requirements during this time. Should any questions arise regarding subdivision, water systems or access, please contact Inspector Marvin Dorsey at (323) 890-4243. | This comment is noted; no text revisions are required. |
| 17 | LAFD | FORESTRY DIVISION:<br>The statutory responsibilities of the County of .Los Angeles Fire Department, Forestry Division include erosion control, watershed management, rare and endangered species, vegetation, fuel modification for Very High Fire Hazard Severity Zones or Fire Zone 4, archeological and cultural resources, and the County Oak Tree Ordinance. The areas germane to the statutory responsibilities of the Los Angeles County Fire Department, Forestry Division have been addressed. | This comment is noted; no text revisions are required. |
| 18a | VRMA | None | No comments were submitted. |
| 18b | VPWA | None. | No comments were submitted. |
| 19 | SCERC | The Stanislaus County Environmental Review Committee (ERC) has reviewed the subject project and has no comments at this time. | No comments were submitted. |
| 20 | BIA | CLWA's transfer of 41,000 acre-feet of water from Kern County in 1999 represented wise water planning for the Santa Clarita Valley. The BIA is pleased to see that the CLWA has produced this new EIR so that the litigation pending on the 1999 transaction can finally be resolved. | This comment is noted; no text revisions are required. Indeed, by augmenting CLWA's supplies, the Project serves to mitigate anticipated water resource shortages for existing land uses and for land uses projected by local general and specific plans. |

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| 20 (cont) | BIA | We are in the midst of a housing shortage in our State, especially in the Los Angeles and Ventura County regions. With housing supply in high demand it is critical for agencies such as CLWA to plan for future infrastructure needs. The continuance of such planning and water management programs is designed to enable the agency to meet its mission of providing water for anticipated growth in the Santa Clarita Valley. We support the Agency board and staffing in continuing that mission.<br><br>CLWA has taken the proper steps to insure that its current users as well as future users will be assured safe and reliable water. The Building Industry Association would like to commend the CLWA for taking these preemptive actions. | |
| 21 | C-WIN | **CLWA is the Wrong Lead Agency and Must Wait for DWR to Complete the new Monterey Plus EIR.** Under the principles articulated by the 3rd District Court of Appeal in the PCLvDWR case (#CO24576), CLWA is not the proper lead agency in this transaction which has tremendous statewide significance as it necessarily must address the Monterey Amendments. DWR is the only proper lead agency. | Please refer to the Master Response. |
| 22 | C-WIN | This transfer is not consistent with the PCLvDWR settlement, reached in May of 2003, under which DWR has already commenced its own statewide review of the Monterey Amendments. Until the new EIR, known as "Monterey Plus" is finalized and the project is approved, the only transfers recognized as final are those listed in attachment E of the settlement. This is not one of those transfers and therefore would be illegal until completion and certification of the new "Monterey Plus" EIR. The CLWA proposed EIR is potentially on a collision course with DWR's "Monterey Plus" EIR and could produce a result that is at odds with the court mandated EIR on the Monterey Amendments currently being produced by DWR.<br><br>C-WIN incorporates the January 10, 2002 letter from attorney Robert H. Clark to then General Manager of CLWA Robert C. | Please refer to the Master Response and to Comments 2, 3, 5, 6, 8, 9 and 10 and the Responses thereto. This Project is consistent with the Monterey Amendment Settlement Agreement. Section II of the Monterey Amendment Settlement Agreement provides that the Monterey Amendment will remain in place during preparation of the new EIR for the Monterey Amendment. Nothing in the Monterey Amendment Settlement Agreement prevents transfers from continuing to occur under the Monterey Amendment while the new Monterey Amendment Program EIR is being prepared. Section III(C)(4) of the Monterey Amendment Settlement Agreement only requires the Monterey Amendment EIR to analyze past, present and future transfers as they relate to the potential environmental effects of the Monterey Amendment. The Monterey Amendment Settlement Agreement's recognition of certain transfers as final and immune from challenge did not state nor imply that other |

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| 22 (cont) | C-WIN | Sagehorn where he points out this problem and warns, "Alternatively, CLWA may choose to create an EIR that does not rely in any way on Monterey Amendment provisions, and then complete the 41,000 AF water entitlement transfer outside of Monterey. There are adverse financial implementations to this course of action, and any water transfer outside of Monterey—assuming it might be acceptable to Kern County Water Agency and Wheeler Ridge—*could be made subject to agricultural water deficiency provisions in the same manner that the Devil's Den water entitlement transfer was originally made subject to those agricultural water deficiency provisions" (emphasis added*) (See Attachment A).<br><br>C-WIN also incorporates a letter from attorney Alyse M. Lazar to DWR Director Lester Snow dated May 18, 2004 and the response from Mr. Snow's office dated June 17, 2004. In the response letter, Mr. Snow says,<br><br>"DWR's treatment of the transfer of Table A amounts from Kern County Water Agency to Castaic Lake Water Agency will be governed by the Settlement Agreement. As provided in Paragraph III.C.4 of the Settlement Agreement, the EIR will include an "analysis of the potential environmental impacts relating to (a) the Attachment E transfers, and (b) the Kern-Castaic Transfer, in each case as actions that relate to the potential environmental impacts approving the Monterey Amendments." Section 1(0) of the Settlement Agreement defines the "Kern-Castaic Transfer" as "the transfer of 41,000 AF of water from Kern County Water Agency to the Castaic Lake Water Agency, approved by DWR on march 31, 1999." DWR has not completed any draft or final analysis regarding these transfers." (See Attachment B). | transfers are prevented from becoming final. In fact, Section II(E) of the Monterey Amendment Settlement Agreement recognized that this Project is not subject to the jurisdiction of the Sacramento Superior Court in the *PCL* case. Instead, the Monterey Amendment Settlement Agreement acknowledged that environmental review for this Project is subject to the jurisdiction of the Los Angeles Superior Court.<br><br>Because the May 5, 2003 Monterey Amendment Settlement Agreement provides for the Monterey Amendment to remain in effect, the issue addressed in the prior January 10, 2002 letter of Robert Clark referenced in this comment about the transfer being subject to pre-Monterey Amendment agricultural deficiency provisions is moot. Please also refer to Comment 45 and to the Response thereto. As noted in the Response to Comment 45, CLWA would benefit from the Project under pre-Monterey Amendment agricultural water deficiency provisions.<br><br>Regarding the letter from Alyse M. Lazar, the fact that the new Monterey Amendment Program EIR will analyze the Project and other past, present and future transfers as they relate to the potential environmental effects of the Monterey Amendment does not necessitate that CLWA await the Monterey Amendment EIR before it can approve the Project. Indeed, the new Monterey Amendment Program EIR could take months to complete, and CLWA is under mandate of the Los Angeles County Superior Court in *Friends of the Santa Clara River v. Castaic Lake Water Agency* ["*Friends I*"], Los Angeles Superior Court Case No. BS 056954, to certify an EIR that complies with CEQA and is consistent with the views expressed in the Court of Appeal opinion in *Friends I* contained at 95 Cal.App.4th 1373. |

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| 23 | C-WIN | **The Proposed Transfer is Currently the Subject of Litigation.** The CLWA EIR states that CLWA has 95,200 AF of Table A SWP water. This is not accurate as the 41,000 AF from the sale by KCWA to CLWA under the old Monterey Amendments is the subject of ongoing litigation. Allowing development of new homes based on this challenged and uncertain source of water is not prudent or reasonable.<br><br>C-WIN is currently a plaintiff in several cases against CLWA opposing proposed transfers that depend on the 41,000 AF transfer mentioned above. Any transfer that is dependent on a water source that is not free and clear is not reliable. C-WIN hereby incorporates our ongoing case against CLWA, the Department of Water Resources (DWR) and Semitropic Water Storage District , Civ No. 215327. Castaic is proposing to transfer 24,000 AF of its 2002 allocation of it's State Water Project (SWP) water, heavily relying on and siting the 41,000 AF transfer as complete to help justify the 24,000 AF transfer, and store it in the Semitropic Water Bank. This case is currently going to appeal. | The DEIR correctly states that the current CLWA Table A Amount is 95,200 AF. The judgment of the trial court on remand from the Court of Appeal in *Friends I* did not invalidate the 41,000 AF Project that is the subject of this DEIR. The trial court in that case did not enjoin any part of this Project. According to the trial court, "Respondent will not be prohibited from using the water to which it is entitled, but petitioner may renew its application for such prohibition based upon evidence of the actual use of such additional water for purposes it considers improper." In a subsequent appeal of the trial court's judgment on remand, in an unpublished opinion, the Court of Appeal affirmed that judgment.<br><br>The comment states that the Project allows for the development of new homes. However, the Project does not constitute an approval for the development of new homes. As noted in DEIR Section 1.1, CLWA is not a land use agency that can approve new homes or other new development. That section appropriately cautions any land use agencies intending to rely on the Project for a water supply for development projects that "past water deliveries are not a guarantee of future water delivery rates." The delivery projections and reliability models mentioned in the DEIR are used to identify environmental impacts of this Project, not as environmental review for new development. The DEIR analyzes the indirect environmental effects of the Project—those impacts that could arise from future development using the water provided by the Project.<br><br>The comment mentions the case of *California Water Network and Friends of the Santa Clara River v. Castaic Lake Water Agency ["Network"*], Ventura Superior Court No. 215327, wherein the Court refused to invalidate a water storage project. That 24,000 acre-foot storage project was a 10-year banking of water to firm up CLWA's water supply for existing uses, and was defined as not providing water to accommodate new development. (See DEIR Section 6.3.3.1) The trial court in *Network* upheld |

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| 23 (cont) | C-WIN | | CLWA's environmental review for the water banking project, and, as the comment indicates, the case is now on appeal.<br><br>Nothing in the *Friends I* trial court judgment on remand or *Friends I* Court of Appeal opinion prevented the storage project addressed in *Network* from using a portion of the 41,000 acre-feet available in Year 2002. |
| 24 | C-WIN | As the EIR states, under current law, urban water suppliers must maintain updated water management plans (Urban Water Management Plans). CLWA's UWMP is currently being challenged in court for claiming to have more water than is actually available. | The Court of Appeal in *Friends of the Santa Clara River v. Castaic Lake Water Agency* (2004), 123 Cal.App.4th 1, ["*Friends II*"] ordered the trial court to vacate CLWA's approval of its UWMP based upon the Court's determination that the UWMP must address the timing for remediation of perchlorate contamination found in a limited portion of the groundwater basin. CLWA intends to adopt an amended or updated UWMP that fully discusses issues raised by the Court of Appeal.<br><br>The invalidation of the UWMP does not constitute a new substantial environmental impact or an increase in the severity of an environmental impact for the Project. The DEIR does not tier off or rely on the UWMP for any information, including information regarding estimates of water supply, water use, water demand, or water supply reliability. As stated in DEIR Section 5.6, "Although information in the UWMP was considered in the analysis for the Project, an independent analysis and determination of environmental impacts was carried out for the Project."<br><br>This Project is not a development project that would rely on the UWMP in the CEQA process. The "paper water" issue in *PCL* referred to misleading local land use planners as to how much water can be relied upon to serve the long-term needs of a development project. This DEIR does not use UWMP projections to determine the amount and reliability of this Project. DEIR Section 1.1 cautions any land use agencies intending to rely on the Project for a water supply for development projects that "past water deliveries are not a guarantee of future water delivery rates." The delivery |

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| 24 (cont) | C-WIN | | projections and reliability models mentioned in the DEIR are used to identify environmental impacts of this Project, not as environmental review for new development. |
| 25 | C-WIN | Public comments submitted on the recently finalized DWR "SWP Delivery Reliability Report" underscore the continuing problem that contractor estimates of reliability have frequently promised more water than is actually obtainable for building purposes. This EIR is representative of the "paper water" critically described in the 3rd District Appeal Court decision mentioned above.<br><br>**Water Reliability as Stated in the Proposed EIR is Not Accurate**. This EIR, along with many other proposed developments in California, is dependent on the analysis by DWR and it's State Water Project Delivery Reliability Report, Final 2002, to give planners and the public accurate information on SWP water reliability. These numbers are critical because planners and the public count on them when considering water availability to meet future demand. This Reliability Report has been seriously criticized for overstating actual available supply, questionable modeling and simulations, and lack of proper peer review. C-WIN hereby incorporated this Final Report, including all of the published comment letters in Appendix B. Please make a special note of those letters submitted by Senator Michael Machado, Robert Wilkinson, Arve Sjovold, Joan Wells, Dr. Peter Gleick and myself.<br><br>C-WIN also incorporates "A Strategic Review of CALSIM II and its Use for Water Planning, Management, and Operations in Central California" submitted by the California Bay Delta Authority Science Program Association of Bay Governments, December 4, 2003. This document raises significant questions about the accuracy of DWR's Delivery Reliability Report.<br><br>In addition, C-WIN incorporates two letters, the first from Systems Analyst Arve R. Sjovold dated November 11, 2003, title, "Analysis of SWP Reliability of Delivery". (See | Please refer to Comments 4 and 5 and the Responses thereto.<br><br>The "paper water" issue in *PCL* referred to misleading local land use planners as to how much water can be relied upon to serve the long-term needs of a development project. That issue might come up with reference to an EIR for a new development project or with reference to an urban water management plan upon which new development might rely. But it does not pertain to this DEIR that analyzes the environmental impacts of augmenting CLWA's existing water supply. Therefore, the reliability analysis for the DEIR helps determine the extent of environmental impacts (including indirect growth inducing impacts) to be analyzed, and nothing more. The delivery projections and reliability models mentioned in the DEIR are not used as environmental review for new development. DEIR Section 1.1 appropriately cautions any land use agencies intending to rely on the Project for a water supply for development projects that "past water deliveries are not a guarantee of future water delivery rates."<br><br>The comment incorrectly states that the DEIR depends on DWR analysis from the 2002 Final State Water Project Delivery Reliability Report to give planners and the public accurate information on SWP water supply reliability. As set forth in DEIR Section 3.15.2.2 at pages 3.15-30 and 3.15-31, the DEIR assessed water supply reliability for this Project based instead on two independent model studies using the DWRSIM model conducted by DWR in 1998 for the 2000 CALFED Bay-Delta Program EIR. As set forth in the Response to Comment 4, the DWRSIM model studies provided the best estimates of SWP supply reliability that were available when DEIR supply analyses were conducted, and are consistent with the 1998 environmental setting used in this EIR. |

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| 25 (cont) | C-WIN | Attachment C). The second is from PCL President Sage Sweetwood dated February 2, 2004 to Delores Brown of DWR raising grave concerns about the validity of the DWR model known as CALSIM II. (See Attachment D).<br><br>C-WIN incorporates a table prepared by DWR dated 9/16/02 titled "Historical versus Modeled Table A Deliveries and Demands." This is a draft document released by DWR. The modeled deliveries are significantly above the actual historical deliveries…graphically showing what the Third District Court of Appeal was referred to when they sited the "paper water" in the system. (See Attachment E). | Since the DWRSIM studies were conducted, the modeling tool DWR uses to simulate operations has evolved (first to CALSIM I, and more recently to CALSIM II). However, while the modeling tool itself has changed, the criteria used in the models to simulate SWP operations have not significantly changed. While DWR has completed a more recent assessment of SWP reliability in its SWP Delivery Reliability Report using CALSIM II, the results of these new studies are comparable to the results of the DWRSIM studies (see DEIR Appendix D, Section 2.2 and Figures 2.1 and 2.2 for a comparison of these model study results). As set forth in the Response to Comment 4, the DWRSIM model SWP delivery reliability results were slightly higher than delivery reliability results from these CALSIM II studies. Therefore, from an environmental impact assessment standpoint, the DEIR analyzed the worst-case scenario, i.e., the scenario that would result in greater direct and indirect impacts in both the CLWA and WRMWSD service areas.<br><br>DWRSIM, like CALSIM II, estimates the amount of water the SWP could deliver to Contractors in each month over the 73 years of operation, for a given set of facilities and operating constraints and for a given level of Contractor demand. The results are interpreted as the capability of the SWP to meet the assumed SWP demand, over a range of hydrologic conditions, for that assumed set of physical facilities and operating constraints.<br><br>The DEIR uses results from the two DWRSIM studies to determine SWP water supplies for both the pre-Project environmental baseline and the Project environmental impact analysis. Results from the DWR SWP Delivery Reliability Report are only used in the DEIR to determine estimates of SWP water supplies for the current environmental setting.<br><br>Because the DEIR only depends on the DWR SWP Delivery Reliability Report results to determine the current |

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| 25 (cont) | C-WIN | | environmental setting, criticisms of that Report referenced in the comment that are directed at assumed use of that Report and at use of the CALSIM II model for assessing water supply reliability are not valid.<br><br>Nevertheless, CLWA has considered the letters referenced in the comment that refer to the DWR SWP Delivery Reliability Report, and the DWR responses thereto, and provides the following summary analysis of those comments. The DWR responses can be found at the same web site where the letters are located, www.swpdelivery.water.ca.gov.<br><br><u>10/21/02 Letter by Arve Sjovold of Citizens Planning Association and 3/24/03 DWR Response</u>: The primary criticism of the 2003 DWR Report was that it did not calibrate results to historical delivery records. The DWR response provided information regarding why past deliveries cannot accurately be used to predict future deliveries and therefore, why calibrating CALSIM II to historical deliveries is not appropriate.<br><br><u>10/31/02 Letter by Robert Wilkinson and 4/2/03 DWR Response</u>: The primary criticism of the 2003 DWR Report and CALSIM II model were that the model projects nearly a million acre-feet more than extracted from the Delta during the 1980s and 1990s. The Wilkinson letter asserts that the Report and model fail to take into account environmental and legal constraints. The DWR response refutes those contentions, explaining that current environmental regulations and Delta protection standards allow for more operational certainty of the SWP, giving an example of how CALSIM II accurately predicted the lower deliveries in the prior decades given prior legal and operational constraints.<br><br><u>08/29/02 Letter by Peter Gleick of Pacific Institute and 08/29/02 DWR Response</u>: The Gleick letter raises concerns very similar to those raised by the Wilkinson letter. |

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| 25 (cont) | C-WIN | | 10/30/02 Letter by Michael Machado of California State Senate and 3/11/03 DWR Response: The Machado letter attaches Nov. 1, 2002 comments by Dennis O'Connor of the California Research Bureau on the Report.<br><br>The O'Connor comments describe five major concerns with the Report: 1) recent deliveries lower than the modeled 2001 conditions; (2) year 2021 studies do not seem to reflect growth in upstream use; (3) CALSIM II has not been calibrated or verified; (4) the results appear inconsistent with previous estimates and models; (5) CALSIM II is not being used as designed.<br><br>In response, DWR explained the following: (1) the report used 2001 demand conditions that are higher than historical demand. Therefore, during wetter years when deliveries are limited by demand and not supply, the model will show higher deliveries than historically to meet that higher current demand. During dry periods when supplies are limited, the model's delivery results, when adjusted to reflect historic conditions, are quite comparable to historic deliveries; (2) the model does account for growth in upstream consumptive use; (3) DWR continually checks CALSIM II to determine if it reasonably simulates water operations in the system; (4) of two model examples cited, the first model used a daily and not a monthly time-step as used in CALSIM II. Regarding the second example, DWRSIM results in CLWA's UWMP, DWR stated: "DWR understands that the [UWMP] incorporates a more conservative interpretation of the results of the referenced DWRSIM study. DWR supports and encourages local water agencies to apply the level of SWP reliability they determine is appropriate for their areas, taking into account local supplies, other imported supplies, demand-management programs and |

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| 25 (cont) | C-WIN | | local planning criteria. The DWP Delivery Reliability report should serve as a reference document to help clarify decisions that are made at the local level"; (5) CALSIM studies are best used as comparative studies.<br><br><u>10/19/02 Letter by Carolee Krieger of Citizens Planning</u> Association and DWR 3/24/03 Response: This letter raises issues similar to those in the Sjovold, Gleick and Wilkinson letters.<br><br>In addition to the comment letters to the DWR SWP Delivery Reliability Report, CLWA has considered the information regarding the CALSIM II model referenced in this comment and has determined that CLWA's use of the CALSIM II model for the limited purpose set forth in the DEIR is appropriate. CLWA makes note of the following with regard to the documents referenced in the comment:<br><br>December 4, 2003 "A Strategic Review of CALSIM II and its Use for Water Planning, Management and Operations in Central California." While the peer review panel did identify a number of areas for model improvement in this document, that was a primary purpose for commissioning their review. However, they did not characterize any of these areas as so flawed that the model's results could not be relied on. In fact, the peer review panel's conclusions regarding the CALSIM II model on page 2 of this document states: "We believe the use of an optimization engine for simulating the hydrology and for making allocation decisions is an appropriate approach and is in fact the approach many serious efforts of this kind are using. It is a substantial improvement of the previous modeling approaches and provides a basis for consensus among federal and state interests. The modeling approach addresses many of the complexities of the CVP-SWP system and its water management decisions." And on page 20, they go on to state: "Few, if any, modeling organizations in the country have consistently done as good a job on model development and |

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| 25 (cont) | C-WIN | | application for such a large, complex, and controversial system as the modeling group which developed CALSIM II." The August 2004 joint response of DWR and the Bureau of Reclamation to this document can be found at baydeltaoffice.water.ca.gov/modeling/index..cfm under "Peer Review Response."<br><br>February 2, 2004 Sage Sweetwood Letter. This letter does not contain any independent evidence regarding CALSIM II. The letter merely restates the December 4, 2003 Report's suggestions for improvements to the model. The letter also acknowledges the 2003 Reports conclusions about the usefulness of the model.<br><br>November 11, 2003 Analysis of SWP Reliability of Delivery. The Analysis reviews the DWR 2003 State Water Project Delivery Reliability Report. The Analysis is based on calculations using CALSIM II, and does not contain an independent analysis of the CALSIM II model. The Analysis uses CALSIM II model published results to question the reliability estimates for the SWP contained in the DWR 2002 Report. According to the Analysis, the 2002 Report 76% level of reliability for average years must take into account actual contractor practices and contractor specific situations. Thus, the Analysis contains information that is not germane to whether CALSIM II is an appropriate model.<br><br>Draft September 16, 2002 Chart of Historical vs. Modeled Table A Deliveries. The Chart does not contain sufficient information about what model is used or what data set is used, or who prepared the chart. The Chart also indicates it is in draft, and not final form. Assuming the chart is prepared by DWR and refers to the DWR SWP Delivery Reliability Report, the chart shows that historic deliveries have been limited by historic contractor demand in most years, and that in many of those years there was adequate water available to meet the higher demand used in the model study. |

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| 26 | C-WIN | Significant Cumulative Impacts Not Recognized. CLWA is continuing to speculatively and irresponsibly approve proposed developments incrementally based on the hope that they will successfully acquire this 41,000 AF of SWP Table A allocation from the Kern County Water Agency. C-WIN hereby incorporates the following comment letters to show just how much is being proposed incrementally using this contended source as final. The cumulative impacts are not being considered. This is very significant when the true reliability numbers for the actual water supply are factored in as well.<br>▪ The C-WIN January 1, 2004 objection letter to the CLWA on the Negative Declaration for a proposed 35,000 AF transfer for a Groundwater Banking Project that depends on this same 41,000 AF transfer.<br>▪ The C-WIN February 3, 2004 objection letter to the LA County Regional Planning Department on the proposed West Creek Project #98-008 to build 2,545 residential units that depend on this same 41,000 AF transfer.<br>▪ The C-WIN February 26, 2004 objection letter to the County of Los Angeles Regional Planning Department regarding the proposed River Valley Project No. 00-196 to build 1,444 residential units, 1.5 million square feet of non-residential mixed-use space, along with a 7 acre elementary school and public recreational facilities; this project also relies on this 41,000 acre foot transfer.<br>▪ The C-WIN May 4, 2004 letter to the Planning and building Services Department of the City of Santa Clarita regarding the proposed River Park Project No. 02-175 to build 1,183 residential units, heavily relying on this same 41,000 AF transfer. | The cumulative impacts of the projects referenced in the comment are considered at Sections 6.3.3.1 (CLWA projects) and 6.3.3.2 (DMS projects) of the DEIR. CLWA does not approve new development, and the Project includes no approval of new development. As noted in DEIR Section 1.1, CLWA is not a land use agency that can approve new development. That section appropriately cautions any land use agencies intending to rely on the Project for a water supply for development projects that "past water deliveries are not a guarantee of future water delivery rates." The delivery projections and reliability models mentioned in the DEIR are used to identify environmental impacts of this Project, and are not intended or represented to constitute environmental review for new development. CLWA did not participate in any water supply assessment for either the West Creek or the River Village projects. The Riverpark project is listed in the Los Angeles County Development Monitoring System (DMS), as are the other two mentioned development projects. The River Village project did not rely on this Project for its water supply reliability analysis. The 35,000 acre-foot Groundwater Banking Project is now final and not subject to challenge, and is a one-time 10-year storage project that cannot, because it is short-term by its nature, cause or promote growth. (See DEIR Section 6.3.3.1). |
| 27 | C-WIN | This 41,000 AF water transfer should be rejected until the EIR for the new "Monterey Plus: has been finalized and adopted. When and if you do proceed, it is required that DWR be the lead agency. | Please refer to the Master Response and to Comments 9, 10, 11 and 22 and the Responses thereto. |

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| 28 | C-WIN | CWN hereby incorporates all other comments by reference opposing this transfer submitted on this CLWA EIR proposing to permanently transfer 41,000 AF of Table A allocation from the Kern County Water Agency to the Castaic Lake Water Agency. | This comment is noted; no text revisions are required. |
| 29 | FSCR I | As we noted in our response to the Notice of Preparation, the Castaic Lake Water Agency (CLWA) is not the proper Lead Agency to prepare an Environmental Impact Report (EIR) for this project under the California Environmental Quality Act. | Please refer to the Master Response. |
| 30 | FSCR I | The 1995 Monterey Agreement between the California Department of Water Resources (DWR) and water contractors of the State Water Project was put in place to control transfers of the type described in the subject document. There is at present no Monterey Agreement EIR because of the PCL decision of September 2000, which held that the Monterey Agreement EIR prepared by CCWA was inadequate. The court held that the DWR was the proper Lead Agency for this Agreement because only the DWR has the statewide perspective needed to evaluate the environmental impacts to the entire water distribution system. | Please refer to the Master Response and to Comments 9, 10 and 11 and the Responses thereto. The comment incorrectly states that the 1995 Monterey Amendment was necessary to control transfers of the type specified in this Project. The 1995 Monterey Amendment had as one of its purposes to help facilitate transfers between agricultural and urban contractors, but such transfers were not prohibited prior to execution of the Monterey Amendment. The Monterey Amendment Settlement Agreement explicitly states that the SWP will operate under the Monterey Amendment while the new Monterey Amendment Program EIR is prepared. This includes operation under Article 53, pursuant to which the Kern County Water Agency consented to up to 130,000 acre-feet of agriculture to urban transfers. Suggestions that consideration of such transfers must await completion of the new Monterey Amendment Program EIR would render this element of the Monterey Amendment Settlement Agreement a nullity, contrary to the clear understanding of the signatories to that document. As the comment notes, a new Monterey Amendment Program EIR has not yet been certified, but DWR is in the process of preparing that new EIR. This comment confuses this Project and the DEIR with the Monterey Amendment and its new Program EIR. As noted in the Response to Comment 10, several transfers have occurred since the September 2000 *PCL* decision. |

| No. | Commenter | Comment | Response |
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| 31 | FSCR I | The EIR for the 41,000 acre-feet transfer must tier from a certified Monterey Agreement EIR, which does not currently exist. This was indeed suggested by the Second Appellate District Court decision of January 2002 in the case brought against CLWA by Friends of the Santa Clara River. Page 19 of this decision states that "Respondent may be able to cure the PCL problem by awaiting action by the state DWR complying with the PCL decision, then issuing a subsequent EIR, supplement to EIR, or Addendum to EIR (Guidelines 15162, 15163, 15164) tiering on a new Monterey Agreement EIR. | Please refer to the Master Response and to Comment 10 and the Response thereto. The statement by the Court of Appeal in *Friends I* was a suggestion, not a requirement. The Court of Appeal could not have intended to require CLWA to tier off a programmatic EIR when CEQA allows a lead agency for a project to choose whether or not to tier off an available programmatic EIR. CEQA does not require a lead agency to delay a project and to wait for a programmatic EIR to become available, even where a programmatic EIR is contemplated. (See 14 Cal. Code Regs. §§ 15160 & 15168) |
| 32 | FSCR I | Since CLWA cannot legally be the Lead Agency for the subject transfer, the only legitimate way for CLWA to proceed with EIR preparation is to await DWR's preparation and certification of a Monterey Agreement EIR. The subject DEIR is thus invalid and not in compliance with court decisions involving this transfer of state water. | Please refer to the Master Response. |
| 33 | FSCR II | Please include the following correspondence between our attorney and the Department of Water Resources and their response regarding the timeline for the completion of the Monterey Agreement Environmental Impact Report. Because this EIR must be tiered on the State wide impacts addressed in the Monterey Agreement EIR and could not proceed without this Agreement, your Agency must wait until the state wide document has been certified before certifying the EIR for this project. | Please refer to the Master Response. With regard to the attached 5/18/04 letter from Alyse M. Lazar and the 6/17/04 Lester Snow DWR response thereto, please refer to the Comment 22 and the Response thereto. There is no legal requirement that this EIR be tiered off the new Monterey Amendment Program EIR. Please refer to Comment 31 and the Response thereto. |
| 34 | FSCR II | We continue to protest that you may not approve this document because you are not the correct lead agency for a project with state-wide impacts. Since the Dept. of Water Resources was found to be the legitimate lead agency for such a transfer in the decision PCL v. DWR, 2000, we protest your disregard for legal precedent on this matter. We note that your current general manager, Dan Masnada, is the same person that proceeded illegally in the above case when he was general Manager of Central Coast Water Agency. He is well aware that your agency is not proceeding according to law. | Please refer to the Master Response. The identity of the CLWA manager is irrelevant to the issue of which agency is the appropriate lead agency for the Project. |

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| 35 | FSCR II | Further, we wish to state that none of these documents, nor the current EIR before you address the effects of an earthquake or levee break (such as recently occurred in the Sacramento Delta, news article attached). These emergencies were also not addressed in the Urban Water Management Plan 2000. We ask that you address how your agency intends to manage such a water emergency under current water availability scenarios and how water supply would be affected under such an emergency with the additional buildout this transfer would permit. | The potential for earthquakes or levee breaks to temporarily affect water supply is noted. These issues are more appropriately addressed in the updated Urban Water Management Plan, which is scheduled for release in 2005 and requires such analysis. The EIR focuses on the environmental impacts of the transfer of Table A Amount and evaluates the water supply that would be available to CLWA using an established model developed by DWR. While emergencies could occur and temporarily disrupt water supplies, these are not impacts of the Project, and the EIR evaluates reasonable scenarios and uses the worst-case scenario in terms of growth-related impacts.<br><br>SWP and CLWA facilities are designed to resist damage upon the occurrence of a seismic event. CLWA maintains substantial reservoir storage for use should SWP deliveries be temporarily interrupted from any catastrophe. The potential for seismic or other catastrophic damage significant enough to interrupt CLWA water deliveries is low, but the concern expressed in the comment is noted. Any such damage could disrupt CLWA water deliveries temporarily, but any such temporary interruption would have a less than significant impact on the DEIR projections for the long-term reliability of the Table A Amount proposed to be transferred by this Project. The Project is intended to provide an augmented water supply, over the long term, to CLWA and its purveyors. Short-term disruptions in delivering this water supply will cause inconvenience to all those reliant on CLWA's supplies. That inconvenience could occur equally today with CLWA's present sources of supply, should a catastrophic event occur. CLWA's purveyors have made provision for use of groundwater in the event CLWA deliveries are interrupted. |
| 36 | FSCR II | We ask that you respond to the recommendations made recently by the two experts, Kathy Kelly and Jonas Minton who gave testimony regarding State Water project availability before the City of Santa Clarita Planning Commission on June 29th, 2004. They both suggested that the planners should | The DEIR focuses on the environmental impacts of the transfer of Table A Amount and evaluates the water supply that would be available to CLWA using an established model developed by DWR. Three hydrologic scenarios are analyzed. The average year supply is the average amount of water available |

| No. | Commenter | Comment | Response |
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| 36 (cont) | FSCR II | analyze the effect of cutbacks that would be required under the worse case historical delivery rate, 13% of Title A amounts in 1991, on existing businesses and residents in the Santa Clarita Valley. Since ground water sources are in the Santa Clarita Valley are fully utilized, substantial cutbacks would be required. This significant impact should be addressed. | based on DWRSIM model results over its entire period of hydrologic record. The multiple dry year period supply is the average amount of water available over the four consecutive drought years of 1988 through 1991 based on DWRSIM model results. The single dry year supply is the supply available in the single year with the lowest total SWP deliveries based on DWRSIM model results, which occurred in 1977. In this single dry year, the supply was about 22% of Table A Amounts, and the increase in SWP supply due to the Project was estimated to be 9,200 acre-feet. If instead the supply in a single year were 13% of Table A Amounts, then the increase in supply due to the Project would be reduced to 5,300 acre-feet. Any environmental impacts based on this lower supply amount would be less than those described in the DEIR. Use of the 22% supply amount results in analysis of the worst-case environmental impact assessment scenario. The Project would have a beneficial impact to water supply, including groundwater, because it would increase the amount of water available to the CLWA service area, and would not result in a potentially significant impact.<br><br>The comment implies that CLWA approves development projects. CLWA does not have the authority to approve development projects. The DEIR includes an analysis of indirect impacts of the Project, focusing on growth-related impacts, but CLWA defers to the local agencies with land use authority to conduct site-specific and project-specific CEQA review of proposed development projects. Please refer to the response to Comment 26.<br><br>The comment states incorrectly and includes no evidence that groundwater sources in the Santa Clarita Valley are fully utilized. As Section 3.15.1.3 of the DEIR indicates, at Page 3.15-18, average annual production from the Alluvial Aquifer is approximately 30,000 acre-feet, within or below the 30,000-40,000 acre feet per annum operational yield. In addition, Page 3.15-19 indicates that average annual production from the |

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| 36 (cont) | FSCR II | | Saugus Formation is 6,800 acre-feet, well below a conservative estimate of the operational yield at 15,000 acre-feet per annum. Those yields factor in the increased groundwater pumping that occurs in dry years, given the amount of State Project water available under the Project as calculated using DWR reliability studies. (See DEIR Table 3.15-7)<br><br>The projected average water demand will be less than the projected water supply available for the foreseeable future. (See Table A-1 in Attachment A to Volume II of the FEIR) Thus, the DEIR indicates that groundwater use will not increase above average operational yield even with increased dependence on State Project water. As DEIR Section 3.15.1.3 notes, the prior importation of State Project water has increased the yield of the Alluvial Aquifer as a result of return flows. Thus, increased importation under the Project potentially could increase groundwater yields. The comment provides no evidence of a significant environmental impact on groundwater resources as a result of the Project. |
| 37 | PCL/CPA | This letter provides comments on the Draft EIR entitled *Supplemental Water Project Transfer of 41,000 Acre-Feet of State Water Project Table A Amount*, on behalf of the Planning and Conservation League (PCL) and the Citizens Planning Association of Santa Barbara County (CPA). If finalized, that transfer would be the largest permanent agriculture-to-urban transfer under article 53 of the Monterey Amendments, with major implications for water resources and land use planning in Southern California. The environmental impacts of these amendments, including the instant transfer, remain to be addressed in DWR's pending "Monterey Plus" EIR review. The scoping comments submitted for that review (attached as Exhibit 1), including those of PCL, should be studied in connection with the present EIR review. | This comment is noted. Please refer to the Master Response. The commenter correctly identifies the Project as a large permanent transfer of SWP Table A Amount.<br><br>However, the comment incorrectly implies that the new Monterey Amendment Program EIR will evaluate the specific environmental impacts of this Project. The Monterey Amendment Settlement Agreement provides that this Project is subject to the jurisdiction of the *Friends I* trial court, which court has ordered that CLWA certify a new EIR for this Project. The Monterey Amendment Settlement Agreement provides that the new Monterey Amendment Program EIR must analyze the environmental impacts of this Project and other transfers as they relate to the environmental impacts of approving the Monterey Amendment. The upcoming Monterey Amendment EIR will not analyze the local Project-related growth-inducing impacts in the same degree of detail for the CLWA service area, although the Monterey Amendment EIR will include the 41,000 |

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| 37 (cont) | PCL/CPA | | acre-feet transfer in its analysis together with all other transfers of Table A Amounts.<br><br>The DEIR analyzes the potential indirect environmental impacts of the Project, arising out of growth that may be served by this water supply, taking into account pre-Monterey Amendment baseline conditions, including those for agricultural State Project water. (See DEIR 3.0) The DEIR analyzes the Project impacts both with and without the Monterey Amendment. (See DEIR 3.15.2.2 & Table 3.15-5)<br><br>As set forth in the Master Response, the choice of lead agency is not dictated by the size of the project, but by which agency has principal responsibility to approve and carry out the Project. Also, as described in the Master Response, CLWA, as the local agency principally approving and implementing the Project, not DWR, has more expertise and perspective to explore the implications for water resources and land use planning within CLWA's jurisdiction. |
| 38 | PCL/CPA | PCL and CPA were among the plaintiffs whose successful CEQA challenge set aside the Central Coast Water Authority's original 1995 Monterey Program EIR. That ruling led to decertification of the predecessor EIR for Castaic's transfer, which unlawfully relied upon that defective analysis.<br><br>The instant Draft EIR, prepared by the same firm (SAIC) as the decertified Monterey EIR, provides a case of history repeating itself. It is legally insufficient in process and substance, failing Castaic's duty under CEQA to properly inform decision-makers and the public of the project's environmental consequences. The Draft EIR cannot be reconciled with the Monterey Amendments court decision (*Planning and Conservation League v. Department of Water Resources* (2000) 83 Cal.App.4th 892) and the settlement agreement later reached in that case. (The full Settlement Agreement appears on DWR's website at http://www.montereyamendments.water.ca.gov/.) | Please refer to the Master Response. The decertified Monterey Amendment EIR analyzed the potential environmental impacts of major amendments to the SWP contracts, with statewide implications. The "project" to be analyzed in the new Monterey Amendment Program EIR will differ significantly from the Project in this DEIR. This DEIR analyzes the potential environmental impacts of a local project. The lead agency and water supply reliability issues identified in *PCL* as not having been adequately analyzed in the decertified Monterey Amendment EIR, have been addressed in this DEIR to the extent those issues are relevant to the Project. In any event, the identity of the firm preparing the EIR is not relevant in establishing the issue of the adequacy of an EIR. The comment points to no substantive evidence of the inadequacy of the DEIR in support of its statement that the DEIR is insufficient in process and substance and fails CLWA's duty under CEQA. |

| No. | Commenter | Comment | Response |
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| 39 | PCL/CPA | PCL and CPA submitted a comment letter on August 22, 2004. This letter, attached as exhibit 1, addressed both the instant transfer and a related proposal to transfer 16,000 acre-feet of Table A amounts from another of the Kern County Water Agency's member districts. PCL urged Castaic that it should "refrain from moving forward with these separate project reviews, which are premature and likely to operate at cross-purposes with DWR's statewide review" of the project referenced in the Monterey Amendments case settlement. PCL and CPA advised Castaic that if it prematurely attempted to proceed with separate EIRs on these permanent transfers, it would "lack the institutional authority and statewide accountability" to serve as CEQA lead agency. The DEIR simply ignores PCL's comments, and sidesteps similar ones made by other organizations. | Please refer to the Master Response and to Comments 2, 3, 5, 6 and 22 and the Responses thereto. The DEIR does not include an analysis of a 16,000 acre-foot transfer of Table A Amount as part of the Project because any such future transfer is speculative and is not linked to the Project. However, the DEIR does discuss the cumulative impacts of the 16,000 acre foot transfer in DEIR Section 6.3.3.1. CLWA issued an NOP for the 16,000 acre-foot transfer, but because the option agreement for the 16,000 acre-foot acquisition expired, CLWA has conducted no further environmental review.<br><br>DWR's new Monterey Amendment Program EIR will not constitute an EIR for this Project. The Monterey Amendment Program EIR will analyze the potential impacts resulting from this Project and other transfers as they relate to potential environmental impacts of approving the Monterey Amendment.<br><br>CEQA does not require that a lead agency delay a project to await a program EIR that will discuss the project as part of a broader analysis of similar projects. CEQA gives agencies the choice to prepare a project EIR in lieu of tiering off a program EIR.<br><br>As the parties to the Monterey Amendment Settlement Agreement recognized, a transfer between two State Contractors is not a project for which DWR should be the lead agency. The EIR for this Project is being prepared by CLWA under the supervision and at the direction of the Los Angeles Superior Court. DWR does not have principal responsibility to approve or carry out the Project, and is acting as a responsible agency. The physical environmental impacts of a two party transfer are generally confined to the respective service areas of the two agencies involved (CLWA and WRMWSD, as a member agency of KCWA), although the DEIR analyzes potential impacts upon SWP facilities as well. |

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| 40 | PCL/CPA | PCL filed similar comment letters on several local projects contesting Castaic's improper and premature reliance on the 41,000 acre-feet transfer as an integral part of its reliable water supply. These comments (addressing, respectively, the West Creek Project, the River Village Project, and the Riverpark project) are attached as exhibits 2-4. They raise important questions affecting the adequacy of this EIS, as well as the prospect of possible cumulative impacts not addressed in Castaic's draft. | Please refer to the Response to Comment 26. |
| 41 | PCL/CPA | Castaic's so-called "stand-alone" Draft EIR is fraught with potential for inconsistency with DWR's upcoming environmental review and decision on the "Monterey Plus" project. That review will address the identical transfer from a statewide perspective, with an integrated analysis of that project in its entirety. Castaic lacks the expertise and authority to proceed based upon its isolated assessment of project impacts, alternatives, and mitigation, each of which may well be undermined by DWR's subsequent analysis and decision. | Please refer to the Master Response and to Comments 2 through 6 and the Responses thereto. The comment incorrectly suggests that the new Monterey Amendment Program EIR will address this Project in its entirety with an integrated analysis. The Los Angeles Superior Court in *Friends I* ordered CLWA, not DWR, to prepare the EIR for this Project. The Monterey Amendment Settlement Agreement requires DWR to prepare a new program EIR for the Monterey Amendment, not for this Project. The Monterey Amendment Settlement Agreement excludes the possibility that the new Monterey Amendment Program EIR could constitute an EIR for this Project because it states that the Los Angeles Superior Court retains jurisdiction over the environmental document for this Project. The Monterey Amendment Settlement Agreement only requires that DWR analyze the potential impacts resulting from this Project and other transfers as they relate to the potential environmental impacts of approving the Monterey Amendment. Attachment D of the Monterey Amendment Settlement Agreement recognizes that non-final individual transfer projects will be reviewed by DWR only as the responsible agency.<br><br>There is no evidence that this DEIR will be undermined by DWR's new Monterey Amendment Program EIR. Both this DEIR and the Monterey Amendment DEIR use the same DWR model (CALSIM II) to evaluate potential impacts, and CLWA |

| No. | Commenter | Comment | Response |
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| 41 (cont) | PCL/CPA | | has coordinated with DWR, acting as a responsible agency, to ensure that the DEIR will not undermine DWR's efforts in preparing the new EIR for the Monterey Amendment. |
| 42 | PCL/CPA | Two recent Second District Court of Appeals cases reinforce the point that Castaic Lake Water Agency (CLWA) should not pursue its own independent EIR on the 41,000 acre foot transfer in advance of the completion of DWR's tier-one "Monterey Plus" EIR.<br><br>In *Friends of the Santa Clara River v. Castaic Lake Water Agency* (2002) 95 Cal.App.4th 1373, the Second District court of appeal ordered the decertification of the previous EIR Castaic prepared to support the instant transfer. The Friends group and other environmental organizations opposed the project decision on that Kern/Castaic transfer, citing environmental consequences in the Santa Clara River area and association with numerous sprawl development projects. In its CEQA assessment, the court recognized that the proposed 41,000 acre-feet transfer "is part of an overall larger scheme, analyzed on a programmatic basis in the Monterey Agreement EIR." (*Id.* at 1384.) | Please refer to the Master Response and to Comments 37, 39 and 41 and the Responses thereto. The possibility that the Project can be considered part of an overall larger scheme for purposes of tiering off a program EIR, instead of preparing a stand alone project EIR, does not mandate that the agency tier off a program EIR. |
| 43 | PCL/CPA | Another recent Second District appellate decision, *Santa Clarita Organization for Planning and the Environment (SCOPE) v, County of Los Angeles (*2003*)* 106 Cal.App.4th715, critically addressed Castaic's characterization of the 41,000 acre-feet transfer. In that case, the County of Los Angeles violated CEQA in its review of the West Creek development project that erroneously assumed that 100 per cent of Castaic's purported 41,000 acre-feet would be available in wet years and 50 per cent in drought years. Drawing on *Planning and Conservation League's* assessment of the historic disparity between Table A amounts and deliverable water, the court concluded that the EIR failed to undertake a "serious and detailed analysis" of State Water Project supplies, and observed that "[t]he dream of water entitlements for the incomplete State Water Project is no substitute for the reality of actual water the SWP can deliver." (*Id*. at pp. 723, 717.) | This comment is noted, but it is inapplicable to the DEIR. It is not a comment on the Supplemental Water Project EIR. The project that was the subject of the *SCOPE* litigation and EIR is distinguishable from this Project. In *SCOPE*, the EIR for a development project[1] was invalidated because its cumulative impacts analysis of past, present and future developments on the amount of water available relied heavily on SWP Table A Amounts in calculating the total available water supply. The EIR in *SCOPE* made no attempt to calculate or even discuss the differences between Table A Amounts and actual supply. The EIR in *SCOPE* did not contain estimates or past delivery history from DWR, the agency that manages the SWP, in projecting how much water the SWP can deliver in different types of years. |

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| 43 (cont) | PCL/CPA | | In contrast, this DEIR does not analyze a development project, but a transfer of SWP Table A Amount. CLWA's acquisition of an additional 41,000 acre-feet Table A Amount serves to firm up CLWA's SWP deliveries to meet CLWA's current demand and to help meet future demand projected in local land use agency planning documents. The DEIR for this Project contains a detailed calculation of the total available water supply and discusses in detail the differences between Table A Amounts and actual supply. The DEIR for this Project contains DWR reliability estimates using DWR models as to how much water DWR can deliver in different types of years. The DEIR in Section 1.1 also cautions any land use agencies intending to rely on the Project for a water supply for new development that "past water deliveries are not a guarantee of future water delivery rates."<br><br>[1] *The EIR in SCOPE was not prepared by Castaic as suggested in the comment – CLWA does not approve development projects.* |
| 44 | PCL/CPA | The Courts have also emphasized that DWR must act as lead agency in performing Tier 1 environmental studies. If Castaic continues with its separate environmental reviews without awaiting DWR's assessment in the "Monterey Plus" EIR, it would violate CEQA's lead agency requirement based upon the well-established standards set forth in *Planning and Conservation League v. Department of Water Resources*. The court in that case could hardly have been clearer that *DWR* is the "state agency charged with the statewide responsibility to build, maintain, and operate" the State Water Project. (*Id.* at p. 906.; see also Wat. Code, §12930, *et seq.*) Finding that DWR was the only entity with the requisite statewide perspective and expertise to serve as lead agency, the court found it "incongruous to assert that any of the regional contractors" could "assume DWR's principal responsibility for managing the SWP." (*Id.*)<br><br>The court-approved settlement agreement in *Planning and Conservation League* recognizes DWR's duty as "the | Please refer to the Master Response and to Comments 2, 3, 4, 5, 6, 8, 9, 10, 22 and 72 and the Responses thereto. The DEIR is not a Tier 1 environmental study. The Project does not encompass administering, building, maintaining, managing and operating the SWP. DWR's role in the Project is as a responsible agency, charged with responsibility of approval of a point of delivery agreement to facilitate the transfer. The Monterey Amendment Settlement Agreement recognizes the role of State Water Project contractors as lead agencies for two party transfers between contractors. The Monterey Amendment Settlement Agreement provides that the Monterey Amendment will remain in place during preparation of the new Monterey Amendment Program EIR, thus permitting contractor transfers of the 130,000 acre-feet identified in Section 53 the Monterey Amendment. CLWA, not DWR, has local expertise regarding anticipated future projects within CLWA for indirect and cumulative impacts analysis. DWR's statewide authority and experience has been utilized, to the extent appropriate, in evaluating the Project's potential environmental |

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| 44 (cont) | PCL/CPA | State agency responsible for administration and operation of the SWP," as well as its continuing obligation to comply with applicable requirements of CEQA and the Water Code. (Settlement Agreement, Section X.B.) The transfer guidelines disclosed to contractors under the settlement agreement also recognize the continuing need to comply with all existing legal requirements, including CEQA, and to honor the lead agency principles identified in the Third District's decision in the Monterey Amendments case (see http://ceres.ca.gov/ceqa/cases/2000/PCLvDWR-2000.html).<br><br>These principles apply clearly to the proposed permanent transfers of the Table A amounts referenced in the state project contracts, which require DWR's approval and presuppose the application of Monterey. They also concededly require changes in the amount of supplies available to several water agencies, the location and timing of project deliveries, and changed utilization of the project's conveyance and storage facilities. The transfers, which may require the fallowing of farmland in agricultural areas outside the jurisdiction of CLWA and are associated with proposed annexations linked to some of the more controversial development projects in California, demand the statewide authority and experience that only DWR can provide. | impacts, in that DWR has been consulted as a responsible agency.<br><br>DWR's new Monterey Amendment Program EIR will not analyze the Project in its entirety. According to the Monterey Amendment Settlement Agreement, DWR will only analyze the potential environmental impacts resulting from this Project and other transfers as they relate to the potential environmental impacts of approving the Monterey Amendment. Oversight of the CEQA analysis for the Project falls within the jurisdiction of the Los Angeles Superior Court, as stated in the decision in the *Friends I* case and as acknowledged by the Monterey Amendment Settlement Agreement, Section III(E).<br><br>There is no evidence that this DEIR will violate DWR's lead agency status in the preparation of the new Monterey Amendment Program EIR. The Monterey Amendment project description is substantially different from the description for the Project. The two environmental analyses share one common feature--both this DEIR and the Monterey Amendment EIR use the same DWR model (CALSIM II) to evaluate potential impacts.<br><br>The Project does not require the fallowing of farmland and is not linked to any development project. Please refer to the Response to Comment 72 for a thorough discussion regarding the lack of need for fallowing resulting from the Project. Please also refer to the Responses to Comments 23 and 26. |
| 45 | PCL/CPA | Lastly, Castaic's hypothetical "non-Monterey" analysis of the transfers in the Draft EIR cannot substitute for DWR's new assessment of the Monterey changes. In *Friends*, Castaic unsuccessfully attempted to portray its transfer EIR as capable of standing alone, outside the Monterey Amendments program. Although transfers were available under Article 41 of the pre-Monterey State Water Project contracts subject to express DWR approval, DWR has neither reviewed nor conferred approval on the present transfer under Article 41. | Please refer to the Master Response and to Comments 3, 5 and 10 and the Responses thereto. As those comments from DWR note, DWR has approved of the DEIR's "non-Monterey" analysis. The *Friends I* court rejected CLWA's claim that the prior Project EIR stood alone because the prior Project EIR did not analyze the environmental impacts on the seller's lands under pre-Monterey Amendment conditions. However, the DEIR does analyze those impacts, as set forth in DEIR Section 3.2 and Appendix C. Therefore, the "straw man" problem of |

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| 45 (cont) | PCL/CPA | Moreover, it is highly speculative whether agriculture-to-urban transfers such as the 41,000 acre foot transfer would even have taken place without the Monterey Amendments, since those Table A amounts would have been subject to "agriculture first" cutbacks under pre-Monterey article 18(a). Read in context, such maneuvers would amount to little more than the "straw man" argument considered and rejected in the *Friends* appeal. (95 Cal.App. 4th at p. 1387.) | referencing the Belridge EIR that did not address the impacts to the seller's lands, discussed in *Friends I*, has been resolved in the DEIR. To clarify, the Project could occur either pre- or post-Monterey Amendment and has been analyzed accordingly in this "stand alone" DEIR.<br><br>The commenter fails to acknowledge that the Monterey Amendment Settlement Agreement provides that the Monterey Amendment remains in full force and effect, and that permanent Table A Amount transfers may occur under the Monterey Amendment, while DWR prepares the new Monterey Amendment EIR.<br><br>As noted in DEIR Section 1.4.2, CLWA has 12,700 acre-feet of SWP agricultural contractor water previously purchased under the pre-Monterey Amendment condition. DEIR Table 3.15-17 illustrates that CLWA would obtain more of an advantage from the Project under imposition of pre-Monterey Amendment Article 18(b) in average and multiple dry years than it would under the Monterey Amendment. Therefore, the Project is potentially advantageous to CLWA even without the Monterey Amendment. That is because the remaining 41,500 of CLWA's 54,200 Table A Amount pre-existing the Project is designated as M&I contractor water and would benefit in years when agricultural contractor cutbacks would occur under pre-Monterey Article 18(b). |
| 46 | PCL/CPA | The instant Draft EIR, includes glaring errors. A piecemeal and startlingly inaccurate description of the Monterey case Settlement Agreement (ES 2-4) fails even to inform the reader that DWR's statewide review of the "Monterey Plus" project could affect the future of this transfer or of the Monterey Amendments themselves. | The description of the Settlement Agreement is accurate and contains the specific information relevant to the EIR analysis. Because the new Monterey Amendment EIR is still in preparation, the Supplemental Water Project EIR contains an analysis of environmental impacts that would occur both with and without the Monterey Amendments in place, consistent with CEQA Guidelines section 15144, which indicates that "while foreseeing the unforeseeable is not possible, an agency must use its best efforts to find out and disclose all it can." Trying to forecast what future changes to SWP Contracts might occur as a result of the new Monterey Amendment EIR, and |

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| 46 (cont) | PCL/CPA | | what the environmental impacts of such changes would be, is speculative and not required by CEQA (CEQA Guidelines section 15145). Because the Monterey Amendment Settlement Agreement provides that the Monterey Amendment will remain in full force and effect while DWR prepares a new EIR, it is appropriate that the environmental analysis for this Project include both the "with and without Monterey Amendment" conditions.<br><br>The September 24, 2002 trial court judgment on remand in *Friends I* provided as follows with respect to the water transfer under this Project pending certification of an EIR that complies with CEQA and the Court of Appeal opinion: "Respondent will not be prohibited from using the water to which it is entitled, but petitioner may renew its application for such prohibition based upon evidence of the actual use of such additional water for purposes it considers improper." The Court of Appeal affirmed that judgment in a subsequent unpublished opinion.<br><br>Please refer to the Master Response and to Comments 2-6 and the Responses thereto. The DEIR is not tiered off the new Monterey Amendment Program EIR. The new Monterey Amendment Program EIR is still pending and could take many months to complete. As noted by DWR, the approach to environmental analysis in the DEIR is not inconsistent with the approach that DWR is taking in preparing the new Monterey Amendment Program EIR. DWR is a responsible agency that must approve or disapprove the Project and will rely upon CLWA's certified EIR to perform that function. |
| 47 | PCL/CPA | The "Settlement Agreement underscores the non-finality of the 41,000 acre-feet transfer and the need for DWR's statewide review. For example:<br><br>• Section III.D refers to a list of transfers listed in attachment E to the agreement, which the settling parties, without specifically endorsing or opposing them, recognize as | Please refer to the Master Response and to Comments 9, 10 and 22 and the Responses thereto. The Monterey Amendment Settlement Agreement does not state or imply that the new Monterey Amendment Program EIR must serve as the EIR or as a Tier 1 EIR for this Project. Section (III)(C)(4) of the Monterey Amendment Settlement Agreement only requires that the new Monterey Amendment Program EIR analyze the |

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| 47 (cont) | PCL/CPA | "final" and agree not to challenge. This transfer is *not* included in that list.<br><br>• Further evidence of the non-finality of the Castaic transfer is that section III.E singles out this transfer for a special acknowledgment recognizing that it is the subject of pending litigation in this Court.[fn.1]<br><br>• Section III.C.4 recognizes DWR's commitment to provide in its forthcoming statewide programmatic EIR an "[a]nalysis of the potential environmental effects" relating to "the Kern-Castaic Transfer," identifying it as one of the actions "that relate to the potential environmental impacts of approving the Monterey Amendments."<br><br>[Fn. 1 from letter:] The Draft EIR erroneously attempts to recast this provision as a "specific exclusion" of this transfer from "any prohibitions against transfers of Table A amounts by the Settlement Agreement." That is simply wrong. Section III.E recognizes that this transfer is "subject to pending litigation in the Los Angeles Superior Court following remand from the Second District Court of Appeal." It reflects a recognition that "jurisdiction with respect to that litigation should remain in the [Los Angeles] court," and the settling parties' concurrence that "nothing in this settlement agreement is intended to predispose the remedies or other actions that may occur in that pending litigation." | potential environmental impact of Monterey Amendment Settlement Agreement Attachment E transfers and this Project as actions that relate to the potential environmental impacts of approving the Monterey Amendments. Section III(E) of the Monterey Amendment Settlement Agreement, which recognizes that the Los Angeles County Superior Court in *Friends I* has jurisdiction over this Project, serves to limit the analysis required by Section III(C)(4). The Los Angeles County Superior Court in *Friends I* stated in its judgment on remand with respect to this Project: "Respondent will not be prohibited from using the water to which it is entitled, but petitioner may renew its application for such prohibition based upon evidence of the actual use of such additional water for purposes it considers improper."<br><br>With respect to DEIR reference to a "specific exclusion," see the Response to Comment 10. |
| 48 | PCL/CPA | DWR has recently confirmed that this transfer remains subject to the Settlement Agreement and its future "Monterey Plus" EIR. As DWR Director Lester Snow wrote on June 17, 2004 to *Friends* case lead counsel Alyse Lazar, "DWR's treatment of the transfer of Table A amounts from Kern County Water Agency to Castaic Lake Water Agency will be governed by the Settlement Agreement. As provided in Paragraph lllC4 of the Settlement Agreement, the EIR will include an "analysis of the potential environmental impacts relating to (a) the Attachment E transfers, and (b) the Kern-Castaic Transfer, in each case as | Please refer to the Master Response and to Comments 22, 33 and 47. The Snow letter does not state that the Project will be reviewed by DWR as a new project. In fact, the Snow letter reaffirms what the Settlement Agreement provides, i.e., that the Project and the Settlement Agreement Attachment E transfers will be reviewed only "as actions that relate to the potential environmental impacts of approving the Monterey Amendments." |

| No. | Commenter | Comment | Response |
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| 48 (cont) | PCL/CPA | actions that relate to the potential environmental impacts approving the Monterey Amendments." Section 1(0) of the Settlement Agreement defines the "Kern-Castaic Transfer" as "the transfer of 41,000 AF of water from Kern County Water Agency to the Castaic Lake Water Agency, approved by DWR on March 31, 1999." DWR has not completed any draft or final analysis regarding these transfers." Given both the required state leadership on an ongoing Tier 1 environmental study and the pending litigation, the future of the Castaic transfer and, indeed, the broader Monterey Amendments, cannot be assumed. | |
| 49 | PCL/CPA | The Draft EIR's assertion that the Settlement Agreement "did not change the substance of the Monterey Amendments" is also misleading. Although those amendments are part of the "Monterey Plus" project, the agreement also eliminates misleading references to "entitlements" from the state contracts and adds a new provision to the contracts imposing water reporting requirements. The agreement also imposes a host of other substantive changes in State Water Project operation that should be described in the Final EIR. | Section II of the Monterey Amendment Settlement Agreement authorizes the continued administration and operation of the SWP and Kern Water Bank in accordance with the Monterey Amendment and the amendment attached as Exhibit A to the Settlement Agreement. As the recitals and Section 8 of the Exhibit A amendment explains, the intent of most of the Exhibit A changes was "solely for clarification purposes" and to "not in any way change the rights, obligations or limitations on liability of the State or the District." The only other provision in the Exhibit A amendment was the addition of Article 58, which provides for biennial reporting by DWR of the delivery capability. Article 58 is a procedural, and not a substantive change. None of the Exhibit A changes or other provisions of the Settlement Agreement appear to alter the environmental impacts of the Monterey Amendment. In any event, the Monterey Amendment is an entirely different project from that analyzed in the DEIR for the Project.<br><br>Under the Monterey Amendment Settlement Agreement, the Monterey Amendment remains in place, including Article 53 that provides for permanent agricultural to urban contractor transfers of 130,000 acre-feet of Table A Amounts from Kern County. This Project was a transfer that fell within that 130,000 acre-feet Table A Amount, but the Project could equally occur under Article 41 of the State Water Project contract without the Monterey Amendment in place. Section III(E) of the Settlement |

| No. | Commenter | Comment | Response |
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| 49 (cont) | PCL/CPA | | Agreement confirms that the environmental analysis for this Project is subject to the jurisdiction of the Los Angeles County Superior Court, the venue for the *Friends I* case, and is not subject to the jurisdiction of the Sacramento County Superior Court, the venue for the challenge to the prior Monterey Amendment Program EIR. |
| 50 | PCL/CPA | Castaic's refusal to await DWR's "Monterey Plus" EIR would fatally compromise its ability to identify alternatives to the proposed transfer that might maximize its benefits and minimize its environmental impacts statewide prior to rendering the transfer a *fait accompli*. DWR's EIR will programmatically address Castaic's transfer in the context of statewide contract amendments. A major issue requiring assessment in that document will be the possible *alternative* dispositions of the 41,000 acre feet of Table A amounts to serve other uses. To list several possible examples, the alternative uses subject to statewide analysis might include ecological restoration, urban infill development in Los Angeles or San Diego, and relief from cutbacks of Colorado River deliveries in excess of the California's 4.4 million acre-feet in annual entitlement. (See *Arizona v. California* (1964) 376 U.S. 340 (Colorado River); fn. 7, *supra* p. 16).) In short, legally adequate assessment of these issues under CEQA will require DWR's "statewide perspective" rather than the provincial experience of a local water agency, and demands recognition that this transfer is an overall part of the Monterey program. (*Friends I*, 95 Cal.App.4th at p. 1384.) | Please refer to the Master Response. The comment misconstrues what the Monterey Amendment Settlement Agreement states regarding analysis of the Project in DWR's new Monterey Amendment Program DEIR. Section III(C)(4) of the Monterey Amendment Settlement Agreement states that DWR will analyze the potential environmental impacts of the Project as they relate to the potential environmental impacts of approving the Monterey Amendment. Thus, DWR's analysis of the Project in the new Monterey Amendment Program DEIR will be included as part of a broader analysis of past and future permanent transfers of Table A Amounts. But DWR's analysis of the Project impacts will not constitute the EIR for the Project and is not required to serve as a Tier 1 EIR for the Project. Section III(E) of the Monterey Amendment Settlement Agreement, which recognizes that the Los Angeles County Superior Court in *Friends* I has jurisdiction over this Project, serves to limit the analysis required by Section III(C)(4).<br><br>The comment appears to confuse the appropriate environmental analysis of the Monterey Amendment with the appropriate analysis of the Project that is the subject of the DEIR. An EIR need only consider alternatives to the project described and analyzed in that EIR. The Court of Appeal in *Friends I* ordered the environmental review for the Project to be conducted by CLWA under the jurisdiction of the Los Angeles Superior Court. The Monterey Amendment Settlement Agreement acknowledges the jurisdiction of that court over the EIR for this Project. The alternatives suggested for analysis by this commenter are more appropriate suggestions for consideration in DWR's preparation of the DEIR for the Monterey Amendment, to the extent that the alternatives are |

| No. | Commenter | Comment | Response |
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| 50 (cont) | PCL/CPA | | feasible or acceptable. None of the alternatives suggested by the commenter fit within the criteria for alternatives to the Project. None of the suggested alternatives would feasibly attain most of the basic objectives of the Project as required by CEQA. The objectives of the Project are to augment CLWA's Table A Amount to meet the water demands of existing users and anticipated future growth and to provide a means of delivery for the augmented water supplies. The DEIR includes analysis of a "No Project" alternative and a reasonable range of alternatives that will foster informed decision-making and public participation, including those alternatives that would feasibly attain most of the basic objectives of the Project but would avoid or substantially lessen any of the significant effects of the Project. As noted elsewhere in these responses to comments, DWR has provided its statewide perspective to the DEIR in DWR's role as a responsible agency. DWR is charged with analyzing the potential environmental impacts of the Project and other transfers as they relate to the potential environmental impacts of approving the Monterey Amendment because DWR has agreed to prepare its new Monterey Amendment Program EIR in accordance with the provisions of the Monterey Amendment Settlement Agreement. |
| 51a | PCL/CPA | The Draft EIR's water supply assessment (especially in sections 3.15 and Appendix D) make highly problematic assumptions about state water reliability, | Please refer to response to comment 25. |
| 51b | PCL/CPA | as well as the availability of "surplus" water under Article 21 of the state project contracts. | SWP surplus water is SWP water that can be made available to Contractors when water and capacity are available in excess of SWP storage needs and Table A supplies. The different types of surplus water, and surplus water terminology, both with and without the Monterey Amendment are described in Table A-2 of Attachment A to Volume II of the FEIR. This table is a sub-set of Table 3.15-3 on page 3.15-8 of the DEIR.<br><br>The uses of surplus water in the DEIR's water supply assessment are described below for each category of surplus water. As described below, the assumptions for surplus water |

| No. | Commenter | Comment | Response |
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| 51b (cont) | PCL/CPA | | made in the water supply assessment are consistent with the SWP Contracts, SWP operations and the availability of surplus water, and both WRMWSD's and CLWA's ability to take delivery of surplus waters.<br><br>**Scheduled Surplus Water**<br><br>Scheduled surplus water was included only in the With Article 18(b) Implemented allocation scenario. It was included in this scenario because with the reduction in Table A Amounts under that scenario, scheduled surplus water would have been available on a scheduled or more dependable basis similar to Table A supplies (i.e., Contractors could schedule deliveries of scheduled surplus water in advance, in a manner similar to their annual Table A requests). Because the overall availability of SWP supply is independent of the way water is allocated among Contractors, it was assumed that the SWP supply would remain the same under this scenario. However, because total Table A Amounts would be proportionally reduced to the "minimum project yield," there would be frequent occasions when water above this minimum project yield amount would be available as part of allocated supplies. For example, if DWR anticipates the available SWP supply to be 3.0 MAF in a particular year, and if all Contractors' Table A Amounts were reduced to a hypothetical new minimum project yield of 2.0 MAF, then the 1.0 MAF of available SWP supply above that minimum project yield could be scheduled, in advance, for delivery to Contractors similar to Table A supplies. This is consistent with the SWP Contracts, SWP operations and the availability of surplus water, and both WRMWSD's and CLWA's ability to take delivery of this water.<br><br>Scheduled surplus water is assumed to be unavailable under the Without Monterey Amendment and With Monterey Amendment allocation scenarios because (1) for the Without Monterey Amendment allocation scenario, scheduled surplus water was generally available only during the early years of the |

| No. | Commenter | Comment | Response |
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| 51b (cont) | PCL/CPA | | SWP, when total Contractor demands were low, and has not been available since the mid-1980s due primarily to increasing Contractor demands for Table A supplies, and (2) for the With Monterey Amendment allocation scenario, the category of scheduled surplus water was eliminated as part of the Monterey Amendment. This is consistent with the SWP Contracts, SWP operations and the availability of surplus water, and both WRMWSD's and CLWA's operations and facilities.<br><br>**Unscheduled Surplus Water and Article 21 Water**<br><br>As described on page 3.15-36 lines 33-40, unscheduled surplus water/Article 21 water was not included in the water supply analysis for any of the three water allocation scenarios. This was because unscheduled surplus water/Article 21 water is not available on a routine or predictable basis, and is generally only available for short periods of time during low demand months when most Contractors have a limited ability to use it. While unscheduled surplus water/Article 21 water is available under the SWP Contracts and SWP operations, it is only periodically and temporarily available and is not a reliable supply. Not including this water is consistent with WRMWSD's and CLWA's operations and facilities because both agencies have limited capacity to take delivery of this water when it is available (as compared to a few other SWP Contractors that have large surface and/or groundwater storage facilities and can take delivery of large amounts of unscheduled surplus water/Article 21 water when it is available and store the water for future use). |
| 51c | PCL/CPA | DWR's record of deliveries to contractors under the SWP figured centrally in the Third District's conclusion that the 1995 EIR must be set aside. (See *PCL v. DWR*, 83 Cal. App. 4th at 908 (noting the "huge gap between what is promised and what can be delivered" and that "actual, reliable water supply" is "in the vicinity of 2 to 2.5 MAF of water annually" rather than the 4.23 MAF of Table A "entitlements"); 83 Cal. App. 4th at 913 | CLWA has obtained and included in the DEIR a frank assessment of DWR's record of deliveries. In the DEIR, CLWA shows a record of historic SWP deliveries for 1990 through at least 2001, showing total SWP deliveries, SWP deliveries to WRMWSD, and SWP deliveries to CLWA (see Tables 3.15-2, 3.15-5, and 3.15-8, respectively). In addition to showing actual acre-feet of deliveries, these tables show the SWP allocation |

| No. | Commenter | Comment | Response |
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| 51c (cont) | PCL/CPA | (average actual deliveries under the SWP from 1980-1993 "were around 2.0 MAF").<br><br>A frank assessment of DWR's record of deliveries is essential to a wide variety of issues addressed in the EIR, including the no project alternative as well as the assessment of hydrologic impacts, land use and planning impacts, growth-inducing impacts, and cumulative impacts. Anticipating the importance of this issue, the Monterey Settlement Agreement required periodic SWP reporting on the reliability of SWP deliveries. | percentage for each year. These allocation percentages show the percentage of Contractors' requested Table A Amounts the SWP was able to meet. For example, while total SWP deliveries appear low in 1998, the allocation of 100 percent indicates that Contractors' SWP requests were completely met. Low deliveries that year were due to 1998 being a very wet year, which reduced Contractor demands for SWP water. Therefore, the low deliveries in 1998 were limited by demand, not by supply. In 2001, total SWP deliveries were only slightly less than in 1998. However, the allocation percentage that year was only 39 percent, indicating that SWP supplies were only able to meet 39 percent of Contractors' requested Table A Amounts. Clearly, the low SWP deliveries in 2001 were constrained by the amount of available supply.<br><br>The *PCL* and *SCOPE* cases (*Planning & Conservation League v. Department of Water Resources* [2000] 83 Cal.App.4th 892 and *Santa Clarita Organization for Planning the Environment v. County of Los Angeles* [2003] 106 Cal.App.4th 715) do not require CLWA to prepare a study or model independent of DWR studies and models.<br><br>Several commenters on the SWP Delivery Reliability Report questioned the reliability estimates in the report, based in part on the argument that historic deliveries were much lower than the report's estimates. However, at least one of these commenters (Dennis O'Connor) acknowledges in his comments that "while many try to compare the modeled 2001 reliability against historic SWP operations, it is not really appropriate for much of the period" (O'Connor 2002). This is because Contractors' contractual Table A Amounts and requests for SWP water were in a build-up phase during much of this period. Table A Amounts, which limit how much SWP water a Contractor may request, reached a maximum in 1990 for most Contractors; and delivery requests for most Contractors have only recently increased up to their Table A Amounts. In addition, the regulatory rules governing the Delta and SWP |

| No. | Commenter | Comment | Response |
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| 51c (cont) | PCL/CPA | | operations have become more stringent over the years, with most of the current rules issued in 1995. Therefore, as O'Connor notes in his comments, "comparing modeled 2001 reliability against actual deliveries is somewhat misleading much beyond the last few years" (O'Connor 2002). DWR has responded to the comments of O'Connor and others on this issue (see letter from DWR to Senator Michael Machado dated March 11, 2003; DWR 2003c).<br><br>In addition to providing information on historic SWP deliveries, the DEIR includes a detailed analysis of indirect and growth-related impacts of the Project (see Chapter 5). The DEIR also provides a summary of the effects of the Project with regard to local and regional Plans and Policies (see DEIR Chapter 4). |
| 51d | PCL/CPA | The Draft EIR uses dubious modeling assumptions to claim an average of annual deliveries exceeding the historical record by approximately a million acre-feet. (See DEIR, 3.15-7.) | Please refer to Responses to Comments 25 and 51c. |
| 51e | PCL/CPA | In part, Castaic's EIR relies upon dated studies employing an outmoded model (DWRSIM). | The differences between DWRSIM and CALSIM II model study results were considered and found to be so minimal as to not result in changes to the environmental impact determinations in this DEIR. Moreover, use of the slightly higher SWP supplies associated with the use of DWRSIM resulted in DEIR consideration of the worst-case scenario; i.e., the scenario that would result in greater direct and indirect impacts in both the CLWA and WRMWSD service areas. Direct impacts would remain less than significant regardless of the modeling tool used, and indirect impacts from growth-related development would remain significant regardless of the modeling tool used. No new environmental impacts would result from the use of CALSIM II instead of DWRSIM.<br><br>As described on page 3.0-5 line 10 through page 3.0-6 line 27, page 3.15-31 line 15 through page 3.15-32 line 2, in Appendix D section 2, and in Responses to Comments 4 and 25, the environmental impact analysis was conducted using DWRSIM because these studies were consistent with the 1998 "pre- |

| No. | Commenter | Comment | Response |
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| 51e (cont) | PCL/CPA | | Project" environmental setting used in the DEIR. Additionally, at the time the analysis was conducted for the DEIR, the DWRSIM studies from the CALFED Bay-Delta Program EIS/EIR provided the best available estimates of SWP deliveries, and were the most comprehensive, well-established, publicly available model studies available. The two DWRSIM studies used received extensive public and technical review as part of the CALFED process and formed the basis for the SWP and CVP water supply analysis for the CALFED Bay-Delta Program EIS/EIR.<br><br>Once DWR released the CALSIM II studies conducted for DWR's SWP Delivery Reliability Report, the SWP deliveries from these studies were compared with the results from the DWRSIM studies used for this DEIR. While the modeling tool itself has changed, the criteria used in the models to simulate SWP operations have not significantly changed. The delivery results of DWR's more recent assessment of SWP reliability in its SWP Delivery Reliability Report using CALSIM II are comparable to the results of the DWRSIM studies (see Table A-3 of Attachment A to Volume II of the FEIR and Appendix D of the DEIR, Section 2.2 for a comparison of these model study results). As shown in Table 3, the results of the two modeling studies are similar; however, in general, the estimates of SWP supplies associated with the 41,000 AF of Table A Amount based on the SWP Delivery Reliability Report and CALSIM II are somewhat lower than the amounts under the DWRSIM studies for the comparable allocation scenario. Therefore, from an environmental impact assessment standpoint, the DEIR analyzed the worst-case scenario; i.e., the scenario that would result in greater direct and indirect impacts in both the CLWA and WRMWSD service areas. The reasons for these differences were discussed in the DEIR on page 3.15-31 line 29 through page 3.15-32 line 2 and are briefly summarized below:<br>• The results in this EIR account for the variable demand used by DWR in its model studies (consistent with the way DWR actually has allocated water), while the results |

| No. | Commenter | Comment | Response |
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| 51e (cont) | PCL/CPA | | as presented in DWR's delivery reliability report do not (i.e., in DWR's report, deliveries are presented as a percentage of Table A, regardless of the lower demands used in some years of the study); and,<br>• The "existing" case in this EIR is based on 1998 SWP demand conditions, while the "existing" case in DWR's report is based on higher 2001 SWP demand conditions. The 2001 total SWP demand is higher than the 1998 demand due to increased M&I Contractor demands. A higher total demand can result in some years in less water being allocated to the same Table A Amount, so the higher 2001 demand results in a slightly lower quantity of water associated with the 41,000 AF of Table A Amount. |
| 51f | PCL/CPA | To move beyond DWRSIM's obvious deficiencies, the Draft EIR also makes unwarranted extrapolations from DWR's 2003 reliability report. | The commenter refers to "unwarranted extrapolations from DWR's 2003 reliability report," but provides no further information regarding any specific "extrapolations" or what is "unwarranted." As discussed in more detail in Response to Comment 25, the SWP Delivery Reliability Report was used in the DEIR only to estimate SWP supplies for the current environmental setting. The pre-project 1998 environmental baseline and the project environmental impact analyses were based on separate model studies (DWRSIM model studies conducted by DWR for the CALFED Bay-Delta Program EIS/EIR), and not on model studies from the SWP Delivery Reliability Report.<br><br>While the derivation of supply estimates in the DEIR for the current environmental setting is based on data from the SWP Delivery Reliability Report, the derivation method used is straightforward and was performed just as suggested by DWR in that report. In that report, DWR presents the probability of being able to meet total SWP deliveries as a percent of full Table A Amounts. DWR suggests that this information can be directly applied to individual Contractors by multiplying the total delivery percentages by an individual Contractor's Table A Amount. In the DEIR, supply estimates were derived for |

| No. | Commenter | Comment | Response |
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| 51f (cont) | PCL/CPA | | three hydrologic conditions. Estimates of total SWP supplies under each of these hydrologic conditions were taken directly from Table B-3 of DWR's SWP Delivery Reliability Report. The delivery percentage under these conditions were determined by dividing these total SWP deliveries by total Table A Amounts of 4.133 million AF, and CLWA's share of that supply was determined by multiplying this percentage by CLWA's Table A Amount of 95,200 AF. For example, the average supply available to CLWA was estimated by starting with the average total SWP supply from DWR's Table B-3, which is 2.962 million AF. Dividing this supply by the total Table A Amounts of 4.133 million AF results in a delivery percentage of 71.7 percent. Multiplying this percentage by CLWA's Table A Amount of 95,200 AF results in an estimated average supply to CLWA of 68,300 AF. Supply estimates for the hydrologic conditions based on specific hydrologic years were derived in the same manner, starting with total SWP deliveries from DWR's Table B-3 for those specific years.<br><br>These limited extrapolations, which were conducted just as suggested by DWR, are not "unwarranted." None of the environmental impact analyses performed for the DEIR were based on the particular data that were derived from the SWP Delivery Reliability Report. |
| 51g | PCL/CPA | That report has faced significant controversy regarding its overall conclusions and the computer modeling that underpins its reliability projections. For instance, the reliability report constructs delivery probability charts for the SWP for two years, 2001 and 2021. As noted by several commenters, the median delivery identified in the report (3.297 MAF) is on the order of 50% greater than the actual record of historic deliveries to the SWP as reported by DWR. A detailed analysis by Dennis O'Connor for the California Research Bureau, referenced in the comment letter of Senator Machado [fn2], indicates that the draft reliability report provides no credible explanation for this disparity. O'Connor's analysis concludes that among other problems, the results are inconsistent with previous estimates | Please refer to Response to Comment 25. |

| No. | Commenter | Comment | Response |
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| 51g (cont) | PCL/CPA | and models, recent deliveries were lower than the modeled 2001 conditions, and 2021 does not reflect any growth in upstream consumptive use. His assessment also observes that CALSIM II is not calibrated or otherwise verified, and that the draft reliability report does not use the CALSIM II model as designed. Because the draft reliability report appears to overstate the supply reliability of the SWP, O'Connor's analysis warns that DWR's assessments of reliability should not replace the "paper water" problem with a new, simulation-based "cyber water" problem. Other comment letters, notably those of Robert C. Wilkinson, Peter Gleick, and Arve Sjovold, reach similar conclusions. (Please see http://swpdelivery.water.ca.gov/ and comments submitted regarding the instant EIR by Arve Sjovold.)<br>[2][Fn 2 from letter]: See Appendix E page E-94 at http://swpdelivery.water.ca.gov/SWP%20Delivery%20Reliability.final.2002.pdf. | |
| 51h | PCL/CPA | Controversy over the reliability report, on which this EIR relies, led to review of CALSIM II modeling by an External Review Panel including some of the world's leading experts on water resource systems. Their report, "Strategic Review of CALSIM II and its Use for Water Planning, Management, and Operations in Central California" was released on December 4, 2003. The Panel raised serious concerns regarding the application of the model to predicting reliable deliveries, especially as those deliveries related to particular contractors. Many of the Panel findings agree with concerns we have articulated throughout the Monterey EIR process. Notably, the Panel found that:<br><br>• "Examination of the report "CALSIM II Simulation of Historical SWP/CVP Operations,' DWR (2003) indicates that the current formulation of CALSIM II: Overestimates water deliveries to SWP and CVP contractors…" (p. 11)<br>• "Most successful applications of optimization [CALSIM's type of computer model] …have calibrated | Please refer to Response to Comment 25. |

| No. | Commenter | Comment | Response |
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| 51h (cont) | PCL/CPA | • their objective functions…so that the model results correspond to what actually happens or would happen under a particular hydrologic and demand scenario…It does not appear that such a calibration of the objective function weights in CALSIM has yet been completed." (p. 4)<br>• "…currently many users are not sure of the accuracy of the results. A sensitivity and uncertainty prediction capability and analysis is needed" (p. 8)<br>• "In our opinion, CALSIM II has not yet been calibrated or validated for making absolute predictions values." (p. 9)<br>• Regardless of how possible it is to match the model closely with observed behavior, statistics on the accuracy of the calibration run should be supplied to users to enable them to gauge the likely errors involved with using the model output. (page 9)<br>• In CALSIM II, "Groundwater resources are assumed infinite, i.e., there is no upper limit to groundwater pumping." (p. 8)<br>• "Realistic upper bounds to pumping from any of the aquifers represented in the model need to be developed and implemented." (p. 27)<br>• "In general, the level of representation of groundwater in CALSIM II is not reasonable from the point of view of the reviewers." (p. 27)<br>• "In many cases, it appears that water use and other hydrologic data inputs to CALSIM II are based on data collection and analyses that took place during the 1960's when DWRSIM and PROSIM were being constructed. It is important to ensure that data used for CALSIM II are up-to-date and consistent with the best current information." (p. 20).<br>• In general, it appears that the developers of CALSIM II do not have a clear idea of how to define the scope of CALSIM II use and many of its applications are evolving in a reactionary manner. Model developers | |

| No. | Commenter | Comment | Response |
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| 51h (cont) | PCL/CPA | should identify clearly the desired uses for CALSIM II and then determine acceptable approaches for satisfying those desires. Developers should seek to improve data accuracy and overcome unrealistic assumptions to improve the confidence in model results. (page 25) | |
| 52 | PCL/CPA | Furthermore, as numerous CEQA cases have consistently held, local agencies such as CLWA have an independent responsibility to adequately assess reliability. Castaic therefore, and cannot rest its analysis solely on its old DWRSIM studies and the DWR Reliability Report. | The *PCL* and *SCOPE* cases (*Planning & Conservation League v. Department of Water Resources* [2000] 83 Cal.App.4th 892 and *Santa Clarita Organization for Planning the Environment v. County of Los Angeles* [2003] 106 Cal.App.4th 715) do not require CLWA to formulate an independent model to assess SWP supply reliability.<br><br>DWR is the state agency that manages and operates the SWP. It is also the state agency responsible for development and periodic updates of the statewide water plan. As such, DWR is in the best situation to have the SWP-specific knowledge and operational experience necessary to estimate SWP supply reliability, as well as knowledge of the broader statewide water user information affecting future SWP reliability. The modeling tools that DWR has developed are based on this extensive experience and knowledge. CLWA and other SWP Contractors have participated in extensive discussions with DWR regarding the development, use and adequacy of the DWRSIM and CALSIM II models. While recognizing that no model is perfect, DWRSIM, the DWRSIM studies conducted for the CALFED Bay-Delta Program EIS/EIR, CALSIM II, and the CALSIM II studies contained the SWP Delivery Reliability Report provide the most comprehensive and accurate assessment of SWP reliability available. Additionally, in their comment letter on the DEIR, DWR stated that the DEIR "adequately discusses the reliability of the SWP, pre- and post-Monterey Amendment conditions, future conditions, and SWP operations." (See Response to Comment 5)<br><br>The SWP is a very complex water system. Its operations are governed by river flow requirements, Delta regulatory and |

| No. | Commenter | Comment | Response |
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| 52 (cont) | PCL/CPA | | water quality requirements, and facility constraints; its operations must be coordinated with the U.S. Bureau of Reclamation's (USBR) operation of the comparably complex Central Valley Project system; and all of these operations are affected by numerous other water users upstream of the Delta. Added to this system complexity is the more typical water supply uncertainty due to hydrologic variability. SWP supplies to an individual SWP Contractor are further affected by the demands of the other Contractors. Given the complexity of this entire system, CLWA relies on DWR to provide the best estimate of SWP supply reliability. Also, as directed by DWR, the SWP Contractors must factor their other available water supplies into their assessments of SWP supply reliability. |
| 53 | PCL/CPA | Without adequate review, the transfer would place available water in one of the places in California most likely to promote urban sprawl and destroy environmental habitat The Draft EIR's growth inducement section (Chapter 4) fails to appreciate the significance of this transfer as a linchpin of sprawl development. Following the *PCL* decision and through the Monterey EIR, the state has a responsibility and, as noted above is the only entity with the requisite resources and purview, to determine the environmental impacts, particularly including induced growth impacts, of transfers such as the 41,000 acre-foot transfer. Local agency analysis of these impacts prior to the Tier I Monterey EIR impermissibly and imprudently ignore the state's role in considering alternatives to that transfer which would, for example, meet existing shortfalls in developed Southern California dependent on diminishing Colorado River supplies, while avoiding "dumb growth" in the undeveloped frontier at the Los Angeles-Kern County border. | Please refer to the Master Response and to Comments 37 and 50 and the Responses thereto. CLWA has no jurisdiction over land use planning. Nonetheless, Chapter 4 of the DEIR analyzes the potential indirect (growth related) impacts of the Project. CEQA does not require CLWA to speculate that land use plans might lead to urban sprawl or destroy habitat. CEQA does not require CLWA to analyze growth inducing impacts that are not reasonably foreseeable. City and county land use plans are an appropriate benchmark for what constitutes a reasonably foreseeable impact.<br><br>Any new project that proposes to rely upon the transferred Table A Amount will have to satisfy CEQA requirements to describe its environmental impacts, provide public notice and information, and mitigate its impacts. The Project, by its nature, does not create the kinds of impacts described in this comment, and it will be the job of appropriate planning agencies to ensure that future land use decisions do not promote urban sprawl or destroy environmental habitat. The DEIR analyzes the indirect environmental impacts of the Project, acknowledging that firming up and augmenting local water supplies will remove one obstacle to growth.<br><br>CLWA has a responsibility to provide water for future |

| No. | Commenter | Comment | Response |
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| 53 (cont) | PCL/CPA | | population and housing needs projected in local general and area plans to the extent feasible and consistent with law. The cities and counties have been charged by the California Legislature to govern issues of urban growth while addressing the environmental concerns resulting from growth. To that end, local agencies with land use authority have adopted general plan documents to appropriately plan for and mitigate the environmental impacts of future development within their respective jurisdictions. Each of the local general plans has a final environmental document that analyzes potential environmental impacts of the growth described in the document, and proposes mitigation measures for those impacts.<br><br>The *PCL* decision concluded that DWR was the proper lead agency for a project that impacted SWP facilities, contracts and operations statewide. The *PCL* decision did not hold that if a project's environmental impacts relate to statewide issues that a state agency should be the lead agency. The key reason for DWR being designated by the *PCL* court as the appropriate lead agency was that the Monterey Amendments involved changes in the operation of statewide infrastructure, substantive changes in SWP contracts statewide and disposition of state-owned land. If *PCL* stands for the proposition that state agencies must be the lead agency where an environmental issue is a statewide issue, such as urban sprawl, then it would require state agency review of virtually every major local development project and would eviscerate CEQA statutory and regulatory provisions that require local lead agency environmental review.<br><br>The new Monterey Agreement Program EIR will not analyze in detail growth inducing impacts on the Southern California region, and on the CLWA service area in particular, as suggested by the commenter. A programmatic EIR by its nature will focus on wider programmatic impacts of the Monterey Amendment, which impacts may include growth |

| No. | Commenter | Comment | Response |
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| 53 (cont) | PCL/CPA | | inducing impacts in the urban areas of Southern California that receive permanent Table A transfers. Further, with respect to the suggestion that the DEIR should consider alternatives to the 41,000 acre-foot transfer, those are alternatives more appropriately suggested to DWR for consideration as it prepares its new Monterey Amendment Program DEIR, to the extent that the alternatives are feasible or acceptable. Those alternatives are not appropriate in the analysis of impacts of the Project. |
| 54 | PCL/CPA | Rather than squarely confronting the scope and mitigation of growth inducement, the Draft EIR improperly defers the issue to subsequent decisions of local agencies on individual projects. A "chicken and egg" problem emerges here. As reflected in PCL's comment letters on specific projects, local agencies are relying upon *Castaic* to inform them of the reliable water available to support specific proposed projects ranging in scope from small developments to Newhall Ranch. The Draft EIR is entirely speculative in its assumption that project-related growth can be mitigated to insignificance. This issue cannot be credibly reviewed in isolation from the statewide Monterey EIR. | Please refer to the Master Response and to Comments 12, 22, 23, and 53 and the Responses thereto. Please note that CLWA has worked closely with DWR (see Comments 2 through 6 and the Responses thereto) to ensure that the approach to analyzing impacts of the Project will be consistent with the approach taken by DWR in preparing its Monterey Amendment DEIR. CLWA's analysis of the indirect impacts of the Project, associated with growth, acknowledges that environmental impacts will occur and relies upon the local land use agencies to perform their analysis and mitigation of future projects consistent with CEQA. CLWA's reliance on local land use agencies is consistent with requirements by the California Legislature that the local land use agencies include a water supply assessment as part of its environmental impact analysis and mitigation for development projects. (See Water Code §§ 10910, 10911.) Contrary to the suggestion in the comment, CLWA does not assume that project-related growth can be mitigated to insignificance. CLWA has no land use regulatory authority and must rely upon local agencies to exercise their authority in a manner consistent with all applicable laws, including CEQA. CEQA does not require CLWA to implement mitigation measures that are outside CLWA's jurisdiction and that fall within the jurisdiction of local land use agencies. Each of the general and area plans adopted by land use agencies within CLWA's service area underwent CEQA review prior to adoption. Those environmental documents are final and not subject to challenge. This DEIR has relied upon those plans and their mitigation measures approved under |

| No. | Commenter | Comment | Response |
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| 54 (cont) | PCL/CPA | | CEQA in projecting and addressing indirect growth inducing impacts of the Project. |
| 55 | Public Citizen | Public Citizen, a consumer rights organization that has been working to strengthen public oversight over water, urges Castaic Lake Water Agency to refrain from conducting the environmental review of permanent transfers of State Water Project Table Amounts. We believe that is unlawful for CLWA to be the lead agency under CEQA for this project because the Department of Water Resources is currently conducting its statewide review of the "Monterey Plus" Project.<br>Please refer to the Sierra Club's August 15 letter for further reasoning why the DWR must be the lead agency. | Please refer to the Master Response. |
| 56 | Public Citizen | We request that this document be withdrawn and that the document not be re-submitted for circulation until the Monterey Agreement EIR is completed and certified. | Please refer to the Master Response. |
| 57 | SCOPE | As we stated in our NOP comments, we believe that Dept. of Water Resources must be the lead agency for the following reasons:<br>▪ The published appellate decision in PCL v. DWR, 2000 found that the Dept. of Water Resources should be the lead agency for this review.<br>▪ DWR is best suited to ensure that widespread notification of interested parties occur.<br>▪ DWR is best suited to recognize environmental impacts that might be incurred to a wide spread area of the state as a result of this water transfer and to properly assess such impacts.<br>DWR, in its capacity as operations manager of the SWP, will be acquainted with other state projects that would affect or be affected by this transfer. | Please refer to the Master Response. The published decision in the *PCL* case did not concern this Project and made no finding with respect to the environmental review for this Project. The *PCL* case involved a programmatic EIR affecting the entire SWP system and all of its contractors. This Project involves a project EIR for a transfer between two SWP contractors.<br><br>DWR and WRMWSD participated in helping CLWA identify parties to whom notice was given.<br><br>The areas affected by the Project are the receiving and sending areas associated with this 41,000 acre-feet transfer. DWR is not the agency best suited to provide notice to those areas or to analyze potential site-specific impacts in those locales. A local agency has more knowledge of those parties who should receive notice and more information regarding potential localized impacts. As to those areas, CLWA has provided notice as required by CEQA, and CLWA can properly analyze the potential Project impacts in those areas. Notice to other areas under the jurisdiction of DWR is not necessary or required by CEQA. CLWA made a concerted effect to identify and notify potentially interested parties regarding this DEIR, |

| No. | Commenter | Comment | Response |
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| 57 (cont) | SCOPE | | including parties who are outside CLWA's and WRMWSD's service areas, but who might have an interest in the DEIR and the Project.<br><br>With respect to DWR knowledge of State projects that may have an effect on the Project, DWR's knowledge has been shared with CLWA in DWR's capacity as a responsible agency. See Comment 6 and the response thereto. With regard to WRMWSD knowledge of WRMWSD projects and localized impacts, WRMWSD's knowledge has been shared with CLWA in WRMWSD's capacity as a responsible agency. |
| 58 | SCOPE | Changes to water quality including increased chlorides, nitrates or other constituents of SWP project water, and how these constituents will affect the new TMDL requirements approved by Regional Water Quality Control Board approved subsequently to the previous EIR, should be discussed and mitigated. Increased pollution from Trihalomenthanes in public water supply due to higher percentage of reliance on SWP project water as main source should be disclosed. Trihalomenthanes now exceed the new MCL standards after filtration by CLWA due to the filtration method currently used. | The Project does not contemplate or cause a change in regulatory water quality compliance levels. The Project does not include or cause an increase in contaminant levels of Castaic's SWP water deliveries. New TMDL requirements approved by the Regional Water Quality Control Board are not part of or caused by the Project.<br><br>As shown by DEIR Table 3.15-4 and as discussed on pages 3.15-8 through 3.15-9 and 3.15-25, the average water quality for SWP deliveries to CLWA is well below MCL (Maximum Contaminant Level) standards for chlorides, nitrates and other constituents.<br><br>As shown by DEIR Table 3.15-10 water quality test results for drinking water within CLWA, including both SWP water and groundwater supplies, show typical values well below MCL standards for identified constituents, including chloride, nitrate and trihalomenthanes (THMs).<br><br>The issue of chloride concentration deals with indirect impacts to local surface water from water discharges after use. As set forth on DEIR pages 3.15-24 and 3.15-25, the primary cause for high chloride concentration is water softeners. As DEIR page 3.15-25 notes, Sanitation Districts of Los Angeles County has adopted an ordinance that prohibits the installation and use of self-regenerating water softeners in the Santa Clarita Valley. |

| No. | Commenter | Comment | Response |
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| 58 (cont) | SCOPE | | As DEIR Section 4.2.15 states, because all new development will be regulated by that ordinance, indirect chloride loading impacts to local surface water will be mitigated to a less than significant level.<br><br>With respect to THMs, which can be produced under certain conditions by water treatment processes using chlorine, CLWA's Rio Vista Water Treatment Plant uses a treatment process that utilizes both chlorine and ozonation, and is in compliance with THM MCL standards. As noted in DEIR Section 6.3.3.1, CLWA is upgrading the Earl Schmidt Filtration Plant to comply with current and proposed water quality regulations. The Earl Schmidt Filtration Plant and the Rio Vista Water Treatment Plant will be in compliance with water quality standards by June 2005. |
| 59 | SCOPE | This document relies on transfers to the Semi-Tropic Water Banking project for supply reliability, but does not address potential water quality issues that could preclude groundwater from being pumped back into the aqueduct. This is an issue that would be addressed if DWR were the lead agency. We incorporate by reference all contracts between, DWR, CLWA, and Semitropic, particularly the pumpback agreements and sections of the EIR indicating high arsenic and radon levels in the Semi-tropic groundwater basin. There is no up to date water quality data from the groundwater in the Semi-Tropic area included in this report. If the Semi-tropic Water Storage program is going to be relied upon to increase water supply reliability, then water quality data should be made available for review. | The DEIR does not rely on either the 2002 or the 2003 CLWA Water Banking projects in its water supply reliability analysis. DEIR Sections 3.0 and 3.15 make clear that the DEIR relies on two 1998 studies using the DWRSIM model to assess water supply reliability. Those studies took place prior to the water banking projects. The 2002 and 2003 water banking projects are short term and are separate and independent from the Project. They are not intended to, and do not, provide long-term water supply upon which new development can rely. Those water banking projects are not transfers as suggested in the comment; each constitutes a temporary one-time storage of prior SWP deliveries to CLWA, as described in DEIR Section 6.3.3.1.<br><br>This comment seeks to improperly apply to the Project the issue of potential water quality impacts of pump-back provisions for the water banking projects despite the finality of the environmental review for those two water banking projects. The 2003 water banking project negative declaration became final without any challenge having been filed within the statute of limitations period. The 2002 water banking project has already been litigated and the Ventura County Superior Court judgment in favor of CLWA is now on appeal. |

| No. | Commenter | Comment | Response |
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| 59 (cont) | SCOPE | | The issue of groundwater quality impacts resulting from pump-back provisions was raised in the *Network* case; the trial court concluded that the negative declaration adequately analyzed the issue. As the July 14, 2004 Ventura Superior Court decision in *Network* explained, "Petitioners contend that the initial study was inadequate, particularly in its water quality component. The delivery agreement between DWR, Castaic and the Kern County Water Agency requires that ground water re-introduced into the aqueduct must meet the terms of the Semitropic Turn-in Agreement (AR 13:2573), the net effect of which is that water must meet DWR's then current water quality criteria (AR 12:2248). As such, there is no potential for an outdated water quality standard to be applied." The *Network* case is presently on appeal.<br><br>The Administrative Record in the *Network* case, which can be found at the CLWA Administrative Office, showed that the Semitropic groundwater does not contain levels in excess of drinking water primary MCLs or in excess of imported (secondary) SWP water quality standards. (See *Network* Administrative Record 1:138, 139, 140; Tables 5-11 & 5-12; 8:1542-43, 1542-43.) That Administrative Record showed that water pumped by Semitropic under its Groundwater Banking Program has met DWR water quality standards. (See *Network* Administrative Record 47:2501.) In addition, the 1994 Semitropic Groundwater Banking Project EIR, which also can be found at the CLWA Administrative Office, included information showing that the groundwater sub-basin used for water banking creates a barrier against and prevents poor groundwater quality migration. (See *Network* Administrative Record 400) |
| 60 | SCOPE | In conclusion, we request that this document be withdrawn, that the document not be resubmitted for circulation until the Monterey Agreement EIR is completed and certified, and that all parties whose groundwater may be impacted are properly notified when re-circulation occurs. | Please refer to the Master Response. |

| No. | Commenter | Comment | Response |
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| 61 | Sierra Club | In the notice of preparation for this project, the Castaic Lake Water Agency announced its intention to move forward within its own separate environmental review of permanent transfers of State Water Project Table A Amounts. The Sierra Club and others commented at that time that such a procedure would violate state law, several court decisions and the Monterey Agreement Settlement to which CLWA is a signatory.<br>As you are aware, in the Monterey settlement agreement, which Castaic signed, the court-identified lead agency, the Department of Water Resources. DWR is already conducting a statewide environmental review of a new "Monterey Plus" project. We strongly urge Castaic to refrain from moving forward with this separate project review, which is premature and likely to operate at cross-purpose with DWR's statewide review. | Please refer to the Master Response. Please see Responses to Comments 10 and 44. |
| 62 | Sierra Club | Moreover, even if Castaic continues to proceed now with its own separate EIR on this transfer, it lacks the institutional authority and statewide accountability to serve as CEQA lead agency under the Planning and Conservation League decision. | Please refer to the Master Response. The reference in *PCL* to institutional authority and statewide accountability refers to facilities and territory of DWR, both of which were issues pertaining to the Monterey Amendment EIR, not to this Project-specific DEIR. |
| 63 | Sierra Club | The Sierra Club re-iterates the following legal issues put forward in January 2004 comment letter by the Planning and Conservation League. These issues were either ignored or inadequately addressed in the Environmental Impact Report now under review: The "Monterey Amendments" Problem. Under Planning and Conservation League and two sequel decisions addressing Castaic's transfer of Table A amounts, "tiering" or otherwise relying on that EIR would render the approval decision vulnerable to CEQA challenge. However, any attempts by Castaic to conduct a separate Monterey review in advance of DWR's, or to rely on its own hypothetical non-Monterey analysis, would shift rather than solve this fundamental CEQA problem.<br><br>In *Planning and Conservation League*, the Third District Court of Appeal found that Central Coast Water Agency's 1995 EIR | Please refer to the Master Response and to Comment 43 and the Response thereto.<br><br>This DEIR does not undertake to conduct a separate Monterey Amendment review in advance of DWR's new Monterey Amendment EIR.<br><br>Contrary to the assertion in the comment, the *SCOPE* decision did not address CLWA's characterization of the transfer. The *SCOPE* case addressed the assumption made in the environmental analysis of the development project, conducted by the County of Los Angeles as lead agency, that 100% of CLWA's Table A Amount would be available for delivery in all years, without discussing DWR models, historic SWP deliveries, or valid projections for future SWP delivery reliability. The court rejected this assumption, finding that it |

| No. | Commenter | Comment | Response |
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| 63 (cont) | Sierra Club | "failed to meet the most important purpose of CEQA, to fully inform the decision makers and the public of the environmental impacts of the choices before them." (83 Cal.App.4th at 920.)<br><br>CCWA improperly served as lead agency in place of DWR and prejudicially failed to analyze the enforcement of the pre-Monterey permanent shortage provision, article 18(b), prior to its elimination from the State Water Project contracts. The appellate court found it unnecessary to adjudicate the other CEQA deficiencies identified by the Monterey plaintiffs after analyzing the defects in the lead agency selection and no project assessment, observing that "DWR, with its expertise on the statewide impacts of water transfers, may choose to address those issues in a completely different and more comprehensive manner." (*Id.*) The court also noted that the deficiencies in the 1995 EIR might be related to the "provincial experience" of CCWA. (*Id.*)<br><br>In *Friends of the Santa Clara River v. Castaic Lake Water Agency* (2002) 95 Cal.App.4th 1373, the Second District Court of Appeal ordered the decertification of an EIR prepared by Castaic, supporting its Monterey Amendments-based attempt to permanently acquire 41,000 acre-feet of State Water Project entitlements (now "Table A" amounts) from the Kern County Water Agency and its Wheeler Ridge member district. The appellate court found that Castaic's EIR violated CEQA by "tiering" from the invalidated Monterey EIR. This ruling involved precisely the same transfer that Castaic now attempts to address in its separate 41,000 NOP. That piecemeal approach, however, is in apparent defiance of the expectation of the court of the appeal in the Friends case that Castaic would await "action by the DWR complying with the PCL decision." (95 Cal.App.4th at p. 1388.)<br><br>Another recent Second District appellate decision, *Santa Clarita Organization for Planning and the Environment (SCOPE) v. County of Los Angeles* (2003) 106 Cal.App.4th 715, critically addressed | was not based upon adequate evidence in the administrative record, and thus concluded that the environmental analysis was inadequate. In contrast, this DEIR uses DWR modeling to project reliability of the Table A Amount transferred for this Project.<br><br>With regard to the cases addressing interim use of the water from the Project, none of those cases are relevant to the present environmental review of the Project. Therefore, they do not constitute evidence of a significant environmental impact resulting from the Project. Please also refer to Responses to Comments 23, 39, 46, and 47. |

| No. | Commenter | Comment | Response |
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| 63 (cont) | Sierra Club | Castaic's characterization of the 41,000 acre-feet transfer. In that case, the County of Los Angeles violated CEQA in its review of the West Creek development project that erroneously assumed that 100 percent of Castaic's purported 41,000 acre-feet would be available in wet years and 50 percent in drought years. Drawing on Planning and Conservation League's assessment of the historic disparity between Table A amounts and deliverable water, the court concluded that the EIR failed to undertake a "serious and detailed analysis' of State Water Project supplies, and observed that "[t]he dream of water entitlements for the incomplete State Water Project is no substitute for the reality of actual water the SWP can deliver." (*Id*. at pp. 723, 717.)<br><br>The EIR appears to confuse the legitimacy of Castaic's separate review with the distinct issue of the interim operation of the 41,000 acre-feet transfer pending further environmental review. (See Public Resources Code section 21168.9; 41,000 NOP p.1) The trial court did not enjoin interim operation, but left the issue open to further demonstrations that could lead to interim prohibition. Various cases addressing the interim use of this water for new projects prior to the completion of CEQA review are now working their way through the Court system.<br><br>The 41,000 acre-feet transfer is not on the list of Table A amount transfers recognized as "final" in the Monterey Amendments settlement agreement (Attachment E.). Such transfers cannot proceed without new environmental analysis satisfying CEQA. (Monterey Settlement Agreement, section VII.A.) That settlement agreement, while recognizing that the remedial issue remains before the Second District, also requires DWR's "Monterey Plus" EIR to analyze the 41,000 acre-feet transfer, as well as other transfers facilitated by Monterey Amendments provisions, such as other agriculture-to-urban transfers referenced in Article 53 of those amendments. (Section II.C.4.)<br><br>If Castaic rushes to finality by continuing its separate | |

| No. | Commenter | Comment | Response |
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| 63 (cont) | Sierra Club | environmental reviews at this stage, without the benefit of DWR's statewide "Monterey Plus" EIR, its perspective would mirror the "provincial experience" criticized in the *Planning and Conservation League* decision. (83 Cal. App. 3d at 918.) Such an attempt would also create a substantial risk of final decisions based on local analysis that may well prove inconsistent with DWR's "Monterey Plus" EIR. | |
| 64 | Sierra Club | If Castaic continues with this separate environmental review without awaiting DWR's assessment in the "Monterey Plus" EIR, it would violate CEQA's lead agency requirement based upon the well-established standards set forth in Planning and Conservation League v. Department of Water Resources. The court in that case could hardly have been clearer that DWR is the "state agency charged with the statewide responsibility to build, maintain, and operate" the State Water Project. (Id. At p. 906.; see also Wat. Code, section 12930, et seq.) Finding that DWR was the only entity with the requisite statewide perspective and expertise to serve as lead agency, the court found it "incongruous to assert that any of the regional contractors" could "assume DWR's principal responsibility for managing the SWP." (Id.)<br>Similarly, the court-approved settlement agreement in Planning and Conservation League expressly recognizes DWR's duty as "the State agency responsible for administration and operation of the SWP," as well as its continuing obligation to comply with applicable requirements of CEQA and the Water Code. (Agreement, Section X.B.) The transfer guidelines disclosed to contractors under the settlement agreement also recognize the continuing need to comply with all existing legal requirements, including CEQA, and to honor the lead agency principles identified in the Third District's decision in the Monterey Amendments case. (Agreement, Attachment C.)<br><br>These principles apply clearly to the proposed permanent transfers of the Table A amounts referenced in the state project contracts, which require DWR's approval and presuppose the | Please refer to the Master Response. The transfer guidelines referenced by the commenter are included in the Monterey Amendment Settlement Agreement and state that the State Water Project contractor, and not DWR, shall be the lead agency for a two party transfer such as this Project. (The two parties are CLWA, the transferee, and WRMWSD, a KCWA member agency.)<br><br>Because the Project could occur as a pre- or post-Monterey Amendment transfer, the non-Monterey Amendments analysis contained in the DEIR is precisely what the Court called for in the *PCL* case. The analysis addresses what supplies would have been available based on the "agriculture first" cutbacks under pre-Monterey article 18(a). (See DEIR section 3.15.2, including Table 3.15-15.) As DWR notes in its Comment 5, DWR would have provided this same analysis if it had been preparing the DEIR. The quote from the *PCL* case about the necessity for DWR lead agency expertise on statewide impacts of water transfers refers to a statewide program affecting all water transfers, not to an isolated contractor to contractor transfer as in this Project.<br><br>With respect to the issues of transferring water from agriculture to urban use raised by this comment, please refer to Responses to Comments 44 and 45.<br><br>The identity of the CLWA manager is not relevant to the adequacy of environmental review in this DEIR. |

| No. | Commenter | Comment | Response |
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| 64 (cont) | | application of Monterey. They also concededly require changes in the amount of supplies available to several water agencies, the "location and timing" of project deliveries, and changed utilization of the project's "conveyance and storage facilities." The transfers, which may require the fallowing of farmland in agricultural areas and are associated with proposed annexations linked to some of the more controversial development projects in California, demand the statewide authority and experience that only DWR can provide.<br><br>Neither the summary references to other project EIRs nor a hypothetical "non-Monterey" analysis of the transfers can substitute for DWR's new assessment of the Monterey changes based on its statewide expertise and authority. For example, although transfers with DWR approval were available under Article 41 of the pre-Monterey State Water Project contracts, it is highly speculative whether agriculture-to-urban transfers such as this proposal would even have taken place without the Monterey Amendments, since those Table A amounts would have been subject to "agriculture first" cutbacks under pre-Monterey article 18(a). Read in context, such maneuvers would amount to little more than "straw man" argument considered and rejected in the Friends appeal. (95 Cal.App.4th at p. 1387.)<br><br>Lastly, we note that the same General Manager of Central Coast Water Agency, Dan Masnada, under whose guidance, CCWA proceeded in violation of CEQA as the wrong lead agency, is now the general manager of Castaic Lake Water Agency. In that capacity, he is once again directing his agency with full knowledge of the consequences, to proceed as lead agency in violation of the law. | |

| No. | Commenter | Comment | Response |
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| 65 | Sierra Club | Communities, local organizations and agencies that would have the most knowledge of impacts surrounding these statewide issues, the accuracy of the environmental disclosure and the viability of proposed mitigation, were not notified. Failure to notice and receive input from interested parties deprives the decision-makers of a full disclosure of all impacts and deprives the affected community or public agency of its right to provide information during the public process. The DWR would be better equipped to ensure that all parties are properly noticed and involved in the project review. | Please refer to the Master Response. This comment provides no specifics and therefore no evidence that proper notice was not given. Please also refer to the responses to Comment 57 and to Attachment B of Volume II of the FEIR. |
| 66 | Sierra Club | This EIR purports to analysis statewide issues, including but not limited to, impacts to agricultural lands, sensitive species, the accuracy of the DWR CalSim model, air quality, etc., but since the EIR was not circulated on a statewide basis, the public and agencies from other areas may not have been informed of the release of the document, and thus did not have the opportunity to review its accuracy. | Please refer to the Master Response. CEQA does not require that an EIR that considers statewide issues have a state agency as its lead agency or give notice to all agencies that may have some interest in those issues. Please refer to the responses to Comments 53 and 57 and to Attachment B of Volume II of the FEIR. |
| 67 | Sierra Club | Impacts to DWR facilities – Castaic Lake Water Agency cannot presume to be the lead agency for State Water Project facilities. | Please refer to the Master Response. This Project does not impact all or even a majority of SWP facilities. The Project's potential impacts are primarily locale-specific, occurring primarily in Kern County (the sending site) and CLWA's service area (the receiving site), with a minor impact to a small portion of SWP facilities (from KCWA to CLWA).. |
| 68 | Sierra Club | Nor does it discuss the ability of the State Water Project facilities to accommodate this huge transfer now that the Metropolitan Water District will be requiring delivery of a greater amount, if not all of its Title A amount. Adequacy of facilities such as the Banks pumping station, effects of the ESA and CalFED Record of Decision, capacity in the San Luis Reservoir in light of recent sharing agreements are not discussed. | The vast majority of MWD deliveries proceed through the East Branch of the California Aqueduct, not the West Branch, through which CLWA receives its deliveries. (See DWR Bulletin 132-02, page 272-275 and 288. The tables on those pages show the large amount of MWD deliveries through the East Branch and show that West Branch deliveries are only at approximately one-half capacity) Amendment 18 to the CLWA SWP contract with DWR provides that DWR will modify the instantaneous rate of flow to CLWA through the West Branch from 99 to 150 cfs. That increase in instantaneous capacity will be more than sufficient to provide for the annualized increase in capacity shown as needed by CLWA for the Project on Exhibit A to Amendment 18. |

| No. | Commenter | Comment | Response |
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| 68 (cont) | Sierra Club | | Increased deliveries by MWD through the West Branch combined with increased deliveries to CLWA under the Project will not overtax the delivery system because the Castaic Lake reservoir has sufficient capacity to handle those deliveries. As the DEIR explains at pages 3.15-41 and 3.15-42:<br><br>"The amount of water stored at Castaic Lake would not be expected to change as a result of the Project. As discussed in section 3.15.1.2, Castaic Lake is the terminal reservoir on the West Branch of the California Aqueduct and is operated to help meet peak deliveries during the summer months for those SWP Contractors that receive deliveries from Castaic Lake and to provide an emergency water supply in case of a major supply system outage. Castaic Lake is also used for year-round recreational purposes. Under normal operations, the amount of storage that is withdrawn from Castaic Lake to make deliveries to Contractors over the summer (the amount withdrawn that exceed the amount delivered to the lake) is typically about 30,000 AF (or about 10 percent of the lake's volume). The amount of this storage withdrawal is small relative to total deliveries from the West Branch, which averaged about 403,000 AF from 1990 through 2000. In other words, most deliveries from the West Branch are conveyed through the California Aqueduct and Castaic Lake in about the same month the water is delivered to Contractors from the lake. In the future, DWR is expected to maintain this same general operation at Castaic Lake regardless of whether deliveries from the West Branch increase, and regardless of whether increased deliveries are due to Table A Amount transfers such as the Project." |
| 69 | Sierra Club | Impacts to Agricultural Resources – In a letter dates 5-19-98 from the Planning Department of Kern County to the original Notice of Preparation for this project, a request was made to ensure that the transfer of 130,000 acre feet from the Monterey Agreement was not exceeded. This Agency requested that acknowledgment of previous actions be made in the DEIR and that cumulative impacts of SWP capacity rights be analyzed. | Please find attached as Table A-4 in Attachment A of Volume II of the DEIR, a compilation of total transfers to date under the 130,000 acre-foot amount referenced in Article 53(a) of the Monterey Amendment. As Table A-4 demonstrates, this Project will not cause the amount of total transfers under that provision to exceed the 130,000 acre-foot amount. As noted in the Response to Comment 10, since the 1998 letter referenced |

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| 69 (cont) | Sierra Club | We would like to re-state that request for this document and include that letter which you have in your possession by reference into these comments. | by the comment, there have been other transfers outside of the 130,000 acre-foot provision of Article 53(a) pursuant to the Monterey Amendment. As noted in the Response to Comment 49, the present Project was intended by CLWA and KCWA to be included in the 130,000 acre feet of Table A Amount to be made available for transfer from agricultural to urban SWP contractors, but the Project could equally occur under Article 41 of the State Water Project contract without the Monterey Amendment in place. Any agricultural to urban transfers from areas listed in Article 53(a) in excess of 130,000 acre-feet will be processed pursuant to other provisions of the State Water Project contract.<br><br>Please refer to Comments 68 and 72 and the Responses thereto regarding SWP capacity. |
| 70 | Sierra Club | They also requested an analysis of the impacts on the land within the WRMWSD in Kern County including Agricultural Preserve Map 204, 220 and 220No. 4-12-19. Additionally, they requested a table showing "the ultimate potential amount of capacity that could be transferred how many acre feet would be converted to M&I allotment for urban users and as a condition of transfer, if any land in WRMWSD would be permanently fallowed, retired or detached from the District." This information is important because it allows the decision-makers to access the impacts that might be caused to agricultural land or the increase in pumping of groundwater that might be caused by this project. | The May 19, 1998 Kern County letter requests an analysis of Project impacts on the lands within the WRMWSD, including Williamson Act lands. DEIR Section 3.2.2.2.2 explains that because no new construction will occur, the Project will cause no direct losses of Important Farmland or conflicts with existing zoning or Williamson Act contracts. DEIR Section 3.2.2.2.2 also explains that the Project will not cause indirect impacts to agricultural resources within WRMWSD's service area. In years of average or greater than average SWP deliveries, water associated with the 41,000 AF Table A Amount would be in excess of WRMWSD's demands. In years of less than average SWP deliveries, WRMWSD water management actions, including participation in groundwater banking projects, will allow WRMWSD to provide other water resources within the district when SWP deliveries alone are not sufficient to meet demands. Table 3.2-3, which summarizes the change in acreage impacts on the WRMWSD land from 1998 to 2000, provides support for the Section 3.2.2.2.2 analysis. DEIR Section 3.2.1.2 also provides support for that analysis, by stating that there have been no agricultural zoning changes to WRMWSD lands that are part of the Project since 1998. As noted in DEIR Table 3.2-4 and Section 3.2.1.2, lands under |

| No. | Commenter | Comment | Response |
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| 70 (cont) | Sierra Club | | Williamson Act contracts in Kern County have increased since 1998.<br><br>The May 19, 1998 Kern County letter additionally requests analysis of the feasibility of the use of groundwater supplies and of the potential economic losses. DEIR Section 3.2.1.2 provides that analysis, noting that by the year 2001, WRMWSD had developed more than 88,000 acre feet of new annual supply, including groundwater and supplemental water from groundwater banking projects. As evidenced by the discussion in that section, the 1991 financial loss caused by the 1991 drought was reversed and/or offset by the subsequent acquisition of the new groundwater supplies and by the income generated from groundwater banking projects. Also, as noted in DEIR Section 3.2.2.2.2, the reduction in WRMWSD Table A Amount caused by this Project will help reduce financial costs and/or offset financial losses by reducing WRMWSD's share of fixed SWP costs. Alternative sources of water are available to the agricultural operations within WRMWSD's service area at lower overall costs than they would incur by retaining this Table A Amount. Thus agriculture is made more viable by reducing the overall cost of water and by transferring for value Table A Amounts no longer used by WRMWSD.<br><br>Finally, the May 19, 1998 Kern County letter requests disclosure of the ultimate potential amount of WRMWSD capacity that could be converted to urban use and the amount of fallowing required by WRMWSD for that to happen. DEIR Section 3.2.2.2 demonstrates that the Project will not cause fallowing or conversion or agricultural land to urban uses within WRMWSD. Fallowing will not occur in average or above-average water years, and prior WRMWSD diversification of water sources provides sufficient alternative water supply in the absence of the 41,000 Table A Amount so as to not require fallowing. DEIR Section 3.15.1.2 estimates that under favorable economic conditions, demands within the contract lands are |

| No. | Commenter | Comment | Response |
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| 70 (cont) | Sierra Club | | approximately 180,000 to 190,000 AF, and that demands will not increase because the suitable agricultural lands within the district are already in agricultural production. With regard to fallowing, DEIR Section 3.2.1.2 notes that fallowing of an annual average of 27,300 acres occurs regardless of the Project for economic reasons related to crop markets and prices and for agronomic reasons related to pests and disease. Under CEQA, the DEIR does not analyze fallowing or conversion of agricultural land to urban use because these are not foreseeable results of the Project. |
| 71 | Sierra Club | The EIR includes a report entitlement "Effects on Agricultural Production…etc." found in Appendix C. We note that this report, included for circulation in the DEIR is labeled as *DRAFT* report. We wonder why the Final Report was not included for circulation and request that CLWA state how they can base their assumptions on a draft report. | The final report has been substituted in place of the draft report. The final report is entirely consistent with the draft report. |
| 72 | Sierra Club | A chart found on page 15 of this report is apparently presented in response to the Kern Agency request. It appears to show water need already in excess of WRMWSD Title A amount even using 100% of the water entitlement, a situation that the Court has already found not to be tenable (see foot note 7, PCL v DWR, 2000). This chart is footnoted with the statement that it "Assumes supplies available regardless of source." There is no analysis as to whether this transfer will cause fallowing in future drought years, only the statement that it hasn't in the past. There is also no analysis as to whether overdraft is occurring or will occur in the next drought cycle, only a statement that the chart assumes supplies are available without any explanation of the impacts of over-pumping to make them available. There is no chart that shows how much water was used from what sources before the transfer in question and how much water will be needed and how it will be supplied *after the transfer*. | Please refer to Comment 70 and the Response thereto. The Table 4 chart found at page 15 of the DEIR Appendix C, referred to in the comment, does not show WRMWSD demand for SWP water in excess of WRMWSD's Table A Amount. Table 4 estimates the amount of water applied to various crops from various water sources, only one of which is SWP water. However, Table 4 overstates the amount of water applied to crops during limited SWP water supply years such as 1991. (See DEIR Appendix C, Page 14.) Table 4 reflects only actual SWP delivery amounts, not the WRMWSD Table A Amount. Therefore, Table 4 does not show WRMWSD demand in excess of WRMWSD's Table A Amount.<br><br>The DEIR provides adequate information to determine that fallowing will not result from the Project. (See DEIR Section 3.2.) As indicated by DEIR Section 3.15.1.2, WRMWSD has several sources of water supply available, including but not limited to groundwater, groundwater banking, and surplus water. DEIR Table 3.15-5 shows the total available supply, and that amount significantly exceeds in recent years the peak demand of 180,000 to 190,000 AFA as set forth in DEIR Section |

| No. | Commenter | Comment | Response |
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| 72 (cont) | Sierra Club | | 3.15.1.2. As explained in Section 3.15.1.2, demands within the district are not anticipated to materially increase in the future because the suitable agricultural lands within the district's service area already are in agricultural production.<br><br>As to overdraft, according to personal communication with W.Taube (WRMWSD General Manager), WRMWSD groundwater data and hydrographs indicate that since WRMWSD ceased use of the subject Table A Amount, groundwater levels have increased through time due to return flows from the importation of the current level of supplemental water deliveries, and there is no evidence of overdraft occurring in that portion of the Kern County Groundwater Basin in which WRMWSD is located.<br><br>As to the use of various water supply sources caused by the Project, DEIR Section 3.2.2.2.2 explains that prior WRMWSD diversification will allow WRMWSD to continue to provide surface water within the district when SWP deliveries alone are not sufficient to meet demands. Also, as DEIR Section 3.15.2.2 explains, at page 3.15-46, economic decisions made by farmers whether to use local groundwater in-lieu of using imported water are not dictated by the Project. As explained in DEIR Section 3.15.1.2, even if transferred water were needed, and groundwater pumping were the sole source of replacement, the potential environmental impact to WRMWSD would be less than significant, given the significant volume of water in storage and the trend of increasing groundwater levels. |
| 73 | Sierra Club | The original purpose of the state water project was to provide a supplementary water source so that groundwater would not be pumped in excess of sustainable levels. Now it appears that this water transfer will bring about the very situation one sought to avoid. We believe it is imperative that CLWA notify all interested parties in surrounding areas of their intention to make this transfer, and of the possible increased need for groundwater pumping if this transfer occurs. Because pumping of groundwater sources to replace state water | Please refer to Comments 70 and 72 and to the Responses thereto. The Project will not require increased groundwater pumping in WRMWSD or KCWA because there are sufficient alternative available water sources, as explained in DEIR Section 3.2.2.2.2. Assuming that the amount transferred were needed by WRMWSD and that groundwater were the only source, Section 3.15.1.2 notes that groundwater production of that amount would have a less than significant impact because there is a vast amount of groundwater in storage, which |

| No. | Commenter | Comment | Response |
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| 73 (cont) | Sierra Club | transferred to other areas will have significant impacts on the Public Trust and the vitality of farming operations, we reiterate, the DWR should be the lead agency for this document. | amount has been increasing since the transfer began, as indicated by groundwater levels.<br><br>The Project will not result in increased groundwater pumping in CLWA's service areas because the Project provides supplemental water to augment and firm up existing CLWA supplies. Please also refer to Comment 36 and the Response thereto.<br><br>The public trust doctrine does not apply to the State Water Project, to transfers of SWP water, or to groundwater. |
| 74 | Sierra Club | The closing paragraphs of this report include a rather chilling understatement; ***"In a series of consecutive 'dry years', the unavailability of a proportional share of the SWP contract amount may contribute to a mismatch between water supply and demand."***<br>Have farmers been notified of this "mismatch"? How much fallowing will this cause, what will be the economic impacts to farmers, laborers and communities? Isn't this exactly the question that everyone has requested that the EIR address? Where is the answer? Given the substantial move away from annual row crops into permanent orchards of fruits, nuts and vineyards that require multiple years of investment (see Table 2 on pg. 6), dry years with insufficient state water will substantially damage these crops. *One should also note the increase in groundwater pumping indicated by this table.* | The comment takes out of context the sentence contained at page 22 of DEIR Appendix C. The remainder of that paragraph explains: "However, the effect depends on the annual reliable supply and costs of the water from district wells and other supplemental sources. If the supplies from the supplemental sources offset the reduced SWP entitlement, there should be a limited effect on water availability. Overall, the water supplies from the supplemental sources more than offset the reduced SWP Entitlement and, when the carrying cost of holding excess SWP Entitlement is considered, at a lower cost." This language has been slightly reworded in the final NEA Report, without changing the substance. (See FEIR Volume II, Section 4.)<br><br>As set forth in the Response to Comment 72, WRMWSD has several different water supply options in a period of multiple dry years. Please also refer to the Response to Comment 70.<br><br>Also, as set forth in the Response to Comment 72, personal communication with W. Taube indicates that groundwater levels are increasing and there is no evidence of overdraft. |

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| 75 | Sierra Club | Flooding and water quality changes – In a letter dated May 21st 1998 also from the previous EIR review, the Ventura County Flood Control Department notes that the NOP correctly identifies downstream flooding from increased effluent flows as a potential significant impact. There should be a discussion of the potential for this impact in the DEIR for the project before you. | The referenced letter states: "The initial study correctly identifies flooding as an unknown potentially significant impact. Potential development in eastern Ventura County with additional water allotments could increase the need for additional flood control facilities." The potential for growth-related development to increase flooding is addressed in section 4.2.15 of the DEIR. Also note that the letter from the Ventura County Flood Control Department on the current EIR (included in Appendix A) states that "the District has no comments with respect to flood control and NPDES issues." |
| 76 | Sierra Club | Changes to water quality including increased chlorides, nitrates or other constituents of SWP project water, and how those constituents will affect the new TMDL requirements approved by Regional Water Quality Control Board approved subsequently to the previous EIR, should be discussed and mitigated. Increased pollution from Trihalomenthanes in public water supply due to higher percentage of reliance on SWP project water as main source should be disclosed. (See attached news article.) | Please refer to the Response to Comment 58. |
| 77 | Sierra Club | This document purports to address statewide issues, but fails to discuss the impacts of the Bay-Delta water quality standards on this project. Again, this is but another example of why DWR must be the lead agency. | These standards are included as part of DWRSIM, the model that was used to identify Project impacts. Please refer to section 1.1 of Appendix D, which includes a description of water quality criteria applicable to the SWP Delta pumping. As discussed in section 3.15.2.2, the Project would have an imperceptible or minor impact on the water quality of the Delta, and all changes would be within applicable quality standards and agreements. |
| 78 | Sierra Club | This document relies on transfers to the Semi-Topic Water Banking project for supply reliability, but does not address potential water quality issues that could preclude groundwater from being pumped back into the aqueduct. This transfer project is currently being litigated. | Please refer to the Response to Comment 59. |
| 79 | Sierra Club | Growth Impacts – In a letter dated May 12th, 1998 from the City of Santa Clarita, the City states that "the DEIR should define current and anticipated water availability for the CLWA service area as compared to the ultimate buildout of the City of Santa Clarita General Plan, and the Santa Clarita Valley Areawide | Information regarding the existing versus new population that could be served by the Project is summarized in DEIR Section 3-0. As noted, this is dependent upon the availability of SWP water, which can vary from year to year. The population that could be served by the Project is compared to relevant growth |

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| 79 (cont) | Sierra Club | Plan. This information was requested to clearly identify the need for the project, and should be included for the current project. The City's requests for disclosure in the areas of geology, growth inducement and impacts to Kern County groundwater and development monitoring system analysis should also be addressed for the current project. | projections in Section 5.3. The referenced letter from the City of Santa Clarita does not address impacts to Kern County. These issues were addressed in the DEIR, however, for both the CLWA and WRMWSD service areas. (The development monitoring system (DMS) is a list of proposed and approved projects that is maintained by the County of Los Angeles, and the analysis of cumulative impacts based on DMS projects is specific to the CLWA service area.) |
| 80 | Sierra Club | In response to this question, the CLWA relies, but pretends not to rely, in the Urban Water Management Plan that is being litigated. The issue under litigation is over-statement of water supply, particularly the reliance on the availability of polluted water from wells that are now closed because they exceed the MCL for ammonium perchlorate. The Sierra Club requests than an analysis of the impact of growth in a multiyear drought scenario in the Santa Clarita Valley be conducted as part of this EIR. Santa Clarita is now relying on state water as its primary source of supply (since the groundwater is either fully committed or polluted –see attachment). We believe it would be particularly important for decision makers to understand the impacts of the recurrence of the historical SWP worst-case scenario when only 13% of the contractors' Title A amounts were available. (See notes attached from presentation to Santa Clarita City Council, June 29, 2004. Transcript to be provided before Final EIR is released.) | Please refer to Response to Comment 24. The DEIR does not tier off nor rely on the UWMP for any information, including information regarding estimates of water supply, water use, water demand, or water supply reliability. DEIR Section 3.15.1.3 provides a discussion of the studies that were relied upon for its information. As a review of pages 3.15-19, 3.15-20 and 3.15-26, 3.15-27 and 3.15-28, the DEIR's analysis of the perchlorate issue is based on recent studies and reports, not the UWMP. As stated in DEIR Section 5.6, "Although information in the UWMP was considered in the analysis for the Project, an independent analysis and determination of environmental impacts was carried out for the Project."<br><br>The analysis requested in the comment was performed in the DEIR (refer to section 3-0, "Population and Housing Impacts, Allocation of Project Water to Existing and Future Users;" section 3.10.2.2.3; and section 4.2). Three scenarios were identified, including a multiple dry year period (this supply is the average amount of water available over the four consecutive drought years of 1988 through 1991 based on DWRSIM model results). The single dry year supply is the supply available in the single year with the lowest total SWP deliveries based on DWRSIM model results, which occurred in 1977. In this single dry year, the supply was about 22% of Table A Amounts, and the increase in SWP supply due to the Project was estimated to be 9,200 acre-feet. If instead the supply in a single year were 13% of Table A Amounts, then the increase in supply due to the Project would be reduced to 5,300 acre-feet. Any environmental impacts based on this lower |

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| 80 (cont) | Sierra Club | | supply amount would be less than those described in the DEIR. Use of the 22% supply amount results in analysis of the worst-case environmental impact assessment scenario. |
| 81 | Sierra Club | Sensitive species – The current project is based on an EIR that does not address impacts to endangered species as a result of the entitlement transfer. Draw down of groundwater will result in reduction or elimination of surface water and may occur in both the transferring and receiving agencies (during drought periods when state water is unavailable) as a result of this project. Since species issues were not addressed in the Warm Springs/Maricopa/Belridge EIR, they should be addressed for the proposed project, as its implementation would cause significant impacts. These include impacts to endangered species impacted in both areas including but not limited to the San Joaquin Kit Fox in the WRMWSD and the Unarmored Three-Spine Stickleback in the Castaic Lake Water Agency. The Kit fox could be impacted by draw down of groundwater that impacts surface flows or diversion of surface flows required by lack of state water project supplies. The Stickleback could be affected by increased effluent flows that cause a change in surface water quality (this problem has already been identified as an area of concern by the Regional Water Quality Board) or increased pumping of groundwater required to make up for delivery cutbacks during a drought. Impacts and proposed mitigations should be discussed. We note that a section 4d consultation may be required if endangered species will be affected and request that the US Army Corps of Engineers be sent notification of this project since it appears that they have not been so notified. | The comment that the current project is based on an EIR that does not address impacts to endangered species as a result of the entitlement transfer analysis is not correct. The Supplemental Water Project EIR is a stand-alone document and is not based on any other EIR. Impacts to special status species are addressed in section 3.4, Biological Resources. No mitigation measures are identified, because no significant impacts would occur. Section 4d of the Endangered Species Act is not applicable to this project, because no impacts to threatened species would occur. A copy of the DEIR was sent to the Ventura Office of the U.S. Army Corps of Engineers (refer to Attachment B of Volume II of the FEIR), but no comments were received from that agency. |
| 82 | Sierra Club | The EIR includes a list of sensitive species in Appendix B, but does not discuss how these species will be affected when substantial over-draft occurs, either due to over-reliance on this SWP water in the Santa Clarita Valley without sufficient back up sources or over-draft in the farming areas due to transferring away to much of their supplemental SWP water supply. | Please refer to the Responses to Comments 36 and 72 for a discussion about groundwater supply. This Project is not a groundwater project. The Project augments CLWA's groundwater supply and will not result in groundwater draw down in the WRMWSD service area. Please refer to the Response to Comment 58 regarding the quality of water provided by CLWA to its purveyors. The comment presents no evidence of a groundwater drawdown that could significantly |

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| 82 (cont) | Sierra Club | | impact sensitive species.<br><br>The DEIR analyzes impacts to groundwater and concludes that impacts to the CLWA service area would be beneficial and that impacts to WRMWSD would be less than significant (refer to section 3.15.2). The comment fails to provide factual evidence to support the presumption that overdraft or significant drawdown will occur in either the CLWA or WRMWSD service areas as a result of the Project. Consequently, these comments cannot constitute sufficient evidence of a significant effect upon the environment under Public Resources Code section 21082.2(c). (See Citizen Action To Serve All Students v. Thornley (1990) 222 Cal.App.3d 748 [speculation and generalizations about traffic, parking, economic effects, and earthquake safety did not constitute substantial evidence].) |
| 83 | Sierra Club | Further, it has recently come to our attention that Berrenda Mesa has published a draft EIR to withdraw/divert approximately 70,000 AF from local streams and groundwater sources. Since the transfer of SWP surface water will affect ground water pumping sources, this EIR and its impacts must be included and addressed during the water transfer review process. We therefore believe this document must be included in the review process and incorporate it by reference. | Any withdrawal of water proposed by Berrenda Mesa would be a separate project not connected to this EIR or any other CLWA program, nor would it affect the same environmental resources as the Project evaluated in the present EIR. The service areas of Berrenda Mesa and WRMWSD are approximately 50 miles apart, and the service areas of Berrenda Mesa and CLWA are approximately 150 miles apart. |
| 84 | Sierra Club | Air Quality – The effect of the project on increasing particulate matter from increased or overdraft use of groundwater in a PM10 non-attainment zone for this air pollution problem should also be addressed. THE EIR only addressed project specific impacts such as pumping facilities and grading for new pipes. It did not address fugitive dust created by dried up landscapes. CLWA is well aware of the problems created by dust due to draw down of Owens Lake and its impact on surrounding communities because one of its Directors helped negotiate the settlement on behalf of LADWP. This is an example of an impact that must be anticipated in both the transferring farmlands and the receiving Santa Clarita area. Santa Clarita is already in a non-attainment zone for PM10s as is the Central Valley. Clean Air Act compliance will be | The potential for fugitive dust emissions to occur due to changes in agricultural practices is considered in section 3.3.2.2.2. Since no changes in agricultural practices would occur, fugitive dust emissions would not increase. A reduction in water supply causing air quality concerns would not occur. Direct air quality impacts in the CLWA service area are addressed in section 3.3.3.3.4. Indirect impacts resulting from induced growth are addressed in section 4.2.3, and it is concluded that impacts may not be mitigable to less than significant. As addressed in the Responses to Comments 70 and 72 and in portions of the DEIR cited therein, the Project will not directly or indirectly cause drawdown or overdraft that might increase fugitive dust. |

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| 84 (cont) | Sierra Club | necessary. A cut-back in water supply caused by air quality concerns as already occurred for the LA Dept. of Water and Power in the Owens Valley, would be much more appropriately dealt with in the planning process than after new building is already approved based on that water. | |
| 85 | Sierra Club | State Water Reliability – One of the most apparent reasons that the review must await completion of the Monterey "Plus" environmental review is that a new hydrological model "CalSim II" is being proposed for use in evaluating the reliability of water deliveries of the sate project supply. This information is obviously critical to all the above stated issues. There has been substantial criticism of the model (peer review attached). Among other circumstances, the model does not address climate change or levee breaks such as the substantial recent failure in the Jones tract (news article attached). The DWR must complete its environmental review of this issue and resolve discrepancies before reliability factors on which the Castaic EIR is based, can be assumed to be accepted. Again, tiering is based on a DWR document that has not been circulated for review, has not been through the public comment process and has not been certified. | Please refer to the Response to Comment 25 for a discussion of the use of models in the DEIR. Refer to the Master Response for further discussion regarding the comments that the Supplemental Water Project EIR must await completion of the Monterey Plus EIR. Also, please note that this EIR does not tier from the Monterey Plus or any other EIR. It is a stand-alone, project EIR. |
| 86 | Sierra Club | We believe that DWR must be the lead agency for the following reasons:<br>▪ The published appellate decision in PCL v. DWR, 2000 stated: *"We agree with the trial court that DWR, not CCWA, has the statutory duty of assessing environmental consequences of projects involving the SWP* [State Water Project]." (Pg. 1 of Decision). We incorporate this decision by reference into the administrative record.<br>▪ DWR is best suited to ensure that widespread notification of interested parties occur.<br>▪ DWR is best suited to recognize environmental impacts that might be incurred to a wide spread area of the state as a result of this water transfer and to properly asses such impacts.<br>▪ DWR, in its capacity as operations manager of the SWP, will be acquainted with other state projects that would | Please refer to the Master Response and to Comments 2, 3, 4, 5, 6, 53 and 57 and the Responses thereto. The *PCL* case cited in this comment involves a program EIR analyzing the impacts of a major amendment to the SWP contracts statewide, alterations to the operation of the State Water Project, and the state's transfer of the Kern Fan Element property. For all of those reasons, the court in *PCL* held that DWR must be the lead agency for the Monterey Amendments Program EIR. This Project is a transfer of Table A Amount from WRMWSD, through KCWA, to CLWA. The Project does not encompass all or even a major part of the various provisions of the Monterey Amendment, does not impact a substantial part of the SWP facilities, and does not interfere with or preempt the Monterey Amendment DEIR process. CLWA has consulted DWR, as a responsible agency, in the preparation of the Project DEIR. |

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| 86 (cont) | Sierra Club | affect or be affected by this transfer.<br>▪ CLWA failed to address many issues of statewide concern in this document. | |
| 87 | Sierra Club | We therefore request that this document be withdrawn, that the document not be re-submitted for circulation until the Monterey Agreement EIR is completed and certified, and that all parties whose groundwater may be impacted are properly notified when re-circulation occurs. | Please refer to the Master Response. |
| 88 | TCW | It is our understanding that this environmental document is being re-circulated by Court Order because the program EIR on which it was based was set aside in the decision PCL v. DWR, 2000. In that decision the Court found that an individual contractor (Central Coast Water Agency) could not be the lead agency for a state wide project that had impacts to a wide geographical and social group of people. The decision found that the Department of Water Resources should be the correct lead agency. We would like to express our dismay that your agency is now proceeding once again in a manner contrary to law by circulating this document as the lead agency and before the Monterey Agreement EIR has been completed. We note that the same General Manager of Central Coast Water Agency, Dan Masnada, that was found to be in violation of CEQA for proceeding as the wrong lead agency, is now the general manager of Castaic Lake Water Agency. In that capacity, he is once again directing his agency to proceed as lead agency in violation of the law.<br><br>We believe that the Department of Water Resources must be the lead agency for the discussion of the statewide impacts of water transfers for the following reasons:<br>1. The published appellate decision in PCL v. DWR, 2000 stated "We agree with the trial court that DWR, not CCWA, has the statutory duty of assessing environmental consequences of projects involving the SWP [State Water Project]." (Pg. 1 of decision). We incorporate this decision by reference into the administrative record.<br>2. DWR is best suited to ensure that widespread | Please refer to the Master Response and to Comments 57 and 86 and the Responses thereto. The comment incorrectly states that this DEIR is a re-circulation of the prior EIR for this Project. The trial court in *Friends I* set aside the certification of that prior EIR and ordered that CLWA certify a new EIR that complies with CEQA and is consistent with the view expressed by the Court of Appeal in *Friends I*. This DEIR is the environmental document prepared in response to the trial court's order. The identity of the lead agency's manager is irrelevant to the adequacy of the DEIR. |

| No. | Commenter | Comment | Response |
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| 88 (cont) | TCW | notification of interested parties occur.<br>3. DWR is best suited to recognize environmental impacts that might be incurred to a wide spread area of the state as a result of this water transfer and to properly asses such impacts.<br>4. DWR, in its capacity as operations manager of the SWP, will be acquainted with other state projects that would affect or be affected by this transfer. | |
| 89 | TCW | Many anomalies in the CEQA process have already occurred because the general Manager of Castaic Lake Water Agency has chosen to proceed contrary to law and to the published appellate court decision in a case to which he was a party. This includes the fact that they were not notified of the circulation of this draft EIR, nor were others in water districts including Berenda Mesa and in other areas statewide. | Please refer to the Master Response and to Attachment B of Volume II of the FEIR and to Comment 57 and the Response thereto. The Project's potential environmental impacts primarily occur in Kern County and CLWA's service area. The DEIR also analyzes potential impacts to SWP facilities. The Project effects will occur in limited areas, not statewide. CEQA does not require notice to unaffected areas.. |
| 90 | TCW | Further, it has recently come to our attention that Berenda Mesa has published a draft EIR to withdraw/divert approximately 70,000 AF from local streams and groundwater sources. Since the transfer of SWP surface water will affect groundwater pumping sources, this EIR and its impacts must be included and addressed during the water transfer review process. We therefore believe this document must be included in the review process and incorporate it by reference. | Please refer to the Response to Comment 83. |
| 91 | TCW | The original purpose of the state water project was to provide a supplementary water source so that groundwater would not be pumped in excess of sustainable levels. Now it appears that this water transfer will bring about the very situation one sought to avoid. We believe it is imperative that CLWA notify all interested parties in Berenda Mesa and other areas proposing increased groundwater pumping, of their intention to make this transfer, because pumping of groundwater sources to replace state water transferred to other areas will have significant impacts on the Public Trust and the viability of farming operations. | Please refer to the Response to Comment 73. |

| No. | Commenter | Comment | Response |
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| 92 | TCW | Such impacts to groundwater that affect both public trust surface flows and water for farming, should be addressed in the program EIR. It is therefore improper for CLWA to proceed before the completion of the Monterey Agreement EIR. | Impacts to groundwater, surface water, and agricultural resources are addressed in the DEIR (sections 3.2 and 3.15). Please refer to the Master Response and to Comments 2, 72 and 73 and the Responses thereto. |
| 93 | TCW | In conclusion we request that this document be withdrawn, that the document not be re-submitted for circulation until the Monterey agreement EIR is completed and certified and that all parties whose groundwater may be impacted are properly notified when re-circulation occurs. | Please refer to the Master Response and to Comments 73, 91 and 92 and the Responses thereto. |
| 94 | UWCD | United Water Conservation District has reviewed the Draft EIR for the proposed transfer of 41,000 acre-feet of State Water Project Table A Amount water from the Kern County Water Agency's member unit Wheeler Ridge-Maricopa Water Storage District to Castaic Lake Water Agency. This proposed transfer of SWP water is beneficial to the Santa Clara River Watershed and is fully endorsed by United Water. | This comment is noted; no text revisions are required. |
| 95 | UWCD | The permanent transfer of 41,000 acre-feet of SWP water to the Castaic Lake Water Agency provides a valuable additional source of water for the Santa Clarita Valley. This additional water improves the potential for conjunctive-use of water within the valley. This is especially important given the urbanization of this area. Increased surface water supplies should provide water managers throughout the basin more flexibility with respect to the magnitude of additional groundwater pumping needed to meet the escalating M&I demand for water within the basin. | This comment is noted; no text revisions are required. |
| 96 | UWCD | Although discussed in various sections within the Draft EIR it should be reemphasized here that 41,000 acre-feet of SWP Table A Amount water doesn't guarantee this amount can be delivered every year. Hydrologic conditions and storage carryover in any particular year primarily dictate the annual allocation of water to the S WP Contractors. Historic deliveries to M&I Contractors should not be used to project future deliveries. The adoption of the Monterey Amendment (following the principles of the Monterey Agreement) will require that M&I Contractors and Agricultural Contractors more equitably share the pain of future water shortages. | This comment is noted; no text revisions are required. |

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| 96 (cont) | UWCD | During the previous drought, allocations, as a percentage of table A Amount (Entitlement), to Agriculture contractors were significantly less than allocations to the M&I Contractors. | |
| 97 | UWCD | As an ongoing general comment to all water purveyors within the Santa Clarita Valley, United Water has a very real interest in the continued health of the Santa Clarita Groundwater Basin and the flow of the Santa Clara River. United Water represents the collective interests of downstream residents that depend on the flow of the Santa Clara River for recharge to groundwater, surface water diversions and environmental mandates. United Water's goal is that the quantity and water quality associated with the flow of the Santa Clara River into Ventura County not be diminished. The development and implementation of the inter-Agency regional monitoring program of groundwater levels, groundwater quality, surface water flows, and surface water quality should provide ongoing data with respect to the relative health of the Santa Clarita and downstream basins as well as surface water. In the event that surface water flow into Ventura County is diminished in either quantity or quality, and can be reasonably linked to over pumping of the aquifer systems and/or surface water discharges to the river within Santa Clarita Valley, United Water would seek to remedy the problem. | This comment is noted; no text revisions are required. |
| 98 | Sjovold | Please accept these comments with the attachments in opposition to the proposed transfer. Besides being an arrogation of power by CLWA unto itself, it flies in the face of the present process at the State level to properly assess the environmental impacts of the Monterey Amendments as mandated by the Court of Appeals. What is particularly troubling is the adoption of material developed by DWR on SWP reliability which is demonstrably in-correct. As a member of the plaintiff committee presently engaged with DWR to fashion a new Monterey EIR, I am quite aware of the issues involved with the CALSIM II model, which is the model used to generate the incorrect information on SWP reliability. The attached analysis shows why the reliability information is incorrect and argues that until the CALSIM II model can | Please refer to the Master Response and to Comments 2 through 6 and 25 and the Responses thereto. The Project does not encompass the Monterey Amendment and does not interfere with or preempt the Monterey Amendment DEIR process. CLWA has consulted DWR, as a responsible agency, in the preparation of the Project DEIR.<br><br>The analysis attached to the comment refers to the CALSIM II model, with the principal criticism that it overstates deliveries if applied to the last several years. The DEIR used CALSIM II results only in estimating SWP supplies for the current environmental setting. All other SWP supply analyses in the DEIR (i.e., for both the 1998 environmental setting and the environmental impact analyses) used DWRSIM model studies. |

| No. | Commenter | Comment | Response |
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| 98 (cont) | Sjovold | correct its fundamental deficiencies it cannot be relied upon. Without this model's results the CLWA EIR is without any foundation for the claims made concerning the reliability of supplies that CLWA attaches to the SWP. In fact, one can make the argument on the same basis that present CLWA SWP supplies are already overtaxed. | The analysis attached to the comment fails to identify any defect in these DWRSIM model studies used in this DEIR. As set forth in the Responses to Comments 4 and 25, the DWRSIM model studies provided the best estimates of SWP supply reliability that were available when the DEIR supply analyses were conducted, and are consistent with the 1998 environmental setting used in this EIR. Also, as set forth in the Response to Comment 4, the DWRSIM model SWP delivery reliability results were slightly higher than delivery reliability results from the CALSIM II studies that subsequently became available in the DWR SWP Delivery Reliability Report. Therefore, from an environmental impact assessment standpoint, the DEIR analyzed the worst-case scenario, i.e., the scenario that would result in greater direct and indirect impacts in both the CLWA and WRMWSD service areas. |
| 99 | Swans | It has come to our attention the Castaic Lake Water Agency is possible planning to affect a position on the above captioned matter which, in our opinion, will gravely impact the Monterey Agreement EIR process.<br><br>We also wish to comment that we see a direct conflict of interest and possible injustice to the public and interference with the CEQA process by your agency's spearheading any effort to circumvent, delay, interfere, or otherwise impede the more appropriate participation of the Department of Water Resources, the agency we believe entitled to administrate on behalf of the general public of the State of California in this matter.<br>We, the below listed voters and community members raise our voices in writing in complete objection to any and all interference by the Castaic Lake Water Agency and formally request the immediate withdrawal of any and all past, present or future water transfer documents until the EIR is complete. Furthermore, we wish to be added to the list of mailings for any matters regarding this subject. | Please refer to the Master Response and to Comments 2 through 6 and the Responses thereto. Beyond those responses, CLWA is unable to respond to the comment because the comment fails to note in what manner the commenter believes that the DEIR will "gravely impact" the Monterey Amendment DEIR preparation process and fails to explain in what manner the DEIR or CLWA actions "circumvent, delay, interfere or otherwise impede" DWR participation. The commenter has been added to the mailing list for this EIR. |

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| 100 | Churchill | Water transfers are a statewide issue that induce growth and reduce water for farming. Therefore I believe that your agency is the wrong lead agency for this project; I believe the correct lead agency is the Department of Water Resources, which is both indicated and qualified under state law to address statewide impacts. DWR will also notify all interested parties to the extent of their knowledge.<br><br>If such a major transfer is allowed to proceed under the lead agency status of a small regional water agency, it will set a precedent that will affect many major water decisions throughout the state of California. I believe it is imperative that such a major change in state policy receive full environmental review and comments from all affected parties. I therefore request that this project be re-noticed by the Dept. of Water Resources acting as lead agency as a project of statewide concern so that all impacts may be disclosed and properly addressed. | Please refer the Master Response and to Comments 53, 54, 70 and 72 and the Responses thereto. The *PCL* decision concluded that DWR was the proper lead agency for a project that impacted SWP facilities and operations statewide, amendment of the SWP contracts statewide, and disposition of state-owned land. The commenter fails to explain how the Project will "set a precedent that will affect many major water decisions throughout the state of California." As explained in more detail in the Responses to Comments 70 and 72 and in the DEIR sections cited therein, the Project will not reduce water available for farming. As noted in the Responses to Comments 10 and 69, this Project is only one of the many recent permanent transfers of Table A Amounts. This Project sets no precedent. The commenter also suggests that the Project represents a major change in state policy. In so doing, the commenter appears to confuse the Monterey Amendment, which does represent a major change in state policy, with the Project, which is a simple transfer of Table A Amount that could occur with or without the Monterey Amendment. |
| 101 | Volker | On behalf of California Water Impact Network and Friends of the Santa Clara River, we wish to incorporate by reference the comments submitted on the above DEIR by the Sierra Club. We wish to emphasize, in particular, that Castaic Lake Water Agency is not the correct "lead agency" for this project under the California Environmental Quality Act. As the Third District Court of Appeal made clear in *Planning and Conservation League v. Department of Water Resources*, 83 Cal.App.4th 892, 920 (2000), "DWR, with its expertise on the statewide impacts of water transfers, " is the proper lead agency under CEQA for decisions regarding transfers of State Water Project water between SWP water contractors.<br>We also wish to incorporate by reference our Opening Trial Memorandum (filed August 21, 2003) and Reply Trial Brief (filed May 3, 204) in the matter *California Water Network and Friends of the Santa Clara River v. Castaic Lake Water Agency*, Ventura Superior Court No. 215327. These memoranda point out the importance of recognizing DWR's lead agency status | Please refer to the Master Response. The *PCL* case cited in this comment involves a program EIR analyzing the impacts of a major amendment to the SWP contracts statewide, alterations to the operation of the State Water Project, and the state's transfer of the Kern Fan Element property. For all of those reasons, the court in *PCL* held that DWR must be the lead agency for the Monterey Amendments Program EIR. This Project is a transfer of Table A Amount from one State Water Project contractor to another. DWR and the petitioners in the *PCL* case all acknowledged in the Monterey Amendment Settlement Agreement, Attachment D, Paragraph 4, that a single contractor-to-contractor transfer is not the same as a program that facilitates transfers statewide. The language regarding transfers quoted from the *PCL* case is taken out of context and is inapplicable to a transfer between two contractors as contemplated by this Project.<br><br>With respect to the unspecified arguments contained in the trial |

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| 101 (cont) | Volker | regarding transfers of State Water Project water. | briefs in the case of *California Water Network and Friends of the Santa Clara River v. Castaic Lake Water Agency* [*Network*] Ventura Superior Court No. 215327, the ruling of the Superior Court in that case held:<br>"Petitioners argue that the Department of Water Resources should be the lead agency and cite the court to *Planning and Conservation League v. Dept. of Water Resources*, 83 Cal.App.4th 892. The fact present here are sufficiently different from those present in *PCL* to make the finding in that case that the DWR was the lead agency inapplicable here. *PCL* involved the Monterey Agreement and the resolution of conflict between urban and agricultural allocations of water during times of shortage. The agreement was statewide in its scope and involved 29 agencies. The present circumstance is local in its character and involves the DWR in a much more passive and secondary role. The present project does not involve either a substantial restructuring of the distribution of water, [n]or does it involve water throughout the state. It does involve a diversion of Castaic's water to a water bank, and the subsequent withdrawal of that water. Castaic is the agency most deeply involved in the planning, and execution of this project. It is the appropriate lead agency as described in *PCL*, Public Resources Code section 21067, and 14 CCR 15051(a). DWR is involved, and is a responsible agency, but it is not the lead agency for the project." (Ruling, page 2, line 28 through page 3, line 18.). |
| 102 | PM (Plambeck) | I'd just like to express my concern that this EIR is proceeding without completion of the Monterey Agreement. I think the court was fairly concise about the need for the programmatic EIR in both legal decision…. | Please refer to the Master Response. |
| 103 | PM (Plambeck) | …very concerned about the lead agency, and Castaic Lake Water Agency is not the right lead agency. | Please refer to the Master Response and to Comments 53 and 54 and the Responses thereto. |
| 104 | PM (Plambeck) | It was my understanding prior to this that the two EIRs were moving forward in tandem and they would be completed simultaneously. | Please refer to the Master Response. |

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| 105 | PM (Plambeck) | And I just think that – that the folks up north that challenged the EIR will probably continue to challenge the EIR and that they're going to be very concerned that this is proceeding in a manner that's not consistent with an appellate court decision that they won, and that means that even though you know that's there and you're going ahead and doing this anyway, and it sort of seems like a waste of taxpayer's money since there's already a published appellate court decision on it. And so I would just ask you to keep that in mind and that it might be the better part of valor to move the two EIRs forward in tandem as I understood had been originally planned. | Please refer to the Master Response. Please also refer to the responses to Comments 31, 46 through 48. |
| 106 | PM (Bertoni) | First, I'd like to thank the board for providing us this opportunity to comment on the project, on the EIR. You have extended the public comment period beyond the normal 45 days to 60 days. You have also held the public hearing during your comment period, which is not required under CEQA, so you've gone above what's the minimum under CEQA and the City appreciates that and also appreciates being provided with all the documentation very quickly and promptly throughout the whole process. So first off, we'd like to thank you for that. | This comment is noted; no text revisions are required. |
| 107 | PM (Bertoni) | Second off, I noticed that by sharing on EIR for water transfer, it's not really the water transfer itself. In regards to the water transfer, I would just say that as we reviewed the EIR it appears that this EIR was prepared for water transfer that would allow to you a few things. One of them would be to provide more reliability in the existing water supply. The other would be to allow for growth that's already been anticipated under existing general plans for both of the City of Santa Clarita and the County of Los Angeles.<br>So to that extent, the City is supportive of that. The City has always been supportive of additional water reliability and also to make sure that as well plan for our future growth, we will have water supplied for that.<br>This city has a couple very high-profile projects that it is very important to the City and the point being the City to have adequate water supply for that.<br>As you know, we're very – a housing rich city. We are trying to | This comment is noted; no text revisions are required. |

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| 107 (cont) | PM (Bertoni) | balance that out to be as equally jobs rich and so things such as our employments such as the Center Point Business Park to the south of you or the Gate (inaudible) project in Newhall are very important for the City, very important for the City's goals.<br>So to the extent that this would provide water for that, that's an important City goal. Also, things such as the redevelopment of downtown Newhall and that revitalization would require some additional water. So the supply part of it, the City is supportive of that additional reliability of water supply. | |
| 108 | PM (Bertoni) | We reviewed the EIR at the City and we reviewed it under the – to see if it adequately addressed the potential environmental impact to the City of Santa Clarita, and our review indicated that it has. So at this time we have no comment on the EIR and would happy to answer any questions. Thank you. | This comment is noted; no text revisions are required. |
| 109 | PM (Wisehart) | The United Water Conservation District has reviewed the draft EIR for the purpose – for the proposed transfer of 41,000 acre-feet of state project water that will come from the Kern County Water Agency's member unit Wheeler Ridge-0Maricopy Water Storage District to the Castaic Lake Water Agency. This proposed transfer of State Water Project water is beneficial to the Santa Clara River Watershed and is fully endorsed by United Water. | This comment is noted; no text revisions are required. |
| 110 | PM (Wisehart) | The permanent transfer of 41,000 acre-feet of State Water Project water to the Castaic Lake Water Agency provides a valuable additional source of water for the Santa Clarita Valley. This additional water improves the potential for conjunctive use of water within the valley. This is especially important given the urbanization of this area. Increased surface water supplies should provide water managers throughout the basin more flexibility with respect to the magnitude of additional groundwater pumping needed to meet the escalating M&I demand for water within the basin.<br>As an ongoing general comment to all water purveyors within the Santa Clarita Valley, United Water has a very real interest in the continued health of the Santa Clarita groundwater basin and the flow of the Santa Clara River. United Water represents the collective interests of downstream residents that depend on | This comment is noted; no text revisions are required. |

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| 110 (cont) | PM (Wisehart) | the flow of the Santa Clara River for recharge to groundwater, surface water diversions, and environmental mandates. | |
| 111 | PM (Wisehart) | United Water's goal is that the quantity and quality of water associated with the flow of the Santa Clara River into Ventura County not be diminished. The development and implementation of the inter-agency regional monitoring program of groundwater levels, groundwater quality, surface water flows, and surface water quality – and you know I am talking about the MOU agreement that we all signed with your upstream purveyors – should provide ongoing data with respect to the relative health of the Santa Clarita and downstream basins as well as surface water.<br>In the event that surface water flow into Ventura County is diminished in either quantity or quality and can be reasonably linked to over pumping of the aquifer system and/or surface water discharges to the river within the Santa Clarita Valley, United Water would seek to remedy the problem. | This comment is noted; no text revisions are required. |
| 112 | PM (Wisehart) | We appreciate the efforts of the Castaic Lake Water Agency to appropriately plan and augment the water supplies of our watershed as represented by this water transfer project. | This comment is noted; no text revisions are required. |
| 113 | PM (Dunn) | When talking to DWR and asking how that happened, because this agency used to have originally a 23,000 acre-feet per year allocation from the state, that the state DWR would transfer and transport to Castaic Lake for Castaic Lake Water Agency, but DWR also had allocations from many farmers and other water users in the San Joaquin Valley. DWR said that those allocations the CLWA had been subsequently purchasing were designed to take turn-outs in the San Joaquin Valley, and those acre-feet were to get off in the San Joaquin Valley.<br><br>In other words, they were telling me that the Tehachapi pumping station and the aqueduct, that is I guess mostly owned for use by the Metropolitan Water District, was not designed to transport those farmers' allocations here.<br><br>So I have asked when I was on the agency and I have asked as a public comment when I'm not on the agency what contracts | Please refer to Response to Comment 68. The vast majority of MWD deliveries proceed through the East Branch of the California Aqueduct, not the West Branch, through which Castaic receives its deliveries. Amendment 18 to the CLWA SWP contract with DWR provides that DWR will modify the instantaneous rate of flow to CLWA through the West Branch from 99 to 150 cfs. That increase in instantaneous capacity will be more than sufficient to provide for the annualized increase in capacity shown as needed by CLWA for the transfer on Exhibit A to Amendment 18. |

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| 113 (cont) | PM (Dunn) | do you have with Metropolitan Water District or DWR that says you can transport that water that you are purchasing, those additional purchases here? Doesn't matter is you've banked them up there. Some day you will want to transport them here, and I am told there are no such contracts.<br>We know now that since the Arizona and those people re cutting off MWD's allocations by way of Colorado River, MWD not has to rely more heavily on the DWR an their allocation in this aqueduct and the capacity in the aqueduct. Many unaware, even in our community, that Castaic Lake Water Agency only has 5,000 acre-foot of storage in the Castaic Lake, Many think we've got a real good reservoir here, and we'll really high and dry.<br>And so with the demand that MWD is going to have on the aqueduct now more so demand 'cause you can't get it from the Colorado River, and with the drought situations, and this agency has no contracts that they can transfer those additional allocations here, and I heard nothing in the words tonight just like it was going to be transferred. Nothing was in the Urban Water Management Plan It kind of scares me that we're going to sit here in the drought situation and MWD is going to need their full capacity of Castaic Lake and their full capacity of the state aqueduct, and all this water you purchased you can't bring here. I would like to see that addressed in the EIRs. I would like to see that addressed in the urban water management plans that you can bring this water here. | |
| 114 | PM (Mankin) | There is no issue more important in the future of this community than the availability of water. Having available water impacts almost every segment of this community business and consumer marketplace. It's about, again, as all of you know, it's about having local agency being aggressive in the way they find and bring new water into the valley, and most importantly, it's about the economic future of the Santa Clarita Valley.<br><br>My job as president of the Chamber achieved spokesman of the business community is twofold. First, I work with companies | This comment is noted; no text revisions are required. |

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| 114 (cont) | PM (Mankin) | from outside of this market and try to encourage them to locate their company or business here. I am heavily involved in business recruitment. Second, and probably more important, I am actively involved with working with local companies to assure that they have the right kind of political, economic, and physical infrastructure in place to make it possible for them to grow their respective businesses. Regional economic analysts have predicted – and I heard this at a meeting this spring – they predicted that we will generate some 4,700 new jobs here in the valley this year alone. I suspect we're ahead of that pace already. In looking at specific projects, one project, Center Point Business Park which is now under construction will generate an estimate – estimated 8,000 new jobs over the next few years. Many other such project area either now on the books nor have actually started development. There is no issue more important to as many of these companies than knowing that one, two or ten ears from now they can turn on a water facet and actually have water flow out of it. The issue you are discussing this evening will provide these companies with some sense of security that water, in fact, can and will e available to them during times of drought. I highly encourage you to continue to make the necessary decisions that can and will make these new water resources available to both our existing business community and to those businesses that will soon call us home in the future. | |
| 115 | PM (Donlon) | BIA is pleased to see that CLWA has produced a new EIR for the litigation pending on the transaction which can be resolved. The CLWA transfer of 41,000 acre-feet of water from Kern County in 1990 represented wise water planning at the time for the Santa Clarita Valley. Such planning and water management programs on the part of CLWA ensures that its current users as well as future users will be assured safe and reliable drinking water.<br>BIA would like to commend CLWA and its agency and staff for taking these preemptive actions. | This comment is noted; no text revisions are required. |
| 116 | PM (Donlon) | We urge you to support and certify this EIR. | This comment is noted; no text revisions are required. |

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| 117 | EHL | Endangered Habitats League is concerned that your agency is the wrong lead agency for this project. Water transfers are a statewide issue that induce growth and reduce water for farming. They should be addressed by an agency that is qualified under state law to address statewide impacts and will notify all interested parties. In this case, this is the Department of Water Resources. | Please refer to the Master Response and to Comments 2 through 6 and the Responses thereto. The Project has localized (in KCWA's service area, the sending site, and in CLWA's service area, the receiving site) and not statewide impacts. The choice of lead agency is determined by many factors (please refer to the Master Response and to the Responses to Comments 37, 39 and 53), not by nature of the environmental issues raised. |
| 118 | EHL | The impacts of this transfer are considerable and affect a wide variety of interest, yet sufficient notification has not occurred, for example to our group. | Please refer to Comment 57 and the Response thereto. CLWA made a good faith attempt to notify all interested parties of the EIR's release, sending approximately 250 copies of the DEIR to agencies (including water agencies), organizations, and individuals throughout the state. The distribution list is included in Attachment B of Volume II of the FEIR. CLWA also provided notices regarding the availability of the DEIR to the County Clerk's office of the affected counties. Additionally, the release of the DEIR was noticed in *The Signal* newspaper, and CLWA held a public meeting to present an overview of the EIR and to receive comments on July 28. The meeting notice was posted on CLWA's website, and the meeting was held at 7 P.M. to facilitate the attendance of the working members of the public. All Kern County member agencies were notified. Please see Attachment B of Volume II of the FEIR, the notice/distribution list. |
| 119 | EHL | If such a major transfer is allowed to proceed under the lead agency status of a small regional water agency, it will set a precedent that will affect many major water decisions throughout the state of California. It is imperative that this major change in state policy receive full environmental review and comments from all affected parties. We therefore request that this project be re-noticed by the Dept. of Water Resources acting as lead agency as a project of statewide concern so that all impacts may be disclosed and properly addressed. | Please refer to the Master Response. This comment fails to identify the "major state policy" to which it refers. That particular comment is too vague to allow for a substantive response. Please see the Response to Comment 100. |

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| 120 | Library | This is in response to the Notice of Completion for the Draft Environmental Impact Report for the Castaic Lake Water Agency Supplemental Water Project Transfer. The County of Los Angeles Public Library has reviewed the document and determined that this project will not have an impact on library services. | This comment is noted; no text revisions are required. |
| 121 | SCAG | The Draft EIR, in Section 5.0, Consistency with Adopted Plans and Policies, cited SCAG policies and addressed the manner in which the proposed Project is consistent with applicable core policies and supportive of applicable ancillary policies. This approach to discussing consistency or support of SCAG policies is commendable and we appreciate your efforts. | This comment is noted. |

## MASTER RESPONSE

## TO ISSUES RAISED BY COMMENTERS REGARDING APPROPRIATE LEAD AGENCY TO PREPARE EIR AND THE RELATIONSHIP BETWEEN THIS EIR AND THE EIR FOR THE MONTEREY AMENDMENT

### I. CLWA MUST BE THE LEAD AGENCY UNDER THE DOCTRINE OF THE LAW OF THE CASE.

The doctrine of the law of the case requires that CLWA be the lead agency for the Project. Under the doctrine of the law of the case, "Litigants are not free to continually reinvent their position on legal issues that have been resolved against them by an appellate court." (*Yu v. Signet Bank/Virginia* (2002) 103 Cal.App.4th 298, 312.)

The Court of Appeal held with respect to the prior EIR prepared by CLWA for the Project: "We have examined all of appellant's other contentions and find them to be *without merit*. If the *PCL*/tiering problem had not arisen, we would have affirmed the judgment." (*Friends of the Santa Clara River v. Castaic Lake Water Agency ["Friends"]* (2002) 95 Cal.App.4th 1373, 1387.) The Court of Appeal ordered that the trial court in that case retain jurisdiction over the Project and this subsequent EIR. (*Id.* at 1388.)

Thus, by deciding that there was no other legal defect with the prior Project EIR prepared by CLWA as the lead agency, and by retaining jurisdiction over this EIR in that case, the Court of Appeal resolved against subsequent legal challenges that CLWA is the proper lead agency for the Project. Indeed, the Court of Appeal ordered CLWA to act as the lead agency: "The trial court shall . . . retain jurisdiction until respondent certifies an EIR complying with CEQA . . .." (*Friends*, *supra*, 95 Cal.App.4th at 1388; See also the discussion of continuing jurisdiction of the court in Draft EIR ("DEIR") Section 1.2.1.)

### II. CLWA MUST BE THE LEAD AGENCY BECAUSE IT HAS PRINCIPAL RESPONSIBILITY TO APPROVE AND CARRY OUT THE PROJECT.

CLWA must act as the lead agency because it has primary responsibility to carry out or approve the Project. The agency that has the primary responsibility to carry out or approve a project must be the lead agency, even if the project would be located within the jurisdiction of another public agency. (See Pub. Res. Code § 21067; 14 Cal. Code Regs. § 15051.) CLWA has the primary responsibility to carry out and approve the Project because CLWA will purchase, arrange for transport of, and use the Project water. (See DEIR Section 1.3 and Chapter 2.) The owner of the Project *res* is under mandate to act as the lead agency. (See *Friends of Cuyamaca Valley v. Lake Cuyamaca Recreation and Park Dist.* (1994) 28 Cal.App.4th 419, 428, *rev. denied*.) There is legal precedent for a local water agency acting as lead agency when it proposes to import supplemental water. (See *Temecula Band of Luiseno Mission Indians v. Rancho Cal. Water Dist.* (1996) 43 Cal.App.4th 425.)

As Section 1.1 of the DEIR indicates, CLWA has the principal responsibility for carrying out and approving the Project because a substantial portion of the Project occurs within CLWA's jurisdiction and substantially affects CLWA.

## III. CLWA MUST BE THE LEAD AGENCY BECAUSE IT IS THE LOCAL AGENCY UNDERTAKING THE PROJECT.

CLWA must be the lead agency because it is the local agency undertaking the Project. The local agency undertaking a project must be the lead agency. (See Pub. Res. Code § 21152.) A local agency under CEQA is any public agency that is not a state agency, board or commission. (See Pub. Res. Code § 21062.) Thus, CLWA is a local agency. As explained in Sections 1.1 and 1.3 and Chapter 2 of the DEIR, CLWA will carry out the Project in that it is the major proponent of the Project and has assumed the primary task of effectuating the SWP water supply contract amendment.

Some of the comments to the DEIR suggest that CLWA lacks the institutional authority to undertake the Project because DWR must approve the delivery of the water through the SWP system. DWR is certainly a responsible agency because it must approve the transfer and execute amendments to the CLWA and KCWA SWP contracts. However, DWR cannot be the lead agency merely because it will approve the point of delivery for the Project. A state agency that has a role in approving or carrying out a local agency project must act as a responsible agency. (See *Bakman v. Department of Transportation* (1979) 99 Cal.App.3d 665, 678-679.)

In *Bakman*, the local agency submitting an application for a permit to expand an airport was held to be the lead agency, and the California Department of Transportation was held to be a responsible agency. It did not matter that the DOT had to consider the advantages and disadvantages to the public of the proposed expansion in acting to approve the airport.

DWR's role in the Project contrasts with DWR's role for the Monterey Amendment specified in *Planning and Conservation League v. Department of Water Resources* ["*PCL*"] (2000), 83 Cal.App.4th 892. In *PCL*, the Court of Appeal determined that the DWR was the appropriate lead agency for the Monterey Amendment because the Amendment involved major changes in DWR contracts with all 29 State Contractors, DWR changes in management and operation of the entire SWP system, DWR conveyance of the Kern Fan Element, and DWR facilitation of water transfers throughout the SWP system.

In contrast with *PCL*, the Project does not involve DWR conveying land, DWR changes in management and operation of the entire SWP system, major changes to statewide contracts, or DWR facilitating transfers among all contractors. As Sections 1.1, 1.3, 3.0 and Chapter 2 of the DEIR state, the Project, although requiring the use of SWP facilities, would involve a transfer to CLWA from WRMWSD through KCWA, its representative state contractor. The Project will take place within a limited geographic area and does not implicate the entire SWP water rights and supply framework. In this Project, DWR need only consider the capacity of a small portion of the SWP to deliver CLWA's newly purchased SWP contract water right.

The Project more closely resembles a recent water banking project between CLWA and Semitropic Water Storage District than the Monterey Amendment. Both the Project and the water banking project involve exchange of SWP water between two water contractors pursuant to a local project initiated and carried out by one of the State Contractors.

The recent Superior Court decision regarding that water banking project held that the local State Contractor agency, CLWA, was the appropriate lead agency under CEQA, even though DWR had a role in approving a point of delivery agreement and in facilitating the exchange through local changes in operation of the SWP. (See *California Water Network and the Friends of Santa Clara River v. Castaic Lake Water Agency* (2004), Ventura County Case No. CIV 215327.) The Superior Court in that case concluded: "Castaic is the agency most deeply involved in the planning and execution of this project. It is the appropriate lead agency as described in *PCL*, Public Resources Code Section 21067, and 14 Cal. Code Regs. 15014(a)." That case is currently on appeal.

## IV. CLWA MUST BE THE LEAD AGENCY BECAUSE IT CANNOT DELEGATE ITS RESPONSIBILITY OVER ITS SWP CONTRACT RIGHTS.

Because CLWA is the party purchasing the SWP contract right pursuant to the Project, CLWA cannot delegate its review and consideration to another body. "Delegation is inconsistent with the purpose of the review and consideration function since it insulates the members of the council from public awareness and possible reaction to the individual members' environmental and economic values. Delegation is inconsistent with the purposes of the EIR itself." (*PCL*, 83 Cal.App.4th at 907, citing *Kliest v. City of Glendale* (1976) 56 Cal.App.3d 770, 779.)

In *PCL*, the Court of Appeal held that DWR could not delegate its responsibilities over execution of global, long term SWP contract amendments, Kern Fan Element conveyance, and statewide distribution of water because DWR had the appropriate statewide perspective and expertise for all of the elements of the Monterey Amendment. (*PCL*, 83 Cal.App.3d at 906.) In contrast, DWR is not primarily responsible for the elements of the Project, nor do all or even a majority of the Project elements require DWR's statewide perspective and expertise. CLWA has primary responsibility for purchasing, obtaining delivery of, and using the SWP contract rights pursuant to the Project. (See DEIR Chapter 2.) These are not matters requiring DWR statewide perspective and expertise, but are matters for which CLWA must stand accountable to its electorate.

As Section 1.1 of the DEIR indicates, CLWA has the expertise to implement the Project. CLWA has specific expertise to address growth inducement and growth-related impacts in its own service area, which are the primary impacts of the Project. CLWA is the agency with the greatest knowledge of local water supply issues and their relationship to planning decisions.

CLWA has been able to obtain the benefit of DWR's statewide perspective and expertise helpful to environmental analysis of the Project as a result of DWR's participation as a responsible agency. As responsible agencies, KCWA and WRMWSD have been actively involved in the development of the EIR and have provided input regarding baseline conditions and impacts to the WRMWSD service area, including impacts to agricultural resources, land use, air quality, water resources, and biological resources.

DWR comments on the DEIR confirm that DWR has been actively involved in the development of the DEIR: "DWR appreciates inclusion and consultation in the early stages of preparation of this DEIR." (Comment 5)

DWR comments on the DEIR also confirm that, from DWR's perspective, the DEIR has adequately addressed issues involving the SWP: "The [DWR] staff have reviewed the [DEIR] and found that the document adequately and thoroughly discusses the proposed project and its impacts. The DEIR provides a good discussion of the relationship between the 41,000 acre-feet Table A transfer and the current process for preparation of a new EIR for the Monterey Amendment. DWR notes that this DEIR adequately discusses the reliability of the SWP, pre- and post-Monterey Amendment conditions, future conditions, and SWP operations." (DWR Comments 1, 2 & 4)

With CLWA acting as lead agency, dissemination of information about the Project and the availability of the DEIR has been more extensive than CEQA requires. CLWA ensured that the DEIR, and notices of preparation of the DEIR, were widely distributed, sending approximately 250 copies to agencies (including water agencies), organizations, and individuals throughout the State. The notice and distribution list is included as Attachment A to this Master Response. DWR and WRMWSD cooperated with CLWA in the preparation of this notice/distribution list.

## V. CLWA NEED NOT SUBORDINATE ITS LEAD AGENCY STATUS TO THE DWR PROGRAMMATIC ANALYSIS FOR THE NEW MONTEREY AMENDMENT EIR.

CLWA need not wait for or rely upon DWR's programmatic analysis in the new Monterey Amendment EIR. CEQA does not require a lead agency for a project to wait for another lead agency to prepare a programmatic EIR that is in the process of adoption; nor does CEQA require that a project EIR tier off a programmatic EIR. CEQA does not mandate that a program EIR be prepared even for a series of actions that can be characterized as one large project. (See 14 Cal Code Regs. 15168.)

The Court of Appeal in *Friends* did not require CLWA to tier off of or await adoption of DWR's new Monterey Amendment EIR. That Court of Appeal and appellant PCL merely suggested tiering as one course of action that CLWA could pursue if CLWA wanted to await action by DWR. (See *Friends*, *supra*, 95 Cal.App.4th at 1387-1388; See also DEIR Section 1.2.1.) The DEIR does not tier off either the old or new Monterey Amendment EIR. Except to the extent that it tiers off the 1988 CLWA Capital Program EIR, the DEIR stands alone as a project EIR.

There is no need for this project EIR to tier off the new Monterey Amendment EIR because the DEIR is for a stand alone project and because the DEIR contains thorough and independent analyses of the issues that *Friends* cited as lacking as a result of decertification of the original Monterey Amendment EIR. These issues include the potential environmental impacts that would arise as a result of KCWA transferring 130,000 acre-feet of Table A Amount, of which this 41,000 acre-feet transfer is a part. Unlike the 1999 Project EIR, the DEIR specifically identifies the environmental impacts to the SWP and associated facilities and to WRMWSD from the Project both with and without the Monterey Amendment. (See DEIR Sections 3.2, 3.4 & 3.15, particularly Section 3.15.2, and Appendices C & D.) Thus, the DEIR meets the requirements of CEQA to properly inform decision-makers and the public of the Project's environmental consequences.

The DEIR acknowledges use of a DWR modeling tool ("DWRSIM") that will generate slightly different water supply reliability estimates than would be generated from use of the more recent DWR modeling tool that DWR will use for the Monterey Amendment EIR ("CALSIM II"). Both models, however, use similar criteria to simulate SWP operations, and the results of both, while slightly different, are comparable for EIR purposes. (See DEIR Appendix D, Section 2.2.)

The DEIR publishes the water supply reliability results from both models and explains the differences and CLWA's reasons for using the DWRSIM model. (See DEIR Appendix D, Figures 2.1 & 2-2 and Section 2.2.) Thus, decision makers for this Project and public planning agencies interested in regional water planning are fully informed of the possible differences between modeling results as to the reliability of the amount transferred. In addition, the decision makers for this Project and public planning agencies are cautioned not to rely on past water deliveries as a guarantee of future deliveries. (See DEIR Section 1.1.)

The DEIR's use of the DWRSIM model to calculate the reliability of the transferred amount results in the DEIR considering slightly higher water supply reliability than would be the case if the CALSIM II model had been used. As a result, the DEIR analyzes slightly greater growth potential and environmental impacts than it would if the CALSIM II model had been used. However, these differences are not so significant as to cause a difference in analysis of significant impacts between DWR and CLWA (See Comments 2-6 by the DWR).

By using DWRSIM model results for its DEIR analyses, CLWA has used the model results that project the "worst case" growth rate (i.e., the greatest potential growth) and thereby the greatest potential environmental impacts. If one speculates that CALSIM II reliability figures will turn out to be more accurate, the need for the Project still remains, and the impacts will be less than described in the EIR. Thus, the public and decision makers are informed of the greatest possible environmental impact.

Because the DEIR does not rely on the CALSIM II model to project the reliability of the amount transferred, issues raised in various comments about the accuracy of the

CALSIM II model are not germane to this DEIR (those criticisms are discussed separately in the responses to particular comments).

However, the DEIR does use the CALSIM II model to calculate the current environmental setting. It was used for this purpose because it provides the best available estimate of SWP supplies at current levels of SWP demand. (See DEIR Section 3.15.2.2 and Appendix D, Section 6.1.2.2.)

The Settlement Agreement in *PCL* ("Monterey Settlement Agreement") does not require CLWA to wait for DWR certification of DWR's new Monterey Amendment EIR before CLWA can certify an EIR for the Project. (See DEIR 1.2.2.) Section III(C)(4) of the Monterey Settlement Agreement requires that the new Monterey Amendment EIR include, *inter alia*, analysis of the potential environmental effects relating to Attachment E Transfers and this Project.

Section III(C)(4) of the Monterey Settlement Agreement does not state that the new Monterey Amendment EIR must treat the Attachment E Transfers and this Project as new projects. Section III(C)(4) of the Settlement Agreement only states that the Monterey Amendment EIR must analyze the effects of the Attachment E Transfers and this Project "as actions that relate to the potential environmental impacts of approving the Monterey Amendments." Thus, Section III(C)(4) of the Settlement Agreement merely requires that the Monterey Amendment EIR consider the cumulative impacts of the Attachment E Transfers and the Project in its review of the Monterey Amendment.

Any claim that the Settlement Agreement requires either the Attachment E Transfers or this Project to be reviewed by the DWR as new projects as part of the new Monterey Amendment EIR is disavowed in the Settlement Agreement. Section III(D) states that the Attachment E Transfers are recognized as final. With respect to this Project and the *Friends* litigation that necessitated preparation of this EIR, Section III(E) of the Settlement Agreement states: "The Parties agree that jurisdiction with respect to that litigation should remain in that court and that nothing in this Settlement Agreement is intended to predispose the remedies or other actions that may occur in that pending litigation." One of the actions ordered by the Court of Appeal in "that pending litigation" was CLWA's certification of a new EIR (this EIR) for the Project. (See *Friends*, *supra*, 95 Cal.App.4th at 1388.) Thus, the Settlement Agreement is consistent with the present EIR process.

The parties to the Settlement Agreement acknowledged that DWR would not be required to act as the lead agency for the transfer of Table A Amounts between existing SWP Contractors. Sections I(D) and VII(D) incorporate by reference Attachment D Principles Regarding Public Participation Process in SWP Contract Negotiations. Paragraph 4 of the Attachment D Principles provides: "When DWR is a responsible agency, (e.g., when existing SWP Contractors agree to transfer entitlement between themselves), the public participation will be scheduled to facilitate coordination with the lead agency's CEQA process."

# Section 4 – Changes to DEIR Text

# 4.0 CHANGES TO THE DEIR TEXT

**Executive Summary and Chapter 1, Introduction**

The following text from DEIR Page ES-4, lines 20-31, and DEIR Page 1-4, lines 13-23, should be deleted:

"It should be noted at this point that the Settlement Agreement concerning the PCL Litigation creates a specific exclusion for this Project from any prohibitions against transfers of State Water Project Table A Amounts by the Settlement Agreement. The exclusion states:

> With respect to Section III(c)(4)(b) regarding the Kern-Castaic Transfer, the Parties recognize that such water transfer is subject to pending litigation in the Los Angeles County Superior Court following remand from the Second District Court of Appeal (See Friends of the Santa Clara River v. Castaic Lake Water Agency 95 Cal.App.4th 1373, 116 Cal.Rptr.2d 54 (2002); review denied, April 17, 2002). The Parties agree that jurisdiction with respect to that litigation should remain in that court and that nothing in this Settlement Agreement is intended to predispose the remedies or other actions that may occur in that pending litigation."

The above text should be replaced with the following:

"The Monterey Amendment Settlement Agreement does not require that the new Monterey Amendment Program EIR be certified before an EIR for this Project can be certified, nor does it require that the EIR for this Project tier off the new Monterey Amendment Program EIR. The Monterey Amendment Settlement Agreement does not require that the new Monterey Amendment Program EIR serve as the EIR for this Project. Section III(C)(4) of the Monterey Amendment Settlement Agreement only requires DWR to analyze the potential impacts resulting from this Project and other transfers as they relate to the potential environmental impacts of approving the Monterey Amendment. Section III(E) of the Monterey Amendment Settlement Agreement clarifies that the Section III(C)(4) analysis is limited by remedies or other actions of the Los Angeles County Superior Court in *Friends I*, stating:

> With respect to Section III(C)(4)(b) regarding the Kern-Castaic Transfer, the Parties recognize that such water transfer is subject to pending litigation in the Los Angeles County Superior Court following remand from the second District Court of Appeal (*See Friends of the Santa Clara River v. Castaic Lake Water Agency 95 Cal.App.4th 1373, 116 Cal.Rptr.2d 54 (2002); review denied, April 17, 2002*). The Parties agree that jurisdiction with respect to that litigation should remain in that court and that nothing in this Settlement Agreement is intended to predispose the remedies or other actions that may occur in that pending litigation."

**Chapter 8, References**

Page 8-8, line 21. The word "Draft" should be replaced with "Final."

**Appendix C, Agricultural Resources**

The May 23, 2003 report by Northwest Economic Associates should be replaced with the following final report dated May 28, 2003.

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Quality Solutions to Complex Problems
Northwest Economic Associates
www.nwecon.com

November 19, 2004

Mary Lou Cotton, Water Resources Manager
Castaic Lake Water Agency
27234 Bouquet Road
Santa Clarita, CA 91350

Dear Ms. Cotton:

We have reviewed the draft economics report and now view that report as final. Please mark your records accordingly, and we will forward a copy of the final report to you. Thank you.

Sincerely yours,

Duane A. Paul

Duane A. Paul, Ph.D
Senior Consultant

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# Effects on Agricultural Production from Transferring 41,000 Acre-Feet of State Water Project Entitlement from Wheeler Ridge-Maricopa Water Storage District

***FINAL REPORT***

**Prepared for**

**Castaic Lake Water Agency**
**27234 Bouquet Canyon Road**
**Santa Clarita, CA 91350**

**By**

**Northwest Economic Associates**
**P.O. Box 5129**
**Fair Oaks, CA 95628**

**May 28, 2003**

# Table of Contents

**Executive Summary** **ES-1**

**Introduction** **1**

**Existing Conditions** **2**

Cropping Patterns ..... 2

Cropping Pattern Changes by Service Area ..... 8

Factors Accounting for Cropping Pattern Changes ..... 10

Water Sources and Costs ..... 12

Water Use ..... 14

**Decision-Making by Farmers** **17**

Profit Maximization ..... 18

Crop Rotations and Profit Maximization Over Time ..... 18

Effects of Water Costs and Availability ..... 20

**Results** **23**

**References** **25**

# Executive Summary

- Between 1990 and 1999, permanent crops increased from 30 percent to 38 percent of cropped land in Wheeler Ridge-Maricopa Water Storage District (WRMWSD). Between 1999 and 2001, they rose to 48 percent. Vineyards are the single most important permanent crop. Permanent cropped acreage has increased in both surface water and ground water service areas of the district.

- Because of the large capital costs for establishing a vineyard, grove, or orchard, the increase in permanent crop acreage suggests that farmers in the service area are confident that they will be able to consistently obtain the water necessary for their operations. The actions of WRMWSD have increased the reliability of water and helped offset the rising costs of SWP surface water. Growers are able to produce more labor-intensive, higher value crops.

- WRMWSD has diversified its water supply and management portfolio dramatically since the 1980s. The district's SWP entitlement remains an integral component of total supplies, but supplemental sources now provide a substantial drought buffer for the district.

- WRMWSD has invested in ground water recharge storage and recovery systems outside of the WRMWSD service area as well as distribution and pumping infrastructure in order to increase the reliability of water in dry years. Banking surface water when available or conjunctively using ground water in wet and normal years allows WRMWSD to have a more reliable water supply when normal demand exceeds supplies available from the SWP. This banking and reliability more than offsets any of the impacts of the 41,000 AF transfer of SWP surface water.

- The transfer of 41,000 AF of SWP water will have little or no impact on cropping patterns and production in WRMWSD. The district has taken adequate steps to insure that more reliable water supplies from various sources will be available at lower cost to offset the transfer. The transfer and resulting payment for the transferred water reduce the fixed costs of the unneeded SWP entitlement and thus reduce the financial burden to WRMWSD. The district is better able to continue to improve its water infrastructure and supply. Without this

infrastructure and reliable supply, more lands will likely be removed from production temporarily or permanently.

- During the last 12 years, WRMWSD has experienced a significant shift in agricultural cropping patterns. Farmed land in the WRMWSD has varied from a low of 60,370 acres in 1991, a severe drought year, to a high of 94,499 acres in 1998. Crop acreage fluctuated by an average of 11.6 percent each year between 1990 and 2001. The principal factors causing the variations likely have included water availability, crop rotations, and crop prices.

- Annual crop acreage has declined, while acreage in permanent crops has increased. Annual crop acreage fell by 13,376 acres in the WRMWSD surface water service areas from between 1990 and 1999 and by a further 9,068 acres between 1999 and 2001. In the surface water service areas, cotton acreage declined by 15,534 acres between 1990 and 1999 and by a further 1,528 acres between 1999 and 2001. Over the same two periods in the groundwater service areas, annual crop acreage increased by 8,668 and decreased by 5,128, respectively.

- Many economic factors influence cropping decisions and resultant cropping patterns. Changes in crop prices, particularly for cotton, and the total of variable costs (including water prices), as well as strong demands for grapes and citrus, appear to have influenced the decisions of farmers in the WRMWSD regarding crop choices.

- As overall production costs increase, including those for water, cotton growers find it harder and harder to stay in production. Rotation crops such as grain and hay do not even cover variable costs in some years. Growers are better off to fallow lands than to continue production of these crops.

- Fallowing has been a regular part of cropping patterns in WRMWSD. Between 1991 and 1998, the amount of fallowed land decreased by 34,000 acres. Since 1998, fallowed acreage has increased by 11,600 acres. Fallowing is attributable to many different factors, including crop prices, cultivation practices, production costs, and others. Fallowing thus varies widely between years. From 1990 through 2001, the amount of land fallowed fluctuated annually by 34.9 percent, or 9,651 acres.

- During the early 1990s drought period, it became apparent that Department of Water Resources (DWR) announced water shortages could become a reality and that water costs would soar when water was not delivered. Following this period of drought impacts, WRMWSD experienced a significant shift of acreage to higher value crops such as fruits and vegetables and a reduction of acreage in lower value crops such as cotton, hay, and other field crops. The last two to three years appears to be a period of leveling out of new perennial crop plantings and increased fallowing.

- Fallowing has increased since 1998 even though State Water Project (SWP) deliveries, with the exception of 2001, have been relatively high. The increase is probably due to market conditions, particularly for cotton, as well as other economic and agronomic reasons.

- Total applied agricultural water within WRMWSD averaged about 251,000 acre-feet (AF) annually between 1990 and 1999 and about 259,000 AF annually between 1999 and 2001. Over those two periods, total WRMWSD deliveries from all sources averaged 158,000 AF and 168,000 AF annually, respectively. The remainder was supplied by on-farm ground water pumping, user input, or other water supplies available to farmers in the WRMWSD area.

- Before the 41,000 AF transfer, WRMWSD held a water supply contract for about 238,000 AF of SWP water. After the transfer, the remaining 197,000 AF of contract amount, with supplemental supplies, should leave the district comfortably able to meet demands in normal and wet years. Neither cost nor availability should be adversely affected in those years, and the transfer should not, of itself, cause an increase in fallowing.

- The WRMWSD supplemental water supplies were developed primarily to help meet demands during dry years. Those sources will more than make up for any dry year shortfall incurred as a result of the 41,000 AF of water transferred.

# Introduction

Agriculture is the main industry in the Wheeler Ridge-Maricopa Water Storage District (WRMWSD) service area. Agricultural lands in this area are among the most productive in Kern County and the entire state. Water is a key input to agriculture here, and has been instrumental in the production of a variety of crops destined for both domestic and international markets. The cost and availability of various water sources have significant effects on farm profitability and survivability.

Over time, farmers in the service area have changed cropping mixes, adopted different rotations, and used different water sources for their operations. These changes are an outgrowth of the many factors incorporated into the decision-making framework used by farmers, some unique to each farm, others common to all.

This report considers the farm-level impacts of the 41,000 acre-feet (AF) transfer of State Water Project (SWP) entitlement from WRMWSD to Castaic Lake Water Agency (CLWA). The focus of the analysis is on whether the transfer will cause changes in agricultural practices, including additional land fallowing within WRMWSD. The report is presented in three sections. The first is an assessment of pertinent existing conditions within WRMWSD, including information on components of water supply and uses. The discussion also incorporates a review of crop acreages and use of various water sources over time. The second section describes the decision-making framework which farmers seeking specific economic objectives follow in determining which crops to plant and which inputs, including water, to use on these crops. This development follows widely-accepted principles of farm management and agricultural economics. The third section discusses the relationship of the transfer on agricultural operations within WRMWSD.

# Existing Conditions

## Cropping Patterns[1]

Crops grown within the WRMWSD service area had a farm-level production value of nearly $283 million in 2001 (see Table 1).[2] Grapes provided the greatest dollar value, at 31 percent of the total, followed by mixed produce and melons at 26 percent, citrus at 25 percent, and cotton at seven percent. Total value in 2001 was 6 percent greater than the comparable value in 1999, and the value in 1999 was 23 percent higher than that in 1990. The allocation of value among crops has also changed a great deal since 1990, when grapes accounted for just 18 percent of the total, mixed produce and melons 36 percent, citrus 11 percent, and cotton 20 percent. Because of the 1987-92 drought that so severely impacted Kern County and the entire San Joaquin Valley, the value of crop production in WRMWSD fell between 1990 and 1992 and then rose to exceed the 1990 value only by 1995.

Since 1990, net farmed land[3] in WRMWSD has varied from a low of 60,370 acres in 1991 to a maximum of 94,499 acres in 1998 (see Table 2). For the 12 years shown, the normal annual variation in net farmed land was 11.6 percent,[4] or about 9,700 acres. As shown in Figure 1, the general trend in net cropped acreage was positive until about 1999.[5] Similarly, the general trend in the acreage of annual crops was positive until about 1996, then notably

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1 Cropping information for WRMWSD is taken from annual crop reports provided by the district for the years 1990 through 2001.

2 Based on crop acreages reported by WRMWSD and average price and yield data reported for Kern County by the Kern County Department of Agriculture.

3 Measured as total cropped less double-cropped land.

4 Measured as the coefficient of variation, calculated as the standard deviation divided by the mean. See Snedecor and Cochran.

5 A two-period moving average is used to reduce variation typical between years.

negative. In 1990, annual crops accounted for 70 percent of cropped acres.[6] By 1999, the annual crop share had fallen to 62 percent and by 2001 to 52 percent. Cotton, historically the predominant annual crop in WRMWSD, represented 61 percent of annual cropped land in 1990, but only 36 percent in 1999 and 37 percent in 2001. From its peak in 1996, land in annual crops fell 9,011 acres by 1999 and an additional 14,196 acres by 2001. Cotton accounted for nearly 80 percent of that reduction. Conversely, the acreage shares of mixed produce and melons rose from 31 percent in 1990 to 38 percent in 1999 and fell to 35 percent in 2001. The share of irrigated grains increased from zero in 1990 to 18 percent in 1999 and fell to 14 percent in 2001.

The negative trend for annual crops has been offset almost completely by the increases in permanent crop acreage. In 1990, permanent crops accounted for 30 percent of cropped land, with vineyards comprising 40 percent of the total, deciduous nuts 26 percent, citrus 23 percent, and deciduous fruits eight percent. In 1999, permanent crops accounted for 38 percent of cropped land, with vineyards 43 percent of the total, deciduous nuts 23 percent, citrus 27 percent, and deciduous fruits five percent. By 2001, permanent crops represented 48 percent, with vineyards at 44 percent of the total, deciduous nuts 21 percent, citrus 30 percent, and deciduous fruits five percent.

Table 2 shows fallowed land[7] ranging from a maximum of 51,620 acres in 1991 to a minimum of 17,649 acres in 1998. The spike in fallowed land in 1991 was attributable largely to the ongoing drought in California and sharply-reduced water supplies, together with higher costs of water from virtually all sources. Because of its different water sources, which are even more diversified today, WRMWSD was able to provide some water to farmers in 1991. Subsequently, fallowed acreage declined sharply until 1998 and has risen since then (see Figure 2).

Farmers fallow land for many reasons, both agronomic and economic. Agronomic reasons include the use of fallowing as part of crop rotations. Economic reasons include such factors as the market conditions and prices for the crops typically grown on the land and the cost and availability of production inputs, including water.

Without information from individual landowners, it is very difficult to distinguish between land that is fallowed temporarily and land that is removed from production either permanently or for a long term. The California Department of Conservation, which monitors land use with aerial photos taken every two years, reports previously productive, but

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6 Calculated relative to total cropped land because some annual cropland is double cropped.

7 As shown in WRMWSD crop reports. Fallowing generally refers to temporarily removing land from production to conserve moisture or to control pests.

currently idle, land as fallowed for at least three monitoring cycles (that is, six years).[8] Ultimately, land may be fallowed for eight years before it is no longer considered to be in active agricultural use. Thus, it is not at all apparent that the increase in fallowed land with the WRMWSD service area since 1998 is attributable to a reduction in SWP entitlements within the district. Rather, the increase appears to be related more closely to crop markets and prices.

8 Molly Penberth, California Department of Conservation, April 30, 2003, personal communication.

## Table 1
## Farm Level Value of Production, by Crop and Total, WRMWSD

| Crop/Acres | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Cotton | $43,019,069 | $16,689,629 | $27,663,667 | $33,714,831 | $37,911,348 | $34,831,452 | $40,411,911 | $38,485,118 | $19,421,271 | $26,461,166 | $25,490,070 | $18,582,103 |
| Sugar Beets | $751,012 | $672,471 | $840,597 | $862,677 | $373,257 | $466,458 | $152,213 | $0 | $205,582 | $0 | $0 | $0 |
| Grain | $886,863 | $953,001 | $1,384,366 | $2,017,655 | $1,253,304 | $3,138,780 | $5,285,858 | $3,058,269 | $3,995,594 | $4,101,029 | $2,741,375 | $2,808,474 |
| Green Feeds | $1,396,620 | $687,643 | $705,721 | $989,778 | $1,415,864 | $1,345,331 | $1,415,121 | $2,275,038 | $1,968,264 | $2,059,065 | $1,980,664 | $2,539,051 |
| Mixed Produce | $77,196,114 | $73,993,874 | $37,366,098 | $48,444,836 | $41,735,435 | $57,430,236 | $49,788,591 | $59,466,855 | $54,425,094 | $80,285,572 | $72,435,938 | $66,370,246 |
| Melons | $0 | $0 | $15,178,882 | $11,810,000 | $17,527,192 | $13,455,741 | $13,424,661 | $14,715,280 | $13,970,325 | $10,559,005 | $8,968,780 | $8,727,570 |
| Vineyard | $38,927,352 | $31,865,396 | $37,027,240 | $45,790,453 | $45,763,512 | $55,045,475 | $64,192,513 | $80,301,649 | $73,479,669 | $84,173,400 | $84,581,368 | $86,940,385 |
| Deciduous Nuts | $18,754,834 | $14,452,109 | $12,384,408 | $19,367,333 | $16,053,249 | $15,309,727 | $18,210,636 | $16,487,093 | $16,267,367 | $11,491,679 | $13,021,446 | $13,035,331 |
| Deciduous Fruit | $11,206,519 | $11,677,651 | $7,492,311 | $8,957,975 | $7,888,785 | $12,950,470 | $11,608,728 | $9,852,647 | $10,991,313 | $8,961,073 | $14,345,391 | $11,845,011 |
| Citrus | $23,176,485 | $10,233,881 | $14,588,823 | $31,144,607 | $38,931,957 | $39,672,318 | $34,076,041 | $55,669,042 | $58,690,301 | $37,264,234 | $73,962,958 | $71,330,901 |
| Pomegranates | $375,112 | $355,687 | $917,011 | $1,007,081 | $1,324,308 | $1,350,818 | $1,408,974 | $758,959 | $647,472 | $1,227,749 | $454,063 | $704,100 |
| Eucalyptus | $15,437 | $14,637 | $36,576 | $40,168 | $22,638 | $23,091 | $76,269 | $41,083 | $36,396 | $61,876 | $22,884 | $35,485 |
| Jojoba | $997,211 | $120,026 | $519,901 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| **Total Value** | **$216,702,627** | **$161,716,007** | **$156,105,602** | **$204,147,394** | **$210,200,848** | **$235,019,897** | **$240,051,517** | **$281,111,032** | **$254,098,647** | **$266,645,848** | **$298,004,936** | **$282,918,657** |

## Table 2
## WRMWSD Annual and Permanent Crop and Other Acreage

| Crop | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Annual** | | | | | | | | | | | | |
| Cotton | 38,071 | 16,192 | 24,621 | 31,063 | 33,369 | 36,795 | 34,702 | 32,369 | 24,953 | 20,781 | 22,110 | 16,204 |
| Sugar Beets | 723 | 746 | 825 | 689 | 370 | 409 | 151 | 0 | 181 | 0 | 0 | 0 |
| Grain | 2,692 | 3,450 | 9,859 | 8,162 | 3,739 | 9,530 | 11,804 | 8,203 | 15,586 | 0 | 0 | 0 |
| Grain, Irrigated | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10,605 | 7,378 | 6,208 |
| Grain, Dry Farmed | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1,655 | 2,117 | 3,099 |
| Green Feeds | 1,836 | 1,146 | 1,206 | 1,442 | 1,514 | 2,002 | 1,737 | 2,923 | 2,938 | 3,340 | 2,933 | 2,924 |
| Mixed Produce | 19,504 | 17,469 | 12,971 | 12,414 | 13,618 | 13,333 | 14,770 | 16,408 | 14,553 | 17,783 | 16,889 | 13,246 |
| Melons | 0 | 0 | 4,064 | 3,361 | 3,832 | 4,073 | 3,965 | 3,924 | 3,845 | 3,954 | 2,350 | 2,241 |
| Total Annual | 62,826 | 39,003 | 53,546 | 57,131 | 56,442 | 66,142 | 67,129 | 63,827 | 62,056 | 58,118 | 53,777 | 43,922 |
| Surface Water Service Areas | 43,092 | 20,947 | 34,731 | 36,939 | 35,870 | 43,153 | 45,183 | 42,945 | 40,634 | 29,716 | 26,591 | 20,648 |
| Ground Water Service Areas | 19,734 | 18,056 | 18,815 | 20,192 | 20,572 | 22,989 | 21,946 | 20,882 | 21,422 | 28,402 | 27,186 | 23,274 |
| **Permanent** | | | | | | | | | | | | |
| Vineyard | 10,719 | 9,883 | 9,633 | 9,708 | 9,778 | 10,774 | 12,547 | 14,222 | 15,315 | 15,745 | 17,387 | 17,701 |
| Almonds | 0 | 0 | 5,103 | 5,225 | 5,301 | 5,155 | 5,540 | 5,524 | 6,099 | 6,282 | 6,410 | 5,994 |
| Pistachios & Walnuts | 0 | 0 | 1,797 | 1,797 | 2,098 | 2,100 | 2,100 | 2,100 | 2,099 | 2,099 | 2,099 | 2,376 |
| Deciduous Nuts | 6,865 | 6,899 | 6,900 | 7,022 | 7,399 | 7,255 | 7,640 | 7,624 | 8,198 | 8,381 | 8,509 | 8,370 |
| Deciduous Fruit | 2,074 | 2,102 | 2,013 | 2,008 | 2,060 | 2,066 | 2,154 | 2,205 | 2,104 | 1,989 | 2,058 | 1,928 |
| Citrus | 6,212 | 6,233 | 6,675 | 6,932 | 7,241 | 7,471 | 7,870 | 8,482 | 9,011 | 9,737 | 11,123 | 12,029 |
| Pomegranates | 243 | 243 | 351 | 351 | 351 | 351 | 351 | 351 | 338 | 377 | 377 | 377 |
| Eucalyptus | 10 | 10 | 14 | 14 | 6 | 6 | 19 | 19 | 19 | 19 | 19 | 19 |
| Jojoba | 646 | 82 | 199 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total Permanent | 26,769 | 25,452 | 25,785 | 26,035 | 26,835 | 27,923 | 30,581 | 32,903 | 34,985 | 36,248 | 39,473 | 40,424 |
| Surface Water Service Areas | 24,824 | 24,025 | 24,339 | 24,598 | 25,242 | 26,005 | 28,081 | 29,923 | 31,364 | 32,350 | 35,021 | 35,533 |
| Ground Water Service Areas | 1,945 | 1,427 | 1,446 | 1,437 | 1,593 | 1,918 | 2,500 | 2,980 | 3,621 | 3,898 | 4,452 | 4,891 |
| Total Cropped | 89,595 | 64,455 | 79,331 | 83,166 | 83,277 | 94,065 | 97,710 | 96,730 | 97,041 | 94,366 | 93,250 | 84,346 |
| -Double Crop | 5,314 | 4,085 | 3,525 | 4,510 | 4,233 | 4,663 | 5,092 | 5,441 | 2,542 | 3,155 | 2,622 | 1,541 |
| Net Farmed | 84,281 | 60,370 | 75,806 | 78,656 | 79,044 | 89,402 | 92,618 | 91,289 | 94,499 | 91,211 | 90,628 | 82,805 |
| +Fallow Lands | 27,588 | 51,620 | 36,031 | 33,189 | 32,980 | 22,523 | 19,584 | 20,949 | 17,649 | 20,855 | 21,659 | 29,291 |
| Total Cultivated | 111,869 | 111,990 | 111,837 | 111,845 | 112,024 | 111,925 | 112,202 | 112,238 | 112,148 | 112,066 | 112,287 | 112,096 |
| Miscellaneous | 6,840 | 6,847 | 6,839 | 6,843 | 6,849 | 6,841 | 6,859 | 6,860 | 6,856 | 6,850 | 6,864 | 6,852 |
| Deferred Lands | 1,659 | 1,659 | 1,659 | 1,659 | 1,659 | 1,659 | 1,659 | 0 | 0 | 0 | 0 | 0 |
| Other Lands | 668 | 738 | 880 | 968 | 919 | 1,073 | 1,098 | 1,129 | 1,183 | 1,270 | 1,361 | 1,257 |
| Native Vegetation | 25,626 | 25,428 | 25,405 | 25,305 | 25,169 | 25,122 | 24,802 | 26,393 | 26,434 | 26,434 | 26,434 | 26,739 |
| **Total District** | **146,662** | **146,662** | **146,620** | **146,620** | **146,620** | **146,620** | **146,620** | **146,620** | **146,621** | **146,620** | **146,946** | **146,944** |

**Figure 1**
**Annual, Permanent, and Net Crop Acreage, WRMWSD**

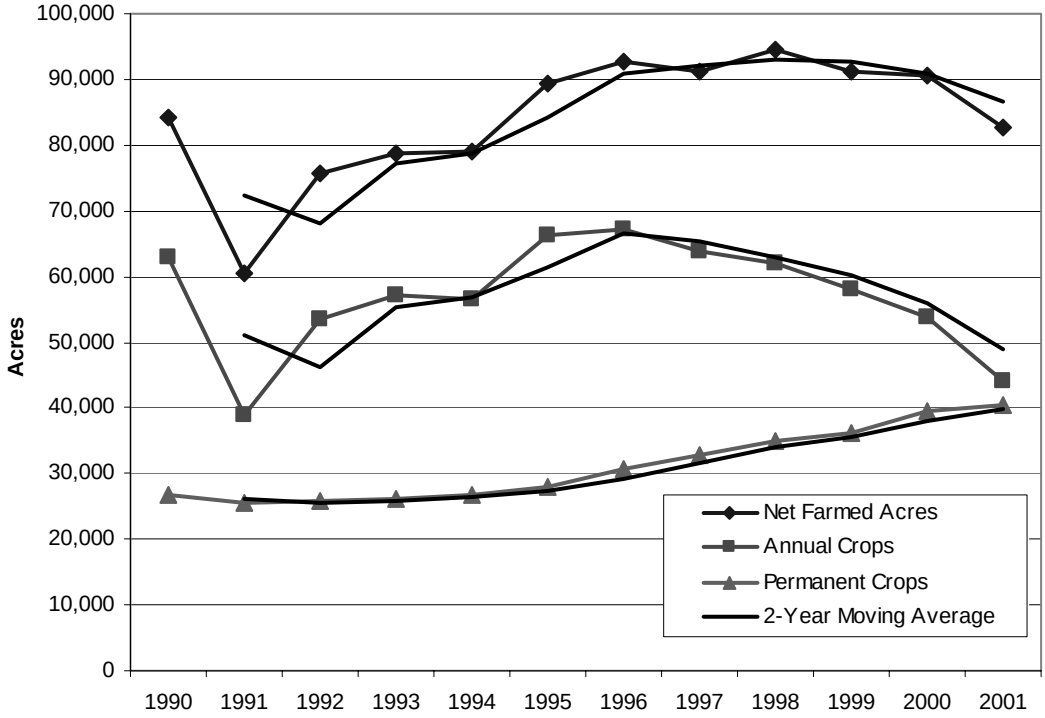
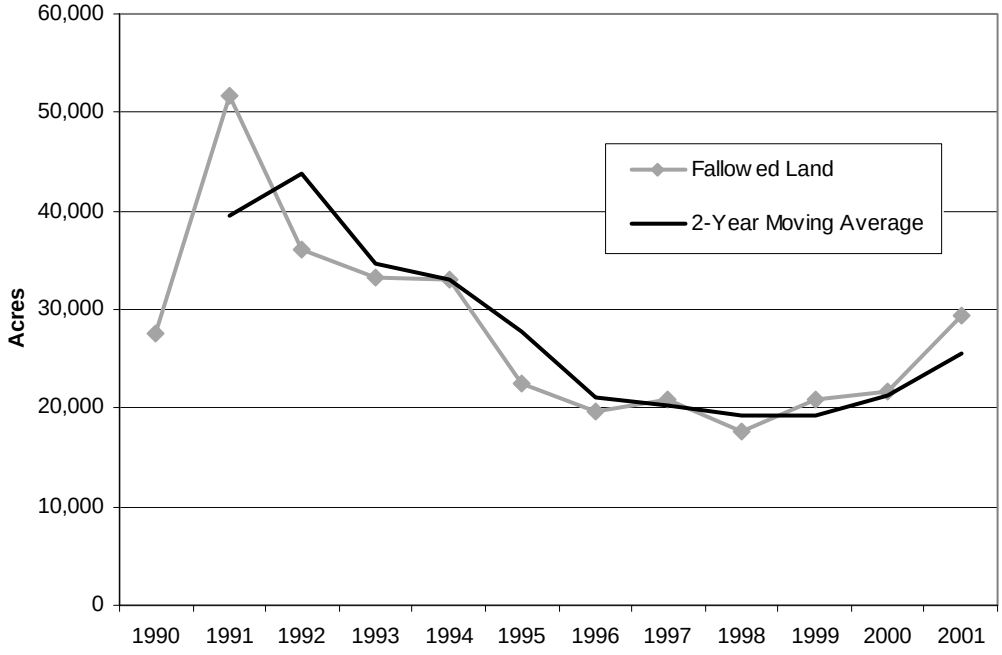



**Figure 2**
**Fallowed Land, WRMWSD**



## Cropping Pattern Changes by Service Area

WRMWSD includes lands served by surface water or ground water or, in some cases, both. Cropped acreage in the surface water service areas (without exclusion of double cropping) fell by 5,850 acres between 1990 and 1999 and a further 5,885 acres between 1999 and 2001. Cropped land in the ground water areas increased 10,621 acres between 1990 and 1999 and fell 4,135 acres between 1999 and 2001.[9] The amount of annual crops in surface water areas fell by 13,376 acres between 1990 and 1999 and a further 9,068 acres between 1999 and 2001. For the two periods in the ground water areas, annual crop land increased by 8,668 acres and fell by 5,128 acres. The acreage of permanent crops rose in both surface water and groundwater service areas (see Figures 3 and 4).

The decline in annual crops and increase in permanent crops in surface water areas relates well to lower prices for some annual crops and higher water prices over the period. As discussed elsewhere in this section, cotton prices have fallen in both nominal and real terms since 1990, and it is no longer feasible to grow cotton in many parts of Kern County. Many cotton producers have been impacted by a "cost-price squeeze" quite common in agriculture.

The shift to permanent crops in the surface water service areas suggests that farmers in those areas are confident that they will be able to obtain water regularly either from within or outside WRMWSD, with or without the 41,000 AF of water under consideration. The capital investment for establishing an orchard, grove, or vineyard can easily exceed $8,000 per acre, excluding land, and farmers will not make those investments unless they are confident that they will be able to obtain adequate water for commercial production or, at minimum, keeping the trees or vines alive. While SWP water certainly remains an important part of the total WRMWSD supply, the SWP component of supply has been supplemented by the development and availability of several sources of supplemental water discussed elsewhere in this section.

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9 Wheeler Ridge-Maricopa Water Storage District, various years, "Crop and Land Use Summary," Bakersfield. The changes also reflect, in part, the reclassification of lands within WRMWSD.

**Figure 3**
**Annual Crop Land in Surface and Ground Water Service Areas, WRMWSD**

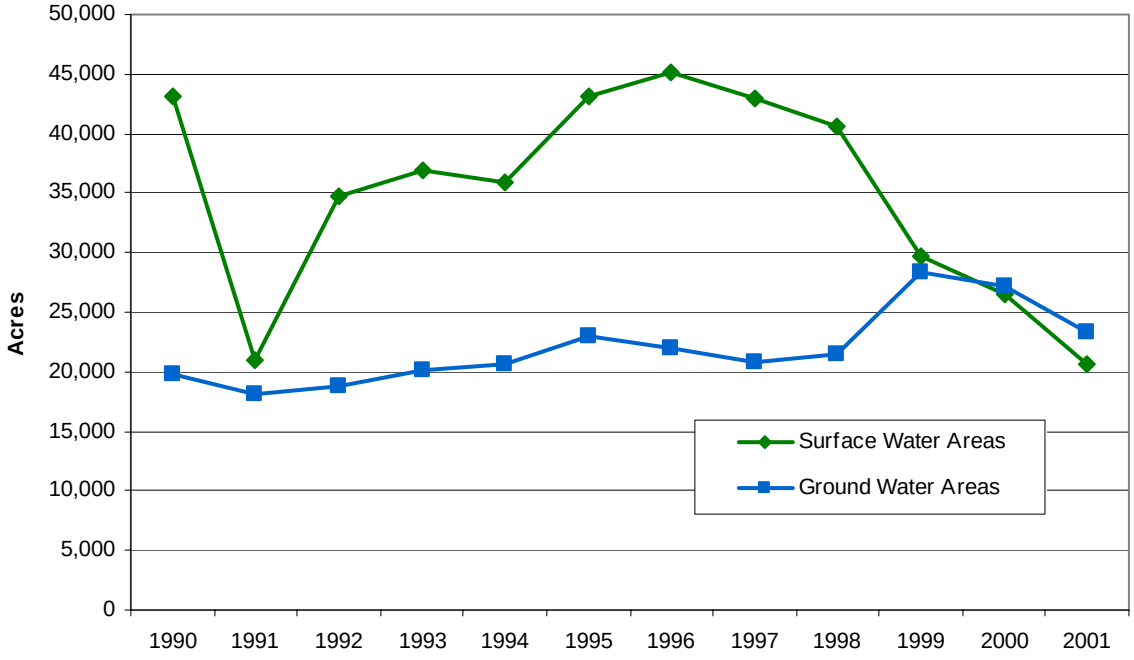
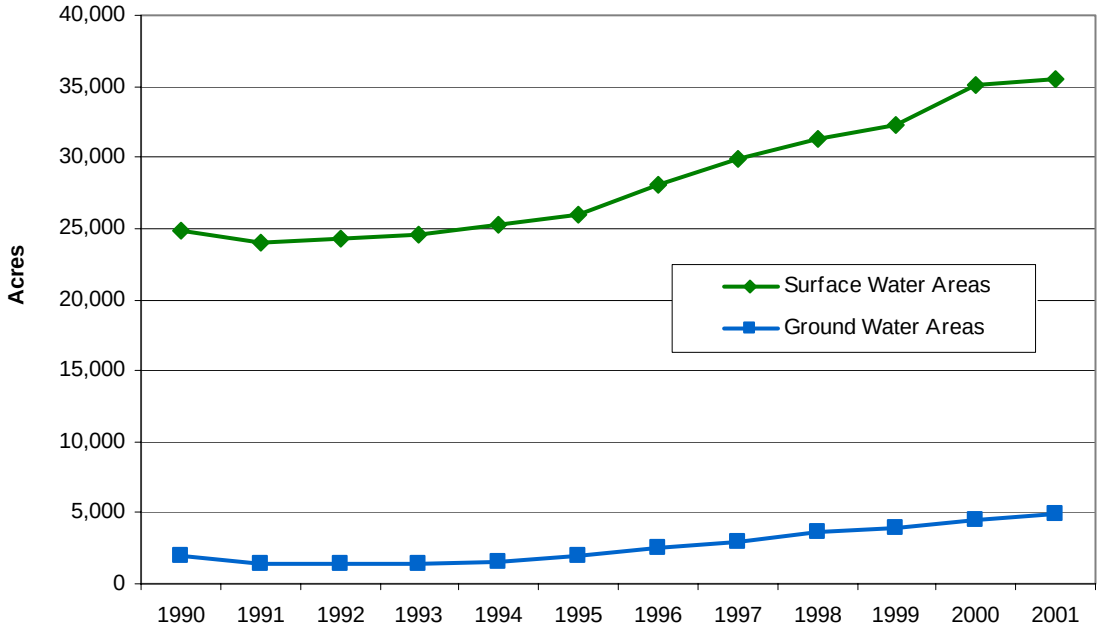



**Figure 4**
**Permanent Crop Land in Surface and Ground Water Areas, WRMWSD**



## Factors Accounting for Cropping Pattern Changes

Changes in cropping patterns, whether from one type of annual crop to another or from annual crops to permanent crops, may be due to several factors. Some of the more important within WRMWSD may include:[10]

- Market conditions and crop prices;
- Input requirements and costs;
- Soil and micro-climate characteristics;
- Crop rotation requirements, including fallowing;
- Water availability and cost;
- Government programs; and
- Contracts with crop processors.

Absent detailed information from each farmer in an area, it is not possible to attribute changes in cropping patterns to any of these or other individual factors. However, changes in prices and production costs for key crops, particularly cotton, grapes, and citrus, and in water costs and availability appear to have played important roles.

Cotton prices have declined in both nominal and real terms since 1990. Acala cotton grown in Kern County[11] sold at an average farm price of $0.77 per pound in 1990. Yield averaged 1,200 pounds per acre, and gross revenue thus averaged $924 per acre.[12] In 2001, the last year for which data are currently available, the average farm price for Acala cotton grown in Kern County was $0.68 per pound. Yield averaged 1,342 pounds per acre, and gross revenue averaged $905 per acre.

While average per-acre gross revenue fell 2.1 percent between 1990 and 2001, costs of production have increased sharply and profitability has declined or disappeared for many growers. In 1995, average total costs to produce cotton in the San Joaquin Valley were estimated at $815 per acre, assuming a yield of 1,250 pounds of lint and application of 2.5 AF

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10 These are discussed in more detail in the section on farm-level decision making.

11 Acala cotton has accounted for 76 to 93 percent of all Kern County cotton since 1990.

12 Kern County Department of Agriculture.

of water at $50 per AF.[13] The total cost figure excludes a payment for management or risk. Average gross revenue for cotton that year in Kern County was reported to be $815 per acre.[14] Thus, the average gross revenue for cotton in 1995 would just cover all costs, but not cover a payment to compensate for management and risk. Moreover, WRMWSD delivered water costs that year were between $58 and $193 per AF, depending on the zone of the district to which the water was delivered.[15] Thus, all other factors unchanged, cotton production in WRMWSD that year would have generated losses of between $20 and $483 per acre, disregarding any compensation for risk or management.[16]

Current published costs are $1,002 per acre for Acala cotton, assuming a lint yield of 1,250 pounds per acre and 2.5 AF of water at $60 per AF, but also excluding payments for risk and management.[17] Under these conditions and based on current cotton prices (assumed at $0.70 per pound, including loan deficiency payments), gross revenue would exceed total costs by $61 per acre, but without a return for management or risk. However, WRMWSD delivered water costs ranged from $89 to $230 per AF in 2001 and are expected to range from $101 to $260 per AF for all of 2002.[18] Clearly, cotton production is infeasible in parts of WRMWSD, and the result has been a continued shift from cotton to other, higher-profit crops

Many factors may affect the rate at which farmers change their crop mix. First, the market demands for fruits, nuts, and vegetable crops relative to supplies may signal that additional plantings of those crops would have adverse effects on prices. Second, processing capacity and the unavailability of processor contracts may limit the amount of vegetable crops such as tomatoes a farmer chooses to grow. Third, field and grain crops, while sometimes unprofitable in isolation, remain important parts of diversified crop rotations. Fourth, the crop history and risk characteristics of farmers may reduce the attraction of changing established cropping patterns.

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13 University of California Cooperative Extension, 1995.

14 Kern County Department of Agriculture.

15 Robert Kunde, WRMWSD, April 1, 2003, personal communication.

16 It is acknowledged that every farm is unique, characterized by soil type, debt levels, water sources and other factors. Moreover, acreage data show that cotton is clearly still profitable on some farms in WRMWSD. However, the sharp declines in cotton acreage since 1990 indicate that the crop is less profitable or unprofitable in many parts of the district.

17 University of California Cooperative Extension, 2003.

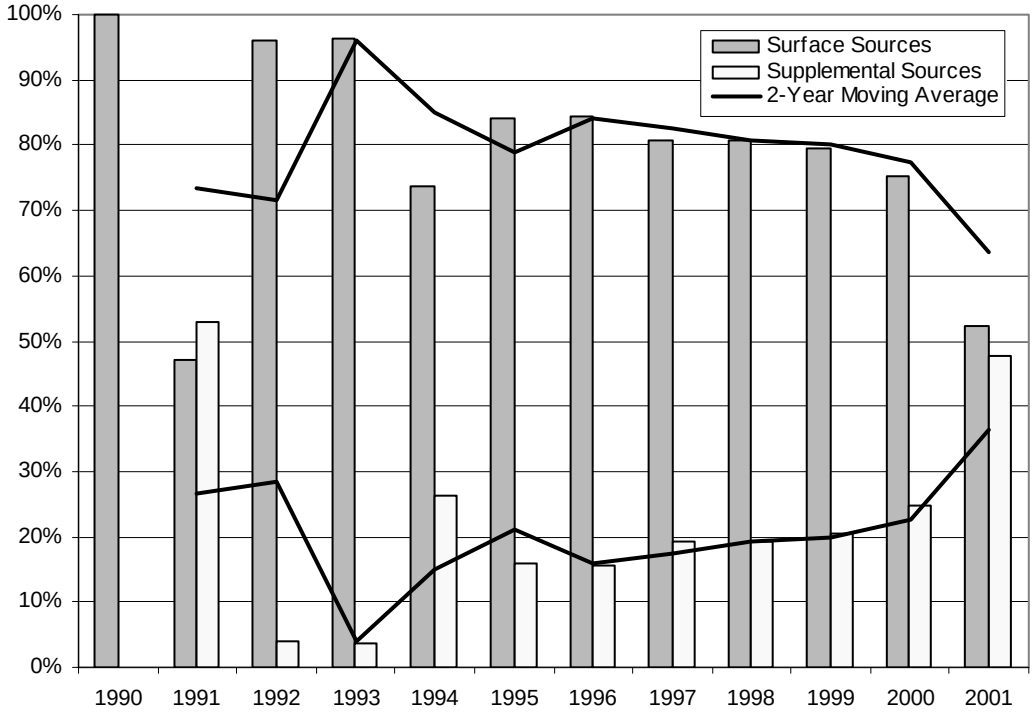
18 Robert Kunde, WRMWSD, April 1, 2003, personal communication.

## Water Sources and Costs

WRMWSD has a contract for SWP water through Kern County Water Agency and regularly provides that water to farmers as supplies permit. However, WRMWSD has also developed district wells and has access to other water sources such that its "water portfolio" is much more diversified today than it was in the late 1980s or early 1990s. Much of this diversification was in response to the nearly complete abrogation of the State of California's responsibility to provide a reliable water supply from the State Water Project, aggravated by the effects of the 1987-92 drought.

Several individual sources collectively comprise the "supplemental water." These include district wells, Blanco Rosa Improvement District wells, Kern Water Bank, Pioneer Project, Berrenda Mesa project, and miscellaneous supplies. Figure 5 shows that these alternative sources have become an increasingly-important component of total WRMWSD potential water availability. The two-period moving average trend line is clearly upward sloping, while that for traditional surface sources is declining. It should be noted that the data on which the figure is based include potential surface and supplemental water supplies rather than actual deliveries. Potential surface supplies are calculated as the sum of Article 21 water, carryover, user input, and the product (SWP Entitlement * Percentage of SWP Allocation) for each year.

**Figure 5**
**Surface and Supplemental Water Sources, WRMWSD**



## Water Use

WRMWSD maintains records for all water deliveries it makes each year. It does not obtain information on ground water pumping by individual farmers. Thus, total water use within the district for any given year is not a single number that can be taken from a report. Bookman-Edmonston Engineering developed average applied water requirements for crops grown in WRMWSD.[19] For this report, estimates of total applied water within WRMWSD were developed by using these figures and multiplying those rates by acreages taken from the annual WRMWSD crop reports. The application rates used are shown in Table 3. The estimated applications, total WRMWSD deliveries, and estimated water applied, but from other sources, are shown in Table 4.

For the period from 1990 through 1999, total annual deliveries by WRMWSD averaged 158,056 AF. From 1999 through 2001, they averaged 168,335 AF. Based on the application rates shown in Table 3 and the crop acreages shown in Table 2, WRMWSD deliveries accounted for about 63 percent of total water applied to crops in the service area from 1990 through 1999 and 65 percent from 1999 through 2001. It should be noted that the estimated applied water figures in Table 4 represent potential applications and assume that farmers were able to obtain all required water in each year. For years in which all water supplies were limited (e.g., 1991), the applied water figures shown overstate actual applications.

**Table 3**
**Average Applied Water Requirements for Various Crops Grown in WRMWSD**

| Crop | Average Applied Water Requirement (Acre-feet per acre) |
|---|---|
| Cotton | 3.00 |
| Sugar beets | 4.20 |
| Grains | 1.35 |
| Green feeds | 5.00 |
| Mixed produce | 2.20 |
| Melons | 2.20 |
| Vineyards | 2.80 |
| Deciduous nuts | 3.90 |
| Deciduous fruits | 3.90 |
| Citrus | 3.60 |
| Pomegranates | 3.60 |
| Eucalyptus/jojoba | 2.50 |

[19] Bookman-Edmonston Engineering.

## Table 4
## Estimated Applied Water, by Crop and Source, WRMWSD Service Area (Acre-Feet)

| Crop | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Cotton | 114,213 | 48,576 | 73,863 | 93,189 | 100,107 | 110,385 | 104,106 | 97,107 | 74,862 | 62,343 | 66,327 | 48,612 |
| Sugar beets | 3,037 | 3,133 | 3,465 | 2,894 | 1,554 | 1,718 | 634 | 0 | 760 | 0 | 0 | 0 |
| Grain | 3,634 | 4,658 | 13,310 | 11,019 | 5,048 | 12,866 | 15,935 | 11,074 | 21,041 | 16,551 | 12,820 | 12,566 |
| Green feeds | 9,180 | 5,730 | 6,030 | 7,210 | 7,570 | 10,010 | 8,685 | 14,615 | 14,685 | 16,700 | 14,665 | 14,620 |
| Mixed produce | 42,909 | 38,432 | 28,536 | 27,311 | 29,960 | 29,333 | 32,494 | 36,098 | 32,017 | 39,123 | 37,158 | 29,141 |
| Melons | 0 | 0 | 8,941 | 7,394 | 8,430 | 8,961 | 8,723 | 8,633 | 8,459 | 8,699 | 5,168 | 4,930 |
| Vineyard | 30,013 | 27,672 | 26,972 | 27,182 | 27,378 | 30,167 | 35,132 | 39,822 | 42,882 | 44,086 | 48,684 | 49,563 |
| Deciduous Nuts | 26,774 | 26,906 | 26,910 | 27,386 | 28,856 | 28,295 | 29,796 | 29,734 | 31,972 | 32,686 | 33,185 | 32,639 |
| Deciduous Fruit | 8,089 | 8,198 | 7,851 | 7,831 | 8,034 | 8,057 | 8,401 | 8,600 | 8,206 | 7,757 | 8,026 | 7,519 |
| Citrus | 22,363 | 22,439 | 24,030 | 24,955 | 26,068 | 26,896 | 28,332 | 30,535 | 32,436 | 35,053 | 40,043 | 43,308 |
| Pomegranates | 875 | 875 | 1,264 | 1,264 | 1,264 | 1,264 | 1,264 | 1,264 | 1,217 | 1,357 | 1,357 | 1,357 |
| Eucalyptus/jojoba | 1,640 | 230 | 533 | 35 | 15 | 15 | 48 | 48 | 48 | 48 | 48 | 48 |
| Total estimated applied water [1/] | 262,726 | 186,848 | 221,704 | 237,670 | 244,283 | 267,965 | 273,549 | 277,527 | 268,584 | 264,402 | 267,480 | 244,303 |
| Total WRMWSD Deliveries | 187,335 | 65,274 | 125,979 | 146,524 | 160,564 | 162,138 | 202,581 | 198,305 | 149,292 | 182,570 | 183,929 | 138,506 |
| WRMWSD Deliveries/Total estimated applied water | 71% | 35% | 57% | 62% | 66% | 61% | 74% | 71% | 56% | 69% | 69% | 57% |
| Estimated Water Applied From Other Sources | 75,391 | 121,574 | 95,725 | 91,146 | 83,720 | 105,827 | 70,968 | 79,222 | 119,292 | 81,832 | 83,551 | 105,797 |

1/ Assumes supplies available regardless of source.

Total water applied within the WRMWSD service area fell from an estimated 277,527 AF in 1997 to 244,303 AF in 2001. Applied water for cotton fell almost 49,000 AF, mixed produce fell 6,900 AF, and melons fell 3,700 AF, paralleling reported acreage declines for those crops. In contrast, applied water on all permanent crops except deciduous fruits increased.

# Decision-Making by Farmers

The data shown in the previous section reflect the combined effects of innumerable decisions made by farmers in the WRMWSD service area each year. Farm-level decision making in WRMWSD and every other agricultural area is a continuous process that adheres to and at times departs from traditional economic theory and models.

Farmers operate, more than most other industries, in an environment closely aligned with the "purely competitive" model of economics.[20] Agriculture includes thousands of producing units all making decisions independent of each other, virtually all are price takers, all have access to good information about markets and prices, and all, or nearly all, are trying to earn as much profit as they can from their operations.

There are extensive domestic and international influences on agriculture. Domestically, the price of natural gas affects fertilizer prices, the price of crude oil affects costs of gasoline and diesel fuel, interest rates affect the cost of operating loans, and economic growth affects consumer demands for all types of products. Agriculture is also subject to many influences from the global economy, evident in the tariffs in the U.S. and other countries on agricultural imports, the increasing production of such crops as cotton and deciduous nuts in Asia, and fluctuating exchange rates.

The decision-making framework which farmers must employ for their operations therefore includes considerations well beyond the farm gate. The results are indicated by decisions such as:

- Crops to plant and when;
- Inputs used and in what combinations;
- When and how to acquire or sell resources;
- When and where to sell harvested crops; and
- When to adopt new technology.

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20 See Henderson and Quandt.

## Profit Maximization

One of the key assumptions in agricultural economics and farm management is that farmers attempt to use resources in a way that will maximize the profit of their operations.[21] An expanded form of that assumption is that farmers, with limited capital, attempt to allocate resources to their land in order to maximize profit across all crops they grow. There are many combinations of inputs which farmers can use in their operations, reflecting opportunities and costs. For example, weeds can be controlled chemically or with manual labor. Seeding and harvesting can be accomplished mechanically or by hand. Land preparation and fertilizing can be undertaken by the farmer or performed by custom operators.

In attempting to maximize profits, farmers weigh the tradeoffs and combine inputs in such a way that, at the margin, the value of product produced with each unit of input is the same for all inputs. All other factors unchanged, so long as the "value of marginal product" is greater for one input than for others, it is rational for the farmer to use at least one more unit of that input because the revenue from the product produced with that unit will exceed the cost of the input.[22] It is reasonable to assume that this framework is applicable not only to such inputs as fertilizer and chemicals, but also to water.

## Crop Rotations and Profit Maximization Over Time

The decision-making framework is somewhat more complicated for the more realistic situation of farming continuously over time rather than in many separate single-year periods. This is particularly true for trees and vines, which take several years to mature and then remain productive for many years. However, for farmers growing several annual crops, a realistic goal would be to maximize profits over a crop rotation. Rotations generally include a sequence which alternates a variety of crops. Rotations may involve several crops and cover a period of several years. Accordingly, crop rotations may have a direct effect on the cropping pattern data reported for a given area.

The purposes of rotations include rebuilding soil nutrient levels, reducing pest concentrations and disease problems, and enhancing soil organic matter. It has been demonstrated that continuously planting the same crop on land causes the population of soil borne pathogens to

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21 See, for example, Heady and Kay and Edwards.

22 It is recognized that not all farmers are in business to maximize profits and do not have, at all times, the information possibly relevant to efficient decision making. However, given the unavailability of information on alternative goals, it is usually assumed that farmers are in business to maximize their profits. See Heady.

increase.[23] Planting crops that are not hosts helps to reduce the populations of those pathogens. Plants which belong to the same family or class of plants (e.g., broadleaf) often share similar pest problems. Thus, effective rotations must incorporate crops which are not closely related.

Some of the factors which affect the rotations used by farmers include the following:[24]

- Cropping history;
- Grower experience;
- Input requirements for crops;
- Compatibility of crops with existing equipment complement and with labor;
- Existing array of pests; and
- Value of crop and market conditions.

Cotton has traditionally been the core crop for rotations in many parts of Kern County. Historically, rotations included cotton and small grains, both grown for commercial sale.[25] More recently, however, small grains have not been grown as extensively for commercial sale because of low crop prices.[26] They are still grown for silage. Other crops more typically included in cotton rotations are tomatoes, onions, melons, carrots, and alfalfa. Typical rotations might include:

- Two years of cotton and one year of tomatoes or melons;
- Two years of cotton, one year of tomatoes or melons or onions, and three years of alfalfa; and
- One or two years of cotton, three years of alfalfa, one year of tomatoes or melons or onions or carrots, and one year of small grain.

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23 See Nunez.

24 University of California Cooperative Extension, 1995.

25 Brian Marsh, University of California Cooperative Extension, Bakersfield, March 26, 2003, personal communication.

26 Between 1996 and 2001, farm-level barley prices fell from $147 per ton to $84.40 per ton, while those for wheat fell from $168 per ton to $112 per ton. See Kern County Department of Agriculture.

By incorporating small grain and comparable crops into rotations, farmers sometimes appear to be growing economically-inefficient crops. However, the use of low-return crops such as small grains in rotations often reflects agronomic rather than purely economic considerations. The value from these crops would be reflected in better soil conditions and higher yields for other rotation crops in subsequent years. Thus, because of rotations, profit maximization must be viewed from a multi-year rather than a single-year perspective.

Fallowing may be an integral part of crop rotations. Fallowing, with a cover crop, may offer efficient opportunities to rebuild soil organic matter and conserve soil moisture. In addition, farmers may fallow some of their land in order to divert irrigation water usually used there to other, more productive parts of their farms. Farmers may also fallow land in order to be eligible for provisions of various government farm programs or as a component of reduced-tillage strategies.

Table 2 includes data on fallowed land, as reported by WRMWSD. Between 1990 and 2001, an average of 27,827 acres were fallowed within the district. Variation between years averaged plus or minus 9,651 acres, and that variation relative to the mean was 34.7 percent. Thus, over a three-year period, the change in the amount of land fallowed could range from (9,651) to 28,953 acres. Consequently, because so many independent farm-level decisions account for fallowed acreage for the entire district, it is impossible to attribute the increase shown since 1998 to any single factor, whether changes in water supplies, crop prices, input costs, or any other.

## Effects of Water Costs and Availability

As noted previously, changes in measured cropping patterns for an area may be due to a variety of factors, such as market conditions, crop prices, government programs, contracts with crop processors, and soil and climate characteristics. For farmers in WRMWSD and throughout the San Joaquin Valley, the availability and cost of water are also critical factors in decisions on which crops to grow and thus in reported cropping patterns. As water reliability is reduced or water costs increase, economic theory as well as reported data suggest that farmers will adjust their crop and input choices to reflect the greater relative scarcity or cost of the resource.

For SWP water, both factors are likely important. Reliability of SWP water was addressed in a recently-completed report, which projected likely delivery capability of the system through 2021.[27] The key findings were that:

[27] California Department of Water Resources, 2002.

- In 75 percent of the years, the annual water delivery of the SWP is estimated to be at least 66 percent of full Table A deliveries

- In 50 percent of the years, annual water delivery is estimated to be at least 83 percent; and

- In 10 percent of the years, annual water delivery is estimated to be at least 98 percent.

Moreover, costs of SWP water and other key inputs have risen, in some cases to the point that uncertainties over water deliveries, crop prices, and other key variables have caused some farmers to change their rotations and crop selection. The shift from annual crops, particularly cotton, to permanent crops in WRMWSD likely reflects this behavior. As discussed previously, cotton production is no longer feasible for many farmers. Similar shifts in ground water service areas likely reflect the increased costs of production, including higher energy costs for pumping.

Figure 6 shows the amount of fallowed land in WRMWSD. As shown, fallowed acreage peaked in 1991 because of severely-limited water supplies during the drought. By 1995, net cropped acreage had reached its 1990 level, and the amount of land fallowed had fallen to a more representative level. Prior to 1998, most of the fallowed land was in the surface water service areas. Since then, an increasing amount of fallowed land has been in ground water service areas. It is likely that some land has been fallowed for longer periods or idled in both surface water and groundwater service areas more recently because of low crop prices. In particular, the average Kern County price for Acala cotton fell from $0.84 per pound in 1995 to $0.68 per pound in 2001.[28] Over that same period, the average Kern County price for Pima cotton fell from $1.28 per pound to $0.86 per pound. Average Kern County prices for barley and wheat peaked in 1996, then fell, respectively, from $147 to $84.40 per ton; and from $168 to $112 per ton. Clearly, many farmers during this period realized that they would be unable to cover even variable production costs and very likely decided to fallow rather than plant crops.

There is no clear relationship between SWP water deliveries and fallowed land in WRMWSD. While SWP deliveries fell from 1996 to 1998, the amount of fallowed land in surface water areas decreased rather than increased. Between 1998 and 2000, SWP deliveries rose, yet the amount of fallowed land increased. Both sets of data indicate that fallowing decisions by farmers have not been based on SWP availability. If SWP water were the only irrigation source in WRMWSD, it would be only logical that as SWP deliveries fell, fallowing would increase. However, because of the diverse water supplies available to irrigators in the district, that relationship is not valid.

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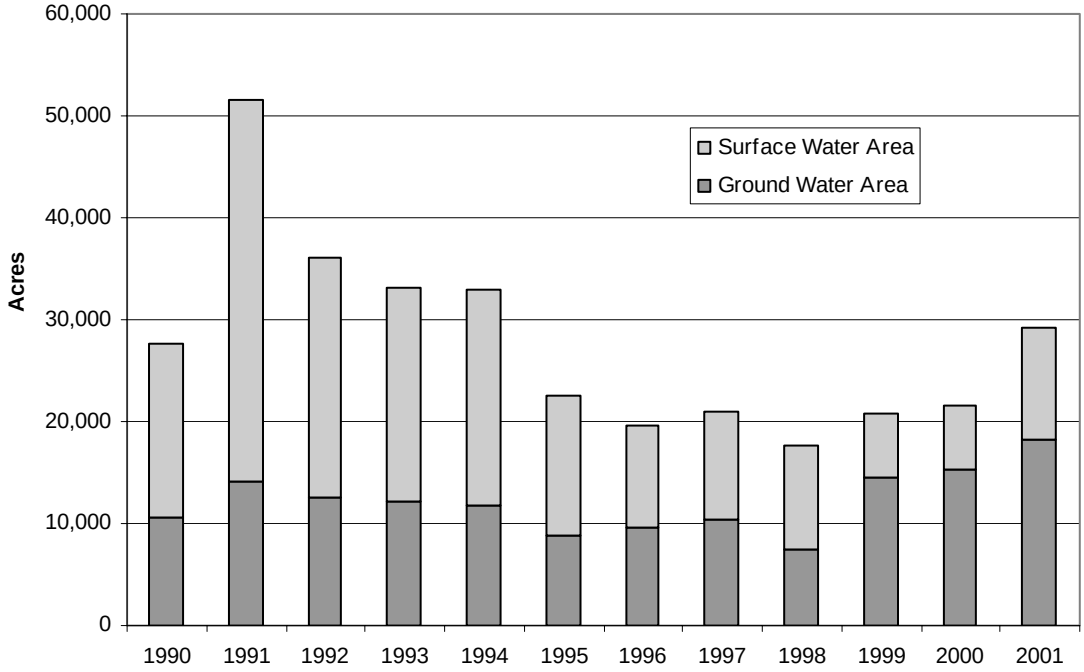
[28] See Kern County Department of Agriculture.

**Figure 6**
**Fallowed Land in Ground Water and Surface Water Service Areas, WRMWSD**



# Results

This section evaluates the expected effects on agricultural practices, including land fallowing, of the 41,000 AF transfer of SWP water from WRMWSD. It draws from the discussion of farm-level decision making and from a review of data presented throughout the report. The approach utilized to estimate the impacts relies on a review of long-term water demands in WRMWSD and of other data previously presented. Discussion includes the expected effects of the transfer during normal and wet years and in dry years on district supplies and costs and on farmer responses.

Table 4 shows that total WRMWSD deliveries of water from all sources since 1990 have varied from a minimum of about 65,000 AF in 1991 to a maximum of nearly 203,000 AF in 1996. Table 4 also shows that estimated total applied water requirements have ranged from about 187,000 AF in 1991 to nearly 278,000 AF in 1997. Estimated total water applied using all water sources fell by 13,125 AF between 1997 and 1999 and by an additional 20,099 AF between 1999 and 2001. Much of this decline is likely attributable to reductions in planted acreages of cotton and other annual crops for which prices dropped so dramatically beginning in the mid 1990s. From 1990 through 1999, WRMWSD deliveries accounted for an average of 63 percent of total applied water. From 1999 through 2001, they accounted for 65 percent.

Prior to the 41,000 AF transfer, WRMWSD had a water supply contract to Kern County Water Agency for Table A amount of about 238,000 AF of SWP water. In normal or wet years, the 41,000 AF is in excess of district needs. It is therefore reasonable to assume that in those years, the transfer would have no or minimal adverse effects on overall water supply. Moreover, the water is in excess of district needs in dry years because of the supplemental sources to which WRMWSD has access. Moreover, in wet, normal, or dry years, irrigator water costs would not be adversely affected by the transfer. .Therefore, because neither the quantity nor cost of district water should be affected adversely, the transfer should have very limited, if any, impacts on land fallowing..

In a critically-dry year or series of such years, the unavailability of part of the WRMWSD SWP contract amount may contribute to a minor mismatch between water supply and

demand. If overall water costs increase, there may be some farm-level impacts. WRMWSD has jointly used several of its supplemental sources only in 2001. The variable and fixed costs (excluding capital costs) for that year did not differ substantially from SWP costs over the previous five years. If the costs in 2001 are representative, the incremental impacts of the transfer on delivered water costs to farmers should be minor. The amount of land fallowed in this dry year scenario, including the transfer, should not be materially different from the normal variation in cropped and fallowed acreage between years

Finally, it should be noted that the transfer discussed in this report is part of the broad WRMWSD strategy of increased efficiency and development and use of the sources of water which are most compatible with that strategy. In particular, by selling unneeded SWP water supplies, WRMWSD is able to avoid the carrying costs for that water even in years when it is not needed. Overall, the water supplies from the supplemental sources more than offset the reduced SWP Entitlement and, when the carrying cost of holding excess SWP entitlement is considered, at a lower cost.[29]

[29] William Taube, WRMWSD, May 23, 2002, personal communication.

# References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# Attachment A - Tables Included in the Responses to Comments

**Table A-1. Projected Future Water Supplies and Demands in Average Hydrologic Conditions for the CLWA Service Area**
(all values in AF)

| *Year* | *Projected Total Average Year Supply (AF)*[1] | *Projected Total Average Demand*[2] | *Projected Total Average Supply Less Total Average Demand* |
|---|---|---|---|
| 2005 | 114,300 | 75,100 | 39,200 |
| 2010 | 114,300 | 82,400 | 31,900 |
| 2015 | 114,300 | 91,600 | 22,700 |
| 2020 | 114,300 | 102,500 | 11,800 |

*Note:* Refer to Tables 3.15-7 and 3.15-9 in the Draft EIR for additional detail.

1. Includes Table A Amount, SWP flexible storage, Semitropic Storage (24,000 AF stored in 2002), and groundwater sources (Alluvial Aquifer and Saugus Formation). Does not include additional 35,000 AF of SWP Table A water stored in Semitropic in 2003. Table A values based on current Table A Amount of 95,200 AF (which includes the Project), and percentages for Table A deliveries from DWR's SWP Delivery Reliability Report (DWR 2003b). The average year supply is the average amount of water available based on DWRSIM model results over its entire period of hydrologic record.

2. Includes municipal and industrial, other demands including irrigated agriculture and miscellaneous uses, and projected conservation.

**Table A-2. SWP Surplus Water[1] Types**

| *Without Monterey Amendment (Including With Implementation of Article 18(b))* | *With Monterey Amendment* |
|---|---|
| **Scheduled surplus water -** Water that DWR determined to be available, in addition to Table A supplies, which was scheduled for delivery throughout the year (in the same manner as Table A supplies). This water was generally available only during the early years of the SWP (when Contractor demands for Table A water were low).[2] | Category deleted as part of the Monterey Amendment. (Given increased Contractor demands through time, this water is physically no longer available.) |
| **Unscheduled surplus water -** Water that DWR made available when water and capacity were available in excess of SWP storage needs and Table A supplies. This water is only available for limited time periods, generally only in the winter or early spring when Contractors demands are low, and only under specific conditions that do not occur on an annual basis. | **Article 21 water -** Same as unscheduled surplus water. Article 21 water was defined under the Monterey Amendment as "interruptible water" but is more commonly referred to as "Article 21 water." |

1. Surplus water is SWP water that can be made available to Contractors when water and capacity are available in excess of SWP storage needs and Table A supplies. See above for terminology for and descriptions of specific types of surplus water. Note that surplus water terminology changed with implementation of the Monterey Amendment.
2. Under the With Implementation of Article 18(b) scenario, scheduled surplus water would once again be available because, with Table A Amounts reduced to a new minimum project yield, water supplies would once again be available in excess of reduced Table A Amounts.

**Table A-3. Comparison of DWRSIM Model Results with the SWP Delivery Reliability Report for the 41,000 AF Table A Amount**

(All values in AF and rounded to the nearest 100 AF)

| | *Average Year*[1] | *Single Dry Year*[1] | *Multiple Dry Year Period*[1] |
|---|---|---|---|
| **Current Conditions (1998 or 2001)**[2] | | | |
| DWRSIM Results (With Monterey Amendment)[3] | 34,400 | 9,200 | 18,100 |
| SWP Delivery Reliability Report[4] | 29,400 | 8,000 | 14,800 |
| **Difference** | **5,000** | **1,200** | **3,300** |
| **Future Conditions (2020 or 2021)** [2] | | | |
| DWRSIM Results (With Monterey Amendment) [5] | 32,000 | 9,200 | 17,600 |
| SWP Delivery Reliability Report[4] | 30,600 | 8,200 | 15,000 |
| **Difference** | **1,400** | **1,000** | **2,600** |

1. The average year supply is the average amount of water available based on DWRSIM model results over its entire 73-year period of hydrologic record. The single dry year supply is the supply available in the single year with the lowest total SWP deliveries based on DWRSIM model results (1977). Multiple dry year period supply is the average amount of water available over the four consecutive drought years of 1988 through 1991 based on DWRSIM model results.
2. Current conditions for the DWRSIM model results and the SWP Delivery Reliability Report are 1998 and 2001 conditions, respectively. Future conditions for the DWRSIM model results and the SWP Delivery Reliability Report are 2020 and 2021, respectively.
3. Based on water deliveries from DWRSIM study 1995D06E-CALFED-771. This study used 1998 DWR estimates of then-existing SWP Contractor demands.
4. Values based on DWR SWP Delivery Reliability Report results and applying the same methodology suggested by DWR in its report.
5. Based on water deliveries from DWRSIM study 2020D09C-CALFED-786.

**Table A-4. Permanent Table A Transfers Completed Under the Monterey Amendment Provisions (Article 53)**

| *From (Seller)* | *To (Buyer)* | *Amount (AF)* | *Year Effective* | *CEQA Status* |
|---|---|---|---|---|
| COMPLETED TRANSFERS | | | | |
| Berrenda Mesa Water District | Mojave Water Agency | 25,000 | 1998 | NOD – 11/1996 |
| Belridge Water Storage District | Palmdale Water Agency | 4,000 | 2000 | NOD – 7/1998; NOD – 4/1999 |
| Berrenda Mesa Water District | Alameda County Flood Control and Water Conservation District Zone 7 | 7,000 | 2000 | NOD – 3/1996 |
| Lost Hills Water District | Alameda County Flood Control and Water Conservation District Zone 7 | 15,000 | 2000 | NOD – 7/1998 |
| Belridge Water Storage District | Alameda County Flood Control and Water Conservation District Zone 7 | 10,000 | 2001 | NOD – 7/1998; NOD – 4/1999 |
| Belridge Water Storage District and Berrenda Mesa Water District | Solano County Water Agency | 5,756 | 2001 | NOD – 7/1998; NOD – 4/1999 |
| Belridge Water Storage District and Berrenda Mesa Water District | Napa County Flood Control and Water Conservation District | 4,025 | 2001 | NOD – 12/2000 |
| **Subtotal** | | **70,781** | | |
| ANTICIPATED TRANSFER | | | | |
| Berrenda Mesa Water District | Undetermined | 16,000 | Unknown | NOP – July 2003; No further action taken |
| **Subtotal** | | **16,000** | | |
| **Total** | | **86,781** | | |

# Attachment B – DEIR Mailing List

# MAILING LIST
# DRAFT EIR FOR CLWA'S SUPPLEMENTAL WATER PROJECT TRANSFER OF 41,000 ACRE-FEET OF STATE WATER PROJECT TABLE A AMOUNT

| *Agency/Organization/ Company Name* | *Contact Name* | *Title* | *City* | *State* |
|---|---|---|---|---|
| ***Alameda County (SC)*** | James Sorenson | Planning Director Planning Department | Hayward | CA |
| ***Alameda County Water District*** | Eric Cartwright | Water Resources Planning | Fremont | CA |
| ***Alameda County Flood Control and Water Conservation District, Zone 7*** | Dale Myers | General Manager | Pleasanton | CA |
| ***Amador County (SC)*** | Susan C. Grijalva | Planning Director | Jackson | CA |
| ***Antelope Valley-East Kern Water Agency*** | Russ Fuller | General Manager | Palmdale | CA |
| ***Audubon Society of California*** | Dan Taylor | Executive Director | Sacramento | CA |
| ***Beale Memorial Library*** | Nila G. Stearns | | Bakersfield | CA |
| ***Belridge Water Storage District*** | Greg A. Hammett | General Manager | Bakersfield | CA |
| ***Berrenda Mesa Water District*** **(R)** | Harry O. Starkey | General Manager | Bakersfield | CA |
| ***Black & Veatch*** | Dave Argo | | Irvine | CA |
| ***Buena Vista Water Storage District*** | Martin Milobar | Engineer-Manager | Buttonwillow | CA |
| ***Building Industry Association, Greater LA/Ventura Chapter*** | Ray Garcia | | Calabasas | CA |
| ***Butte County (SC)*** | Yvonne Christopher | Director | Oroville | CA |
| ***Calaveras County (SC)*** | Kim Hansen | Planning Director Planning Department | San Andreas | CA |
| ***California Air Resources Board*** | James Morgester | Chief | Sacramento | CA |
| ***California Department of Fish & Game, Region 5 Headquarters*** **(T)** | Patricia Wolf | Regional Manager | Long Beach | CA |
| ***California Department of Fish & Game, Sacramento*** | | | Sacramento | CA |
| ***California Department of Health, Drinking Water Program*** | Wayne Hubbard | | Sacramento | CA |
| ***California Department of Health, Sacramento*** | Dat Tran | Drinking Water Program | Sacramento | CA |
| ***California Department of Parks and Recreation*****(T)** | Ruth Coleman | Director | Sacramento | CA |
| ***California Department of Transportation*** | Marta E. Frausto | Planning | Fresno | CA |
| ***California Department of Transportation, District 7*** | Stephan J. Buswell | IGR / CEQA Branch Chief | Los Angeles | CA |

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| *Agency/Organization/ Company Name* | *Contact Name* | *Title* | *City* | *State* |
|---|---|---|---|---|
| ***California Department of Transportation, District 7*** | R.W. Sassaman | District Director | Los Angeles | CA |
| ***California Department of Water Resources, Glendale*** | Charles R. White | Chief<br>Southern District | Glendale | CA |
| ***California Department of Water Resources, Sacramento*(R)** | Dan Flory | Chief SWP Analysis Office | Sacramento | CA |
| ***California Department of Water Resources, Sacramento*(R)** | Peggy Bernardy | Chief Counsel | Sacramento | CA |
| ***California Department of Water Resources, Sacramento*(R)** | Delores Brown | Division of Environmental Services | Sacramento | CA |
| ***California Division of Planning*** | | | Sacramento | CA |
| ***California Highway Patrol, Valencia*** | | | Valencia | CA |
| ***California Native Plant Society, Bakersfield*** | Ellen Cypher | President<br>Kern County Chapter | Bakersfield | CA |
| ***California Native Plant Society, Sacramento*** | | | Sacramento | CA |
| ***California Public Utilities Commission*** | Environmental Review Team | | San Francisco | CA |
| ***California Regional Water Quality Control Board, Central Valley Region*** | Loren Harlow | Executive Officer | Fresno | CA |
| ***California Regional Water Quality Control Board, Los Angeles (Region 4)*** | John Bishop | Director of Regional Programs | Los Angeles | CA |
| ***California State Clearinghouse*** | Governor's Office of Planning and Research | | Sacramento | CA |
| ***California State University, Fullerton*** | South Central Coastal Information Center | Department of Anthropology | Fullerton | CA |
| ***California State Water Resources Control Board*** | | | Sacramento | CA |
| ***Casitas Municipal Water District*** | John Johnson | | Oak View | CA |
| ***Castaic Lake State Recreation Area*** | Mika Yamamoto | Superintendent | Castaic | CA |
| ***Castaic Lake Water Agency*** | Mary Lou Cotton | Assistant to the General Manager | Santa Clarita | CA |
| ***Castaic Union School District*** | Mrs. Beverly Silsbee | Superintendent | Valencia | CA |
| ***Cawelo Water District*** | John Jones | District Manager | Bakersfield | CA |
| ***Central Coast Water Authority (CCWA)*** | Bill Brennan | | Buellton | CA |
| ***City of Los Angeles*** | Vitaly Troyan | City Engineer | Los Angeles | CA |

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| *Agency/Organization/ Company Name* | *Contact Name* | *Title* | *City* | *State* |
|---|---|---|---|---|
| ***City of Los Angeles, Environmental Affairs Department*** | Detrick B. Allen | General Manager | Los Angeles | CA |
| ***City of Santa Clarita*** | Vince Bertoni | Interim Director Planning and Building Services Department | Santa Clarita | CA |
| ***City of Santa Clarita*** | Ken Pulskamp | City Manager | Santa Clarita | CA |
| ***City of Yuba City*** | | Public Works Director | Yuba City | CA |
| | Nancy Clemm | | Los Angeles | CA |
| ***Coachella Valley Water District*** | Tom Levy | General Manager | Coachella | CA |
| ***Colusa County (SC)*** | Kent Johanns | Director Department of Planning and Building | Colusa | CA |
| ***Contra Costa County (SC)*** | Dennis Barry | Director of Community Development | Martinez | CA |
| ***County of Kings*** | Larry Spikes | | Hanford | CA |
| ***Crestline-Lake Arrowhead Water Agency*** | | General Manager | Crestline | CA |
| ***Desert Water Agency*** | Dan Ainsworth | General Manager | Palm Springs | CA |
| ***Dudley Ridge Water District*** | | General Manager | Fresno | CA |
| ***Ecology Center of Southern California*** | | | Los Angeles | CA |
| ***El Dorado County (SC)*** | Conrad B. Montgomery | Planning Director Planning Department | Placerville | CA |
| ***Empire West Side Irrigation District*** | | General Manager | Stratford | CA |
| ***Environmental Defense Fund*** | Tom Graff | | Oakland | CA |
| ***Fresno County (SC)*** | Margie McHenry | Senior Staff Analyst Department of Public Works and Planning | Fresno | CA |
| ***Friends of the Santa Clara River*** | | Chairman | Newbury Park | CA |
| ***Glenn County (SC)*** | Christy Leighton | Principal Planner Planning Department | Willows | CA |
| ***Hansen Consulting*** | David P. Hansen, PE | | Palmdale | CA |
| ***Hatch & Parent*** | Susan Petrovich | | Santa Barbara | CA |
| ***Henry Miller Water District*** | Joe Lutje | Manager | Bakersfield | CA |
| ***Imperial County (SC)*** | Jurg Heuberger | Director, Planning | El Centro | CA |
| ***Inyo County*(SC) *Planning Department*** | | Planning Director | Independence | CA |

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| *Agency/Organization/ Company Name* | *Contact Name* | *Title* | *City* | *State* |
|---|---|---|---|---|
| ***Kern Council of Governments*** | Roger Taylor | Principal Planner | Bakersfield | CA |
| ***Kern County*(CC)** | Rebecca Brownlee | County Clerk | Bakersfield | CA |
| ***Kern County*(CC)** | Ted James | Division Chief<br>Department of Planning & Development | Bakersfield | CA |
| ***Kern County*(CC)** | David Price III | Director<br>Department of Planning & Development | Bakersfield | CA |
| ***Kern County Board of Supervisors*** | Denise Pennell | Clerk of the Board | Bakersfield | CA |
| ***Kern County Water Agency*(R)** | Thomas N. Clark | General Manager | Bakersfield | CA |
| ***Kings County*(SC)** | Bill Zumwalt | Director of Planning<br>Planning Department | Handord | CA |
| ***Kern Delta Water District*** | Mark Mulkay | Engineer-Manager | Bakersfield | CA |
| ***Kronick, Moskovitz, Tiedemann & Girard*** | Cliff Schulz | | Sacramento | CA |
| ***Lake County (SC)*** | Mary Jane Fagalde | Director of Community Development | Lakeport | CA |
| ***Lassen County (SC)*** | Robert K. Sorvaag | Director<br>Department of Community Development | Susanville | CA |
| ***Lennar Communities, Southern California Division*** | Bob Santos | Senior Vice President | Mission Viejo | CA |
| ***Littlerock Creek Irrigation District*** | Brad Bones | | Littlerock | Ca |
| ***Local Agency Formation Commission, Los Angeles* (R)** | | | Glendale | CA |
| ***Local Agency Formation Commission, Los Angeles* (R)** | Attn: Waste Management Division | Public Works Department | Alhambra | CA |
| ***Local Agency Formation Commission, Los Angeles* (R)** | Attn: Land Development Division | Public Works Department | Alhambra | CA |
| ***Local Agency Formation Commission, Los Angeles* (R)** | Attn: Waterworks and Sewer Maintenance Division | Brian D. Hooper<br>Public Works Department | Alhambra | CA |
| ***Local Agency Formation Commission, Los Angeles* (R)** | Attn: Planning Division | Public Works Department | Alhambra | CA |
| ***Local Agency Formation Commission, Los Angeles* (R)** | Creg David, Watershed Management Division | Public Works Department | Alhambra | CA |

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| *Agency/Organization/ Company Name* | *Contact Name* | *Title* | *City* | *State* |
|---|---|---|---|---|
| ***Local Agency Formation Commission, Los Angeles* (R)** | James A. Noyes | Director of Public Works Public Works Department | Alhambra | CA |
| ***Los Angeles County Board of Supervisors*** | Violet Varona-Lukens | Executive Officer | Los Angeles | CA |
| ***Los Angeles County Department of Parks and Recreation*** | Timothy Gallagher | Director | Los Angeles | CA |
| ***Los Angeles County Department of Parks and Recreation*** | Lillie Lowery | Department Facilities Planner 1 | Los Angeles | CA |
| ***Los Angeles County Fire Department*** | Lily Cusick | Forestry Division | Commerce | CA |
| ***Los Angeles County Fire Department*** | David Leininger | Chief, Forestry Division | " | " |
| ***Los Angeles County Public Library*** | Michele Mathieu | | Downey | CA |
| ***Los Angeles County Public Library, Canyon Country Jo Anne Darcy Library*** | Susan Browman | | Canyon Country | CA |
| ***Los Angeles County Public Library, Valencia*** | Dan Golden | | Valencia | CA |
| ***Los Angeles County Public Library, Newhall*** | Judy Hist | | Newhall | CA |
| ***Los Angeles County Regional Planning*** | Kerwin Chih | Impact Assessment Section Director | Los Angeles | CA |
| ***Los Angeles County Regional Planning, Recorder's Office*(CC)** | Conny B. McCormack | Registrar-Recorder/County Clerk | Norwalk | CA |
| ***Los Angeles County Sheriff's Office, Santa Clarita Valley Station*** | Attn: Operations | | Valencia | CA |
| ***Los Angeles County Sheriff's Office, Department Headquarters*** | Leroy D. Baca | Sheriff | Monterey Park | CA |
| ***Los Angeles County, Bureau of Environmental Protection*** | | Department of Health Services | Baldwin Park | CA |
| ***Los Angeles County, North Regional Office*** | | Parks and Recreation Department | Castaic | CA |
| ***Lost Hills Water District*** | Phillip D. Nixon | General Manager | Bakersfield | CA |
| ***Madera County (SC)*** | Dave Merchan | Assistant Planning Director Planning Department | Madera | CA |
| ***Mariposa County (SC)*** | Eric Jay Toll | Director of Planning Planning Department | Mariposa | CA |
| ***McCormick, Kidman and Behrens LLP*** | Russell G. Behrens | Partner | Costa Mesa | CA |

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|---|---|---|---|---|
| ***Merced County (SC)*** | Paul Fillebrown | Director<br>County Public Works Dept. | Merced | CA |
| ***Metropolitan Water District of Southern California*** | Dirk Marks | Water Resources | Los Angeles | CA |
| ***Metropolitan Water District of Southern California*** | Adam Kear | Legal | Los Angeles | CA |
| ***Mojave Water Agency*** | Kirby Brill | General Manager | Apple Valley | CA |
| ***Mono County (SC)*** | Scott Burns | Executive Director of Community Development Planning Department | Mammoth Lakes | CA |
| ***Monterey County*(SC)** | Scott Hennessy | Director<br>Planning & Building Inspection Department | Salinas | CA |
| ***Napa County (SC)*** | Charlie Wilson | Director<br>Conservation Development and Planning | Napa | CA |
| ***Napa County Flood Control and Water Conservation District*** | | Department of Public Works | Napa | CA |
| ***National Audubon Society, California*** | J. William Yeates | | Fair Oaks | CA |
| ***Natural Heritage Institute*** | | | Berkeley | CA |
| ***Natural Resources Defense Council*** | | | San Francisco | CA |
| ***Nevada County (SC)*** | Mark Tomich | Interim Planning Director<br>Planning Department | Nevada City | CA |
| ***Newhall County Water District* (R)** | Ken Peterson | General Manager | Santa Clarita | CA |
| ***Newhall Land and Farming Company*** | Steve Zimmer | Assistant Vice President | Valencia | CA |
| ***Newhall School District*** | Marc Winger | Superintendent | Valencia | CA |
| ***Oak Flat Water District*** | | | Patterson | CA |
| ***Orange County*(SC)** | Tim Neeley | Manager<br>Environmental Planning Services | Santa Ana | CA |
| ***Pacific Bell*** | Ron Tropcich | Director, External Affairs | Pasadena | CA |
| ***Pacific Gas & Electric Company*** | | | Fresno | CA |
| ***Pacific Institute for Studies in Development, Environment and Security*** | Peter Gleick | President | Oakland | CA |
| ***Palmdale Water District*** | Dennis LaMoreaux | General Manager | Palmdale | CA |
| ***Placer County (SC)*** | Fred Yeager | Director<br>Planning Department | Auburn | CA |

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| *Agency/Organization/ Company Name* | *Contact Name* | *Title* | *City* | *State* |
|---|---|---|---|---|
| ***Planning and Conservation League and Citizens Planning Association of Santa Barbara County*** | | | San Francisco | CA |
| ***Planning and Conservation League*** | | | Sacramento | CA |
| ***Plumas County (SC)*** | John S. McMorrow | Director<br>Planning Department | Quincy | CA |
| ***Plumas County Flood Control and Water Conservation District*** | | General Manager | Quincy | CA |
| | Keith Pritsker | | Stevenson Ranch | CA |
| ***Public Utilities Commission*** | | | Los Angeles | CA |
| | R. Bruce Tepper Esq. | | Beverly Hills | CA |
| ***Riverside County (SC)*** | Aleta J. Laurence | Director of Planning<br>Transportation and Land Management<br>Agency/Planning | Riverside | CA |
| ***Rossman and Moore*** | | | San Francisco | CA |
| ***Rosedale-Rio Bravo Water District*** | Hal Crossley | General Manager | Bakersfield | CA |
| ***Sacramento (SC)*** | Thomas W. Hutchings | Director of Planning<br>Planning and Community Development Department | Sacramento | CA |
| ***Sacramento County*** | Maria Bell | Clerk-Recorder | Sacramento | CA |
| ***San Benito County (SC)*** | Rob Mendiola | Director<br>Planning Department | Hollister | CA |
| ***San Bernardino County*(SC)** | Michael E. Hays | Director, Land Use Services | San Bernardino | CA |
| ***San Bernardino Valley Municipal Water District*** | Randy Vangelder | General Manager | San Bernardino | CA |
| ***San Diego County (SC)*** | Gary Pryor | Director of Planning and Land Use<br>Department of Planning & Land Use | San Diego | CA |
| ***San Gabriel Valley Municipal Water District*** | Jim Frei | General Manager | Azusa | CA |
| ***San Gorgonio Pass Water Agency*** | Steve Stockton | General Manager | Beaumont | CA |
| ***San Joaquin County (SC)*** | Ben Hulse | Director of Community Development Department | Stockton | CA |

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# DRAFT EIR FOR CLWA'S SUPPLEMENTAL WATER PROJECT TRANSFER OF 41,000 ACRE-FEET OF STATE WATER PROJECT TABLE A AMOUNT

| *Agency/Organization/ Company Name* | *Contact Name* | *Title* | *City* | *State* |
|---|---|---|---|---|
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| ***Santa Clarita Oak Conservancy*** | Mike Lyons | Treasurer | Saugus | CA |
| ***Santa Clarita Parents' Lobby*** | Patricia Saletore | | Saugus | CA |
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| ***SCOPE, Castaic*** | Michael A. Kotch | President | Castaic | CA |
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| | Sharon L. Roden | | Paso Robles | CA |
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| ***Sierra Club, Santa Clarita Group*** | Martin Schlageter | Conservation Coordinator | Saugus | CA |
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# MAILING LIST
# DRAFT EIR FOR CLWA'S SUPPLEMENTAL WATER PROJECT TRANSFER OF 41,000 ACRE-FEET OF STATE WATER PROJECT TABLE A AMOUNT

| *Agency/Organization/ Company Name* | *Contact Name* | *Title* | *City* | *State* |
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| *Agency/Organization/ Company Name* | *Contact Name* | *Title* | *City* | *State* |
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| ***Young Wooldridge*** | Ernest A. Conant | | Bakersfield | CA |
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| *Notes:*<br>(R)=Responsible Agency, (T)=Trustee Agency, (CC)=County Clerk to post NOP, (SC)=Surrounding County | | | | |

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**CLWA Draft Report, Recycled Water Master Plan, May 2002**
**and CLWA Resolution Regarding Availability of Recycled Water,**
**Approved May 28, 2003**

# DRAFT REPORT
# Recycled Water Master Plan

CASTAIC LAKE WATER AGENCY

May 2002
K/J 014642.00

Kennedy/Jenks Consultants

**Kennedy/Jenks Consultants**

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# Draft
# Recycled Water Master Plan

May 2002

Prepared for

**Castaic Lake Water Agency**
27234 Bouquet Canyon Rd.
Santa Clarita CA 91350-2173

# Table of Contents

*List of Tables* ..... *v*

*List of Figures* ..... *vi*

*List of Appendices* ..... *vi*

*List of Acronyms and Abbreviations* ..... *vi*

**Section 1: Executive Summary ..... 1**

**Section 2: Introduction ..... 2**

2.1 Background ..... 2
2.2 Significant Developments ..... 2
2.3 Objective ..... 3
2.4 Development of the Plan ..... 3
2.5 Master Plan Organization ..... 3

**Section 3: Land Use ..... 5**

3.1 General and Specific Plans ..... 5
3.2 Existing and Projected Land Uses ..... 5

**Section 4: Existing and Projected Potable Water Supply and Demand ..... 7**

4.1 Existing Water Supply, Demand, and Facilities ..... 7
4.1.1 Water Supply ..... 7
4.1.1.1 Imported Water ..... 7
4.1.1.2 Groundwater ..... 7
4.1.2 Water Demand ..... 8
4.1.3 Facilities ..... 8
4.2 Projected Water Supply, Demand, and Facilities ..... 8
4.2.1 Water Supply ..... 8
4.2.2 Water Demand ..... 9

**Section 5: Regulatory Requirements ..... 11**

5.1 Federal Requirements ..... 11
5.1.1 Clean Water Act ..... 11
5.1.2 Safe Drinking Water Act ..... 11
5.1.3 Administration ..... 11
5.2 State Requirements ..... 11
5.2.1 Water Code ..... 12
5.2.2 Title 22 ..... 12
5.2.3 Title 17 ..... 13
5.2.4 Guidelines ..... 13
5.2.5 Oil Field Produced Water-Related Regulations ..... 14

## Table of Contents (cont'd)


5.2.6 Treated Perchlorate-Contaminated Groundwater-Related Regulations ....14
5.2.7 Administration ....14
5.3 Local Requirements ....15

**Section 6: Recycled Water Sources ....16**

6.1 Sources of Recycled Wastewater ....16
6.1.1 Existing and Planned Wastewater Treatment Facilities ....16
6.1.1.1 Existing Facilities ....16
6.1.1.2 Planned Improvements and Expansions ....18
6.1.1.3 Newhall Ranch Water Reclamation Plant ....18
6.1.2 Water Quality ....18
6.1.2.1 Recycled Water Quality Requirements ....18
6.1.2.2 Effluent Quality ....19
6.2 Perchlorate Contaminated Wells ....21
6.3 Oil Field Produced Water ....21
6.4 Summary of Available Source Water Flows ....22
6.5 Water Quality Requirements for Irrigation ....23

**Section 7: Potential Recycled Water Constraints ....27**

7.1 Environmental Considerations ....27
7.1.1 Hydrology of the Santa Clara River ....27
7.1.2 Riparian Habitat ....28
7.1.3 Endangered Species ....28
7.1.4 Potential Impact of the Recycled Water System on Instream Flows ....31
7.2 Water Rights Considerations ....31
7.2.1 Recycled Water from LACSD ....31
7.2.2 Oil Field Produced Water ....33
7.2.3 Perchlorate-Contaminated Water ....33
7.3 Recycled Water Supply Availability ....33

**Section 8: Market Assessment for Recycled Water ....34**

8.1 Potential Users ....34
8.2 Potential Recycled Water Demand ....35
8.3 Conversion Requirements ....35

**Section 9: Seasonal Storage Opportunities ....37**

9.1 Seasonal Supply and Demand Balance ....37
9.2 Seasonal Storage Options ....38
9.2.1 Aboveground Seasonal Storage ....38
9.2.1.1 Reservoir Capacity ....38
9.2.1.2 Reservoir Operation ....38
9.2.1.3 Facility Requirements and Preliminary Cost Estimates ....39

## Table of Contents (cont'd)


9.2.1.4 Advantages and Disadvantages of Aboveground Seasonal Storage....39
9.2.2 Aquifer Storage and Recovery....40
9.2.2.1 Regulatory Requirements....40
9.2.2.2 Hydrogeology North of the San Gabriel Fault....40
9.2.2.3 Water Quality Requirements....41
9.2.2.4 Facility Requirements and Preliminary Cost Estimate....41
9.3 Recommended Seasonal Storage Option....42

**Section 10: Recommended Recycled Water System....43**

10.1 Planning Criteria....43
10.1.1 Recycled Water Supply....44
10.1.2 Recycled Water Pump Station....44
10.1.3 Storage Reservoirs....44
10.1.4 Distribution System....44
10.1.5 Booster Pump Stations....44
10.2 Existing Recycled Water Infrastructure....45
10.2.1 Recycled Water Pump Station....45
10.2.2 Pipeline....45
10.2.3 Reservoir....45
10.3 Recommended Service Policies....45
10.4 Components of the Recommended Plan....45
10.4.1 Recycled Water Supply....46
10.4.2 Recycled Water Pump Stations....46
10.4.3 Storage Reservoirs....46
10.4.4 Distribution System....47
10.4.5 Booster Pump Stations....48
10.5 System Modeling....48
10.5.1 Model Construction....48
10.5.2 System Evaluation....49
10.6 Cost Estimates....49
10.6.1 Capital Costs....49
10.6.2 Operating and Maintenance Costs....51
10.6.3 Water Purchase Costs....51

**Section 11: Permits and Approvals....53**

11.1 Federal....53
11.1.1 U.S. Army Corps of Engineers Nationwide Permit....53
11.1.2 Endangered Species Act Permits....53
11.1.3 U.S. Fish and Wildlife Service Permits....56
11.2 State....56
11.2.1 California Department of Fish and Game....56
11.2.1.1 Incidental Take Permit....57
11.2.1.2 Lake or Streambed Alteration Agreement....57
11.2.2 California Department of Transportation....57

11.2.3 California Department of Health Services ....57
11.2.4 State Water Resources Control Board and Regional Water Quality Control Board ....58
11.2.5 California Division of Occupational Safety and Health ....58
11.3 Local Permits ....58
11.3.1 Los Angeles County Department of Health Services ....58
11.3.2 Encroachment Permits ....58
11.4 National Environmental Policy Act ....59
11.5 California Environmental Quality Act ....59
11.6 Other Institutional Issues ....59

**Section 12: Funding and Financing Opportunities ....60**

12.1 Funding and Financing Alternatives ....60
12.1.1 Capital Reserves ....60
12.1.2 Grants and Low Interest Loans ....60
12.1.2.1 U.S. Bureau of Reclamation ....63
12.1.2.2 U.S. Department of Energy National Energy Technology Laboratory ....63
12.1.2.3 State Water Resources Control Board ....63
12.1.2.4 California Department of Water Resources ....64
12.1.2.5 California Technology, Trade and Commerce Agency ....64
12.1.3 Certificates of Participation ....64
12.1.4 Revenue Sources for Loan/Debt Service Repayment ....65
12.1.5 Recommended Alternative ....65
12.2 Water Rate Policy ....65
12.2.1 Rates Based on Costs of Service ....66
12.2.2 Rates Based on Percentage of Potable Water Rate ....66
12.2.3 Rates by User Class ....66
12.2.4 Recommended Rate Policy ....66

**Section 13: Implementation Plan ....67**

13.1 Implementation Considerations ....67
13.2 Phasing Plan ....67
13.2.1 Phase 1A ....69
13.2.2 Phase 1B ....70
13.2.3 Phase 2 ....70
13.2.4 Phase 3 ....70
13.2.5 Phase 4 ....70
13.2.6 Phase 5 ....71
13.2.7 Phase 6 ....71
13.2.8 Phase 7 ....71
13.2.9 Phase 8 ....71
13.2.10 Phase 9 ....71
13.2.11 Phase 10 ....71
13.2.12 Phase 11 ....72

## Table of Contents (cont'd)

13.3 Implementation Schedule.....72

**Section 14: References .....73**

## List of Tables

3-1 Summary of Current Designated Land Use
4-1 Projected Water Supplies in the CLWA Service Area
4-2 Projected Normal/Average Year Water Usage
6-1 Monthly Effluent Flow from Valencia and Saugus WRPs - Calendar Year 2001
6-2 Historic and Projected Capacity at Valencia and Saugus WRPs
6-3 Effluent Quality and Water Reclamation Requirements for Valencia WRP
6-4 Placerita Oil Field Produced Water Quality
6-5 Summary of Available Source Water Flows
6-6 Comparison of Available Water Quality to Irrigation Quality Standard Guidelines
6-7 Recommended Maximum Concentrations of Trace Elements in Irrigation Water
7-1 Percentage of Current Stream Flow as Effluent
7-2 Sensitive Species Occurring or Potentially Occurring Within the Proposed Santa Clara River SEA
7-3 Use of Native Water vs. Foreign Water
8-1 Proposed Recycled Water Users
8-2 Existing vs. Future Recycled Water Users
9-1 Projected Recycled Water Demand vs. Supply for Year 2010
9-2 Preliminary Capital Cost Estimate for Seasonal Storage Reservoir Alternatives
9-3 Basin Plan Water Quality Objectives
9-4 Preliminary Capital Cost Estimate for ASR Seasonal Storage Alternative
10-1 Summary of Recycled Water System Development Criteria
10-2 Flow and Storage Data by Zone
10-3 Reservoir Volumes and Elevations
10-4 Pipeline Diameters and Lengths
10-5 Booster Pump Station Capacity
10-6 Cost Criteria
10-7 Preliminary Estimate of Capital Cost
11-1 Summary of Permitting Requirements
12-1 Grant and Loan Summary
13-1 Implementation Phases
13-2 Recycled Water Users by Implementation Phase
13-3 Preliminary Cost Estimates by Implementation Phase

## Table of Contents (cont'd)

13-4 O&M Cost Estimates by Implementation Phase

## List of Figures

3-1 Vicinity Map
3-2 CLWA Service Area
4-1 Water Purveyor Service Areas
4-2 Existing CLWA Major Infrastructure
5-1 Understanding Recycled Water Regulations
6-1 Valencia WRP Location Map
6-2 Valencia WRP Process Schematic
6-3 Projected Flow and Capacity of Valencia and Saugus WRPs
6-4 Potential Sources of Non-Potable Water
8-1 Potential Recycled Water Users
8-2 Proposed Recycled Water Users
9-1 Seasonal Recycled Water Supply vs. Demand
9-2 Potential Seasonal Storage Reservoir Sites
9-3 Potential Aquifer Storage and Recovery Area
10-1 Existing CLWA Recycled Water Infrastructure
10-2 Proposed Recycled Water System
10-3 CLWA Recycled Water System Pressure Zones
13-1 Phasing Plan
13-2 Implementation Schedule

## List of Appendices

Appendix A Potential Recycled Water Users

## List of Acronyms and Abbreviations

| | |
|---|---|
| AF/yr | acre-feet per year |
| ASR | Aquifer Storage and Recovery |
| AWWA | American Water Works Association |
| BOD | Biochemical Oxygen Demand |
| CDFG | California Department of Fish and Game |
| CEQA | California Environmental Quality Act |

## Table of Contents (cont'd)

| | |
|---|---|
| CIP | Capital Improvement Program |
| CLWA | Castaic Lake Water Agency |
| COD | Chemical Oxygen Demand |
| COP | Certificates of Participation |
| CWA | Clean Water Act |
| DHS | California Department of Health Services |
| DOE | Department of Energy |
| DOSH | California Division of Occupational Safety and Health |
| DWR | California Department of Water Resources |
| EHA | Essential Habitat Area |
| EIR | Environmental Impact Report |
| EMA | Essential Management Area |
| ESA | Endangered Species Act |
| GIS | Geographic Information System |
| gpm | gallons per minute |
| HMX | octahydro-1,3,5,7-Tetranitro-1,3,5,7-Tetrazocine |
| IWRP | Integrated Water Resources Plan |
| LACDHS | Los Angeles County Department of Health Services |
| LACDRP | Los Angeles County Department of Regional Planning |
| LACSD | Sanitation Districts of Los Angeles County |
| LACWD | Los Angeles County Waterworks District |
| LF | Lineal Feet |
| M&I | Municipal and Industrial |
| MCL | Maximum Contaminant Level |
| mg | million gallons |
| mgd | million gallons per day |
| NCWD | Newhall County Water District |
| NDMA | Nitrosodimethylamine |
| NEPA | National Environmental Policy Act |
| NMFS | National Marine Fisheries Service |
| NPDES | National Pollutant Discharge Elimination System |
| NWP | Nationwide Permits |
| psi | pounds per square inch |
| PVC | Polyvinyl Chloride |
| RDX | Hexahydro-1,3,5-Trinitro-1,3,5-Triazine |
| RO | Reverse Osmosis |
| RWQCB | Regional Water Quality Control Board |
| SAR | Sodium Absorption Ratio |
| SCWD | Santa Clarita Water Division |
| SDWA | Safe Drinking Water Act |
| SEA | Significant Ecological Areas |
| SWP | State Water Project |

## Table of Contents (cont'd)

| | |
|---|---|
| SWRCB | State Water Resources Control Board |
| TDS | Total Dissolved Solids |
| TOC | Total Organic Carbon |
| USACE | U.S. Army Corps of Engineers |
| USEPA | U.S. Environmental Protection Agency |
| USFWS | U.S. Fish and Wildlife Service |
| VOC | Volatile Organic Compounds |
| VWC | Valencia Water Company |
| WRP | Water Reclamation Plant |
| WDR | Waste Discharge Requirements |

# Section 1: Executive Summary

To be provided with Final Recycled Water Master Plan.

# Section 2: Introduction

A Reclaimed Water System Master Plan for the Castaic Lake Water Agency (CLWA) was completed in 1993. This section summarizes the significant developments that have occurred since the preparation of the earlier plan, discusses the objectives of this Master Plan, and provides a brief overview of the methodology.

## 2.1 Background

CLWA has a contract with the State of California to purchase water from the State Water Project (SWP) and wholesale it to four domestic water purveyors in the Santa Clarita Valley. The imported water is delivered to Castaic Lake through SWP facilities. From Castaic Lake, which serves as the terminal reservoir of the SWP's West Branch, it is treated at CLWA's Earl Schmidt Filtration Plant or Rio Vista Filtration Plant and delivered to the domestic water purveyors through transmission lines owned and operated by CLWA.

The four water purveyors primarily serve municipal and industrial (M&I) customers. In normal years, approximately 50 percent of the M&I demand within CLWA's service area is met with imported water. However, the reliability of the SWP supply is subject to the availability of the water (i.e., precipitation and snowpack of the present and past years) and deliveries can be curtailed. When sufficient imported water is not available, the balance is met with local groundwater provided by the purveyors.

While the available groundwater is limited, it is anticipated that water demands will continue to increase. Accordingly, additional reliable sources of water are necessary to meet projected water demands. CLWA recognizes that recycled water is an important and reliable source of additional water.

The Sanitation Districts of Los Angeles County (LACSD) own and operate two water reclamation plants, Saugus Water Reclamation Plant (WRP) and Valencia WRP, within the CLWA service area. The water is treated to tertiary standards and discharged to the Santa Clara River. The Newhall Ranch development is also planning to construct a water reclamation facility, and non-potable water from this source may be incorporated into the CLWA recycled water system. Additionally, Berry Petroleum has expressed interest in treating oil field produced water for sale to CLWA for non-potable uses. Oil field produced water is a by-product of petroleum extraction. Also, treated perchlorate-contaminated groundwater may serve as a temporary source of non-potable water during the 1 to 2 year California Department of Health Services (DHS) demonstration period for the treatment facility. By utilizing the effluent from the WRPs, oil field produced water, and treated perchlorate-contaminated groundwater for irrigation and other non-potable purposes, CLWA can more efficiently allocate its potable water and increase the reliability of water supplies in the Santa Clarita Valley.

## 2.2 Significant Developments

Since the preparation of the previous Master Plan, the CLWA service area has experienced substantial growth. In addition to the changes in population and development in the Santa Clarita Valley, the following major developments have changed the assumptions for the Master Plan, necessitating this update:

- The use of treated effluent from the Saugus and Valencia WRPs is subject to the instream water use requirements of critical habitat along the Santa Clara River. Accordingly, it is assumed that only the portion of the effluent attributable to growth will be used, unless a habitat analysis indicates that use of a greater quantity of the effluent will not create adverse impacts.

- Oil field produced water from Placerita Canyon has been identified as a potential source of water for recycled water use.

- Several wells near the South Fork of the Santa Clara River have been identified as being contaminated with perchlorate. A centralized treatment facility is planned that will provide potable quality water. During the demonstration period required by DHS, the treated water may be available for recycled water use.

- The proposed Newhall Ranch development includes a wastewater reclamation plant and recycled water system. It would be desirable to integrate these facilities into CLWA's recycled water system.

- In addition to considering large aboveground reservoirs for seasonal storage, the concept of aquifer storage and recovery (ASR) is evaluated.

## 2.3 Objective

The primary objective of the Recycled Water Master Plan is to update the 1993 Reclaimed Water Master Plan to consider the significant developments affecting recycled water sources, supplies, users, and demands so that CLWA can develop a cost-effective recycled water system.

## 2.4 Development of the Plan

The information developed in this Master Plan update is largely drawn from the 1993 Master Plan, supplemented with contacts with CLWA, LACSD, local water purveyors, the City of Santa Clarita, the County of Los Angeles, oil company representatives, and potential water users. Additionally, analysis and computer modeling were performed.

Potential existing and future recycled water users were identified from the 1993 Master Plan and updated through contacts with the local purveyors and the City of Santa Clarita. Water demand characteristics, including time-of-use, were assessed through discussions with potential users. Through data analysis and computer modeling, the Master Plan was updated with a revised cost-effective recycled water system. Construction costs were estimated and a construction schedule was prepared.

## 2.5 Master Plan Organization

This report is organized as follows:

- Section 1, Executive Summary, summarizes the contents of the Recycled Water Master Plan.

- Section 2, Introduction, provides background information, introduces the report, and explains its structure.
- Section 3, Land Use, discusses the existing and projected land uses within the CLWA service area.
- Section 4, Existing and Projected Potable Water Supply and Demand, discusses the existing and projected water supply and demand for potable purposes, which necessitates the need for recycled water to serve non-potable demands.
- Section 5, Regulatory Requirements, discusses the federal, state, and local regulations addressing recycled water production, discharge, distribution, and use to protect public health. There are additional regulations that are relevant to oil field produced water, use of impaired waters, such as treated perchlorate-contaminated groundwater, and ASR.
- Section 6, Recycled Water Sources, presents an overview of water recycling facilities, flow, and quality in the Santa Clarita Valley. It also covers other potential sources of water for the recycled water system, including treated perchlorate-contaminated groundwater and treated oil field produced water.
- Section 7, Potential Recycled Water Constraints, provides a brief discussion of the issues that limit the usage of recycled water in the CLWA service area. Issues addressed include Santa Clara River hydrology, the riparian habitat, the endangered species, potential impacts of the proposed recycled water project on stream flows, and water rights issues.
- Section 8, Market Assessment for Recycled Water, identifies potential recycled water users within the CLWA service area and estimates annual demand, peak monthly demand, peak daily demand, and the hourly distribution of water demand during peak months.
- Section 9, Seasonal Storage Opportunities, examines alternatives for addressing the variations in seasonal supply and demand of recycled water, including ASR and aboveground storage.
- Section 10, Recommended Recycled Water System, discusses the planning criteria for system components, presents the recommended infrastructure of the recycled water system, and describes the modeling process used to size facilities. Costs are also presented in this section.
- Section 11, Permits and Approvals, focuses on permit requirements, other institutional issues, and the requirements of the California Environmental Quality Act (CEQA).
- Section 12, Funding and Financing Opportunities, presents a plan for financing the proposed recycled water system. Discussion of financing options, water rate policy, and connection fees is included.
- Section 13, Implementation Plan, presents a plan for implementing the recommended system, including phasing and implementation schedule.

# Section 3: Land Use

To identify an appropriate service area for the recycled water distribution system, information regarding land use is important. This section describes the planning documents that govern land use in the Santa Clarita Valley and presents information regarding the existing and projected land uses within the CLWA service area.

## 3.1 General and Specific Plans

The CLWA service area encompasses approximately 195 square miles within the upper Santa Clara River Basin, much of which is known as the "Santa Clarita Valley," as shown in Figure 3-1. The majority of the CLWA service area is in Los Angeles County, but approximately 20 square miles in the westerly part of the service area extends into an unincorporated area of Ventura County. As shown on Figure 3-2, the CLWA service area includes the City of Santa Clarita and the unincorporated communities of Castaic, Valencia, Saugus, Canyon Country, Newhall, and Mint Canyon, among others.

General Plans have been prepared by the City of Santa Clarita, Los Angeles County and Ventura County, which outline the ultimate land use development anticipated for their respective planning areas. There are also several Specific Plans governing land use in portions of the CLWA service area. The City of Santa Clarita General Plan was adopted in 1991, with some of the elements updated more recently. The land use element has not been updated since 1991. Los Angeles County amended its General Plan for the unincorporated areas of the County in 1993. The Ventura County General Plan includes an Area Plan for the Piru Area of Interest, which was amended in 1992. This Area Plan serves as the land use plan for the Piru area, a portion of which is in the CLWA service area. In the near future, a City of Santa Clarita/Los Angeles County Valleywide General Plan for the entire Santa Clarita Valley will be prepared by the City and the County of Los Angeles for lands within their jurisdictions.

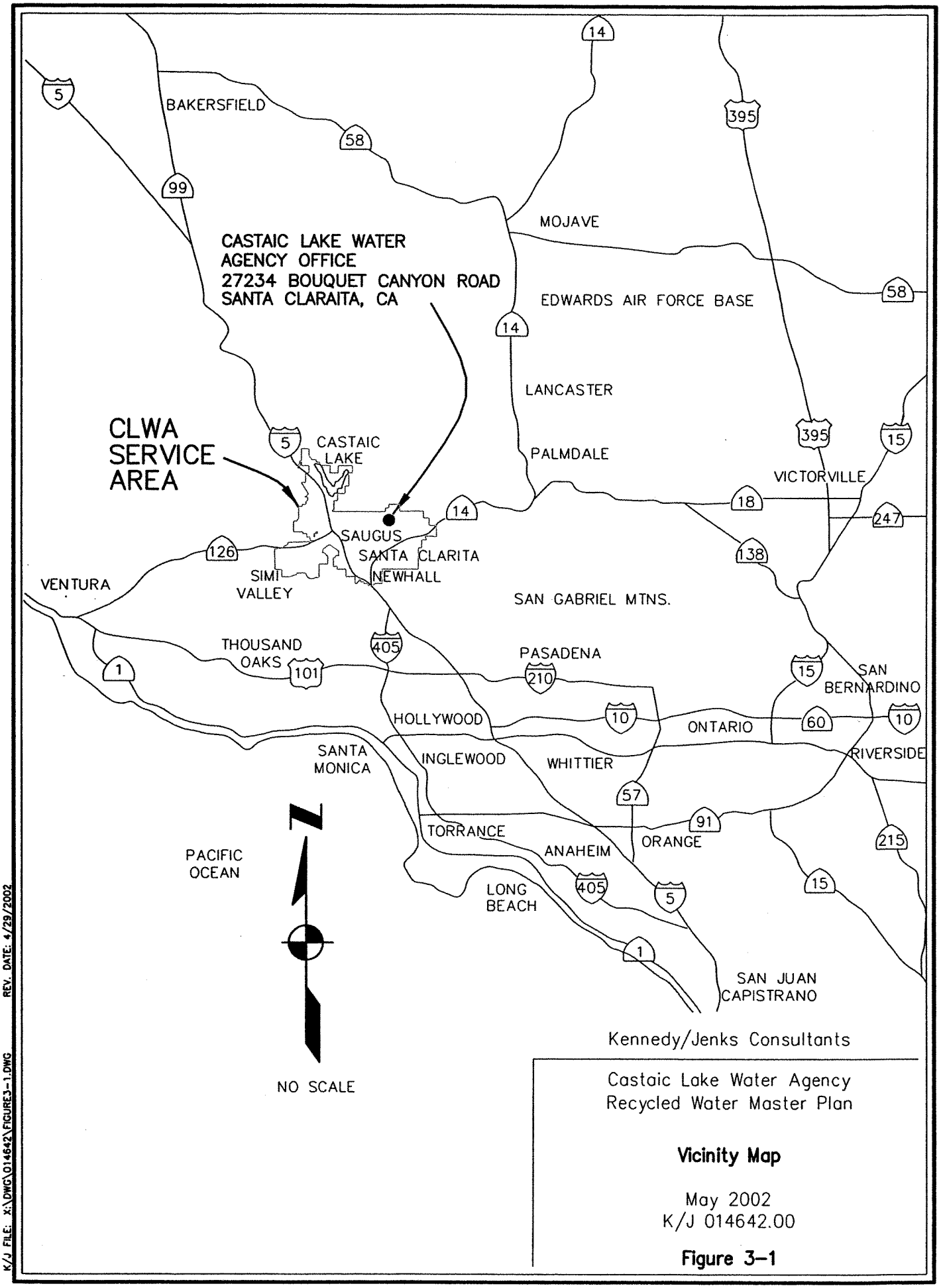
In addition to the General Plans, the following Specific Plans have been developed for areas within the CLWA service area:

- Newhall Ranch Specific Plan
- Northlake Specific Plan
- Canyon Park Specific Plan (now Fairbanks Ranch)
- Porta Bella Specific Plan
- North Valencia II Specific Plans
- Stevenson Ranch Specific Plans (Community Contracts)

Specific plans provide detailed land use information for a certain area.

## 3.2 Existing and Projected Land Uses

The Santa Clarita Valley includes a variety of residential, commercial, industrial, institutional, agricultural, and open space uses. A large portion of the valley is not suitable for development due to steep terrain, flooding potential or federal jurisdiction (Angeles National Forest). However, rapid residential, commercial, and industrial development of portions of the valley floor and canyons has occurred due to growth influences from the Los Angeles metropolitan area

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Castaic Lake Water Agency
Recycled Water Master Plan

**Vicinity Map**

May 2002
K/J 014642.00

**Figure 3–1**

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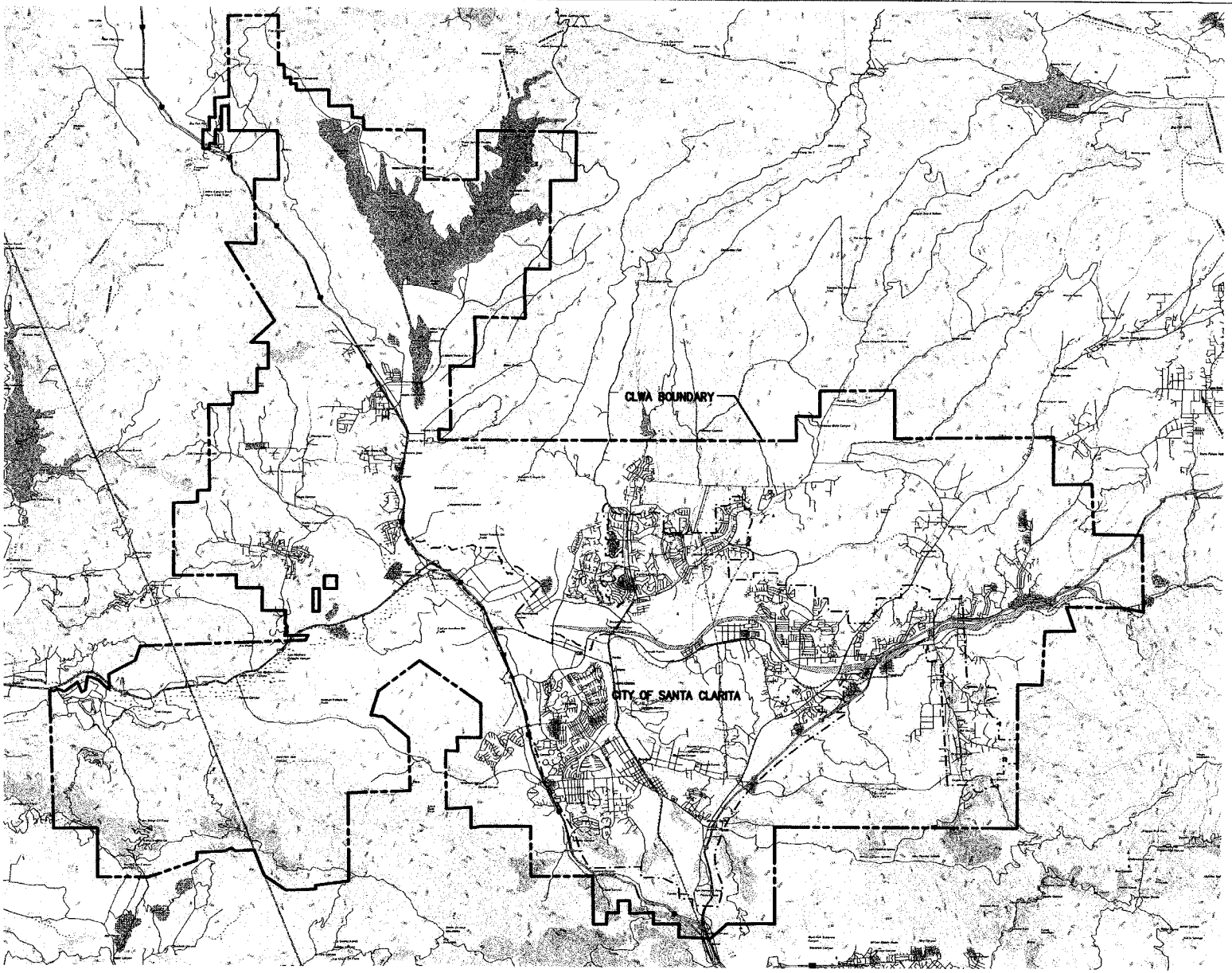


NO SCALE

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Castaic Lake Water Agency
Recycled Water Master Plan

**CLWA Service Area**

May 2002
K/J 014642.00

**Figure 3–2**

K/J FILE: X:\DWG\014642\FIGURE3-2.DWG REV. DATE: 5/14/2002

and the presence of three major highways (U.S. Interstate 5/the Golden State Freeway, State Highway 14/the Antelope Valley Freeway, and State Highway 126).

In 1995, the Los Angeles County Department of Regional Planning (LACDRP) digitized the projected land use within the CLWA service area using a geographic information system (GIS) and prepared a series of reports and maps for CLWA. The land use planning data was incorporated into the land parcel database maintained for CLWA. Table 3-1 summarizes the future acreage of each land use type, as contained in the database. This table represents the expected ultimate distribution of land use as defined in the General Plans.

There are a number of development projects underway and seeking approval in the Santa Clarita Valley. Two significant land use types that could be developed in the future, assuming adoption of the necessary General Plan amendments or Specific Plans, are the nearly 40,000 acres designated Hillside Management in Los Angeles County and almost 8,500 acres of agriculture and open space lands in the Ventura County portion of the CLWA service area.

**TABLE 3-1**
**SUMMARY OF CURRENT DESIGNATED LAND USE**

| Land Use Type | Plan Code | Number of Parcels | Acreage[a] |
|---|---|---|---|
| Commercial | C | 2,090 | 3,130 |
| Hillside Management | HM | 4,845 | 39,674 |
| Industrial | M | 1,503 | 6,167 |
| Municipal | MU | 10 | 136 |
| Non-Urban Residential (0.5 DU/Ac) | N1 | 3,735 | 7,622 |
| Non-Urban Residential (1.0 DU/Ac) | N2 | 369 | 3,021 |
| National Forest | NF | 155 | 9,090 |
| Open Space and Agriculture[b] | O | 599 | 21,435 |
| Public Service Facilities | P | 125 | 2,852 |
| Public Service Facilities | PF | 2 | 32 |
| Resort Recreational | RR | 91 | 592 |
| Transportation Corridor | TC | 31 | 54 |
| Urban Residential (1.1-3.3 DU/Ac) | U1 | 37,944 | 17,022 |
| Urban Residential (3.4-6.6 DU/Ac) | U2 | 4,782 | 2,824 |
| Urban Residential (6.7-15.0 DU/Ac) | U3 | 120 | 473 |
| Urban Residential (15.1-40.0 DU/Ac) | U4 | 3,505 | 491 |
| Floodway/Floodplain | W | 743 | 3,866 |
| Undefined | - | 23 | 27 |
| Total | | 60,672 | 118,508 |

Source: Montgomery-Watson, 1998.
Notes:
(a) Acreage excludes streets and roads for developed areas.
(b) Includes areas in Ventura County, which are currently designated as Agriculture (<1 dwelling unit per 40 acres) and Open Space (<1 dwelling unit per 80 acres). Much of this land is currently used for agriculture.

# Section 4: Existing and Projected Potable Water Supply and Demand

In order to evaluate the need for recycled water, potable water supplies and demand projections are briefly summarized. This section describes the existing and future potable water supplies, demands, and facilities within the CLWA service area.

## 4.1 Existing Water Supply, Demand, and Facilities

### 4.1.1 Water Supply

Water demands in the Santa Clarita Valley are currently met by two sources: SWP and local groundwater supplies. According to the Upper Santa Clarita Valley Water Committee, the total available water supply for the CLWA service area, including SWP water, groundwater, and recycled water sources, is approximately 96,000 to 151,900 AF/yr.[1] CLWA purchases SWP water and wholesales it to three domestic water purveyors: Los Angeles County Waterworks District (LACWD) No. 35, the Newhall County Water District (NCWD), and the Valencia Water Company (VWC). CLWA acquired the Santa Clarita Water Company in 1999; these areas are now served by the CLWA's Santa Clarita Water Division (SCWD). The approximate boundaries of the water purveyors are shown on Figure 4-1. The three retail purveyors plus CLWA comprise the Upper Santa Clarita Valley Water Committee.

#### 4.1.1.1 Imported Water

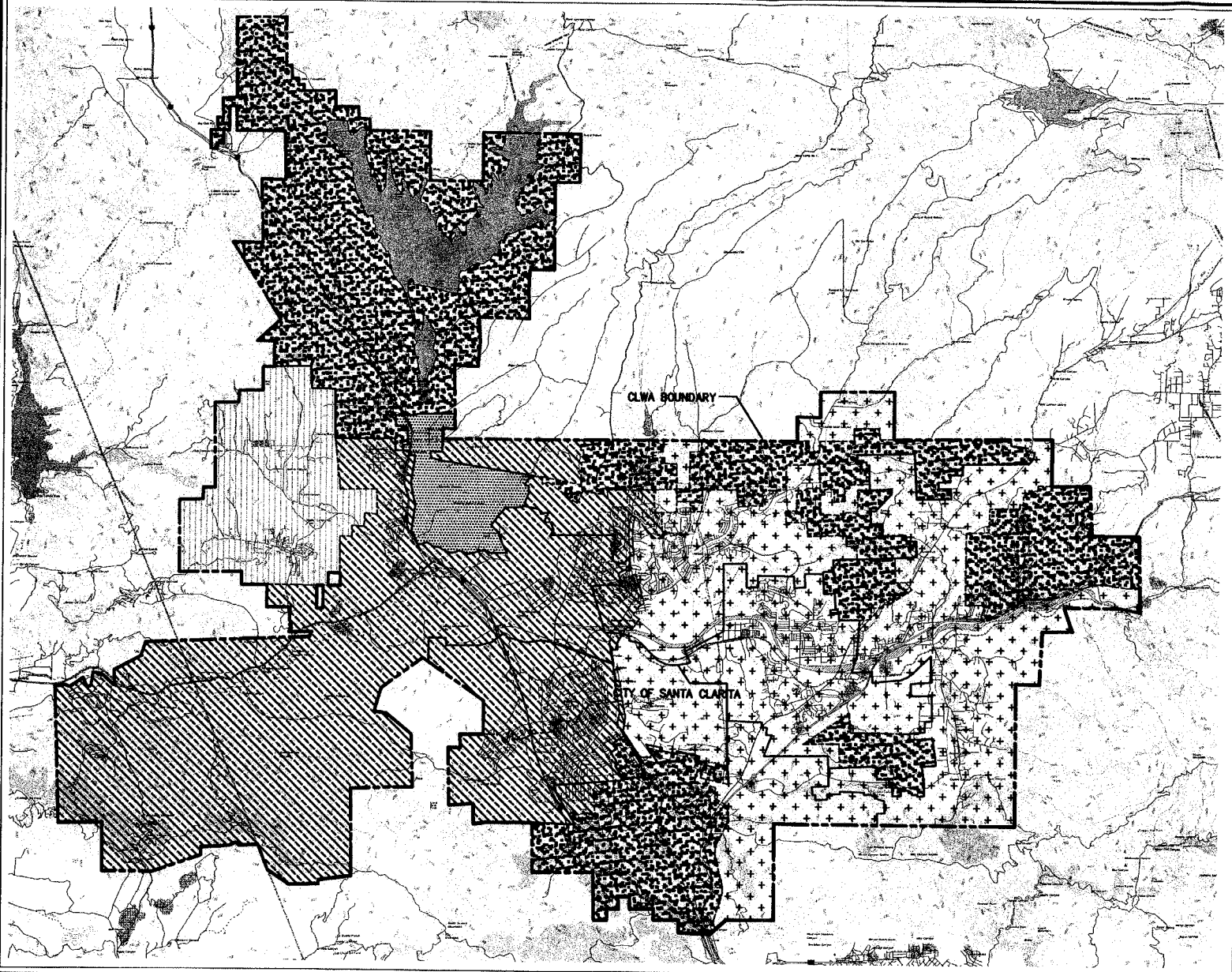
The SWP is managed by the California Department of Water Resources (DWR). CLWA is one of 29 agencies holding long-term contracts with the State of California for SWP water. SWP water originates from rainfall and snowmelt in northern and central California. Runoff is stored in Lake Oroville, then released down the Feather River to the Sacramento River and the Sacramento-San Joaquin Delta. Water is diverted into the Clifton Court Forebay, then pumped into the 444-mile long California Aqueduct. Prior to delivery to CLWA, SWP supplies are stored in Castaic Lake at the end of the West Branch of the California Aqueduct. In 1999, CLWA purchased an additional 41,000 AF/yr from the SWP, bringing its total entitlement to 95,200 AF/yr for M&I uses.

#### 4.1.1.2 Groundwater

In addition to imported water, local groundwater supplies have been developed by domestic water purveyors and by agricultural water users. Two freshwater bearing aquifers, the Alluvial and Saugus aquifers, underlie CLWA's boundaries and form the Eastern Groundwater Basin of the Santa Clara River Valley Basin.

The Alluvial aquifer lies above the Saugus aquifer and is comprised of the alluvial sediments along the river and its major tributaries. The maximum thickness of the alluvium is about 200 feet. A large number of wells penetrate this upper aquifer and historically, most water extracted from the groundwater basin has been from the Alluvial aquifer. The perennial yield of the aquifer is considered to be 31,600 to 32,600 AF/yr, a portion of which is used for agricultural

[1] Upper Santa Clarita Valley Water Committee, "Draft Santa Clarita Valley Water Report, 2001," April 2002.




NO SCALE

LEGEND

- CASTAIC LAKE WATER AGENCY BOUNDARY
- LOS ANGELES COUNTY WATERWORKS DISTRICT No. 36
- NEWHALL COUNTY WATER DISTRICT
- SANTA CLARITA WATER DIVISION
- VALENCIA WATER COMPANY
- LOS ANGELES COUNTY WAYSIDE HONOR RANCHO (AGRICULTURAL ONLY)

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Recycled Water Master Plan

**Water Purveyor Service Areas**

May 2002
K/J 014642.00

**Figure 4–1**

K/J FILE: X:\DWG\014642\FIGURE4-1.DWG REV. DATE: 5/14/2002

uses. As agricultural land is developed for urban use, an increasing portion of this yield becomes available for M&I use. There is no evidence of any historic or recent trend toward permanent water level or storage decline. Additionally, historic operating results indicate that the aquifer is in good operating condition and can support pumpage above the annual perennial yield of 32,600 AF for one or more years without adverse effects, such as a long-term water level decline or degradation of groundwater quality.

The Saugus aquifer has an estimated storage capacity of 1.4 million AF of usable groundwater. A determination of the annual perennial yield has not been made due to the limited information available. Historically, few wells penetrated the Saugus aquifer. However, as water demands in the Santa Clarita Valley have increased, more wells have been drilled into the aquifer. Presently, about one-third of the supply in the Saugus aquifer has been tapped. Pumpage has averaged about 7,400 AF/yr since 1980. Agricultural use of the Saugus aquifer is considered to be less than 100 AF/yr. The anticipated annual aquifer recharge ranges from a minimum of 11,000 AF/yr in dry years to a minimum of 22,000 AF/yr in wet years. Groundwater levels in the aquifer have remained essentially constant over the last 35 to 40 years. The Saugus aquifer is capable of producing on the order of 40,000 AF/yr for short-term periods.

### 4.1.2 Water Demand

The three purveyors that purchase imported water from CLWA generally do not serve agricultural water users. Therefore, only M&I demands are included in the total demands for CLWA. In 2001, the existing water demand from all purveyors was 60,678 AF/yr.[2] Peak water demands occur from May through October.

### 4.1.3 Facilities

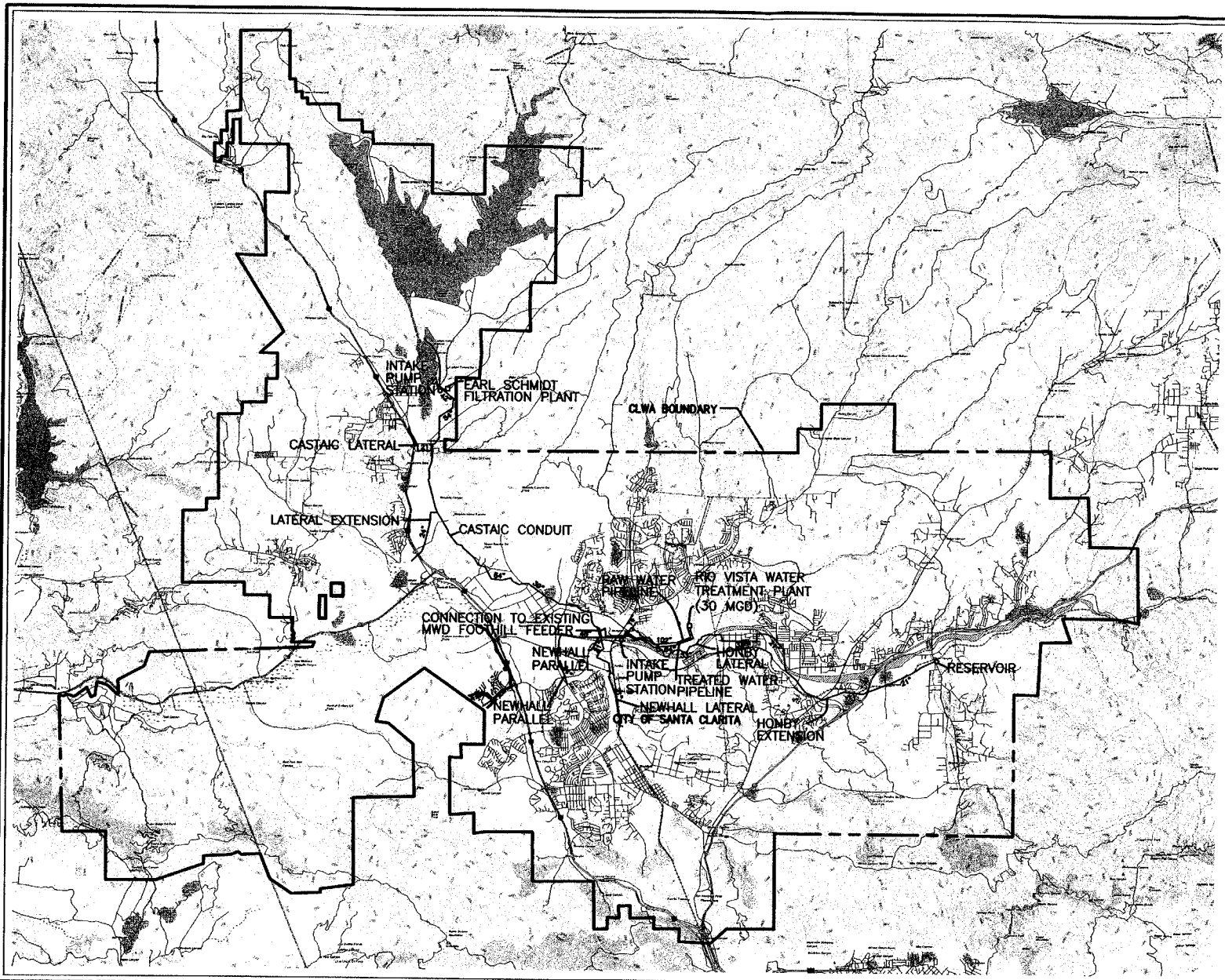
Currently, CLWA treats the imported water stored in Castaic Lake at either the Earl Schmidt Filtration Plant or the Rio Vista Water Treatment Plant and delivers it to the water purveyors through a transmission system. CLWA has a capacity to treat 58 million gallons per day (mgd). The main transmission line, the Castaic Conduit, is located east of the Golden State Freeway, generally paralleling the Freeway and Magic Mountain Parkway from Castaic Lake to a point just north and west of Bouquet Junction where two laterals begin. The Honby Lateral roughly follows the north side of the Santa Clara River to the east, where it crosses to the south to serve Saugus. Headed in a southerly direction, the Newhall Lateral parallels San Fernando Road to serve Newhall and Valencia. The conduit system is shown on Figure 4-2. At the present time, CLWA delivers water to the purveyors through 11 turnouts, including those to its SCWD.

## 4.2 Projected Water Supply, Demand, and Facilities

### 4.2.1 Water Supply

CLWA's future water supply will continue to come from two main sources: the SWP and groundwater. CLWA is pursuing an additional 20,000 AF/yr in addition to the current entitlement of 95,200 AF/yr to bring the total entitlement to 115,200 AF/yr. When rainfall and snowmelt provide an adequate amount of water, CLWA can obtain water from SWP up to their full entitlement. However, during dry years, there may not be enough water to provide CLWA and other SWP contractors with their full water delivery requests. Under existing water supply and

[2] *Ibid.*




NO SCALE

LEGEND

CASTAIC LAKE WATER AGENCY BOUNDARY

EXISTING CASTAIC CONDUIT SYSTEM

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Castaic Lake Water Agency
Recycled Water Master Plan

**Existing CLWA Major Infrastructure**

May 2002
K/J 014642.00

**Figure 4–2**

K/J FILE: X:\DWG\014642\FIGURE4-2.DWG REV. DATE: 5/14/2002

demand conditions, CLWA is expected to receive approximately 37,900 AF per calendar year, approximately 10 percent of the time, and, if CLWA requested 100 percent of the entitlement, it would receive approximately 56,800 AF per calendar year approximately 50 percent of the time.

CLWA has completed an Integrated Water Resources Plan (IWRP) that addresses programs for enhancing water supply reliability during such occurrences. A $300 million capital improvement program has been established to provide facilities and additional water supplies needed to firm up imported water supplies during times of drought. Planned supplies include new wells in the Saugus Formation, stormwater, water banking, water transfers, and desalination. Projected water supplies are summarized in Table 4-1.

The sources of groundwater available to users within the CLWA service area will continue to be the alluvial and Saugus aquifers. From the alluvial aquifer, the safe yield is anticipated to be 32,500 AF/yr, a portion of which will be used for agricultural purposes and, therefore, is not available for M&I use. The Saugus aquifer production is anticipated to be 21,000 to 22,000 AF/yr, of which 20,000 AF/yr is assumed to be allocated for use by M&I users within the CLWA service area and 2,000 AF/yr is utilized by other water users.

**TABLE 4-1**
**PROJECTED WATER SUPPLIES IN THE CLWA SERVICE AREA**

| Source | Supply (AF/yr) | |
|---|---|---|
| | Average Year | Dry Year |
| Alluvial Basin | 30,000 - 40,000 | 30,000 - 35,000 |
| Saugus Formation | 7,500 - 15,000 | 11,000 - 15,000 |
| Saugus New Wells[(a)] | – | 10,000 - 20,000 |
| Stormwater Runoff[(a)] | – | – |
| Recycled Water[(a)] | 1,700 - 17,000 | 1,700 - 17,000 |
| SWP Supplies | 56,800 - 95,200 | 37,900 - 75,800 |
| Groundwater Bank[(a)] | – | 105,000 |
| Water Transfer[(a)] | 5,500 - 9,200 | 3,700 - 7,300 |
| Desalination[(a)] | 2,000 - 5,000 | 2,000 - 5,000 |
| Total | 103,200 - 181,400 | 201,100 - 279,000 |

Source: CLWA, "Urban Water Management Plan," 2000.
Note: (a) Planned programs for future implementation.

### 4.2.2 Water Demand

In preparing the 2000 Urban Water Management Plan, several methods of projecting future water demands were examined, including those based on population projections, historic connection data, and econometric models. Table 4-2 summarizes the projected water demands for the CLWA service area. It is anticipated that these projected demands can be met using the water supplies described above, in both wet and dry years.

## TABLE 4-2
## PROJECTED NORMAL/AVERAGE YEAR WATER USAGE

| Land Use | Water Demand (AF/yr) | | | |
|---|---|---|---|---|
| | 2005 | 2010 | 2015 | 2020 |
| Low-Density Residential | 32,500 | 35,400 | 39,300 | 41,000 |
| Medium to High Density Residential | 18,200 | 24,400 | 32,300 | 42,100 |
| Commercial | 3,100 | 3,500 | 4,000 | 4,500 |
| Industrial | 5,100 | 5,700 | 6,400 | 7,100 |
| Recreational | 3,600 | 3,800 | 4,200 | 4,500 |
| Institutional | 3,100 | 3,400 | 3,600 | 3,900 |
| Miscellaneous Urban Water Use | 1,000 | 1,500 | 2,100 | 2,900 |
| Irrigated Agricultural | 15,100 | 12,400 | 9,800 | 7,100 |
| Increased Conservation Savings | 6,600 | 7,700 | 9,100 | 10,600 |
| Total Projected Water Use | 75,100 | 82,400 | 91,600 | 102,500 |

# Section 5: Regulatory Requirements

Production, discharge, distribution, and use of recycled water are subject to federal, state, and local regulations, the primary objectives of which are to protect public health. There are additional regulations that are relevant to oil field produced water, use of impaired waters, such as treated perchlorate-contaminated groundwater, and ASR. This section describes the regulatory requirements and their administration.

## 5.1 Federal Requirements

Two federal acts regulate the discharge and use of recycled water or wastewater: the Clean Water Act and the Safe Drinking Water Act.

### 5.1.1 Clean Water Act

Federal requirements relevant to the discharge of recycled water, or wastewater, and any other liquid wastes to "navigable waters" are contained in the 1972 amendments to the Federal Water Pollution Control Act of 1956, commonly known as the federal Clean Water Act (CWA) (Public Law 92-500). The CWA created the U.S. Environmental Protection Agency (USEPA) and established the National Pollutant Discharge Elimination System (NPDES), a permit system for discharge of contaminants to navigable waters. NPDES requires that all municipal and industrial dischargers of liquid wastes apply for and obtain a permit prior to initiating discharge.

### 5.1.2 Safe Drinking Water Act

Federal requirements relevant to the use of recycled water for groundwater recharge are contained in the 1986 amendments to the Safe Drinking Water Act (SDWA) of 1974 (Public Law 93-523). The SDWA focuses on regulation of drinking water and control of public health risks by establishing and enforcing maximum contaminant levels (MCLs) for various compounds in drinking water. The 1986 amendments also established requirements for protection of groundwater supplies through wellhead protection programs and regulation of underground injection of wastes.

### 5.1.3 Administration

In the State of California, the administration and enforcement of the NPDES and SDWA programs have been delegated to the state.

## 5.2 State Requirements

State requirements for production, discharge, distribution, and use of recycled water are contained in the California Water Code, Division 7-Water Quality, Sections 1300 through 13999.16 (Water Code); the California Administrative Code, Title 22-Social Security, Division 4-Environmental Health, Chapter 3-Reclamation Criteria, Sections 60301 through 60475 (Title 22); and the California Administrative Code, Title 17-Public Health, Chapter 5, Subchapter 1, Group 4-Drinking Water Supplies, Sections 7583 through 7630 (Title 17). In addition, guidelines for production, distribution, and use of recycled water have been prepared or endorsed by state agencies administering the recycled water regulations.

### 5.2.1 Water Code

The Water Code contains requirements for the production, discharge, and use of recycled water. The Porter-Cologne Water Quality Control Act (Division 7 of the California Water Code), which was promulgated in 1969, established the State Water Resources Control Board (SWRCB) as the state agency with primary responsibility for the coordination and control of water quality, water pollution, and water rights (Division 7, Chapter 1).

Nine Regional Water Quality Control Boards (RWQCB) were established to represent the SWRCB regionally and carry out the enforcement of water quality and pollution control measures (Division 7, Chapter 4). In addition, each RWQCB was required to formulate and adopt water quality control plans and establish requirements for waste discharge to waters of the state. In 1972, Chapter 5.5 was added to Division 7 to provide the RWQCBs with the authority to carry out the provisions of the federal CWA. The Los Angeles RWQCB has jurisdiction over the Santa Clarita Valley.

Division 7, Chapter 7-Water Reclamation, was included in the Porter-Cologne Water Quality Control Act in 1969. Subsequent amendments required DHS to establish water reclamation criteria, gave the RWQCB the responsibility of prescribing specific water reclamation requirements for water which is used or proposed to be used as recycled water, provided for the regulation of injection of waste into the ground, and required the use of recycled water, if available, rather than potable water for irrigation of greenbelt areas.

In addition to Division 7, Chapter 7, Sections 1210 through 1212 of the Water Code, added in 1980, focus on the ownership of treated wastewater and require that the owner of a wastewater treatment plant obtain approval from the SWRCB prior to making any change in the point of discharge, place of use, or purpose of use of treated wastewater.

### 5.2.2 Title 22

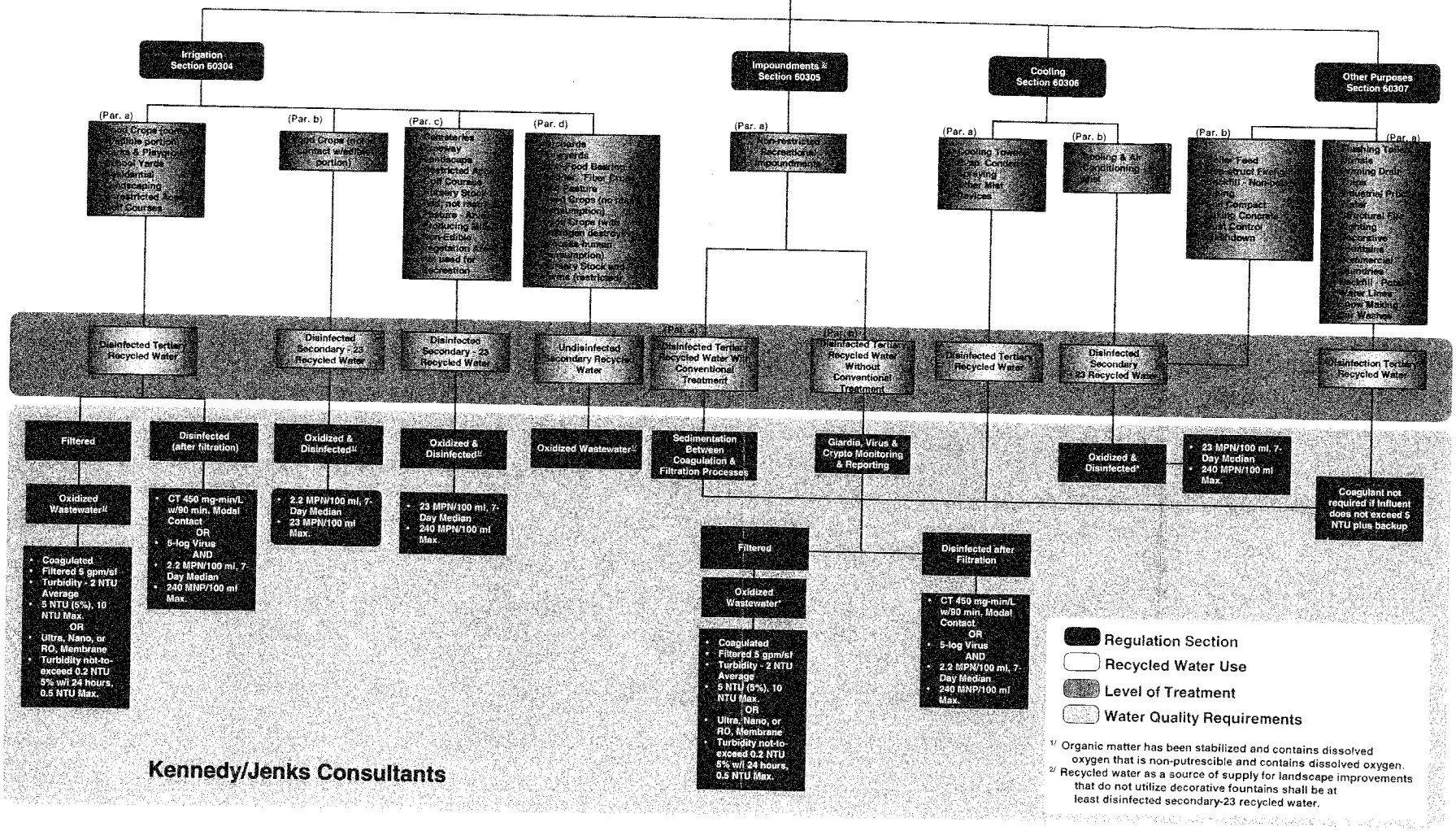
In 1975, Title 22 was prepared by DHS in accordance with the requirements of Division 7, Chapter 7 of the Water Code. In 1978, Title 22 was revised to conform with the 1977 amendment to the federal CWA. The requirements of Title 22, as revised in 1978, 1990, and 2001, regulate production and use of recycled water in California. Title 22 requirements are summarized in Figure 5-1.

Title 22 establishes the quality and/or treatment processes required for an effluent to be used for a specific non-potable application. The following categories of recycled water are identified:

- Disinfected tertiary recycled water
- Disinfected secondary-2.2 recycled water[3]
- Disinfected secondary-23 recycled water[4]
- Undisinfected secondary recycled water
- Disinfected tertiary recycled water with conventional treatment
- Disinfected tertiary recycled water without conventional treatment

[3] The 2.2 refers to the coliform count requirement for the water – 2.2 MPN/100 mL.
[4] The 23 refers to the coliform count requirement for the water – 23 MPN/100 mL.

# Title 22, Article 3 - Uses of Recycled Water

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Castaic Lake Water Agency
Recycled Water Master Plan

**Understanding Recycled Water Regulations**

May 2002
K/J 014642.00

**Figure 5-1**

In addition to recycled water uses and treatment requirements, Title 22 addresses sampling and analysis requirements at the treatment plant, preparation of an engineering report prior to production or use of recycled water, general treatment design requirements, reliability requirements, and alternative methods of treatment.

A draft regulation issued 23 April 2001 specifically addresses Groundwater Recharge Reuse. The regulations address requirements for the engineering report and monitoring and reporting for projects that use recycled water for groundwater recharge.

### 5.2.3 Title 17

The focus of Title 17 is protection of drinking (potable) water supplies through control of cross-connections with potential contaminants, including non-potable water supplies such as recycled water. Title 17, Group 4, Article 2 - Protection of Water System, Table 1, specifies the minimum backflow protection required on the potable water system for situations in which there is potential for contamination to the potable water supply.

Recycled water is addressed as follows:

- An air-gap separation is required on "Premises where the public water system is used to supplement the recycled water supply."
- A reduced pressure principle backflow prevention device is required on "Premises where recycled water is used...and there is no interconnection with the potable water system."
- A double-check valve assembly may be used for "Residences using recycled water for landscape irrigation as part of an approved dual plumbed use area established pursuant to sections 60313 through 60316 unless the recycled water supplier obtains approval for the local public water supplier, or [DHS] if the water supplier is also the supplier of the recycled water, to utilize an alternative backflow prevention plan that includes an annual inspection and annual shutdown test of the recycled water and potable water systems pursuant to subsection 60316(a)."

### 5.2.4 Guidelines

To assist in compliance with Title 22, DHS has prepared a number of guidelines for production, distribution, and use of recycled water. Additionally, DHS recommends use of guidelines prepared by the California-Nevada Section of the American Water Works Association (AWWA). These guidelines are summarized below.

<u>Guideline for the Preparation of an Engineering Report on the Production, Distribution, and Use of Recycled Water.</u> According to Title 22, prior to implementation of a water reclamation project (production, distribution, or use) an engineering report must be prepared and submitted to DHS. This guideline, prepared by DHS and dated March 2001, specifies the contents of an engineering report. The report should describe the production process, including the treated (effluent) water quality, the raw water quality, the treatment process, the plant reliability features the supplemental water supply, the monitoring program, and a contingency plan to prevent distribution of inadequately treated water. The report should include maps of the distribution system and describe how the system will comply with DHS and AWWA guidelines and Title 17. The report should include maps of proposed use areas and should describe the use areas, the

types of uses proposed, the people responsible for supervising the uses, the design of the user systems, and the proposed user inspection and monitoring programs.

Manual of Cross Connection Control/Procedures and Practices. This manual, dated July 1981, focuses on establishing a cross-connection control program to protect the public against backflow and back-siphonage of contamination. Main elements of the manual include areas where protection is required; causes of backflow; approved backflow preventers; procedures, installation, and certification of backflow preventers; and water shutoff procedures (for conditions which pose a hazard to the potable water supply).

Guidelines for the Distribution of Nonpotable Water. These guidelines were prepared by the California-Nevada Section of AWWA in 1992. The purpose of these guidelines is to provide guidance for planning, designing, constructing, and operating non-potable water systems, including recycled water systems. Distribution lines, storage and supply, pumping, on-site (user) applications, and system management are discussed. DHS guidelines reference these guidelines.

Guidelines for the On-Site Retrofit of Facilities Using Disinfected Tertiary Recycled Water. The California-Nevada Section of AWWA prepared these guidelines in 1997 to provide guidance on modifying existing on-site facilities for conversion to use of recycled water, including recommendations for signage, backflow prevention, and separation standards, for landscape irrigation, agricultural irrigation, industrial uses, and impoundments.

### 5.2.5 Oil Field Produced Water-Related Regulations

In California, there are no regulations addressing the use of treated oil field produced water for non-potable purposes. However, certain aspects of the reclamation standards and design criteria for treatment of domestic wastewater for a direct beneficial reuse or a controlled use that would not otherwise occur are applicable. For example, the water must meet the Basin Plan standards.

### 5.2.6 Treated Perchlorate-Contaminated Groundwater-Related Regulations

In California, there are no regulations addressing the use of treated perchlorate-contaminated groundwater for non-potable purposes. However, certain aspects of the reclamation standards and design criteria for treatment of domestic wastewater for a direct beneficial reuse or a controlled use that would not otherwise occur are applicable. For example, the water must meet the Basin Plan standards and applicable NPDES or Waste Discharge Requirements (WDR).

### 5.2.7 Administration

In the State of California, reclamation requirements are administered by the SWRCB, the individual RWQCBs, and DHS. The direct involvement of each agency in water recycled is summarized below:

SWRCB

1. Issue loans in accordance with the Water Code.

2. Approve petitions for the change in place and purpose of use of treated wastewater in accordance with the Water Code.

RWQCB

1. Prepare or revise reclamation requirements in accordance with the Water Code.
2. Review and approve engineering report required under Title 22.
3. Review and approve recharge projects using recycled water in accordance with the Water Code.

DHS

1. Review and approve engineering report as requested by RWQCB.
2. Review and approve final plans for cross connection control and pipeline separations in accordance with Title 17, and inspect distribution system prior to operation.
3. In conjunction with local health agencies, review and approve final on-site (user) system plans for cross connection control in accordance with Title 17, and inspect system prior to operation.

The DHS has delegated a portion of its administrative duties to local health agencies and becomes more involved at the request of the local health agencies.

## 5.3 Local Requirements

Local requirements focus on the distribution and use of recycled water and, primarily, the onsite (user) systems, with emphasis on cross-connection control. State regulations and guidelines discussed above are the governing requirements. The Los Angeles County Department of Health Services (LACDHS) Cross-Connection and Water Pollution Control Program establishes more specific requirements for the separation and construction of potable and recycled water lines, guidelines for on-site (user) systems, and identification of recycled water facilities.

The local requirements are also administered by LACDHS as follows:

1. Review as-built drawings of user's potable water system.
2. Perform an onsite survey of the user's water system.
3. Guide users in methods of identifying potable and recycled water systems.
4. Review and approve design drawings of user's recycled water systems.
5. Inspect user's potable and recycled water systems following construction.

# Section 6: Recycled Water Sources

The extent of the recycled water system is dependent on the amount of water available, as well as the quality of this water. This section presents an overview of sources of recycled water, flow, and quality in the Santa Clarita Valley. It also covers other potential sources of water for the recycled water system, including treated perchlorate-contaminated groundwater and treated oil field produced water.

## 6.1 Sources of Recycled Wastewater

now only 1 District

LACSD provides wastewater collection, treatment, and disposal services to residents of two sanitation districts in the Santa Clarita Valley: District Nos. 26 and 32. District No. 26 serves the eastern portion of the valley, and District No. 32 serves the western portion. The majority of the two districts' service areas lie within the City of Santa Clarita.

### 6.1.1 Existing and Planned Wastewater Treatment Facilities

#### 6.1.1.1 Existing Facilities

LACSD operates two wastewater treatment facilities in the Santa Clarita Valley: Saugus and Valencia WRPs. The two treatment facilities operated independently until 1980, at which time the two plants were linked by a bypass interceptor. The interceptor was installed to transfer a portion of flows received at the Saugus WRP to the Valencia WRP. In order to improve operating efficiencies and because a shortage of space at the Saugus WRP limits future expansion of wastewater facilities in District No. 26, a joint powers agreement was enacted in 1984, creating the Santa Clarita Valley Joint Sewerage System. Through use of wastewater and sludge connecting lines, future expansions of treatment works, including sludge handling and disposal operations, will be provided at the larger Valencia WRP.

The primary sources of wastewater to the Saugus and Valencia WRPs are domestic. Both plants are tertiary treatment facilities and produce high quality effluent. Currently, the effluent from the two WRPs discharges to the Santa Clara River. The Saugus WRP effluent outfall is located approximately 400 feet downstream (west) of Bouquet Canyon Road. Effluent from the Valencia WRP is discharged to the Santa Clara River at a point approximately 2,000 feet downstream (west) of The Old Road Bridge.

Together, the Valencia and Saugus WRPs have a design capacity of 20 mgd (22,410 AF/yr). In calendar year 2001, they produced an average of 16.89 mgd. However, none of the effluent was used as recycled water during this period. Monthly flow data for both WRPs is shown in Table 6-1. During fiscal year 1999-2000 the WRPs produced 16.25 mgd (18,262 AF/yr) of recycled water available for reuse. As the 2001 data was not available at the time the recycled water analysis was initiated, the 16.25 mgd flow was used for this Recycled Water Master Plan.

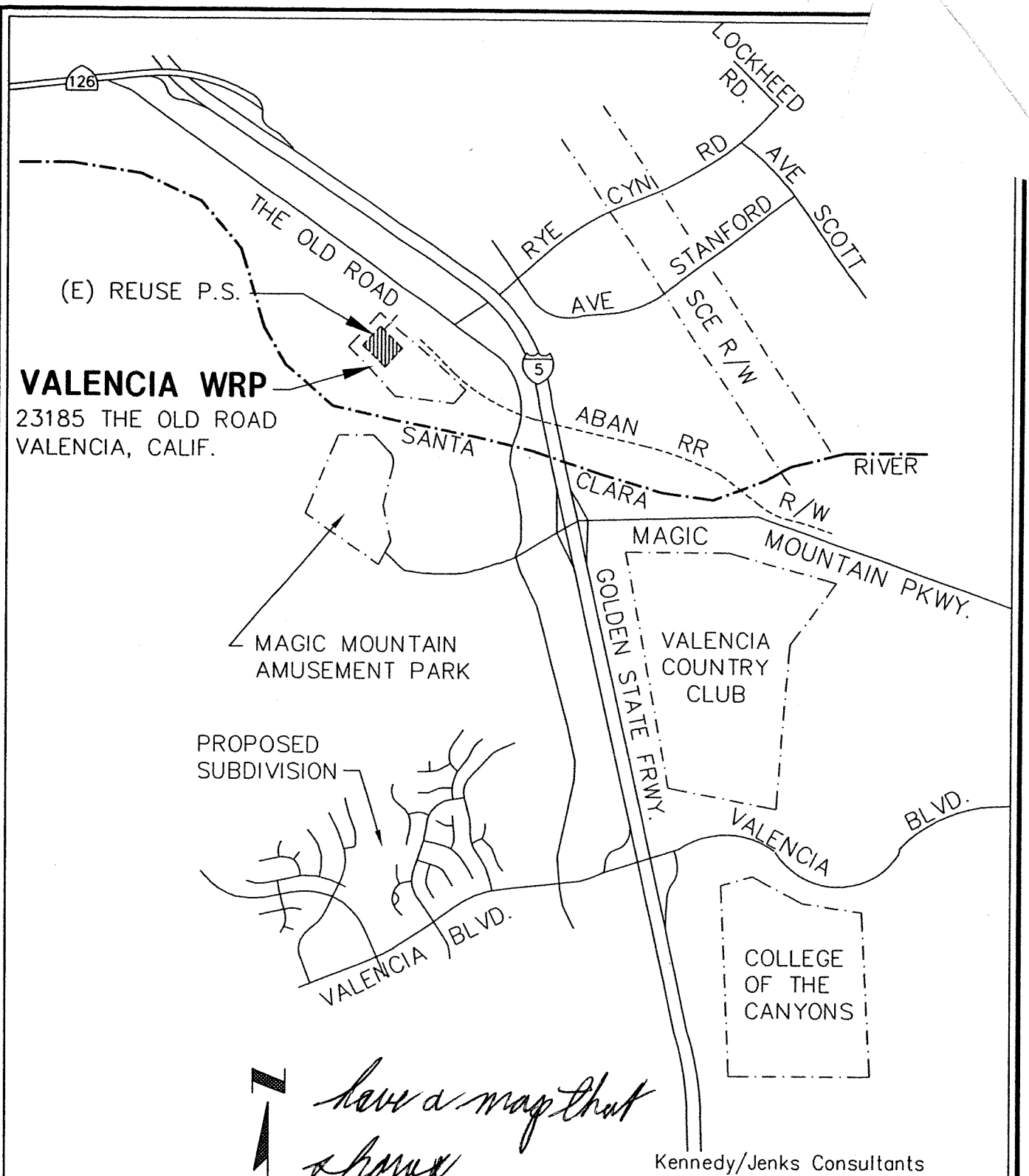
**TABLE 6-1**
**MONTHLY EFFLUENT FLOW FROM VALENCIA AND SAUGUS WRPs - CALENDAR YEAR 2001**

| Month | Saugus WRP Flow (mgd) | Valencia WRP (mgd) | Total Flow (mgd) |
|---|---|---|---|
| January | 6.22 | 10.13 | 16.35 |
| February | 6.18 | 10.65 | 16.83 |
| March | 6.01 | 10.97 | 16.98 |
| April | 5.54 | 11.00 | 16.54 |
| May | 5.26 | 11.36 | 16.62 |
| June | 5.32 | 11.39 | 16.71 |
| July | 5.10 | 11.77 | 16.87 |
| August | 5.46 | 11.61 | 17.07 |
| September | 5.54 | 11.50 | 17.04 |
| October | 5.54 | 11.63 | 17.17 |
| November | 6.01 | 11.44 | 17.45 |
| December | 5.89 | 11.17 | 17.06 |
| Annual Average | 5.67 | 11.22 | 16.89 |

Source: LACSD.

Located within District No. 26, the Saugus WRP is southeast of the intersection of Bouquet Canyon Road and Soledad Canyon Road and was completed in 1962. Two subsequent expansions and flow equalization facilities brought its current design capacity to 6.5 mgd. The treatment process was brought up to a tertiary level with the addition of dual-media pressure filters in 1987. However, no future expansions are possible due to space limitations at the site. In 2001, the Saugus WRP produced an average effluent flow of 5.67 mgd (6,350 AF/yr). Use of recycled water from this facility is permitted under RWQCB Order No. 87-49; however, LACSD staff has expressed concern about diverting these discharges due to potential impacts to downstream habitat. The habitat implications of effluent diversion are discussed in greater detail in Section 7. Until more detailed habitat investigations are conducted, it is assumed that only recycled water from the Valencia WRP will be used.

The Valencia WRP is located within District No. 32 and is on The Old Road near Magic Mountain Amusement Park, as shown in Figure 6-1. A schematic of the Valencia WRP's processes is presented on Figure 6-2. The Valencia WRP was completed in 1967. Following two subsequent expansions, construction of a 4.4 million gallon flow equalization tank in February 1995 and the Stage 4 expansion completed in June 1996, it now has a design capacity of 13.5 mgd. In 2000, the Valencia WRP produced an average effluent flow of 11.22 mgd (12,600 AF/yr). Use of recycled water from the Valencia WRP is permitted under RWQCB Order No. 87-48. On 24 July 1996, CLWA executed an agreement with LACSD to purchase up to 1,600 AF/yr of recycled water from the Valencia WRP. CLWA has been constructing the facilities to utilize this supply and expects to initiate deliveries in 2002. Recycled water from Valencia WRP has been used in the past by the City of Santa Clarita for landscape irrigation and by Pacific Pipeline and Oberg Construction for construction applications. These deliveries were made via tanker truck. In April 2000, a contract was signed with TransCoast Financial for use of up to 20,000 gpd for dust control at a nearby composting facility. The recycled water will be transported via tanker truck.

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**Valencia Water Reclamation Plant**
**Location Map**

May 2002
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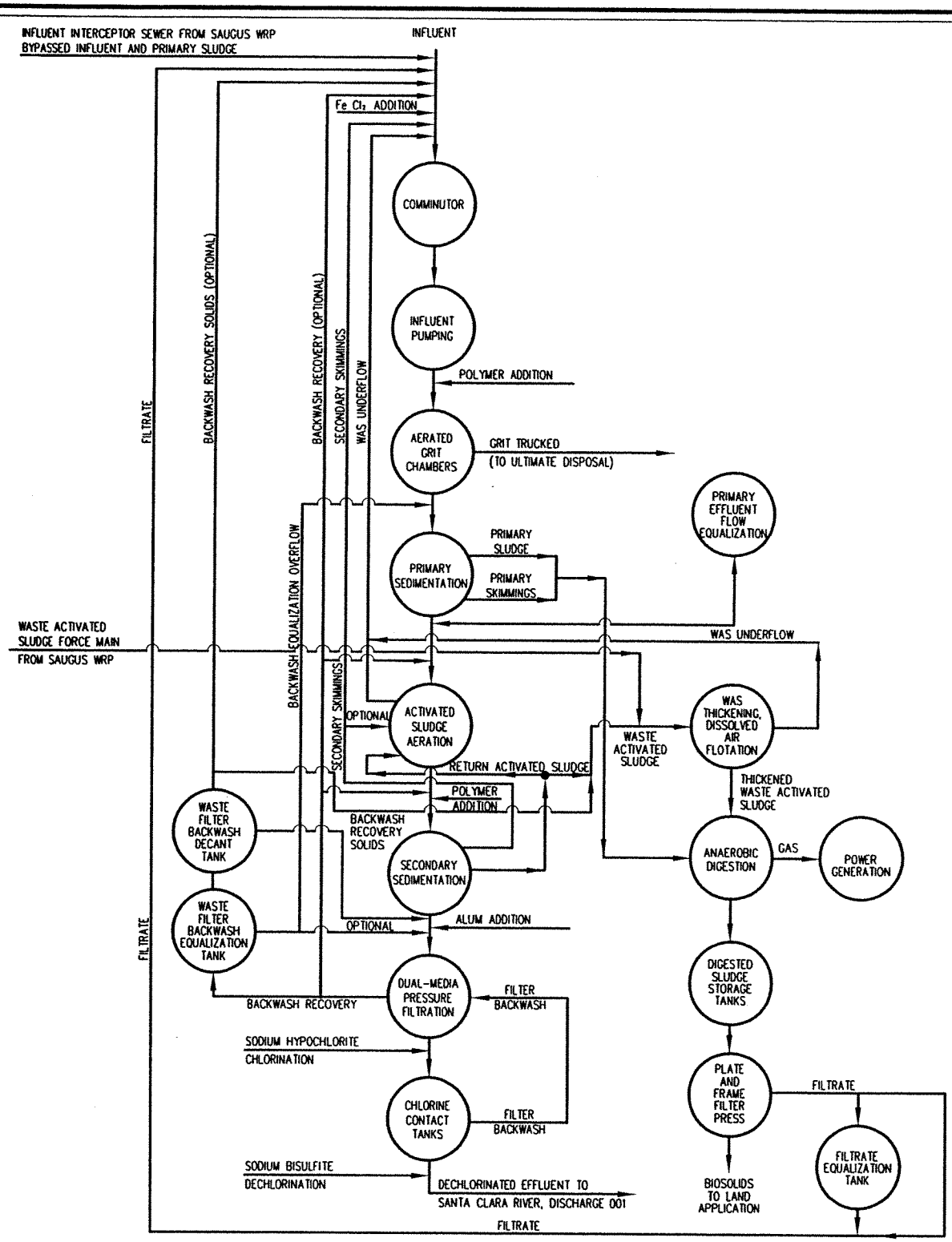
**Figure 6-1**

K/J FILE: X:\DWG\014642\FIGURE6-1.DWG REV. DATE: 5/13/2002

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**Valencia Water Reclamation Plant Process Schematic**

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**Figure 6–2**

SOURCE: LACSD

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#### 6.1.1.2 Planned Improvements and Expansions

To accommodate anticipated growth in the Santa Clarita Valley and to ensure compliance with discharge requirements from the RWQCB, LACSD plans to expand the Valencia WRP. The ultimate capacity of the WRP is planned to be 22 mgd, bringing the ultimate total for both WRPs to 27.6 mgd. No expansion is planned at the Saugus WRP. Construction is expected to occur in 3 mgd increments. Table 6-2 and Figure 6-3 present the projected expansion and flow scenario for the combined Valencia and Saugus WRP planning area.

**TABLE 6-2**
**HISTORIC AND PROJECTED CAPACITY AT VALENCIA AND SAUGUS WRPs**

| Year | Capacity (mgd) |
|---|---|
| 1971 | 6.5 |
| 1976 | 9.5 |
| 1987 | 12.5 |
| 1991 | 13.1 |
| 1995 | 17.5 |
| 1996 | 19.1 |
| 2002 | 28.1 |
| 2010 | 34.1 |

Source: County Sanitation Districts of Los Angeles County, "2015 Santa Clarita Valley Joint Sewerage System Facilities Plan and EIR, Draft," July 1997.

#### 6.1.1.3 Newhall Ranch Water Reclamation Plant

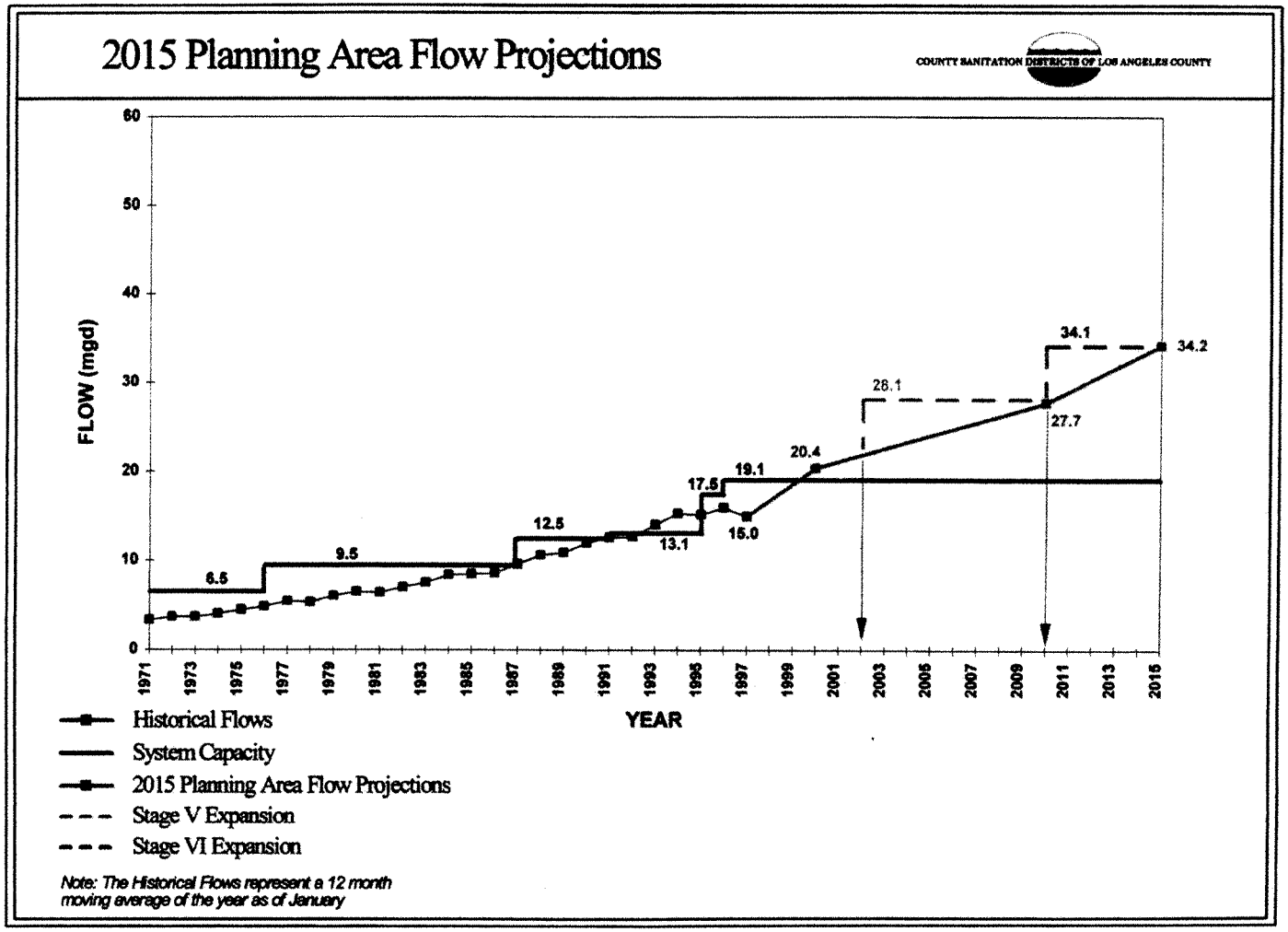
A third reclamation plant for the Santa Clarita Valley is proposed as part of the Newhall Ranch project. This proposed facility would be located near the western edge of the development project along the south side of State Route 126. The plant will be constructed in stages, with an ultimate capacity of 7.7 mgd. Effluent from the proposed water reclamation plant will be used to meet non-potable water demand within the development area. According to the Newhall Ranch Draft Additional Analyses, this plant is projected to produce 5,344 AF/yr on average. During the dry months, all of the recycled water will be used for non-potable uses within Newhall Ranch, supplemented by additional recycled water from CLWA. During the wet winter months when demands are low, the Newhall Ranch WRP will have approximately 286 AF/yr excess recycled water. In order for the WRP to be non-discharging, this recycled water will be transferred into the CLWA recycled water system for use and/or storage.

### 6.1.2 Water Quality

#### 6.1.2.1 Recycled Water Quality Requirements

Effluent quality from the Valencia and Saugus WRPs is regulated by the RWQCB. Discharge permits specifying the wastewater quality requirements for effluent discharged to the Santa Clara River have been issued for each plant. Each plant also has a reclamation permit specifying wastewater quality requirements for recycling of effluent; however, as discussed previously, small quantities of recycled water have only been used intermittently and have been transported via tanker truck.

Depending on the place and purpose of the recycled water use, the necessary treatment processes and the maximum allowable concentrations vary. These variations are addressed in the reclamation permits. Recycled water uses are limited to those identified in the permits. The

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**Projected Flow and Capacity of Valencia and Saugus WRPs**

May 2002
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**Figure 6-3**

G:\PROJECTS\2001\014642.00\report\Figure 6-3.ppt

permits specify that recycled water used as a source of supply in a non-restricted recreational impoundment (use subject to the most stringent requirements) must be adequately disinfected, oxidized, coagulated, clarified, filtered wastewater.

The wastewater quality limitations specified in the reclamation permits conform to the reclamation criteria contained in the California Administrative Code, DHS, Title 22, Division 4, Chapter 3, "Reclamation Criteria." In addition, because the groundwater in the Santa Clarita Valley is beneficially used for domestic supply and other purposes, the reclamation permits stipulate that recycled water cannot contain trace constituents and other substances in excess of the limits set forth in the current edition of the State Drinking Water Standards (California Administrative Code, DHS, Title 22, Division 4, Chapter 15, "Domestic Water Quality and Monitoring.") The maximum constituent concentration limitations for recycled water are listed in Table 6-3.

The reach of the Santa Clara River to which the Valencia WRP discharges (Reach 7) is listed in the 1998 303(d) list of impaired water bodies for ammonia, chloride, and nitrite. The RWQCB has recently issued a draft total maximum daily load (TMDL) of 90 mg/l of chloride for the Valencia and Saugus WRPs. This requirement, if adopted, would require desalination of the effluent prior to discharge or reuse. Potential future limitations on ammonia, nitrate, and nitrite are expected to be met by denitrification.

#### 6.1.2.2 Effluent Quality

The quality of effluent from the Valencia WRP has consistently been in compliance with the recycled water requirements specified in its reclamation permit. Average concentrations of effluent constituents measured during fiscal year 1999-2000 for each plant are listed in Table 6-3. Additionally, the tertiary-treated wastewater is "adequately disinfected, oxidized, coagulated, clarified, filtered wastewater" as specified for use of recycled water in non-restricted recreational impoundment, the use subject to the most stringent requirements in the permits.

The effluent from the WRPs continues to comply with the discharge requirements, as well. During fiscal year 1999-2000, at the Valencia WRP, the $BOD_{5,30}$ measured was approximately 7 mg/l, and suspended solids concentrations averaged <2 mg/l.

**TABLE 6-3**
**EFFLUENT QUALITY AND WATER RECLAMATION REQUIREMENTS FOR VALENCIA WRP**

| Constituent | Effluent Quality[a] | Maximum Limitation[b] |
|---|---|---|
| pH | 7.19 | 6.0 - 9.0 |
| Turbidity (NTU) | 1.0 | 2 |
| Total Coliform (org./100mL) | <1 | 2.2 |
| Temperature (° F) | 76 | – |
| Suspended Solids (mg/l) | <2 | – |
| Settleable Solids (mg/l) | <0.1 | – |
| Total Dissolved Solids (mg/l) | 739 | 1,000 |
| Total Chemical Oxygen Demand (COD) (mg/l) | 28 | – |
| Total BOD (mg/l) | <7 | – |
| Ammonia Nitrogen (mg/l) | <17.9 | – |
| Organic Nitrogen (mg/l) | 1.6 | – |
| Nitrate Nitrogen (mg/l) | 3.22 | – |

| Constituent | Effluent Quality[a] | Maximum Limitation[b] |
|---|---|---|
| Nitrite Nitrogen (mg/l) | 1.61 | – |
| Phosphate (mg/l) | 2.2 | – |
| Fluoride (mg/l) | 0.41 | 1.6 |
| Cyanide (mg/l) | <0.01 | – |
| Chloride (mg/l) | 170 | 300 |
| Sulfate (mg/l) | 135 | 450 |
| Total Alkalinity (mg/l) | 240 | – |
| Total Hardness (mg/l) | 241 | – |
| Calcium (mg/l) | 57.0 | – |
| Magnesium (mg/l) | 19.8 | – |
| Antimony (mg/l) | 0.0010 | – |
| Arsenic (mg/l) | <0.0010 | 0.05 |
| Barium (mg/l) | <0.01 | 1.0 |
| Beryllium (mg/l) | <0.0025 | – |
| Boron (mg/l) | 0.91 | – |
| Cadmium (mg/l) | <0.002 | 0.010 |
| Total Chromium (mg/l) | <0.01 | 0.05 |
| Copper (mg/l) | <0.01 | 1.0 |
| Iron (mg/l) | 0.10 | – |
| Lead (mg/l) | 0.04 | 0.05 |
| Manganese (mg/l) | 0.04 | – |
| Mercury (mg/l) | <0.0002 | 0.002 |
| Nickel (mg/l) | <0.02 | – |
| Potassium (mg/l) | 18.7 | – |
| Selenium (mg/l) | <0.0010 | 0.01 |
| Silver (mg/l) | <0.01 | 0.05 |
| Sodium (mg/l) | 149 | – |
| Thallium (mg/l) | <0.00100 | – |
| Zinc (mg/l) | 0.05 | 5.0 |
| Total Identifiable Chlorinated Hydrocarbons (μg/l) | 0.02 | NS |
| Phenols (mg/l) | <0.010 | 1.0 |
| Detergents (MBAS) (mg/l) | 0.23 | – |
| Oil and Grease (mg/l) | <3.7 | – |
| Sodium Adsorption Ratio | 4.31 | – |
| Conductivity (umhos/cm) | 1368 | – |
| Nitrate + Nitrite (mg/l) | 4.83 | 10 |
| Radioactivity (pCi/l) (gross alpha + gross beta) | – | 65 |

Notes:

(a) Arithmetic mean of effluent analytical data from LACSD, "Eleventh Annual Status Report on Reclaimed Water Use," Fiscal Year 1999-2000. Frequency of analyses varies among constituents; frequency specified in the Monitoring and Reporting Programs outlined in RWQCB-LA Order Nos. 87-48 and 87-49.

(b) Recycled water limitations specified in RWQCB-LA Order No. 89-129 (Valencia WRP). Trace constituent concentration limits obtained from California Department of Health Services, California Administrative Code, Title 22, Division 4, Chapter 15, "Domestic Water Quality and Monitoring" (1989).

NS: Not Specified
mg/l: milligrams per liter
MPN/100 ml: Most probable number per 100 milliliters
NTU: Nephelometric Turbidity Units
pCi/l: picocuries per liter
μg/l: micrograms per liter

## 6.2 Perchlorate Contaminated Wells

The Whittaker-Bermite site in Santa Clarita has historically been used for the manufacture of solid rocket propellants, munitions, and fireworks. Improper use or disposal of the chemical compounds and waste products has resulted in soil and groundwater contamination of the site. Preliminary compounds of potential concern for groundwater include ammonium perchlorate, octahydro-1,3,5,7-Tetranitro-1,3,5,7-Tetrazocine (HMX), Hexahydro-1,3,5-Trinitro-1,3,5-Triazine (RDX),and nitrosodimethylamine (NDMA).

Production wells in both the alluvium and Saugus aquifers have been sampled to determine whether contamination from the Whittaker-Bermite site has affected them. None of the production wells sampled in the alluvium (Stadium, V-U4, V-T2, V-4, and V-U2) contained detectable concentrations of perchlorate, NDMA, HMX, and RDX. Groundwater samples from nine production wells screened in the Saugus aquifer have been analyzed for the constituents of concern. Perchlorate was detected in groundwater samples from four of the nine Saugus wells sampled (NC-11, Saugus 1, Saugus 2, and V-157), at concentrations ranging from 14 to 45 µg/l. Groundwater samples collected from Saugus production wells NC-11, Saugus 1, Saugus 2, and V-157 were also analyzed for NDMA, HMX, RDX, and volatile organic compounds (VOCs). NDMA, HMX, and RDX were not detected in the groundwater samples. TCE was detected in Saugus 1, Saugus 2, and V-157 at concentrations less than the MCL.[5]

There is currently a remediation effort underway to address the perchlorate contamination. While the Remedial Action Plan has not been prepared, the most likely scenario is that contaminated groundwater will be pumped from four production wells and treated to potable standards at a centralized treatment facility near the wells. The location of the facility and the treatment technologies remain to be determined. The treatment capacity may be as high as 8,700 gpm (13,750 AF/yr). If DHS requires a demonstration period for the facility (approximately 1 to 2 years), the treated water could be beneficially used in the recycled water system. The earliest the facility will be on-line is 2003.

## 6.3 Oil Field Produced Water

Oil field produced water is a by-product of oil production generated when oil is pumped out of the reservoir. It is generally of poor water quality and unsuitable for potable, industrial, or irrigation use without treatment. Oil companies are finding that oil production may improve if the oil field produced water is disposed of on the surface rather than through reinjection. However, because of the water quality, reinjection has often been the most cost-effective disposal option.

Treatment processes can produce potable quality water; however, because of the poor initial water quality and the organic constituents, it is often more appropriate for treated oil field produced water to be used for irrigation or industrial purposes to offset potable water demand. Pilot studies performed at the Placerita Oil Field have indicated that even with reverse osmosis (RO) treatment, some organic compounds such as naphthalene, 2-butanone, and ethylbenzene, can be detected in the RO effluent.

The economics of oil production are market-driven and are different from those of drinking water supplies. As oil prices rise or drop, oil fields go into and out of production depending on the

[5] Hargis + Associates Inc., "Field Sampling Plan Technical Memorandum Reconnaissance Groundwater Investigation (Operable Unit 7), Operable Units 2 and 3," 21 April 2000.

costs of production. Therefore, the reliability of oil field produced water should be considered as a long-term, but not a permanent supply.

Studies of the potential reuse of treated oil field produced water from the Placerita Oil Field have indicated that approximately 44,000 barrels per day (1.8 mgd) of treated oil field produced water may be available. For irrigation reuse, the produced water would need to be cooled and treated to remove hardness, silica, total dissolved solids (TDS), boron, ammonia, and total organic carbon (TOC). Water quality for the Placerita Oil Field produced water is summarized in Table 6-4.

**TABLE 6-4**
**PLACERITA OIL FIELD PRODUCED WATER QUALITY**

| Parameter | Untreated | Treated |
|---|---|---|
| TDS | ~6,000 mg/l | 145 mg/l |
| Temperature | 150-175°F | 90°F |
| Boron | ~16 mg/L | 1-2 mg/l |
| Ammonia | 9.3 mg/l | 2-11 mg/l |
| Silica | ~10 mg/l | <1 mg/l |
| Hardness | 1-5 mg/l | <1 mg/l |
| TOC | 120 mg/l | 2 mg/l |

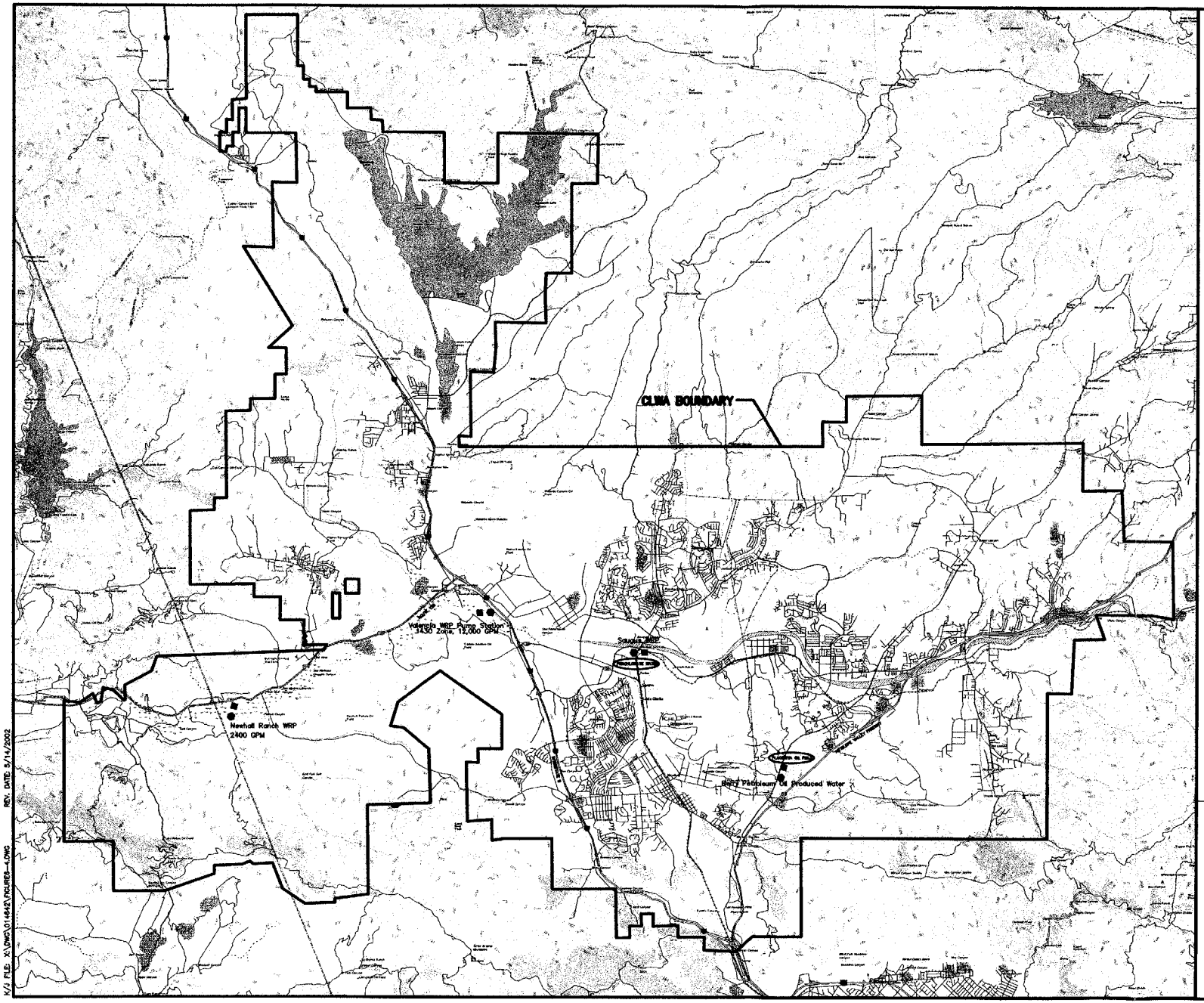
## 6.4 Summary of Available Source Water Flows

As discussed previously, there are four potential sources of water for the non-potable water system. The flows projected to be available are shown in Table 6-5. The sources of non-potable water are presented in Figure 6-4.

**TABLE 6-5**
**SUMMARY OF AVAILABLE SOURCE WATER FLOWS**

| Source | Current Flow | Projected Flow | Available for Non-Potable Use |
|---|---|---|---|
| Valencia WRP | 10.84 mgd | 27.6 mgd | 19,995 AF/yr |
| Saugus WRP | 5.41 mgd | 6.5 mgd | 0 AF/yr |
| LACSD Total | 16.25 mgd | 34.1 mgd | 19,995 AF/yr |
| Oil Field Produced Water | 0 mgd | 1.8 mgd | 1,980 AF/yr |
| Treated Perchlorate Contaminated Water[(a)] | 0 mgd | 12.5 mgd | 11,000 AF/yr |
| Newhall Ranch WRP | 0 mgd | 4.78 mgd | 5,344 AF/yr |
| | | Total | |
| | | Without Treated Perchlorate Contaminated Water | 27,319 AF/yr |
| | | With Perchlorate Contaminated Water | 38,319 AF/yr |

Note: (a) Treated perchlorate contaminated water will only be available during the DHS demonstration period (1-2 years) for the planned treatment facility.

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**Potential Sources of Non-Potable Water**

May 2002
K/J 014642.00

**Figure 6-4**

K/J FILE: X:\DWG\014642\FIGURES-4.DWG REV. DATE: 5/14/2002

## 6.5 Water Quality Requirements for Irrigation

Landscape irrigation appears to be the primary potential use for recycled water. Table 6-6 lists guidelines for irrigation water quality standards and compares the quality of the recycled water available from the Valencia WRP, treated perchlorate-contaminated groundwater, and treated oil field produced water to the standards. Table 6-6 also presents the recommended maximum concentrations in irrigation water and compares the quality of the potential recycled water sources to the recommendations.

From the guidelines, sodium and chloride levels for unblended recycled water are relatively high and may prove toxic to some plants after repeated sprinkler irrigation. If sensitive plants are to be irrigated with recycled water, application of the water by a drip irrigation system or surface system should be considered. In addition, ammonia and nitrate concentrations and boron concentrations fall into the "increasing problems" range and could prove toxic to sensitive plants over a period of time. Salinity of the recycled water also falls into the "increasing problems" range; however, plants vary widely in tolerance to salinity. Provision of adequate soil drainage will help to alleviate any potential problems due to salinity.

Table 6-6 does not list the adjusted sodium adsorption ratios (SAR) of the water sources. The adjusted SARs are related to carbonate and bicarbonate concentrations were not available. However, the unadjusted SAR of the recycled water is below 10, which classifies it as low-sodium water. In addition, the residual sodium bicarbonate levels of the recycled water are relatively low. Because the SAR and residual bicarbonate levels are low, the potential for reducing soil drainage is low. The nutrient composition (nitrogen and phosphorus) of the effluent appears beneficial for irrigation and may result in a reduction in fertilizer use.

Table 6-7 focuses on trace element water quality from Valencia WRP, which would be the largest source of water for the recycled water system. As shown in Table 6-7, the recycled water from Valencia WRP does not exceed any of the recommended values for trace elements in irrigation water. Inadequate data are available on trace element concentrations in oil field produced water and treated perchlorate-contaminated groundwater.

## TABLE 6-6
## COMPARISON OF AVAILABLE WATER QUALITY TO IRRIGATION QUALITY STANDARD GUIDELINES

| Potential Irrigation Problem | Parameter | Units | Degree of Restriction on Use | | | Recycled Water from Valencia WRP | Treated Oil Field Produced Water | Treated Perchlorate Contaminated Groundwater[a] |
|---|---|---|---|---|---|---|---|---|
| | | | None | Slight to Moderate | Severe | | | |
| Salinity - Affects plant water availability | $EC_w$ | dS/m | <0.7 | 0.7-3.0 | >3.0 | 1.15 | 0.23 | 0.76 - 1.20 |
| | TDS | mg/l | <450 | 450-2000 | >2000 | 739 | 145 | 490 - 767 |
| Infiltration – SAR and $EC_w$ affect infiltration rate of water into the soil. | SAR = 0-3 and $EC_w$ | dS/m | >0.7 | 0.7-0.2 | <0.2 | – | – | – |
| | SAR = 3-6 and $EC_w$ | dS/m | >1.2 | 1.2-0.3 | <0.3 | 1.15 | – | – |
| | SAR = 6-12 and $EC_w$ | dS/m | >1.9 | 1.9-0.5 | <0.5 | – | – | – |
| | SAR = 12 - 20 and $EC_w$ | dS/m | >2.9 | 2.9-1.3 | <1.3 | – | – | – |
| | SAR = 20-40 and $EC_w$ | dS/m | >5.0 | 5.0-2.9 | <2.9 | – | – | – |
| Specific Ion Toxicity - Affects sensitive plants | Sodium - Root Absorption | SAR | <3 | 3-9 | >9 | 4.31 | – | – |
| | Sodium - Root Absorption | me/l | <3 | >3 | | 0.19 | – | – |
| | Sodium - Foliar Absorption | mg/l | <70 | >70 | | 149 | – | 53.6 - 153 |
| | Chloride - Root Absorption | mg/l | <70 | 70-355 | >355 | 170 | – | 35.5 - 90.5 |
| | Chloride - Foliar Absorption | mg/l | <100 | >100 | | 170 | – | 35.5 - 90.5 |
| | Boron | me/l | <1.0 | 1.0-2.0 | >2.0 | 0.23 | 0.25-0.5 | – |
| Miscellaneous Effects - Affects susceptible plants | Bicarbonate | mg/l | <90 | 90-500 | >500 | – | – | – |
| | pH | pH units | 6.5-8.4 | higher or lower | – | 7.19 | – | 7.19 - 8.41 |
| | Residual Chlorine | mg/l | <1.0 | 1-5 | >5 | – | – | – |

Source: AWWA - CA/NV Section, "Guidelines for the On-Site Retrofit of Facilities using Disinfection Tertiary Recycled Water," 1997.
Note: (a) Values based on range of values for groundwater extracted by VWC, SCWD, and NCWD. Treatment for perchlorate may affect these values.

## TABLE 6-7
## RECOMMENDED MAXIMUM CONCENTRATIONS OF TRACE ELEMENTS IN IRRIGATION WATER

| Element | Recommended Maximum Concentration (mg/l)[a] | Valencia WRP | Remarks |
|---|---|---|---|
| Aluminum (Al) | 5.0 | NA | Can cause non-productivity in acid (pH < 5.5), but more alkaline soils at pH > 7.0 will precipitate the ion and eliminate any toxicity. |
| Arsenic (As) | 0.10 | <0.0010 | Toxicity to plants varies widely, ranging from 12 mg/l for Sudan grass to less than 0.05 mg/l for rice. |
| Beryllium (Be) | 0.10 | <0.0025 | Toxicity to plants varies widely, ranging from 5 mg/l for kale to 0.5 mg/l for bush beans. |
| Cadmium (Cd) | 0.01 | <0.002 | Toxic to beans, beets, and turnips at concentrations as low as 0.1 mg/l in nutrient solutions. Conservative limits recommended to its potential for accumulation in plants and soils to concentrations that may be harmful to humans. |
| Cobalt (Co) | 0.05 | NA | Toxic to tomato plants at 0.1 mg/l in nutrient solution. Tends to be inactivated by neutral and alkaline soils. |
| Chromium (Cr) | 0.10 | <0.01 | Not generally recognized as an essential growth element. Conservative limits recommended due to lack of knowledge on its toxicity to plants. |
| Copper (Cu) | 0.20 | <0.01 | Toxic to a number of plants at 0.1 to 1.0 mg/l in nutrient solutions. |
| Fluoride (F) | 1.0 | 0.41 | Inactivated by neutral and alkaline soils. |
| Iron (Fe) | 5.0 | 0.10 | Not toxic to plants in aerated soils, but can contribute to soil acidification and loss of availability of essential phosphorus and molybdenum. Overhead sprinkling may result in unsightly deposits on plants, equipment, and buildings. |
| Lithium (Li) | 2.5 | NA | Tolerated by most crops to 5 mg/l; mobile in soil. Toxic to citrus at low concentrations (<0.075 mg/l). Acts similarly to boron. |
| Manganese (Mn) | 0.20 | 0.04 | Toxic to a number of crops at a few tenths to a few mg/l, but usually only in acid soils. |
| Molybdenum (Mo) | 0.01 | NA | Not toxic to plants at normal concentrations in soil and water. Can be toxic to livestock if forage is grown in soils with high concentrations of available molybdenum. |
| Nickel (Ni) | 0.20 | <0.02 | Toxic to a number of plants at 0.5 to 1.0 mg/l; reduced toxicity at neutral or alkaline pH. |
| Lead (Pb) | 5.0 | 0.04 | Can inhibit plant cell growth at very high concentrations. |

| Element | Recommended Maximum Concentration (mg/l)[a] | Valencia WRP | Remarks |
|---|---|---|---|
| Selenium (Se) | 0.02 | <0.0010 | Toxic to plants at concentrations as low as 0.025 mg/l and toxic to livestock if forage is grown in soils with high concentrations of added selenium. An essential element to animals, but in very low concentrations. |
| Tin (Sn)<br>Titanium (Ti)<br>Tungsten (W) | – | NA | Effectively excluded by plants; specific tolerance unknown. |
| Vanadium (V) | 0.10 | NA | Toxic to many plants at relatively low concentrations. |
| Zinc (Zn) | 2.0 | 0.05 | Toxic to many plants at widely varying concentrations; reduce toxicity at pH > 6.0 and in fine textured or organic soils. |

Source: CA/NV Section of AWWA, "Guidelines for the On-Site Retrofit of Facilities Using Disinfected Tertiary Recycled Water," 1997.

Note: (a) The maximum concentration is based on a water application rate which is consistent with good irrigation practices (10,000 $m^3$ per hectare per year). If the water rate greatly exceeds this, the maximum concentration should be adjusted downward accordingly. No adjustment should be made for application rates less than 10,000 $m^3$ per hectare per year. The values given are for water used on a continuous basis at one site.

# Section 7: Potential Recycled Water Constraints

This section provides a brief overview of the constraints on the use of recycled water in the CLWA service area, including environmental considerations and water rights issues.

## 7.1 Environmental Considerations

Effluent from the Valencia and Saugus WRPs is currently discharged to the Santa Clara River, supplementing ephemeral flows. Because effluent discharges from the WRPs flow through riparian habitat of several endangered species, assessment of the potential impact of a recycling project on the habitat is important.

### 7.1.1 Hydrology of the Santa Clara River

Beginning in the San Gabriel Mountains east of Santa Clarita, the Santa Clara River flows approximately 84 miles westward to the Pacific Ocean. Surface flow typically occurs during the rainy or snowmelt seasons; however, portions of the river have surface flow year round. Natural "rising water," agricultural runoff, and other miscellaneous flow contribute to the year-round flow.

In the Santa Clarita Valley, the Valencia and Saugus WRPs contribute to the river flow year-round. Typically, there is year-round surface flow in the river from the Valencia WRP to the vicinity of Piru. In summer months, it appears that the effluent from the WRPs comprises a significant portion of the river flow. An analysis was performed to estimate the current effluent contribution from the two WRPs to the total average stream flow on a monthly basis. The analysis was based on 10 years of stream flow data from Stream Gauge F92C-R provided by the County of Los Angeles Department of Public Works and effluent flow data for the Saugus and Valencia WRPs from LACSD. Stream gauge F92C-R is located on the Union Pacific Railroad bridge, which crosses the Santa Clara River and runs adjacent to Interstate 5. Stream gauge F92C-R has been given several names throughout its forty-year existence, including "Santa Clara River at Railroad Bridge" and "Old Road Bridge". Based on the available data, combined effluent flows from both treatment facilities contribute more than 90 percent of the total river flow from July through October. Table 7-1 summarizes this analysis.

### 7.1.2 Riparian Habitat

The Santa Clara River is one of the few major drainages of the San Gabriel Mountains that remains predominantly unchannelized. It includes freshwater marshes and woodland communities. These habitat types are rapidly disappearing and are important to the local wildlife, as described in numerous biological resource assessments. Such assessments have assisted the Department of Regional Planning, Los Angeles County, in designating Significant Ecological Areas (SEAs) within the county. The original SEA study was completed in 1972, with the second following in 1976. The existing 61 SEAs reflect the findings from the 1976 study. To date, the river plain from the vicinity of the Valencia WRP downstream to the Ventura/Los Angeles County line is designated a SEA by Los Angeles County. However, the increase in population and developed land within the Los Angeles County has created the need to re-evaluate the existing SEA program as part of the next General Plan amendment. The 2001 proposed Santa Clara SEA encompasses the entire Los Angeles County reach of the Santa Clara River, primarily within unincorporated areas of Los Angeles County.

**TABLE 7-1**
**PERCENTAGE OF CURRENT STREAM FLOW AS EFFLUENT**

| Month | 1990-2000 F92C-R Reading (mgd)[a] | 2000 Valencia WRP Flow (mgd) | 2000 Saugus WRP Flow (mgd) | Natural River Flow (mgd)[b] | Total River Flow (mgd)[c] | Effluent % of Flow |
|---|---|---|---|---|---|---|
| January | 110 | 10.62 | 5.19 | 104.81 | 120.62 | 13% |
| February | 115 | 10.74 | 5.47 | 109.53 | 125.74 | 13% |
| March | 28 | 10.8 | 5.27 | 22.73 | 38.8 | 41% |
| April | 18 | 11.02 | 5.32 | 12.68 | 29.02 | 56% |
| May | 17 | 11.21 | 5.29 | 11.71 | 28.21 | 58% |
| June | 9 | 11.69 | 5.17 | 3.83 | 20.69 | 81% |
| July | 6 | 12.08 | 4.81 | 1.19 | 18.08 | 93% |
| August | 4 | 11.98 | 5.35 | 0 | 15.98 | 100% |
| September | 4 | 10.95 | 6.35 | 0 | 14.95 | 100% |
| October | 7 | 11.31 | 5.84 | 1.16 | 18.31 | 94% |
| November | 12 | 11.21 | 5.58 | 6.42 | 23.21 | 72% |
| December | 24 | 10.62 | 6.26 | 17.74 | 34.62 | 49% |

Notes:
(a) Average based on 10 years of stream flow data, 1990-2000, from Los Angeles County Department of Public Works Stream Gauge F92C-R.
(b) Stream gauge F92C-R less the upstream Saugus WRP flow.
(c) Stream gauge F92C-R monthly average plus downstream Valencia WRP flow.

### 7.1.3 Endangered Species

The Santa Clara River supports numerous sensitive biological resources, including habitats and individual species, which have been afforded special recognition by federal, state, or local conservation agencies and organizations as endangered, threatened, rare, or otherwise of concern. Table 7-2 presents the habitats as well as plant and animal species present, or potentially present within the Santa Clara River that have been afforded special recognition as described in the 2001 Draft Biological Resource Assessment of the Proposed Santa Clara River SEA. The species in Table 7-2 have been recorded within the SEA as well as those reasonably expected to occur. The location of each species reflects observations, records in the California Natural Diversity Database, or reported in previous documentation as observed within or in the immediate vicinity of the proposed SEA.

## TABLE 7-2
## SENSITIVE SPECIES OCCURRING OR POTENTIALLY OCCURRING WITHIN THE PROPOSED SANTA CLARA RIVER SEA

| Scientific Name | Common Name | Agency Listing Status[a] | Preferred Habitat | Location |
|---|---|---|---|---|
| **FISH** | | | | |
| *Gasterosteus aculeatus williamsoni* | unarmored threespine stickleback | FE, SE, SFP | Fresh water rivers and streams in the L.A. basin; low flow areas. | Common in Santa Clara River, Arrastre Creek |
| *Catostomus santaanae* | Santa Ana sucker | FE, CSC | Sand, rubble, boulder bottoms; cool, clear water; feed on algae. | Santa Clara River |
| **AMPHIBIANS** | | | | |
| *Bufo microscaphus californicus* | arroyo southwestern toad | FE, CSC, SP | Washes/streams, sandy banks, grown to willows, cottonwoods or sycamores; riparian habitats of semi-arid areas, small cobbly streambeds. | One individual recorded along the Santa Clara River; San Francisquito Cyn.; Castaic Creek (above dam) |
| **REPTILES** | | | | |
| *Clemmys marmorata pallida* | southwestern pond turtle | FSC, CSC, SFP | Ponds, marshes, rivers, streams, irrigation ditches. | Ben Cyn.; Vasquez Rocks; one individual in Santa Clara River, Newhall Ranch |
| *Cnemidophorus tigris multiscutatus* | coastal western whiptail | FSC | Arid and semi-arid desert to open woodlands, where vegetation is sparse. | Santa Clara River and San Francisquito Creek; Common in SEA |
| *Diadophis punctatus modoestus* | San Bernardino ring-neck snake | FSC | Open, relatively rocky areas, within valley-foothill, mixed chaparral, and annual grass habitats. | Placerita Cyn; Santa Clara River |
| **BIRDS** | | | | |
| *Ixobrychus exilis hesperis* | western least bittern | CSC | Emergent wetlands of cattails and tules. | Santa Clara River |
| *Accipiter cooperi* | Cooper's hawk | CSC | Open woodlands especially riparian woodland. | Santa Clara River nesting records; foraging over Newhall Ranch; San Francisquito Creek, common in SEA |
| *Buteo swainsoni* | Swainson's hawk | ST | Plains, ranges, open hills, sparse trees. | Occasional along Santa Clara River; Newhall (100 birds in 2000) |
| *Elanus leucurus* | white-tailed kite | SFP | Grasslands with scattered trees, near marshes, along hwys. | Nesting in woodlands along Santa Clara River, Live Oak Springs Cyn., Placerita Cyn.; near Pico Cyn.; common locally |
| *Coccyzus americanus occidentalis* | western yellow-billed cuckoo | SE | Riverine woodlands, thickets, and farms. | Record from Santa Clara River near Magic Mountain Park (Newhall Ranch; 1974) |

| Scientific Name | Common Name | Agency Listing Status[a] | Preferred Habitat | Location |
|---|---|---|---|---|
| *Empidonax traillii extimus* | southwestern willow flycatcher | FE | Low elevation sites: Riparian woodlands that contain water and low growing willow thickets. High elevation sites: Large, flat, wet meadows that contain patches of willow trees. | One individual observed in mature riparian woodlands of Santa Clara River; nests near Lang, approx. 6 mi. E of Newhall |
| *Lanius ludovicianus* | loggerhead shrike | FSC, CSC | Open habitats with scattered shrubs, trees, posts, fences, utility lines, or other perches. | 4 pairs near agricultural fields/open chaparral near San Francisquito Creek; near Santa Clara River at County line; common locally in SEA |
| *Vireo bellii pusillus* | least Bell's vireo | FE, SE | Perennial and intermittent streams with low, dense riparian scrub and riparian woodland habitats below 2,000 feet elevation; nests primarily in willows and forages in the riparian and occasionally in adjoining upland habitats. | Small population recorded in Santa Clara River riparian woodland and scrub zone along the Ventura-LA county border; Castaic Creek at Santa Clara River |
| *Dendroica petechia brewsteri* | yellow warbler | CSC | Riparian woodlands, montane chaparral, and mixed conifer habitats. | Several pairs recorded nesting in Nat'l Forest near Francisquito Creek; occasionally nests along Santa Clara River |
| *Icteria virens* | yellow-breasted chat | CSC | Riparian woodlands with a thick understory. | One individual recorded in San Francisquito Creek near Santa Clara River |
| *Piranga rubra* | Summer tanager | CSC | Cottonwood-willow woodland and riparian scrub. | Santa Clara River near Lang |
| **MAMMALS** | | | | |
| *Antrozous pallidus* | pallid bat | CSC | Nests in dry, rocky habitats/caves, crevices in rocks, arid habitats including deserts, chaparral, and scrublands. | Historic records in Santa Clara River watershed, Soledad Cyn., and Castaic Creek; common locally |
| *Neotoma lepida intermedia* | San Diego desert woodrat | FSC, CSC | Chaparral, coastal sage scrub, and pinyon-juniper woodland. | Adjacent to Santa Clara River, Newhall Ranch; common in SEA |

Note: (a) FE Federally Listed as Endangered
FSC Federally Special Concern Species
SE State Listed as Endangered
SP State Protected
SFP State Fully Protected
CSC California Special Concern Species

### 7.1.4 Potential Impact of the Recycled Water System on Instream Flows

Because effluent from the Saugus and Valencia WRPs comprises a majority of the flow in the Santa Clara River during summer months, it is important to consider the effect of expanding the recycled water system on the total river flow. In the future, the Santa Clara River may be affected by the Saugus and Valencia WRPs regardless as to what extent the recycled water system is implemented. If the proposed expansion of the recycled water system is not implemented, the effluent from the Saugus and Valencia WRPs would continue to be discharged and average annual discharges to the river would increase by more than 100 percent by the year 2015.

In 1988, CLWA approved a programmatic Environmental Impact Report (EIR) that included a recycled water element. This element included development of 1,700 AF/yr of recycled water and the minimum effluent discharged to the river in 1988 was assumed to be 9.72 mgd for the month of March. This flow was determined by the EIR to have no impact on the environment. Until additional habitat studies are conducted, it is assumed that for the purpose of this Master Plan, the 2000 baseline flow of 16.25 mgd (from Valencia and Saugus WRPs) minus the 1.5 mgd (1,700 AF/yr) currently under development would be discharged to the river. Consequently, future flows above 14.75 mgd would be available for irrigation use.

The impacts on the river habitat and the endangered species from diverting WRP effluent to reuse are beyond the scope of this report. It is recommended that a detailed habitat study be conducted and the minimum flow necessary to maintain the existing habitat be evaluated. Based on this evaluation, additional recycled water diversions may be possible.

## 7.2 Water Rights Considerations

The ability of CLWA to use recycled water is also constrained by their rights to use the water available. The water rights issues are different for recycled water from the WRPs, oil field produced water, and treated perchlorate-contaminated water.

### 7.2.1 Recycled Water from LACSD

A determination of rights to treated wastewater is required prior to long-term project expenditures. Ownership of the rights to wastewater is addressed in three separate state laws or codes:

- Clean Water and Water Bond Law of 1978
- California Department of Fish and Game Code, Section 1600
- Water Code, sections 1210, 1211, and 1702

The Clean Water and Water Bond Law of 1978 established that treated wastewater was the property of the treatment facility that produced it and that the producer could sell or transfer its rights to the treated wastewater. In addition, the rights of the treatment facility allowed the treated wastewater to be used for beneficial purposes regardless of the detriment to downstream users. However, the advice of legal counsel for individual determinations and the development of most equitable and least detrimental projects to all affected parties are recommended.

The California Department of Fish and Game Code Section 1600 requires that "any project which will divert, obstruct or change the natural flow or bed, channel or bank of any river, stream or lake designated by the department in which there is at any time an existing fish or wildlife resource or from which these resources derive benefit" be modified sufficiently "for the protection and continuance of the fish or wildlife resources." On the Santa Clara River, there are users of river water downstream of both the Saugus and Valencia WRPs, as well as SEAs that support endangered species. Potential impacts to these users and the habitat should be addressed in the environmental documents to be prepared for this proposed recycled water project.

Water Code section 1210 provides that "the owner of a wastewater treatment plant has the exclusive right to treated wastewater as against anyone who has supplied the water to the treatment plant, except as otherwise provided by agreement." However, section 1210 expressly provides that this provision does not affect the treatment plant owner's obligations to any legal user of the discharged treated wastewater. Thus, if downstream or secondary appropriators of wastewater flow are considered to be legal users, the right of producers to recycled water could be limited. Such instances have occurred, most recently in Victor Valley (*Victor Valley Wastewater Reclamation Authority, Order WR 2001-Draft )* in which a treated wastewater change petition was denied on the account of injury to third party water right holders.

Water Code section 1211 requires the SWRCB to review a proposed change in point of discharge, place of use, or purpose of use of treated wastewater in the same manner as the SWRCB would review a proposed change to an appropriative water right. As both sections 1210 and 1211 make clear, however, the Legislature did not intend to affect any rights that downstream users may have to the treated wastewater discharge under the common law. Therefore, Water Code section 1702 provides that before granting permission to make a change, the SWRCB must find "that the change will not operate to the injury of any legal user of the water involved." The statutory "no injury" rule set forth in Water Code section 1702 codifies that common law no injury rule and therefore should be interpreted consistent with case law that interprets and applies the common law rule. Generally, the common law no injury rule precludes a change in the exercise of a water right if, among other things, the change would alter the pattern or rate of return flow to the detriment of downstream water right holders (*Scott v. Fruit Growers' Supply Co., 1972).*

An important limitation to the no injury rule is that downstream water right holders are protected from injury only to the extent that the source of the return flow is "native water," as opposed to "foreign water." Native water is that water that under natural conditions would contribute to a given stream or other body of water (surface water or percolating groundwater). When the source of return flow to a stream is native water, the return flow is considered part of the natural flow of the stream to which riparian and appropriative water rights may attach. The no injury rule does not protect downstream water right holders when the source of the return flow is "foreign water." A common example of foreign water is imported water, or SWP water. Riparian right holders have no right to use return flow from foreign water because riparian rights extend only to the natural flow of the stream.

Groundwater extracted from and used in the Santa Clarita Valley and then discharged to the Santa Clara River as wastewater effluent may be considered a "native water" in the river; however, SWP water imported into and used in the Santa Clarita Valley and then discharged to the Santa Clara River as wastewater effluent is clearly a "foreign water." Furthermore, while it could be argued that the existing discharges have a permanent public use (i.e., habitat), only the "foreign water" percentage within the effluent flows could be diverted for recycling purposes.

why so low

In the year 2000, Santa Clarita Valley's water supply consisted of approximately 46 percent groundwater and 53 percent imported water. Projected water demand for the year 2015 is approximately 91,600 AF, 50 percent derived from foreign water and 50 percent derived from native sources. The projected recycled water component would consist of approximately 45 percent of projected wastewater generation. Table 7-3 presents a water supply analysis for the CLWA service area through the year 2015. The table projects the ratio of annual recycled water use to annual imported water use. The maximum recycled water use projected for 2015 is equivalent to approximately 40 percent of the total foreign water projected for that year.

**TABLE 7-3**
**USE OF NATIVE WATER VS. FOREIGN WATER**

| | Native Water (AF/yr) | Foreign Water (AF/yr)[a] | Recycled Water (AF/yr) | Total (AF/yr) | Wastewater Flow (AF/yr) | Wastewater as a Percentage of Water Use | Foreign Water Portion of Wastewater (AF/yr) |
|---|---|---|---|---|---|---|---|
| Existing | 28,409 | 32,579 | 1,700 | 62,688 | 18,685 | 30% | 9,973 |
| Future | 30,800 | 47,600 | 19,000 | 95,400 | 38,200 | 40% | 19,000 |

Note: (a) Foreign water includes SWP water, water transfers, and desalination.

### 7.2.2 Oil Field Produced Water

Oil field produced water at the Berry Petroleum oil fields is produced during petroleum extraction operations by Berry Petroleum. The rights for water produced with petroleum are generally considered to be subject to the rule of capture and, as such, are owned by the owner of the mineral rights. Thus, water rights to the oil field produced water lies with Berry Petroleum who has the right to sell the oil field produced water to CLWA for beneficial uses.

### 7.2.3 Perchlorate-Contaminated Water

Perchlorate contamination of four wells was detected in 1997. These wells are located within the Santa Clarita Valley, owned and operated by three separate purveyors: NCWD, SCWC, and VWC. Within the non-adjudicated basin, each purveyor is the owner and operator of their wells, and has an appropriative right to the pumped groundwater. Each purveyor has the right to sell the pumped contaminated groundwater to CLWA for beneficial use.

## 7.3 Recycled Water Supply Availability

Based on the potential environmental and water rights constraints, a recycled water supply of 15,000 to 19,000 AF/yr appears available if sufficient demand can be developed. According to a target capacity of 17,000 AF/yr is recommended. A market assessment for recycled water is presented in Section 8. If a habitat evaluation indicates that increased diversions of recycled water can be allowed without adverse impacts, additional recycled water development is recommended.

# Section 8: Market Assessment for Recycled Water

In this section, potential recycled water users within the CLWA service area are identified. For each potential user, estimates are provided for annual demand, peak monthly demand, peak daily demand, and the hourly distribution of water demand during peak months. The requirements for potential users to convert their existing water potable systems to recycled water are also discussed.

## 8.1 Potential Users

Potential recycled water users were identified through a number of sources including:

- 1993 Recycled Water Master Plan
- Water consumption records for LACWD No. 36, NCWD, SCWD, and VWC.
- Land use maps.
- General Plans and Specific Plans for the City of Santa Clarita and County of Los Angeles.
- Discussions with City, County, water purveyor, and land developer staff.
- "Windshield" survey of the CLWA service area.

In order to be considered as a potential recycled water user, the user had to be located within the CLWA service area and have a potential non-potable water demand of at least 4 AF/yr. A preliminary list of potential users and their recycled water demand is included in Appendix A, with their locations shown in Figure 8-1. A total potential demand of 33,249 AF/yr was identified.

Potential users with existing water demands ("existing users") include Six Flags Magic Mountain Amusement Park, several golf courses, freeway and roadway median landscaping, the Civic Center, residential and industrial development, and several schools and parks. Potential users with future water demands ("future users") include additional residential and industrial development, as well as additional golf courses. Table 8-2 summarizes the potential demands attributable to existing and future recycled water users.

**TABLE 8-2**
**EXISTING VS. FUTURE RECYCLED WATER USERS**

| Type of User | Projected Demand (AF/yr) |
|---|---|
| Existing | 8,375 |
| Future | 9,064 |
| Total | 17,441 |

The initial list of potential recycled water users was reduced by evaluating the potential users that it would be most expensive to serve until potential uses were approximately 17,000 AF/yr. The cost per acre-foot to serve each user was calculated using the capital costs for pipelines, reservoirs, and pump stations as well as operational costs for pumping. The areas that were retained for recycled water service had costs per acre-foot ranging from $120 to $5,000. Areas that were eliminated from service had costs as high as $13,000/AF. The resulting recycled

water service area centers on Valencia and encompasses a large portion of the CLWA service area.

Table 8-1 presents the final list of potential users to be served by the recycled water system. The locations of the users are shown in Figure 8-2. The user numbers in Figure 8-2 correspond with the user numbers in Table 8-1.

## 8.2 Potential Recycled Water Demand

Potential annual demands for recycled water were estimated from historical water use records for existing users and the proposed irrigated area and expected water user per acre for future users. Demands for recycled water are seasonal, with the highest demands occurring during the hot, dry summer months when irrigation requirements are greatest. Peak monthly irrigation demands for existing users were assessed based on available historical data. To approximate peak monthly demand for future users, a peak monthly usage factor was calculated for the CLWA service area by dividing the combined peak monthly demand of the existing users by the combined average monthly demand. The peaking factor calculated was approximately 2.25. Peak monthly demands were then estimated by applying the peak monthly factor to each future user's average monthly demand.

Peak daily demands and peak hourly demands for existing potential users were either provided by the user, or estimated based on the number of irrigation days per month and the irrigation hours per day. For future potential users, peak daily demands and peak hourly demands were estimated based on irrigation days and hours provided by existing potential user of the same type (e.g., golf course, school, park).

The estimated annual, peak monthly, peak daily, and peak hourly demands for the recycled water users are shown in Table 8-1. The total annual recycled water demand is approximately 17,441 AF/yr. Total peak monthly demand is estimated to be 3,071 AF and total peak daily demand is estimated to be 101 AF.

During the peak month, recycled water demand is anticipated to be highest between the hours of midnight and 6:00 a.m., as most irrigation customers irrigate at night. This is due partly to water efficiency and horticultural benefits, but is also a requirement of DHS to limit public contact. Demand during the peak demand period is expected to be 65,230 gpm.

## 8.3 Conversion Requirements

DHS and the California/Nevada Section of AWWA have prepared guidelines for use of recycled water, which are based on the reclamation criteria set forth in Title 22 and discussed in Section 5.3.2. The guidelines address the steps that should be taken in converting potable water systems to recycled water systems. Two primary goals of the guidelines are to prevent potable water systems from being contaminated by recycled water and to make the public aware that recycled water is being used.

For users with separate irrigation and potable water systems, the primary requirement will be to disconnect the irrigation system from the potable water service and connect it to the recycled water service. Reduced pressure principle backflow prevention devices will need to be installed on the potable service immediately downstream of the meter. For those users with irrigation systems that tie to their potable water systems at several locations, the systems will have to be separated. Additionally, hose bibbs will need to be eliminated from the irrigation systems.

## TABLE 8-1
## PROPOSED RECYCLED WATER USERS

| Map Location # | User Name | Address | Annual Demand (AF/Yr) | Peak Monthly Demand (AF/Mo) | Peak Daily Demand (AF) | Peak Daily Demand (1000 gls) | Peak Hourly Demand (GPM) |
|---|---|---|---|---|---|---|---|
| 5 | Live Oak Elementary | 27715 Saddleridge Road, Castaic | 21 | 6.00 | 0.20 | 64.3 | 179 |
| 6 | **Newhall School District** Office | 25375 Orchard Village Rd, Valencia | 6 | 1.00 | 0.03 | 10.7 | 30 |
| 9 | Valencia Valley Elementary | 23601 Carrizo Drive, Valencia | 18 | 3.00 | 0.10 | 32.2 | 89 |
| 11 | Newhall SD Transp/Maintenance | 26501 Golden Valley, SCTA | 4 | 1.00 | 0.03 | 10.7 | 30 |
| 13 | Cedar Creek Elementary | 27792 Camp Plenty, CC | 12 | 3.00 | 0.10 | 32.2 | 89 |
| 14 | Emblem Elementary | 22685 Espuella, Saugus | 13 | 3.00 | 0.10 | 32.2 | 89 |
| 16 | Helmers Elementary | 27300 Grandview Drive, Valencia | 5 | 1.00 | 0.03 | 10.7 | 30 |
| 17 | Highlands Elementary | 27332 Catala, Saugus | 18 | 4.00 | 0.13 | 42.9 | 119 |
| 19 | Rio Vista Elementary | 20417 Cedarcreek, CC | 23 | 6.00 | 0.20 | 64.3 | 179 |
| 20 | Rosedell Elementary | 27583 Urbandale Ave, Saugus | 21 | 5.00 | 0.16 | 53.6 | 149 |
| 21 | Santa Clarita Elementary | 27177 Seco Canyon Rd, Saugus | 13 | 2.00 | 0.07 | 21.4 | 60 |
| 25 | Valencia High | 27801 Dickason Drive, Valencia | 100 | 26.00 | 0.86 | 278.7 | 774 |
| 26 | Arroyo Seco Jr. High | 22171 Vista Delgado, Saugus | 60 | 11.25 | 0.37 | 120.6 | 335 |
| 27 | Sierra Vista Jr. High | 19425 Stillmore Street, CC | 55 | 10.31 | 0.34 | 110.6 | 307 |
| 28 | Canyon High | 19300 Nadal Street, CC | 110 | 20.63 | 0.68 | 221.1 | 614 |
| 29 | Bowman High | 21508 Redview Drive, SCTA | 9 | 1.69 | 0.06 | 18.1 | 50 |
| 30 | La Mesa Jr. High | 26623 May Way, SCTA | 55 | 10.31 | 0.34 | 110.6 | 307 |
| 31 | Magic Mountain Resort Golf Course | | 429 | 80.44 | 2.65 | 862.3 | 1,597 |
| 32 | Magic Mountain Amusement Park | 26101 Magic Mountain Pkwy, Valencia | 476 | 89.25 | 2.94 | 956.8 | 1,595 |
| 33 | Valencia Interchange | Valencia Blvd & MM Pkwy | 6 | 1.13 | 0.04 | 12.1 | 34 |
| 34 | Valencia Country Club/Golf Course | 27330 Tourney Rd, SC | 590 | 76.10 | 2.50 | 815.8 | 1,511 |
| 35 | Honor Rancho Golf Course | | 450 | 84.38 | 2.78 | 904.5 | 1,675 |
| 36 | Santa Clarita Sports Complex | 26407 Golden Valley Road, SCTA | 50 | 9.38 | 0.31 | 100.5 | 168 |
| 39 | North River Industrial | | 105 | 19.69 | 0.65 | 211.1 | 586 |
| 40 | North River High School | | 135 | 25.31 | 0.83 | 271.4 | 754 |
| 41 | North River Jr. High School | | 60 | 11.25 | 0.37 | 120.6 | 335 |
| 42 | North River Golf Course | | 600 | 112.50 | 3.70 | 1206.0 | 2,233 |
| 43 | North River Commercial | | 45 | 8.44 | 0.28 | 90.5 | 251 |
| 44 | Lago de Valencia - Commercial | McBean/Newhall Ranch Rd(E corner), N Valencia | 29 | 5.44 | 0.18 | 58.3 | 162 |
| 45 | Lago de Valencia - Elementary School | North Valencia Phase II | 16 | 3.05 | 0.10 | 32.7 | 91 |
| 46 | Lago de Valencia - park/rec | Newhall Ranch Rd/N SC River, Valencia | 46 | 8.63 | 0.28 | 92.5 | 154 |
| 48 | Bouquet South - Commercial | Bouquet Canyon Rd/Newhall Ranch Rd, N Valenc | 48 | 9.00 | 0.30 | 96.5 | 268 |
| 49 | Pony League - Pony League Ballfields | Valencia Blvd/SC & S Fork River, N Valencia | 43 | 8.06 | 0.27 | 86.4 | 144 |
| 50 | Pony League - Commercial | Valencia Blvd/SC & S Fork River, N Valencia | 33 | 6.19 | 0.20 | 66.3 | 184 |
| 51 | South River Village - Commercial | NW corner McBean Pkwy & MM Pkwy, N Valencia | 44 | 8.25 | 0.27 | 88.4 | 246 |
| 52 | Valencia Industrial Center | 24800 block of Tibbetts Avenue, N Valencia | 27 | 5.06 | 0.17 | 54.3 | 151 |
| 53 | Civic Center | | 4 | 0.75 | 0.02 | 8.0 | 22 |
| 54 | Saugus High | 21900 Centurion Way, Saugus | 110 | 20.63 | 0.68 | 221.1 | 614 |
| 55 | Rio Vista Center | | 300 | 56.25 | 1.85 | 603.0 | 1,675 |
| 56 | Panhandle Commercial | | 15 | 2.81 | 0.09 | 30.2 | 84 |
| 57 | City Civic Center | | 125 | 23.44 | 0.77 | 251.3 | 698 |
| 58 | City Center Commercial | | 10 | 1.88 | 0.06 | 20.1 | 56 |
| 59 | City Center Commercial | | 5 | 0.94 | 0.03 | 10.1 | 28 |
| 60 | Westridge Golf Course | | 880 | 165.00 | 5.43 | 1768.9 | 3,276 |
| 61 | Vista Valencia Golf Course | 24700 W Trevino Dr, SC | 36 | 6.75 | 0.22 | 72.4 | 134 |
| 63 | Old Orchard Elementary | 25141 Avenue Rondel, Newhall | 17 | 3.00 | 0.10 | 32.2 | 89 |
| 64 | Old Orchard Park (City) | 25023 Avenida Rotella, Valencia | 24 | 4.00 | 0.13 | 42.9 | 71 |

| Map Location # | User Name | Address | Annual Demand (AF/Yr) | Peak Monthly Demand (AF/Mo) | Peak Daily Demand (AF) | Peak Daily Demand (1000 gls) | Peak Hourly Demand (GPM) |
|---|---|---|---|---|---|---|---|
| 65 | Orchard Village Road Tree Farm | | 6 | 1.13 | 0.04 | 12.1 | 34 |
| 66 | Henry Mayo Hospital | 23845.5 McBean Pkwy, Valencia | 153 | 23.00 | 0.76 | 246.6 | 685 |
| 67 | College of the Canyons/Academy of the Canyons | 25455 N. Rockwell Canyon Rd, Valencia | 213 | 39.94 | 1.31 | 428.1 | 1,189 |
| 68 | Newhall Elementary | 24607 Walnut Street, Newhall | 63 | 11.81 | 0.39 | 126.6 | 352 |
| 69 | William S. Hart Park (City) | 24151 N. San Fernando Rd, Newhall | 707 | 132.56 | 4.36 | 1421.1 | 2,369 |
| 70 | College of the Masters (Masters College) | 21726 Placerita Canyon Rd, Valencia | 24 | 5.00 | 0.16 | 53.6 | 149 |
| 71 | Hart High School | 24825 Newhall Avenue, Newhall | 31 | 14.00 | 0.46 | 150.1 | 417 |
| 72 | H.M. Newhall Memorial Park (City) | 24923 Newhall Avenue, Newhall | 49 | 8.00 | 0.26 | 85.8 | 143 |
| 73 | Placerita Jr. High/Learning Post | 25015 Newhall Avenue, Newhall | 53 | 9.94 | 0.33 | 106.5 | 296 |
| 74 | Valencia Glenn City Park | 23750 Via Gavola, Valencia | 29 | 5.00 | 0.16 | 53.6 | 89 |
| 76 | Peachland Elementary | 24800 Peachland Avenue, Newhall | 30 | 5.63 | 0.19 | 60.3 | 168 |
| 78 | Tract 32365 Common Area (Palmer) | | 108 | 20.25 | 0.67 | 217.1 | 603 |
| 79 | Valencia Meadows Elementary | 25577 Fedala Rd, Valencia | 16 | 3.00 | 0.10 | 32.2 | 89 |
| 80 | Valencia Meadows Park (City) | 25671 Fedala Rd, Valencia | 6 | 1.00 | 0.03 | 10.7 | 18 |
| 84 | Friendly Valley Golf Course | 19345 W. Avenue of the Oaks, Newhall | 107 | 20.06 | 0.66 | 215.1 | 398 |
| 94 | Summit Common Area (N & S) | | 157 | 29.44 | 0.97 | 315.6 | 877 |
| 95 | Ridgedale Common Area | | 214 | 40.13 | 1.32 | 430.2 | 1,195 |
| 98 | Golden Oak Ranch | 19802 Placerita Canyon Road, Newhall | 632 | 118.50 | 3.90 | 1270.4 | 3,529 |
| 99 | Almendra Park (City) | 23420 Alta Madera Drive, SCTA | 11 | 2.02 | 0.07 | 21.6 | 36 |
| 100 | Driving Range | | 24 | 4.50 | 0.15 | 48.2 | 89 |
| 101 | North Oaks Park (City) | 27824 Camp Plenty Road, SCTA | 6 | 1.08 | 0.04 | 11.6 | 19 |
| 102 | Santa Clarita Park (City) | 27285 Seco Canyon Road, Saugus | 19 | 3.52 | 0.12 | 37.7 | 63 |
| 104 | Hasley Canyon Park (County) | 28700 W. Quincy Street, Castaic | 17 | 3.19 | 0.10 | 34.2 | 57 |
| 108 | Canyon Country Park (City) | 17615 Soledad Canyon Road, CC | 43 | 8.06 | 0.27 | 86.4 | 144 |
| 113 | North River Commercial | | 24 | 4.50 | 0.15 | 48.2 | 134 |
| 125 | Central Park (City) | 27150 Bouquet Canyon Rd, Saugus | 140 | 26.25 | 0.86 | 281.4 | 469 |
| 126 | Creekview Park (City) | 22200 Park Street, SCTA | 13 | 2.44 | 0.08 | 26.1 | 44 |
| 127 | Bridgeport Park (City) | 23520 Bridgeport Lane, SCTA | 44 | 8.25 | 0.27 | 88.4 | 147 |
| 128 | Circle J Park (City) | 22651 Via Princessa, SCTA | 15 | 2.81 | 0.09 | 30.2 | 50 |
| 132 | Northbridge Park | Grandview Drive, E of McBean Pkwy | 22 | 4.13 | 0.14 | 44.2 | 74 |
| 136 | Apple Park | 24829 Apple Street-Z, Newhall | 7 | 1.00 | 0.03 | 10.7 | 18 |
| 139 | Park - Adjacent to Valencia Valley Elem? | 23645 Carrizo Drive, Valencia | 11 | 2.00 | 0.07 | 21.4 | 36 |
| 141 | Santa Clarita Christian School (k-12) | 27249 Luther Drive, SCTA | 6 | 1.13 | 0.04 | 12.1 | 34 |
| 143 | Legacy Academy | North Valencia Phase II | 16 | 3.05 | 0.10 | 32.7 | 91 |
| 144 | Valencia Vista HOA | Nandina&Valle Del Oro Irrigation, Newhall | 10 | 2.00 | 0.07 | 21.4 | 60 |
| 145 | Valencia Vista HOA | Valle Del Oro @ Pool, Newhall | 9 | 1.00 | 0.03 | 10.7 | 30 |
| 146 | Valencia Vista HOA | Valle Del Oro, Newhall | 11 | 2.00 | 0.07 | 21.4 | 60 |
| 147 | Valencia Vista HOA | Leonard Tree Irrigation, Newhall | 15 | 2.00 | 0.07 | 21.4 | 60 |
| 149 | Valencia Vista HOA | Valle Del Oro, Newhall | 21 | 3.00 | 0.10 | 32.2 | 89 |
| 150 | Valencia Vista HOA | Valle Del Oro, Newhall | 9 | 2.00 | 0.07 | 21.4 | 60 |
| 161 | Lantana Hills HOA | 23818.5 Oakhurst Dr, Newhall | 26 | 6.00 | 0.20 | 64.3 | 179 |
| 162 | Lantana Hills HOA | 23804.5 Oakhurst Dr, Newhall | 17 | 4.00 | 0.13 | 42.90 | 119 |
| 163 | Lantana Hills HOA | 23800.5 Oakleaf Cyn Dr, Newhall | 18 | 4.00 | 0.13 | 42.9 | 119 |
| 165 | Lantana Hills HOA | 21101.5 Oakriver Ln, Newhall | 7 | 2.00 | 0.07 | 21.4 | 60 |
| 166 | Lantana Hills HOA | 23712.5 Oakhurst Dr., Newhall | 6 | 2.00 | 0.07 | 21.4 | 60 |
| 167 | Lantana Hills HOA | 21100.5 Oakleaf Cyn Dr, Newhall | 12 | 4.00 | 0.13 | 42.9 | 119 |
| 168 | Peachland Owners Assoc | 25003-39 Peachland, Newhall | 26 | 4.00 | 0.13 | 42.9 | 119 |
| 197 | The Terrace (Apts?) | 21421 Plane Tree Dr, Newhall | 7 | 1.00 | 0.03 | 10.7 | 30 |
| 198 | The Terrace (Apts?) | Grape Lily (Irigtn), Newhall | 8 | 1.00 | 0.03 | 10.7 | 30 |
| 199 | The Terrace (Apts?) | Valle Del Oro, Newhall | 15 | 4.00 | 0.13 | 42.9 | 119 |

| Map Location # | User Name | Address | Annual Demand (AF/Yr) | Peak Monthly Demand (AF/Mo) | Peak Daily Demand (AF) | Peak Daily Demand (1000 gls) | Peak Hourly Demand (GPM) |
|---|---|---|---|---|---|---|---|
| 200 | The Terrace (Apts?) | Valle Del Oro, Newhall | 16 | 4.00 | 0.13 | 42.9 | 119 |
| 201 | The Terrace (Apts?) | Bottletree (Irigtn), Newhall | 11 | 2.00 | 0.07 | 21.4 | 60 |
| 202 | The Terrace (Apts?) | Ficus 21211-21-24334 Choke Cherry, Newhall | 9 | 1.00 | 0.03 | 10.7 | 30 |
| 203 | The Terrace (Apts?) | Ficus (Irigtn), Newhall | 6 | 1.00 | 0.03 | 10.7 | 30 |
| 204 | The Terrace (Apts?) | Fern Drive, Newhall | 9 | 1.00 | 0.03 | 10.7 | 30 |
| 208 | Coastal Meadowridge | 23645 Meadowridge S/S Co, Newhall | 14 | 4.00 | 0.13 | 42.9 | 119 |
| 234 | Canyon Springs Elementary | 19059 Vicci Street, CC | 8 | 1.50 | 0.05 | 16.1 | 45 |
| 235 | Leona Cox Elementary | 18643 Oakmoor Street, CC | 8 | 1.50 | 0.05 | 16.1 | 45 |
| 237 | Mitchell Elementary | 16821 Goodvale Road, CC | 8 | 1.50 | 0.05 | 16.1 | 45 |
| 251 | City of Santa Clarita | Newhall & San Fern S/W Crn, Newhall | 32 | 6.00 | 0.20 | 64.3 | 179 |
| 252 | City of Santa Clarita | 24242 Railroad Ave, Newhall | 165 | 24.00 | 0.79 | 257.3 | 715 |
| 253 | City of Santa Clarita | 22200 Park St., Newhall | 1614 | 277.00 | 9.11 | 2969.5 | 8,249 |
| 254 | City of Santa Clarita | 27285 Seco Canyon Rd | 28 | 5.25 | 0.17 | 56.3 | 156 |
| 256 | City of Santa Clarita Park | Meadow Drive | 25 | 4.69 | 0.15 | 50.3 | 140 |
| 257 | Sierra Heights Lndscp Maintnc Dist (LMD) | Canvas Street | 4 | 0.75 | 0.02 | 8.0 | 22 |
| 258 | Sunset Hills LMD | 19500 Via Princessa | 34 | 6.38 | 0.21 | 68.3 | 190 |
| 262 | Area Wide District LMD | N Newhall Ranch Rd | 11 | 2.06 | 0.07 | 22.1 | 61 |
| 263 | Area Wide District LMD | Btwn McBean Pkwy&Bouquet Canyon on river | 11 | 2.06 | 0.07 | 22.1 | 61 |
| 264 | Area Wide District LMD | Near Henry Mayo Hospital | 11 | 2.06 | 0.07 | 22.1 | 61 |
| 265 | Area Wide District LMD | Blackbird Lane | 11 | 2.06 | 0.07 | 22.1 | 61 |
| 266 | Old Orchard | 23600 Lyons Ave | 13 | 2.44 | 0.08 | 26.1 | 73 |
| 267 | Valencia Hills | 23000 Wiley Canyon Rd | 19 | 3.56 | 0.12 | 38.2 | 106 |
| 268 | Valencia Meadows | S 25500 McBean Pkwy | 6 | 1.13 | 0.04 | 12.1 | 34 |
| 269 | Valencia Glen | N Orchard Village Rd | 10 | 1.88 | 0.06 | 20.1 | 56 |
| 270 | South Valley HOA | 25700 McBean Pkwy | 6 | 1.00 | 0.03 | 10.7 | 30 |
| 271 | Central & North Valley | 26500 McBean Pkwy | 35 | 6.56 | 0.22 | 70.4 | 195 |
| 272 | Valencia Summit | Rockwell Canyon&McBean Pkwy (center) | 252 | 47.25 | 1.55 | 506.5 | 1,407 |
| 273 | Corporate Center | Sprinfield Court | 4 | 0.75 | 0.02 | 8.0 | 22 |
| 278 | American Beauty | Fanchon Lane | 13 | 2.44 | 0.08 | 26.1 | 73 |
| 279 | Shangri-La | Shangri-La Drive | 40 | 7.50 | 0.25 | 80.4 | 223 |
| 280 | Circle J Ranch | Circle J Rd | 74 | 13.88 | 0.46 | 148.7 | 413 |
| 281 | Circle J Ranch | Circle J Rd | 21 | 3.94 | 0.13 | 42.2 | 117 |
| 282 | Northbridge | 24000 Newhall Ranch Rd | 373 | 69.94 | 2.30 | 749.8 | 2,083 |
| 292 | Institutional (Porta Bella Dvlpmt) | Via Princessa & Santa Clarita Pkwy | 10 | 1.88 | 0.06 | 20.1 | 56 |
| 293 | Porta Bella Park | Santa Clarita Pkwy | 55 | 10.31 | 0.34 | 110.6 | 184 |
| 294 | Porta Bella Park | S of Santa Clarita Pkwy | 9 | 1.69 | 0.06 | 18.1 | 30 |
| 295 | Porta Bella Park | San Fernando Rd | 13 | 2.44 | 0.08 | 26.1 | 44 |
| 296 | Porta Bella Recreational | Soledad Canyon Rd | 14 | 2.63 | 0.09 | 28.1 | 47 |
| 297 | Porta Bella Recreational | S of Soledad Canyon Rd | 14 | 2.63 | 0.09 | 28.1 | 47 |
| 298 | Porta Bella Town Center | N. San Fernando Rd | 62 | 11.63 | 0.38 | 124.6 | 346 |
| 299 | Porta Bella-Soledad Community Center | Soledad Canyon Rd | 31 | 5.81 | 0.19 | 62.3 | 173 |
| 300 | Porta Bella-Neighborhood Community Center | Via Princessa & Santa Clarita Pkwy | 21 | 3.94 | 0.13 | 42.2 | 117 |
| 301 | Porta Bella Office Park | Soledad Canyon Rd | 14 | 2.63 | 0.09 | 28.1 | 78 |
| 302 | Porta Bella Office Park | Soledad Canyon Rd | 12 | 2.25 | 0.07 | 24.1 | 67 |
| 303 | Porta Bella Office Park | San Fernando Rd | 19 | 3.56 | 0.12 | 38.2 | 106 |
| 304 | Porta Bella Business Park | Soledad Canyon Rd | 30 | 5.63 | 0.19 | 60.3 | 168 |
| 305 | Porta Bella Business Park | S of Soledad Canyon Rd | 14 | 2.63 | 0.09 | 28.1 | 78 |
| 306 | Porta Bella Business Park | S of Soledad Canyon Rd | 10 | 1.88 | 0.06 | 20.1 | 56 |
| 307 | Porta Bella Business Park | S of Soledad Canyon Rd | 14 | 2.63 | 0.09 | 28.1 | 78 |
| 308 | North Valencia Jr HS | undetermined | 50 | 9.38 | 0.31 | 100.5 | 279 |

| Map Location # | User Name | Address | Annual Demand (AF/Yr) | Peak Monthly Demand (AF/Mo) | Peak Daily Demand (AF) | Peak Daily Demand (1000 gls) | Peak Hourly Demand (GPM) |
|---|---|---|---|---|---|---|---|
| 309 | North Valencia Eastcreek Community Park | McBean & Newhall Ranch Rd | 40 | 7.50 | 0.25 | 80.4 | 134 |
| 310 | N Valencia Decoro Park-Business Park | Dickason Dr | 247 | 46.31 | 1.52 | 496.5 | 1,379 |
| 311 | Golden Valley Ranch Commercial | | 113 | 21.19 | 0.70 | 227.1 | 631 |
| 312 | Golden Valley Ranch Elementary School | Golden Valley Rd | 27 | 4.97 | 0.16 | 53.3 | 148 |
| 313 | Golden Valley Ranch Park | Golden Valley Rd & Placerita Canyon Rd | 25 | 4.69 | 0.15 | 50.3 | 84 |
| 314 | North Valencia Village Center (Eastcreek) | Decoro Dr & McBean | 9 | 1.69 | 0.06 | 18.1 | 50 |
| 315 | North Valencia Eastcreek County Park | McBean Pkwy | 9 | 1.69 | 0.06 | 18.1 | 30 |
| 316 | N Valencia Decoro Park-Commercial | Newhall Ranch Rd & Copper Hill Dr | 5 | 0.94 | 0.03 | 10.1 | 28 |
| 317 | North Valencia Decoro Park Private Park | Copper Hill Drive | 4 | 0.75 | 0.02 | 8.0 | 13 |
| 319 | Northpark School | 27300 Grandview, SC | 5 | 1.00 | 0.03 | 10.7 | 30 |
| 320 | LA Co Parks and Rec | 14519 Stoneridge - Slope | 15 | 2.00 | 0.07 | 21.4 | 36 |
| 321 | LA Co Parks and Rec | Grand Canyon (across from Lot 40) | 9 | 2.00 | 0.07 | 21.4 | 36 |
| 322 | LA Co Parks and Rec | 29364 Canyon Rim (across Street) | 5 | 1.00 | 0.03 | 10.7 | 18 |
| 323 | Sulfur Springs USD District Office | 24930 Ave Stanford, SC | 4 | 1.03 | 0.03 | 11.0 | 31 |
| 325 | Golden Valley Ranch Commercial | | 113 | 21.19 | 0.70 | 227.1 | 631 |
| 329 | City of Santa Clarita | 23647 Carrizo Dr | 14 | 2.75 | 0.09 | 29.5 | 82 |
| 332 | Newhall Ranch | | 3691 | 692.06 | 22.77 | 7419.2 | 5,152 |
| 333 | Hasley Canyon Golf Course | | 450 | 3.91 | 0.13 | 41.9 | 78 |
| 334 | Panhandle Golf Course | | 440 | 3.91 | 0.13 | 41.9 | 78 |
| 335 | SunCal/Tesoro, LLC Development | Copperhill and Avenida Rancho Tesoro | 375 | 79.38 | 2.61 | 850.9 | 1,576 |
| 336 | Santa Clarita Post Office | Franklin Pkwy | 15 | 2.81 | 0.09 | 30.2 | 56 |
| | Total | | 17,441 | 3,071 | 101 | 32,920 | 65,230 |

Public areas, such as golf courses, parks, and schools, will need to post signs warning the public that recycled water is being used for irrigation. Parks, schools, and other users with exposed drinking fountains near landscaped areas will have to provide shields to prevent recycled water from coming into contact with the drinking fountains.

The cost of these conversion requirements are assumed to be incurred by the users; however, CLWA may adopt a policy to assist with onsite conversion costs. In general, the costs are anticipated to be relatively low. Costs will vary from user to user because the cost will depend on meter size and complexity of the irrigation system.

# Section 9: Seasonal Storage Opportunities

As discussed in Section 7, effluent from both the Saugus and Valencia WRPs is currently discharged to the Santa Clara River. Implementation of the proposed recycled water system would reduce effluent discharged to the river. As recycled water demand is highest in the summer and lowest in the winter, seasonal storage may mitigate potential impacts to the river flow and enable additional recycled water supply to be available during high water use months.

## 9.1 Seasonal Supply and Demand Balance

Due to the need to maintain flow in the Santa Clara River, differences in the monthly production and use of recycled water affect total annual use. The Valencia WRP produces recycled water at a more or less uniform rate throughout the year. Oil field produced water and treated perchlorate-contaminated water are also produced throughout the year. CLWA would receive recycled water from Newhall Ranch WRP only during winter months. However, since most recycled water is used for irrigation, demand peaks during the summer months and is significantly less during the winter months. As a result, recycled water production may not be adequate to meet demands in summer months, while in winter months, surplus effluent may exist. To meet peak summer demands, either potable water must be used to supplement the non-potable supply or seasonal storage for recycled water must be provided.

In 2000, approximately 12.08 mgd was discharged to the Santa Clara River from the Valencia WRP and 4.81 from the Saugus WRP during the peak irrigation month (July). Peak day demands for the recycled water system are anticipated to total 32 mgd. If served by recycled water, these demands would not allow for any recycled water to be discharged to the river from the Valencia WRP during the peak irrigation months. Projected recycled water demand and available supply are shown on Table 9-1 and in Figure 9-1. The recycled water demand pattern was estimated based on evapotranspiration data from DWR.

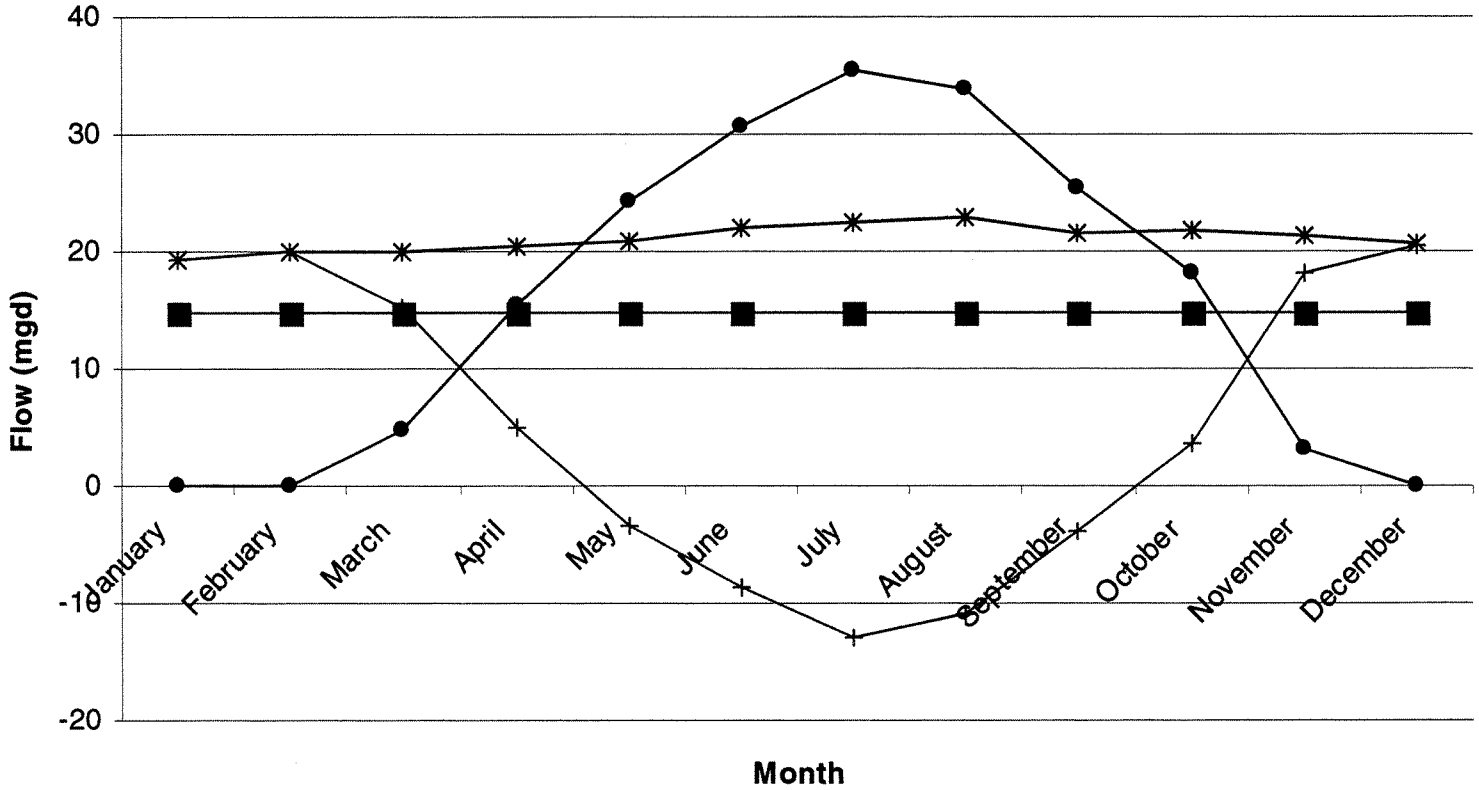
Based on this analysis, it would be desirable to provide seasonal storage to optimize recycled water utilization. The feasibility of seasonal storage is addressed in the following section.

## 9.2 Seasonal Storage Options

The 1993 Reclaimed Water Master Plan addressed two potential seasonal storage options: Charlie Canyon and Oak Spring Canyon sites for open aboveground reservoirs. In addition to aboveground reservoirs, aquifer storage and recovery (ASR) appears to be a potential approach to providing seasonal storage.

### 9.2.1 Aboveground Seasonal Storage

The 1993 Reclaimed Water Master Plan addressed the feasibility of seasonal storage in an aboveground reservoir. The list of potential sites was narrowed down to two, Charlie Canyon and Oak Spring, based on proximity to existing and planned development, to existing faults, or to the proposed recycled water system. These two sites are shown on Figure 9-2.




Required Baseline Flow
Total Available Supply
Total Demand
Excess/Deficit

Kennedy/Jenks Consultants

Castaic Lake Water Agency
Recycled Water Master Plan

**Seasonal Recycled Water Supply vs. Demand**

May 2002
K/J 014642.00

**Figure 9-1**

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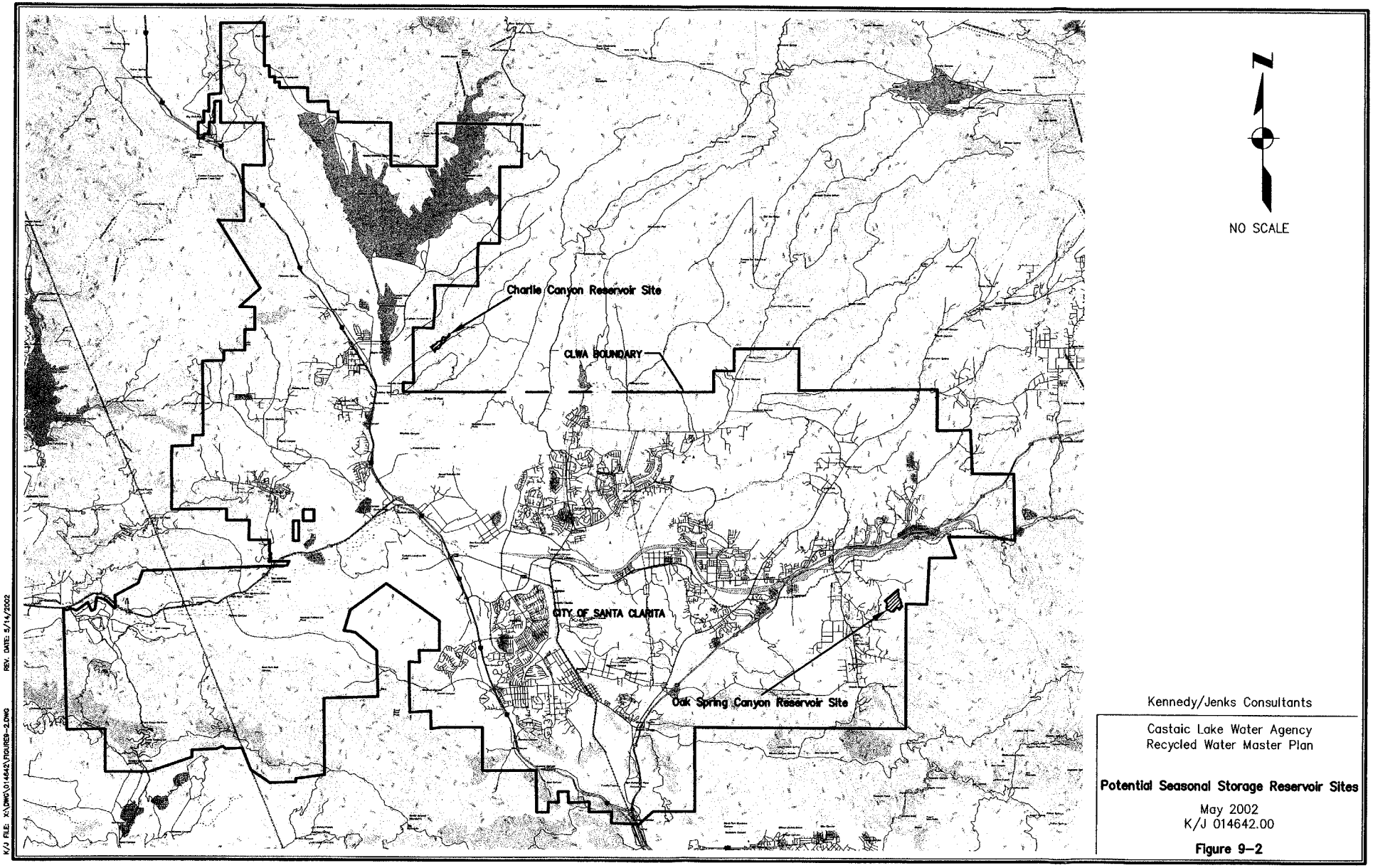



Kennedy/Jenks Consultants

Castaic Lake Water Agency
Recycled Water Master Plan

**Potential Seasonal Storage Reservoir Sites**

May 2002
K/J 014642.00

**Figure 9–2**

K/J FILE: X:\DWG\014642\FIGURE9-2.DWG REV. DATE: 5/14/2002

**TABLE 9-1**
**PROJECTED RECYCLED WATER DEMAND VS. SUPPLY FOR YEAR 2010**

| Month | Required Baseline Flow (mgd) | Available Supply (mgd)[a] | User Demand (mgd) | Excess (+) / Deficit (-) (mgd) |
|---|---|---|---|---|
| January | 14.75 | 19.40 | 0.00 | +19.40 |
| February | 14.75 | 20.02 | 0.00 | +20.02 |
| March | 14.75 | 19.94 | 4.74 | +15.20 |
| April | 14.75 | 20.54 | 15.55 | +4.98 |
| May | 14.75 | 20.97 | 24.41 | -3.44 |
| June | 14.75 | 22.01 | 30.75 | -8.73 |
| July | 14.75 | 22.55 | 30.75 | -12.88 |
| August | 14.75 | 22.94 | 33.94 | -11.00 |
| September | 14.75 | 21.58 | 25.39 | -3.81 |
| October | 14.75 | 21.87 | 18.18 | +3.69 |
| November | 14.75 | 21.31 | 3.19 | +18.12 |
| December | 14.75 | 20.66 | 0.10 | +20.56 |
| Average | 14.75 | 21.15 | 17.42 | +3.78 |

Note: (a) Available supply is total supply minus required baseline flow.

#### 9.2.1.1 Reservoir Capacity

The Charlie Canyon site can provide up to 6,300 AF of water storage. The Oak Spring Canyon can provide up to 12,500 AF of additional water storage. Reservoir capacity should provide storage for maintenance of the minimum target river flow as well as for evapotranspiration. The reservoir should also have a minimum pool, which can equal up to one-third of the total capacity of the reservoir.

#### 9.2.1.2 Reservoir Operation

The two reservoir sites selected allow for two approaches to mitigate potential impacts to the river habitat. The Charlie Canyon site would allow excess supply to the discharged directly to the Santa Clara River. Water from the reservoir released to Castaic Creek would supplement the discharge from the WRPs during May through October, maintaining the target flow for the river beginning at the confluence of Castaic Creek and the Santa Clara River.

The Oak Spring Canyon site would allow for pumping of excess supply up to Oak Spring Canyon, where it would be discharged and supplemented with water from the reservoir released to Oak Spring Creek. The minimum target flow would be maintained beginning at the confluence of Oak Spring Creek and the Santa Clara River.

Reservoir operation would generally follow this pattern:

- Deliver recycled water to reservoir for 5 months each year (November through March).
- Release water from reservoir for 6 months each year (May through October).

#### 9.2.1.3 Facility Requirements and Preliminary Cost Estimates

Preliminary cost estimates for the two alternative reservoir sites, including the cost of necessary distribution system improvements, are presented in Table 9-2. Reservoir costs assume an

earthfill dam. As shown, the Charlie Canyon Reservoir is estimated to cost approximately $11.6 million. The Oak Spring Canyon reservoir is estimated to cost approximately $29.4 million. These estimates are conceptual and only represent estimated capital costs; additional detailed study would be required to further evaluate the feasibility of these reservoirs, including environmental studies, necessary documents for CEQA compliance, watershed investigations, hydrogeologic studies, geotechnical investigations, and seismic investigations.

**TABLE 9-2**
**PRELIMINARY CAPITAL COST ESTIMATES FOR SEASONAL STORAGE RESERVOIR ALTERNATIVES**

| Component | Estimated Cost (2002 Dollars) | |
|---|---|---|
| | Charlie Canyon | Oak Spring Canyon |
| Reservoir | $5,259,000 | $6,959,000 |
| Additional Piping to Reservoir | $285,000 | $1,748,000 |
| System Upgrades | $0 | $5,320,000 |
| System Flushing/Testing | $10,000 | $61,000 |
| Subtotal | $5,554,000 | $14,087,000 |
| Mobilization/Demobilization (10%) | $555,000 | $1,409,000 |
| Taxes (8.25%) | $504,000 | $1,278,000 |
| Contractor OH&P (18%) | $846,000 | $2,147,000 |
| Design Allowance (20%) | $1,492,000 | $3,784,000 |
| Engineering (10%) | $895,000 | $2,271,000 |
| Legal/Admin (2%) | $197,000 | $500,000 |
| Construction Management (5%) | $502,000 | $1,274,000 |
| Contingency (10%) | $1,055,000 | $2,675,000 |
| Total Cost | $11,601,000 | $29,425,000 |

Note: Cost estimates were prepared by adjusting the cost estimates for the 1993 Reclaimed Water Master Plan by the appropriate ENR factor. Property acquisition and additional studies are not included.

#### 9.2.1.4 Advantages and Disadvantages of Aboveground Seasonal Storage

Aboveground seasonal storage of recycled water is difficult to implement because sites must be close to the proposed recycled water system, but sufficiently distant from existing and planned development and faults. The canyon sites that often offer the best topography for storage often involve environmental obstacles that are difficult to overcome. Permitting can also be a substantial challenge. The construction of aboveground storage reservoirs is generally expensive.

In addition, the retail water purveyors have wells along the river that draw water from the alluvial aquifer, downstream of the WRPs discharges. If recycled water is released to the river upstream of these wells, DHS may consider the water to be a potential source of waterborne contamination for the wells and may require disinfection under the Surface Water Treatment Rule, which applies to groundwater under the influent of surface water, or the Groundwater Rule. The potential impact on the retail water purveyors should be evaluated.

Finally, aboveground seasonal storage reservoirs offer operational challenges. During the many months when the reservoir is full, algae have the opportunity to grow, creating water quality problems. Disinfection or other treatment becomes necessary, further increasing both capital and operational costs.

### 9.2.2 Aquifer Storage and Recovery

Instead of storing recycled water in aboveground seasonal storage reservoirs, ASR could be used. During the wet winter months, when recycled water production is at its peak, but demand is low, recycled water could be injected into the Saugus Formation north of the San Gabriel Fault where potable water wells would be separated from recycled water ASR facilities by a fault. During the dry summer months, when demand is highest, the recycled water would be extracted and delivered to customers. ASR avoids the significant siting issues associated with aboveground seasonal storage. Additionally, there is no evapotranspiration loss.

#### 9.2.2.1 Regulatory Requirements

The Draft Groundwater Recharge Regulations discussed in Section 5 apply to planned groundwater recharge projects using recycled water and located in a groundwater basin identified designated in the Basin Plan as a source or potential source of domestic water supply. All of the subbasins of the Eastern Groundwater Basin are designated as being an existing source of domestic water supply. When the regulations are finalized and adopted, any ASR project using recycled water would be subject to these regulations and their requirements for monitoring and reporting. However, based on the definition of recycled water contained in the regulations, an ASR project that only involved treated oil field produced water may not be considered recycled water.

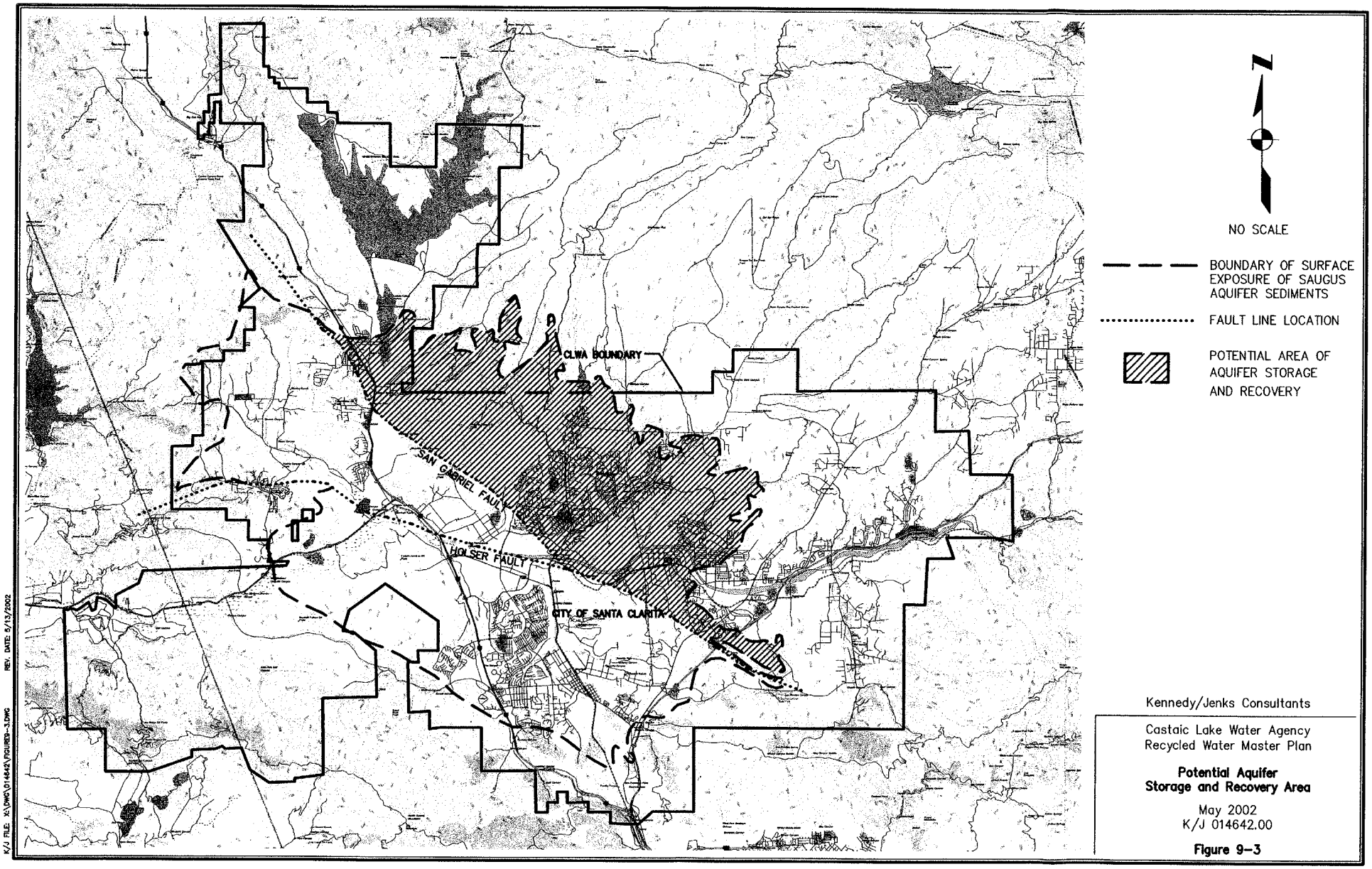
#### 9.2.2.2 Hydrogeology North of the San Gabriel Fault

As discussed in Section 4.1.1.2, there are two freshwater bearing aquifers, the Alluvial and Saugus aquifers, within the CLWA service area. In 1990, the use of the Saugus Formation for conjunctive use was evaluated. At that time, the idea was to inject SWP water during wet years and withdraw it during dry years, when SWP deliveries are curtailed. Subsequently, the VWC demonstrated the feasibility of ASR in an area south of the San Gabriel Fault. Many of the conclusions of these evaluations are also applicable to aquifer storage and recovery of recycled water.

The Saugus Formation underlies approximately 53 square miles of the Santa Clarita Valley in Los Angeles County, and combined with the alluvial deposits from the Santa Clara River and its tributaries, comprises the water-bearing sediments of the Eastern Groundwater Basin. The CLWA boundaries encompass the aquifer almost in its entirety.

Two faults cross the Saugus Formation, dividing it into three parts, each with different characteristics. The San Gabriel Fault traverses the Saugus Formation in a northwesterly direction, while the Holser Fault extends westerly across the aquifer from the San Gabriel Fault. Generally, the aquifer characteristics are best between the two faults and worst north of the San Gabriel Fault. Due to the poor aquifer characteristics north of the San Gabriel Fault, this area is not generally used for the production of drinking water, making it the best location for aquifer storage and recovery of recycled water. Figure 9-3 presents the area where ASR is most likely to be feasible.

The Saugus Formation is comprised of layers of water-bearing deposits. The maximum thickness of the Saugus deposits bearing fresh water varies from 1,500 feet north of the San Gabriel Fault, to 5,000 feet south of the Holser Fault, to 5,500 feet between the two faults. Of the fresh water-bearing deposits, a portion is fine-grained strata, such as siltstones and shales and, therefore, is unsuitable for groundwater storage and extraction. The remaining sand and gravel deposits are potentially usable water-bearing strata for ASR. The maximum combined


CLWA BOUNDARY
SAN GABRIEL FAULT
HOLSER FAULT
CITY OF SANTA CLARITA
NO SCALE
BOUNDARY OF SURFACE EXPOSURE OF SAUGUS AQUIFER SEDIMENTS
FAULT LINE LOCATION
POTENTIAL AREA OF AQUIFER STORAGE AND RECOVERY
Kennedy/Jenks Consultants
Castaic Lake Water Agency
Recycled Water Master Plan
Potential Aquifer Storage and Recovery Area
May 2002
K/J 014642.00
Figure 9-3
K/J FILE: X:\DWG\014642\FIGURE9-3.DWG
REV. DATE: 5/13/2002

thickness of these strata between the depths of 500 feet and 2,500 feet are 400 feet north of the San Gabriel Fault. The 500-foot minimum depth ensures no interference of groundwater from the alluvium and the 2,500-foot maximum depth recognizes the increased costs of pumping at deeper depths.

The Saugus Formation is a confined aquifer, resulting in piezometric water surface elevations in wells as high as several hundred feet above the top of the well perforations. Transmissivity through the aquifer, a measure of the rate water is transmitted through a unit width of aquifer ranges from 80,000 to 160,000 gpd/ft.

#### 9.2.2.3 Water Quality Requirements

Groundwater in the Saugus Formation is generally of calcium bicarbonate or calcium-magnesium sulfate character. In the region north of the San Gabriel Fault, most of the area has theoretical TDS values of more than 800 ppm.

Table 9-3 presents the water quality objectives for the Santa Clara-Bouquet and San Francisquito Canyons portion of the Eastern Groundwater Basin according to the Basin Plan.

**TABLE 9-3**
**BASIN PLAN WATER QUALITY OBJECTIVES**

| Constituent (units) | Basin Plan Objective | Recycled Water (Valencia WRP) | Oil Field Produced Water | Treated Perchlorate-Contaminated Water[(a)] |
|---|---|---|---|---|
| TDS (mg/l) | 700 | 739 | 145 | 1,000 |
| Sulfate (mg/l) | 350 | 135 | NA | 250 |
| Chloride (mg/l) | 150 | 170 | NA | 250 |
| Boron (mg/l) | 1.0 | 0.91 | 1 - 2 | NA |

NA - Not Available
Notes: Values are dependent upon the treatment processes ultimately selected.
(a) Assumes that treated perchlorate-contaminated groundwater will meet primary and secondary MCLs.

#### 9.2.2.4 Facility Requirements and Preliminary Cost Estimate

Implementation of ASR would require the construction of the following:

- Wells that can be used for both injection and withdrawal of recycled water.
- Pipeline connecting the wells to the recycled water system.
- Booster pumping station improvements.

Other investigations and studies that should be conducted in order to determine the feasibility of the ASR seasonal storage alternative and to estimate the costs more accurately include the following:

- Environmental studies, including necessary documents for CEQA compliance.
- Hydrogeologic studies.
- Aquifer investigation.
- Water quality/compatibility investigation.

A preliminary cost estimate for ASR seasonal storage, including the cost of necessary distribution system improvements, is presented in Table 9-4. The cost estimate is based on the assumption that fifteen 1,000-gpm wells will be constructed, for a total maximum supplemental seasonal capacity of 15,000 gpm. The cost estimate does not include the cost of the additional studies. As shown, the ASR project is estimated to cost approximately $4.5 million.

**TABLE 9-4**
**PRELIMINARY CAPITAL COST ESTIMATE FOR ASR SEASONAL STORAGE ALTERNATIVE**

| Component | Cost (2002 Dollars) |
|---|---|
| Wells | $2,000,000 |
| BPS Upgrades | $250,000 |
| Distribution Pipelines Upgrades | $1,620,000 |
| System Flushing/Testing | $5,000 |
| Subtotal | $3,875,000 |
| Mobilization/Demobilization (10%) | $387,500 |
| Taxes (8.25%) | $351,656 |
| Contractor OH&P (18%) | $590,612 |
| Design Allowance (20%) | $1,040,954 |
| Engineering (10%) | $624,572 |
| Legal/Admin (2%) | $137,406 |
| Construction Management (5%) | $350,385 |
| Contingency (10%) | $735,808 |
| Total Cost | $8,093,893 |

Note: Property acquisition and additional studies are not included.

## 9.3 Recommended Seasonal Storage Option

Due to the cost, difficulty in siting, permitting, and obtaining approvals, and the operational difficulties of aboveground reservoirs for recycled water storage, it is recommended that CLWA defer further evaluation of aboveground storage and initiate a feasibility study of recycled water ASR north of the San Gabriel Fault.

# Section 10: Recommended Recycled Water System

This section discusses the development of the recommended recycled water system based on the established planning criteria and the system modeling techniques used to confirm its viability. The planning criteria are the concepts and assumptions that ultimately form the service criteria for the system. In addition, the recommended recycled water system is described.

## 10.1 Planning Criteria

Planning criteria were established for each component of the recycled water system, including the recycled water supply, recycled water pump stations, storage reservoirs, distribution system, and booster pump stations. These criteria are summarized in Table 10-1 and described below. The criteria are generally based on the 1993 Master Plan.

**TABLE 10-1**
**SUMMARY OF RECYCLED WATER SYSTEM DEVELOPMENT CRITERIA**

| System Component | Criteria |
|---|---|
| Recycled Water Supply | 1. Projected production of recycled water sources (Valencia WRP, oil field produced water, treated perchlorate-contaminated groundwater) determine construction phasing.<br>2. Assume WRP equalized effluent flow. |
| Recycled Water Pump Stations | 1. Valencia Pump Station limited to 12,000 gpm.<br>2. Oil field produced water pump station to supply 1,250 gpm.<br>3. Pumps will operate during peak demand periods. |
| Storage Reservoirs | 1. Provide storage for approximately 75% of the peak day demand.<br>2. Reservoir elevations should be adequate to provide consistent delivery pressures to most users. |
| Distribution System | 1. Size to meet the peak hour demands.<br>2. Maximum design velocity is 6 fps.<br>3. Maximum system pressure is 185 psi.<br>4. Optimum delivery pressure is 55 to 150 psi.<br>5. All buried piping is "purple" high-pressure PVC up to 24-inch and steel or ductile iron pipe is used for larger sizes. |
| Booster Pump Station | 1. Size for peak day demands.<br>2. Size in order to operate during off-peak electrical hours in order to minimize energy costs. |

### 10.1.1 Recycled Water Supply

Recycled water would be supplied to the recycled water system by the Valencia WRP. If available, oil field produced water and treated perchlorate-contaminated water would also be used in the non-potable system. Effluent from Newhall Ranch WRP would be transferred to the system during the wet winter months.

### 10.1.2 Recycled Water Pump Station

A 4,000-gpm recycled water pump station has been constructed at the Valencia WRP as described in Section 10.2.1. The recycled water pump station capacity is dependent upon plant production and effluent flow patterns, as well as recycled water demand. The ultimate pump station capacity at Valencia WRP is planned to be 12,000 gpm. A 1,250-gpm recycled water pump station would be constructed to pump oil field produced water into the system

Storage capacity would provide reductions in the required reuse pump station capacity by allowing peak hour demands to be met with a combination of pumped water and water from storage reservoirs. The recycled water pump stations would be controlled by water surface elevations in the storage reservoirs.

### 10.1.3 Storage Reservoirs

The storage capacity to be provided for the recycled water system is equivalent to approximately 75 percent of the peak day demand. Reservoir elevations would be determined by the required system and delivery pressures as discussed later in this section.

### 10.1.4 Distribution System

Distribution system design is dependent upon flow, velocity, and pressure criteria. The distribution system would be sized to handle the peak hour demands. High velocities, which may reduce the useful life of the pipeline and increase energy requirements to delivery water, are not desirable. Maximum design flow velocity in the system would be 6 feet per second.

Two pressure criteria were considered in the planning of the system. Defined as the pressure at any point within the distribution system, system pressure is dependent upon reservoir levels, recycled water demands, and pumping conditions. The maximum system pressure would be 185 pounds per square inch (psi). Delivery pressure refers to the pressure at which recycled water is delivered to the users. Optimum delivery pressure ranges from 55 psi to 150 psi.

### 10.1.5 Booster Pump Stations

The function of the booster pump stations is to boost the system pressure from a lower zone to a higher zone. The stations should be designed to meet the peak day demand of the higher zones. They should also be sized large enough to operate during off-peak electrical hours. The criteria for system pressure and delivery pressure discussed in the previous section also apply to design of the booster pump stations.

## 10.2 Existing Recycled Water Infrastructure

Based on the Reclaimed Water Master Plan prepared in 1993, CLWA has constructed or is in the process of constructing several improvements as described below and shown in Figure 10-1.

### 10.2.1 Recycled Water Pump Station

The recycled water pump station is located at the Valencia WRP. It has a capacity of 4,000 gpm and connects to the existing chlorine contact basin. The recycled water pump station will pump into pipeline IA-2.

### 10.2.2 Pipeline

Recycled water pipeline IA-2 is currently under construction. It includes 15,600 LF of 20- and 24-inch ductile iron pipe from the Valencia WRP recycled water pump station to recycled water reservoir no. 1.

### 10.2.3 Reservoir

Recycled water reservoir no. 1 is now under construction. It is a 1.5 mg aboveground steel reservoir located near the proposed Westridge Golf Course.

## 10.3 Recommended Service Policies

To develop the recommended recycled water system, key service policies must be considered. Because specific service policies have not been established by CLWA, policies necessary for the development of a recycled water system are recommended. Among the recommended service policies upon which the recommended recycled water system is based are:

1. Although retail service by CLWA is limited to areas prescribed by statute, CLWA would provide the facilities to deliver recycled water to individual existing and future users identified as each implementation phase is developed.

2. For new development tracts which plan or are conditioned to utilize recycled water, CLWA would provide the facilities to deliver recycled water to the boundary of the tract or to a location reasonably near the tract.

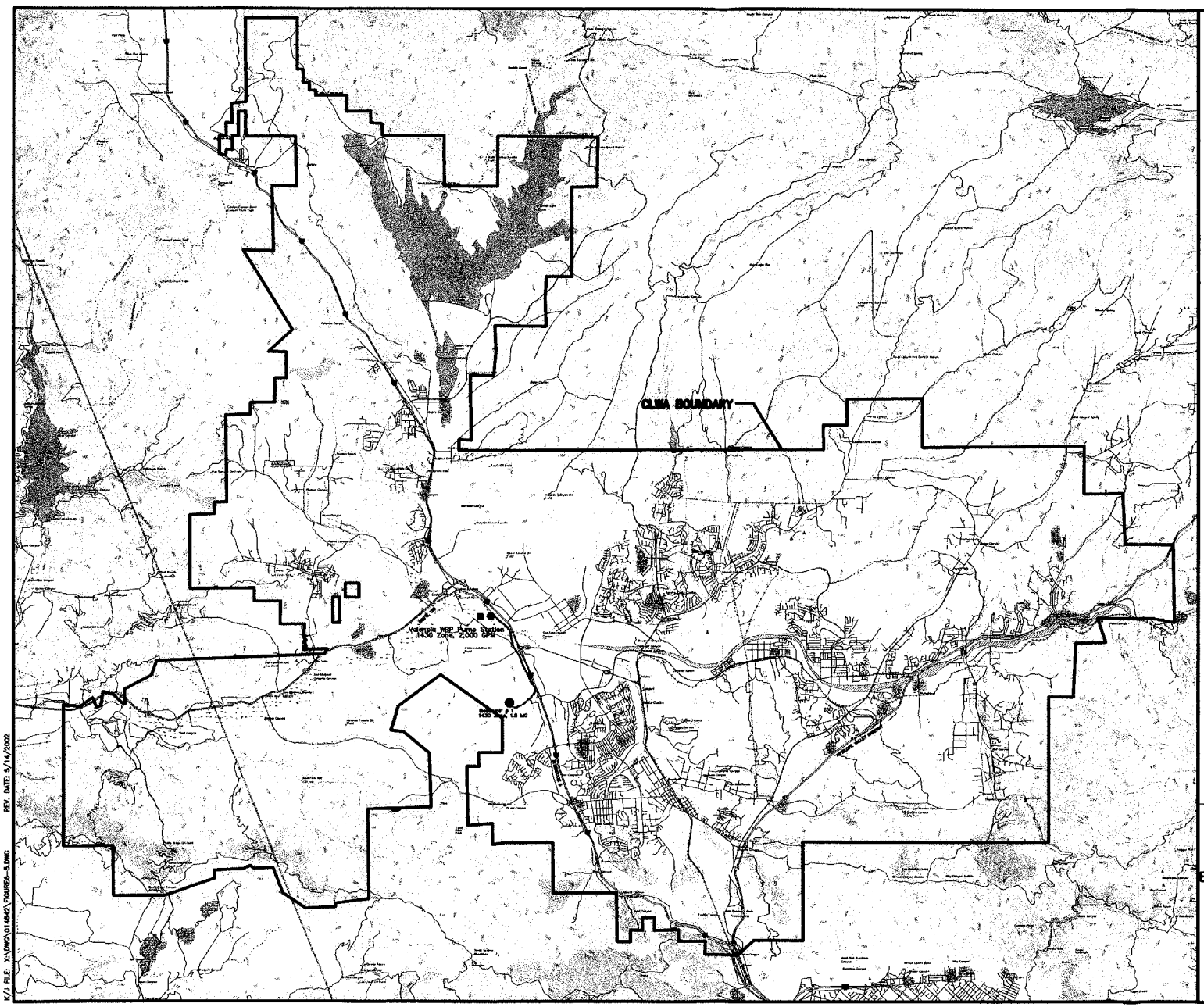
3. Facilities located within planned public right-of-way of new development tracts must be dedicated to CLWA or the retail service provider.

4. At CLWA's convenience and discretion, CLWA may construct transmission facilities through new development tracts.

5. Onsite facilities for new or existing users will be provided by the user. However, CLWA may develop an incentive program to fund onsite retrofits.

## 10.4 Components of the Recommended Plan

Serving approximately 168 users, the recommended recycled water system is divided into two service zones based on the topography of the service area. Each of the zones would contain




Kennedy/Jenks Consultants

Castaic Lake Water Agency
Recycled Water Master Plan

**Existing CLWA Recycled Water Infrastructure**

May 2002
K/J 014642.00

**Figure 10-1**

K/J FILE: X:\DWG\014642\FIGURES-5.DWG REV. DATE: 5/14/2002

storage reservoirs, distribution system piping, and booster pump stations. The reuse pump station is located at Valencia WRP, the main source of recycled water supply. A second source water pump station would be located at the oil field produced water facility. The proposed layout of the recycled water system is shown in Figure 10-2. Flow and storage information for each of the zones is presented in Table 10-2. Figure 10-3 shows the extents of the 1430 and 1680 pressure zones.

**TABLE 10-2**
**FLOW AND STORAGE DATA BY ZONE**

| Service Zone | Peak Day Demand (mgd) | Peak Hour Demand (gpm) | Storage Volume (mg) |
|---|---|---|---|
| 1430 | 22.9 | 43,812 | 17.5 |
| 1680 | 9.0 | 22,870 | 6.75 |
| Total | 31.9 | 66,682 | 24.25 |

Note: (a) Assumes recycled water pump stations operate 24 hours per day.

### 10.4.1 Recycled Water Supply

Recycled water would be supplied to the system from the Valencia WRP, as well as the Placerita oil field and the perchlorate removal treatment plant (temporarily). During periods of peak demand, water would also be supplied from ASR facilities.

At the Valencia WRP, treated wastewater is diverted from the chlorine contact tank via an overflow weir to the reuse pump station. The total system demand for recycled water is approximately 17,441 AF/yr, most of which would be used from May through October.

The recycled water supply from the Valencia WRP would be slightly reduced during filter backwashing. Valencia WRP has 14 filters, which are backwashed throughout the day (20 minutes per filter ever 1.7 hours). When filters are backwashing, the system would still be supplied from the storage reservoirs, oil field produced water, and ASR facilities, and a portion of the Valencia WRP flow would still be available.

### 10.4.2 Recycled Water Pump Stations

The recycled water pump station is located near the chlorine contact tank at the Valencia WRP and would be used to transport the recycled water to the storage reservoirs in each zone. It is currently sized for 4,000 gpm. Assuming constant flow rate and total daily flow equivalent to the peak day demand, the ultimate capacity of the reuse pump station is 12,000 gpm.

A second recycled water pump station would need to be constructed at the oil field produced water facility. The capacity would be 1,250 gpm and the pump station would be located at the Placerita oil field in the 1680 zone.

### 10.4.3 Storage Reservoirs

The recommended plan includes construction of 8 recycled water storage reservoirs. Each zone would have at least one reservoir. The storage capacity in each zone would be equal to 75 percent of the peak day demand. The reservoirs are assumed to be aboveground steel tanks and would range in size from 1.5 mg to 3.5 million gallons. Total storage capacity for the system is 24.5 million gallons. Recycled water entering and exiting the storage reservoirs would

be controlled by two-way flow altitude valves. Storage reservoir locations are shown in Figure 10-1 and reservoir capacities listed in Table 10-3. The reservoir elevations are determined by the system and delivery pressures and are also listed in Table 10-3.

**TABLE 10-3**
**RESERVOIR VOLUMES AND ELEVATIONS**

| Reservoir Number | Service Zone | Volume (mg) | Maximum Water Surface Elevation (ft) |
|---|---|---|---|
| 1[(a)] | 1430 | 1.5 | 1430 |
| 2 | 1430 | 3.0 | 1430 |
| 3 | 1430 | 3.25 | 1430 |
| 4 | 1430 | 3.0 | 1430 |
| 5 | 1430 | 3.5 | 1430 |
| 6 | 1430 | 3.25 | 1430 |
| 7 | 1680 | 3.5 | 1680 |
| 8 | 1680 | 3.25 | 1680 |

Note: (a) Under construction.

### 10.4.4 Distribution System

The proposed pipeline routes for the recycled water system are shown in Figure 10-1. The routes are located along existing public rights-of-way and planned roadways, where possible, to maintain accessibility and minimize the costs of acquiring pipeline easements. The distribution system consists of approximately 275,000 lineal feet (LF) of pipe ranging from 8 to 36 inches in diameter. The lengths and diameters of the pipeline segments for each zone are presented in Table 10-4. High-pressure polyvinyl chloride pipe (PVC) pipe is the primary pipe type used throughout the system. In addition, steel pipe is required at bridge crossings and ductile iron pipe (DIP) at pump stations and reservoirs.

**TABLE 10-4**
**PIPELINE DIAMETERS AND LENGTHS**

| Diameter (in.) | Material | Length (LF) |
|---|---|---|
| 36 | Steel | 64,182 |
| 24 | PVC | 34,696 |
| 20 | PVC | 40,718 |
| 18 | PVC | 15,008 |
| 16 | PVC | 10,946 |
| 14 | PVC | 31,752 |
| 12 | PVC | 20,190 |
| 10 | PVC | 22,501 |
| 8 | PVC | 44,935 |

Note: Only includes new pipelines. Pipeline 1A-2 is not included.

The proposed system crosses the Santa Clara River in three locations: McBean Parkway, The Old Road, and Sierra Highway. It is recommended that the pipelines be supported from existing bridge crossings. It is also recommended that the pipeline be supported from existing bridge crossings across freeways. Pipelines cross the I-5 at Rye Canyon Rd. and Valencia Blvd. and State Route 14 (Antelope Valley Freeway) at Placerita Canyon Rd. Air release valves would be

installed at the high points of the distribution system to remove trapped air, and blow off valves would be installed at the low points of the distribution system to remove sediment.

### 10.4.5 Booster Pump Stations

The recommended plan includes one booster pump station in addition to the recycled water pump stations located at Valencia WRP and the oil field produced water facility. The booster pump station is needed in the 1680 service zone to increase system and delivery pressures. The existing Honby Pump Station is planned to be taken out of potable water service within the next few years. This pump station could be modified to provide recycled water service. Its location is shown in Figure 10-1 and capacity information is listed in Table 10-5.

In addition, users with pressures less than 55 psi may require independent booster pumps stations.

**TABLE 10-5**
**BOOSTER PUMP STATION CAPACITY**

| Booster Pump Station Number | Zones Served | Capacity (gpm) |
|---|---|---|
| 1 | 1680 | 5,000 |

## 10.5 System Modeling

After the demands were identified (as described in Section 8) and preliminary layout and sizing of pipelines, reservoirs, and pump stations was performed, the system was modeled. Computer modeling was performed using H2ONET version 3.1, which runs as a module to AutoCAD 2000.

### 10.5.1 Model Construction

The model accurately represents the proposed model system geometry and major facilities. Because CLWA has very few existing recycled water facilities, the location and characteristics of each feature (e.g., pipe, junction, reservoir) were developed using the planning criteria was manually drawn in AutoCAD. H20Net creates and manages databases to store the input information such as pipe diameters, pipe length, loss coefficients, node demands, and other operating parameters.

Pressure zones were developed based on the topography of the area. Individual demands or geographically close groupings of demand were each assigned to a node. Nodal elevations were determined from a topographic map. Pipelines were located to connect the demand nodes with each other and with the recycled water sources. Pipelines were located in existing and planned streets wherever possible.

Reservoirs were sited for each zone in areas of the appropriate elevation and where land may be available for their construction. Pump stations were sited as needed to maintain adequate pressures throughout the system.

### 10.5.2 System Evaluation

Flow analysis of the system was performed for the ultimate projected peak hour demands of the customers. Most irrigation customers irrigate at night, which is when the peak hour demand would likely occur. Modeling was performed using a Hazen-Williams coefficient of C = 145.

Velocities, headloss, pressures, and reservoir elevation were tracked throughout the simulated operation period so that the critical or limiting conditions of the system could be identified and corrections made. H2ONET has the ability to display simulation results not only in tabular form, but also in graphical form to aid in rapidly identifying system deficiencies by geographic region or pressure zone. H2ONET can display all nodes that fail to exceed a minimum required pressure under any system demand and can display color-coded directional arrows to identify the lines of major flow in the system.

The recommended recycled water was successfully modeled, meeting all of the planning criteria.

## 10.6 Cost Estimates

The costs of the recycled water system include both capital costs and O&M costs.

### 10.6.1 Capital Costs

Table 10-6 presents the criteria used in estimating capital costs for the components of the recycled water system. Cost estimates presented in this report are order-of-magnitude type estimates expected to be accurate within ± 25 percent. The cost estimates were developed from general cost curves, information suppliers, other studies, and Kennedy/Jenks Consultants' previous experience.

Reservoir construction costs include costs for grading, materials, and construction. Pipeline construction costs assume in-street construction with a moderate degree of utility crossings and include such items as valves, traffic control, and road resurfacing. Booster pump station costs consist of costs for all materials, equipment, construction, and testing; costs were halved for modifications to existing pump stations. The Santa Clara River and freeway crossings assume supporting of the pipelines on the bridges. System flushing and testing costs assume that approximately 1,000 feet of pipe will be tested per day. The costs do not include pipeline easements and pump station/reservoir property costs.

The estimated capital cost of the recycled water system is approximately $68 million. Table 10-7 summarizes these costs. Capital costs include mobilization and demobilization, taxes, mark up for contractor overhead and profit, legal/administration, engineering, design allowance, construction management, and a contingency.

The cost estimates were developed to provide a reference for financial planning. The actual construction cost and project cost will depend on the final project scope, the schedule for construction, and market conditions at the time of construction. Feasibility of the project and funding needs must be considered and reviewed thoroughly in order to select the proper option and to provide adequate funding.

## TABLE 10-6
## COST CRITERIA

| Component | Unit Cost[a] |
|---|---|
| Reuse Pump Stations[b] | Based on curve |
| Reservoirs[b,c] | Based on curve |
| Pipelines | |
| 36-inch Steel | $405/LF |
| 24-inch PVC | $165/LF |
| 20-inch PVC | $148/LF |
| 18-inch PVC | $129/LF |
| 16-inch PVC | $112/LF |
| 14-inch PVC | $95/LF |
| 12-inch PVC | $91/LF |
| 10-inch PVC | $80/LF |
| 8-inch PVC | $65/LF |
| Santa Clara River Crossings | $6.15/diameter-inch/LF |
| Freeway Crossings | $6.15/diameter-inch/LF |
| Booster Pump Stations | Based on curve |
| System Flushing and Testing | $1.25/LF |

Notes:

(a) All unit costs represent installed costs, including taxes (8.25% on materials only), contractor overhead and profit (18%), design allowance (20%), engineering (10%), legal/administration (2%), construction management (5%), and contingency (20%). Costs do not include land acquisition or right-of-way.

(b) Costs are based on curves developed for typical reservoir and pump station costs. Reservoir costs were estimated based on $/MG and pump station costs on $/gpm.

(c) Includes tank, foundation, appurtenances, excavation, paving, fencing, landscaping, and telemetry.

## TABLE 10-7
## PRELIMINARY ESTIMATE OF CAPITAL COST

| Component | Estimated Cost (2002 Dollars) |
|---|---|
| Recycled Water Pump Stations | |
| Expansion of Valencia to 12,000 gpm | $930,000 |
| Oilfield-Produced Water Pump Station | $437,500 |
| Reservoirs | |
| 1 | Under Construction |
| 2 | $960,000 |
| 3 | $980,000 |
| 4 | $960,000 |
| 5 | $980,000 |
| 6 | $975,000 |
| 7 | $980,000 |
| 8 | $975,000 |
| Distribution Pipelines | |
| 36-inch Steel | $25,994,000 |
| 24-inch PVC | $5,725,000 |
| 20-inch PVC | $6,026,000 |
| 18-inch PVC | $1,936,000 |
| 16-inch PVC | $1,226,000 |

| Component | Estimated Cost (2002 Dollars) |
|---|---|
| 14-inch PVC | $3,016,000 |
| 12-inch PVC | $1,837,000 |
| 10-inch PVC | $1,800,000 |
| 8-inch PVC | $2,921,000 |
| Booster Pump Stations | |
| Modify Existing Honby Pump Station | $1,043,000 |
| Santa Clara River Crossings | $267,000 |
| Castaic Creek Crossing | $52,000 |
| Freeway Crossings | $246,000 |
| System Flushing and Testing | $350,000 |
| Seasonal Storage (ASR) | $8,093,000 |
| Total | $68,710,000 |

### 10.6.2 Operating and Maintenance Costs

An economic analysis was performed for the proposed recycled water system. In order to calculate the unit cost, the annualized capital cost was added to the estimated annual operations and maintenance (O&M) cost. The total annual cost (annualized capital and O&M) was then divided by the estimated recycled water demand for each phase to obtain the unit cost. Water purchase costs are discussed in Section 10.6.3.

Annualized capital costs were calculated based on a 20-year period at a 6 percent interest rate. Annual O&M costs were estimated by combining estimated pumping costs, parts cost, and labor costs. Pumping costs were estimated based on 82 percent pump efficiencies, 95 percent motor efficiencies, and an electricity cost of $0.12 per kilowatt-hour. Parts costs were estimated to be 1 percent of construction costs of pump stations and 0.1 percent of construction cost of reservoirs and pipelines. Labor costs were estimated based on 3 man-days per month per phase at $40 per hour.

The total average annual unit cost (2002 dollars), including annualized capital, after implementation of the completed recycled water system is $818 per acre-foot. Because CLWA can utilize available revenue sources funds to repay such debt service, it will not be necessary to recover capital costs through recycled water rates although CLWA may opt to do so. Therefore, the average unit operating cost of recycled water is $59 per acre-foot, excluding the cost of acquiring recycled water supplies.

### 10.6.3 Water Purchase Costs

The cost of purchasing water from Newhall Ranch WRP, the perchlorate-contaminated groundwater treatment facility, Berry Petroleum, and LACSD would be different. Costs of obtaining seasonal excess recycled water from the Newhall Ranch WRP would need to be negotiated with Newhall Ranch. Treated perchlorate groundwater may be available during the 1-2 year DHS demonstration period; there may be a charge for taking this water or it may be available for free. The costs of purchasing oil field produced water would be negotiated with Berry Petroleum. The costs of purchasing recycled water from LACSD are governed by an agreement dated July 1996. The cost of purchasing recycled water from LACSD for the first three years "shall be the greater of:

(a) $5.00 per acre-foot; or

(b) one-half the result determined by subtracting the Castaic Water Reuse Project Costs, as defined below, during the fiscal year divided by the total amount of reclaimed water delivered during the fiscal year, from the Water Rate, as defined below provided that deficits, if any, determined by adding the price to the amount determined by the above calculation may be carried over and considered as part of the Castaic Water Reuse Project's Cost in the next fiscal year."

At the end of the first three years, the cost of purchasing recycled water from LACSD "shall be the greater of:

(a) one fifth of the unit cost…of operation and maintenance of the Water Reclamation Plans, during the fiscal year in which the recycled water was received, rounded to the nearest cent, or

(b) the value determined by the method prescribed in (method b for the first three years)."

# Section 11: Permits and Approvals

A number of permits will be required to implement each phase of the recommended plan. These permits are in addition to environmental review requirements under the California Environmental Quality Act (CEQA) or National Environmental Policy Act (NEPA). Because the permitting process can be lengthy, permitting requirements may affect the implementation schedule of the recycled water system. A summary of the permitting requirements is provided in Table 11-1.

## 11.1 Federal

Implementation of the Master Plan may require several federal permits, specifically from the U.S. Army Corps of Engineers (USACE) and U.S. Fish and Wildlife Services (USFWS).

### 11.1.1 U.S. Army Corps of Engineers Nationwide Permit

USACE permit authority derives from the Rivers and Harbors Act of 1899 (Section 10), Clean Water Act (Section 404), and Marine Protection, Research, and Sanctuaries Act (Section 103). These regulations give USACE jurisdiction over all navigable waters within the U.S. Approval by USACE is required for construction of structures or work in or work affecting navigable waters of the U.S. Navigable waters include ocean and fresh waters, bays, streams, wetlands, marshes, swamps, and diked lands. USACE has jurisdiction over all of the above even though selected areas may not be navigable.

A Section 10 Permit covers construction, excavation, or deposition of materials in, over, or under such waters, or any work which would effect the course, location, condition, or capacity of those waters. The river crossings proposed as part of the Master Plan would be accomplished by suspending pipelines under existing bridges or boring and jacking under the riverbed. Because some construction activity may occur within the Santa Clara Riverbed, a Section 10 permit would be required.

The USACE issues nationwide permits (NWP), which authorize discharges of dredge and fill material to waters of the U.S. for activities with minimal environmental impacts. The NWP applies to projects of 1/2 acre of impact or less. USACE must be notified of any impacts over 1/10 of an acre. If these thresholds are exceeded, an individual Section 404 permit may be required.

### 11.1.2 Endangered Species Act Permits

In addition, a biological evaluation may be required to comply with the Endangered Species Act (ESA). Section 7 of the ESA requires all federal agencies to use their authority to conduct conservation programs and to consult with National Marine Fisheries Service (NMFS) or USFWS concerning the potential effects of their actions on any species listed under the ESA. Consultations occur with federal action agencies under Section 7 of the ESA to avoid, minimize, or mitigate the impacts of their activities on listed species. USFWS and NMFS also review non-federal activities which may affect species listed under the ESA and issues permits under Section 10 for the incidental take of those species and for scientific research and enhancement purposes. If endangered species are found within the proposed areas of construction, the Section 10 issuance criteria requires NMFS or USFWS to issue an Incidental Take Permit.

## TABLE 11-1
## SUMMARY OF PERMITTING REQUIREMENTS

| | Agency | Type of Approval | Requirements | Typical Review Period | Comments |
|---|---|---|---|---|---|
| Federal Permits | United States Army Corps of Engineers | Nationwide Permit | Needed if affect 1/10 to 1/2 acre of riverbed. Notify USACE of activities. | 30-60 Days | Notify USACE of activities |
| | United States Army Corps of Engineers | Section 10 Permit | Needed if affect course, location, condition, or capacity of river. | | |
| | United States Army Corps of Engineers | Individual Section 404 Permit | Unlikely to be required. | | |
| State Permits | California Department of Fish and Game | Lake or Streambed Alteration Agreement | Construction plans with application | 30 Days | Avoid nesting season April through September |
| | California Department of Fish and Game | Incidental Take Permit | Application | 30-120 days | Onsite inspection may be required |
| | California Department of Transportation | Encroachment Permit | Six sets of construction plans with application | 4-8 weeks | Inspection required during construction |
| | California Department of Health Services | Cross connection control | Construction plans with specifications | Not applicable | Project must conform to Title 22, DHS and AWWA Guidelines |
| | California Occupational Safety and Health Agency | Trenching and Excavation Permit | Complete plans and specifications | 1-2 weeks | Required by contractor |
| | Regional Water Quality Control Board | NPDES Construction Activity Permit | Application (NOI) before construction starts | 60 Days | Required for project area greater than 5 acres |
| | Regional Water Quality Control Board | Reclamation Permit | Application, Letter, plans, user maps, quantities | 6-9 months | LACSD will take lead |
| | Regional Water Quality Control Board | Engineering Report Requirements | Application, Letter, plans, user maps, quantities | 6-9 months | LACSD will take lead |
| | State Water Resources Control Board | Petition for change in place purpose of use | Petition | Varies | LACSD will take lead |

| | Agency | Type of Approval | Requirements | Typical Review Period | Comments |
|---|---|---|---|---|---|
| Local Permits | City of Santa Clarita | Encroachment Permit | Construction plans with permit application | 60 Days | LACSD will take lead |
| | Los Angeles County Department of Public Works | Excavation Permit | Construction plans with permit application | 3-6 weeks | Inspection required throughout construction |
| | Los Angeles County Flood Control District | Encroachment Permit | Six sets of construction plans with application | 60 Days | Inspection required following construction |
| | Los Angeles County Department of Health Services | Distribution system design & construction approval | Construction plans and specifications | Depends on project | Inspection required following construction, prior to operation |
| | Los Angeles County Department of Health Services | Onsite (cross connection control) (user) facilities approval | As-built of onsite facilities | Not applicable | Onsite inspection following construction |

The decision to grant or deny a permit is dependent upon a public interest review of the probable impacts of the proposed activity and its intended use. Benefits and detriments are balanced by considering effects on conservation, economics, wetlands, wildlife, flood hazards, navigation, water quality, and the needs and welfare of the public. Guidelines restrict discharges into aquatic areas when there are less environmentally damaging, practicable alternatives. Reasonable and practicable mitigation of unavoidable impacts will be required. A permit will be granted unless the project is found to be contrary to the public interest or fails to comply with the guidelines. USACE is required to consult with state and federal wildlife agencies regarding any impacts of a project on aquatic habitats.

### 11.1.3 U.S. Fish and Wildlife Service Permits

USFWS as part of the Department of the Interior, reviews proposals for work and activities in or affecting navigable waters that are licensed, assisted, or conducted by the federal government, pursuant to the National Environmental Policy Act (NEPA), Estuary Protection Act, Department of Transportation Act, Airport and Airway Development Act of 1970, Watershed Protection and Flood Protection Act, Endangered Species Act, Fish and Wildlife Coordination Act, and other federal legislation and regulations. In addition, USFWS reviews permit applications pursuant to Section 10 of the Rivers and Harbors Act, and Sections 208, 402, and 404 of the Clean Water Act, and other Federal legislation for enhancement of fish and wildlife resources. USFWS staff will identify potential adverse impacts and will propose compensation for irretrievable losses.

USFWS may require the preparation of supplemental biological assessments to determine effects of the proposed project on any federally endangered or threatened fish and wildlife species in or adjacent to the project area. USFWS must evaluate the project and comment prior to the construction and operation of the project. In general, USFWS project review may take 60 to 180 days to respond depending on project complexity and staffing issues.

## 11.2 State

The following state agencies may require permits and/or approvals for the recycled water system:

- California Department of Fish and Game (CDFG)
- California Department of Transportation (Caltrans)
- California Department of Health Services (DHS)
- State Water Resources Control Board (SWRCB)
- Regional Water Quality Control Board (RWQCB)
- California Division of Occupational Safety and Health (DOSH)

### 11.2.1 California Department of Fish and Game

CDFG manages California's fish, wildlife, and plant resources, and the habitats upon which they depend, for ecological values and for public use and enjoyment. The CDFG is responsible for issuance of Incidental Take Permits and a Lake or Streambed Alteration Agreement.

#### 11.2.1.1 Incidental Take Permit

Sections 2080 and 2081 of the Fish and Game Code prohibits within the State of California, export out of this State or take, possess, purchase, or sell within this State, any endangered species, threatened species, or species designated as a candidate species under Section 2074.2 of the Fish and Game Code if the Commission has issued notice under Section 2074.4. An Incidental Take Permit must be issued for any projects involving the above stated species. A permit application must be submitted to the Regional Manager. A permit may only be issued if the Director finds that (1) the take authorized by the permit will be incidental to an otherwise lawful activity, (2) the applicant will minimize and fully mitigate the impacts of the take authorized under the permit, (3) the permit will be consistent with any regulations adopted pursuant to Fish and Game Code Sections 2112 and 2114, and/or (4) the applicant has ensured adequate funding to implement the measures required under the permit to minimize and fully mitigate the impacts of the taking, and to monitor compliance with, and the effectiveness of, the measures. On-site inspections may be required prior to a final decision by the Director. The permitting process can take up to 120 days, including a 30-day review period and a 90-day approval/denial period.

#### 11.2.1.2 Lake or Streambed Alteration Agreement

Section 1603 of the Fish and Game Code requires any person who proposes a project that will substantially divert or obstruct the natural flow or substantially change the bed, channel, or bank of any river, stream, or lake or use materials from a streambed to notify CDFG prior to implementation. Notification to CDFG can be accomplished through the submittal of a Notification of Lake and Stream Alteration form (FG 2023) and Project Questionnaire form (FG 2024), along with any other required documents and applicable fees to CDFG. Notification is required for any projects that will take place in or in the vicinity of a river, stream, lake, or other tributaries. This includes rivers or streams that flow at least periodically or permanently through a bed or channel with banks that support fish or other aquatic life and watercourses having a surface or subsurface flow that support or have supported riparian vegetation. Based on the submitted notification, and a possible site visit, CDFG will determine if the proposed project may impact fish or wildlife resources. If CDFG concludes that the proposed project would have a substantially adverse affect on existing fish or wildlife resources, a Lake or Streambed Alteration Agreement from CDFG will be required and reviewed in accordance with CEQA.

### 11.2.2 California Department of Transportation

An encroachment permit from Caltrans will be required for any work done within the state of right-of-way. This includes installation of a pipeline in a roadway crossing under a highway, support of a pipeline on a bridge crossing over a highway, and activities that impact on-ramp and off-ramp traffic. The proposed system has two pipeline crossings over Interstate 5: McBean Parkway and Valencia Boulevard. A permit application along with six sets of final plans and specifications will be required to be submitted for review and approval. Typical review period is 4 to 8 weeks.

### 11.2.3 California Department of Health Services

DHS's primary concerns with respect to the recycled water system are cross connections, separation of pipelines, and any activity that has the potential to result in contamination of drinking water. DHS will review plans and specifications prior to construction.

### 11.2.4 State Water Resources Control Board and Regional Water Quality Control Board

The SWRCB was created by Legislation in 1967 to ensure the highest reasonable quality for waters of the State. Under the SWRCB, there are nine RWQCBs that assist in the implementation of state and federal laws and regulations. The RWQCB regulates the source and the end use of recycled water. Its main involvement in the recycled water system will be through LACSD to modify the reclamation permit to include the specific recycled water users and to review the Engineering Report describing treatment and distribution facilities and users. CLWA's responsibility will be to assist LACSD with preparation of necessary information. In addition, CLWA will need to obtain a NPDES Construction Activity Permit. This permit is required for stormwater runoff from construction projects impacting an area of 5 acres or more. An application (Notice of Intent) must be submitted before construction starts. The review period averages 60 days.

Approval of a Petition for Change of Place and Purpose of Use from the SWRCB is required for any change in discharge location or quantity of wastewater. In 1993, the SWRCB approved a petition for change for the Valencia WRP; however, the amount requested will change according to more recent demand data. In addition, if LACSD pursues the rights to the effluent, review and approval is the responsibility of SWRCB. In either case, LACSD would be the lead agency, requiring assistance from CLWA. SWRCB may also be a potential source of loan or grant funding, as discussed in Section 12.

### 11.2.5 California Division of Occupational Safety and Health

A Trenching and Excavation Permit from DOSH is required by the contractor for the construction of recycled water pipelines that require trenching deeper than 5 feet. Complete plans and specifications are required along with $50 review and approval fee.

## 11.3 Local Permits

This section summarizes the anticipated permits and approvals required from local authorities, including Los Angeles County and the City of Santa Clarita.

### 11.3.1 Los Angeles County Department of Health Services

Plan review and inspection of the distribution system and onsite user facilities to address concerns with drinking water contamination (cross connection control) are required by the Los Angeles County Department of Health Services. LACDHS coordinates with RWQCB and DHS.

### 11.3.2 Encroachment Permits

Encroachment permits are required for all construction work done within local right-of-way from the City of Santa Clarita, the Los Angeles County Department of Public Works (Excavation Permit) and the Los Angeles County Flood Control District. Two sets of final plans and specifications need to be submitted to the County for encroachments. Fees are based on size of excavation in the right-of-way and on the estimated job costs. Review period averages between 1 to 2 weeks.

## 11.4 National Environmental Policy Act

Compliance with NEPA would be required if federal funding is acquired. Typically, compliance with NEPA is achieved by preparing an appropriate document evaluating the potential impacts of the proposed project, such as an Environmental Impact Statement or Environmental Assessment. This documentation is similar to that required by CEQA and can be prepared jointly with CEQA documentation.

## 11.5 California Environmental Quality Act

Preparation of appropriate CEQA documentation will be necessary. CLWA's "Final Program EIR for the Capital Program and Water Plan," including "Acquisition of Supplemental Water and Proposed Second Plant Site," included use of 1,700 acre-feet of recycled water. CLWA's "Site Specific Mitigated Negative Declaration for Construction of a Reclaimed Water Distribution System" included the Phase 1 facilities. It may be desirable to prepare a programmatic environmental document for the Master Plan as well as site-specific CEQA documentation for each implementation phase. The CEQA documentation may be prepared jointly with the NEPA documentation, if NEPA documentation is required.

## 11.6 Other Institutional Issues

Before providing recycled water service, it will be necessary to secure agreements between the following entities:

- LACSD and CLWA: A contract between LACSD and CLWA is required for sale of recycled water to CLWA and construction and operation of facilities on LACSD property
- Berry Petroleum and CLWA: A contract between Berry Petroleum and CLWA is required for the purchase and use of oil field produced water at the Berry Petroleum oil fields southeast of the City of Santa Clarita.
- Respective purveyors and CLWA: An agreement for temporary use of perchlorate-contaminated groundwater from three local groundwater wells is required between CLWA and the purveyors (NCWD, SCWD, and VWC).
- CLWA and purveyors: Contracts between CLWA and local water purveyors will establish the basis for retail operation of the system and sale of the recycled water.
- Purveyors and users: The agreement between purveyors and users (customer service agreement) will establish the requirements for use of the recycled water and will specify that the users understand the regulations controlling the use of recycled water.

# Section 12: Funding and Financing Opportunities

To construct the recycled water system, sufficient capital funds must be secured by CLWA. This section presents a plan for financing the proposed recycled water system. Discussions on financing options, water rate policy, economic analysis and connection fees are included.

## 12.1 Funding and Financing Alternatives

To finance the construction cost of the proposed facilities, CLWA can obtain capital through the following funding sources:

- Capital Reserves
- Grants
- Low interest Loans
- Certificates of Participation

These potential funding sources are listed in Table 12-1 and discussed in detail below.

### 12.1.1 Capital Reserves

CLWA receives revenues from facility capacity fees, 1 percent property taxes, water rates and interest on investments. It also has the authority to levy standby charges but has, thus far, not exercised this authority. To the extent that these revenues have exceeded operational expenses, existing debt, and capital expenditures, substantial capital reserves have accumulated. A portion of these reserves is utilized as security for the repayment of certificates of participation. The remainder is available for operating expenses or CLWA's Capital Improvement Program (CIP) in which the recycled water program is included.

### 12.1.2 Grants and Low Interest Loans

Both the federal and state governments have policies to encourage recycled water projects. These policies have led to several grant and low interest loan programs. Available funds for grants and low interest loans are dependent upon legislative approval and available monies. Those listed in Table 12-1 reflect Fiscal Year 2000-2001 allocations and are likely to be altered in Fiscal Year 2001-2002.

## TABLE 12-1
## GRANT AND LOAN SUMMARY

| | Sponsoring Agency | Funding Authority | Eligible Projects | Total Funds Available | 2000-2001 Funds Available/Interest Rate | Applicant Funding Limitations | Grant or Loan |
|---|---|---|---|---|---|---|---|
| Water Reclamation and Reuse Program | US Bureau of Reclamation | Reclamation Wastewater and Groundwater Study and Facilities Act of 1992 (Title XVI) | Water reuse projects: that reclaim and reuse municipal, industrial, domestic or agricultural wastewater, or naturally impaired groundwater and/or surface waters | | 25% of total project cost | $20,000,000 | Grant |
| Water Recycling Facilities Planning Grant | SWRCB | Proposition 204 | Feasibility studies for water recycling projects | $60,000,000 | 50% of study costs, not to exceed funding limits | $75,000 | Grant |
| Water Recycling Construction Program | SWRCB | Proposition 204 | Wastewater treatment, recycled water storage facilities, pump stations, and recycled water distribution pipelines | $105,000,000 | 25% of eligible cost | $5,000,000 | Grant |
| Water Recycling Loan Program | SWRCB | Proposition 204 | Water recycling projects | $60,000,000 | 50% of the interest rate paid by the State on the most recent sale of State General Obligation Bonds at a 20-year payback rate | $15,000,000 | Loan |

| | Sponsoring Agency | Funding Authority | Eligible Projects | Total Funds Available | 2000-2001 Funds Available/Interest Rate | Applicant Funding Limitations | Grant or Loan |
|---|---|---|---|---|---|---|---|
| Water Conservation Loan Program | DWR | Proposition 13 | Construction of water reclamation storage and distribution facilities, or the purchase of land and land easements for replacement of existing potable water supply | | 50% of the interest rate paid by the State on the most recent sale of State General Obligation Bonds at a 20-year payback rate | $5,000,000 | Loan |
| Local Water Supply Loan Program | DWR | Proposition 13 | Construction of water reclamation facilities to communities for the purpose of supplying additional new local water supplies | | 50% of the interest rate paid by the State on the most recent sale of State General Obligation Bonds at a 20-year payback rate | $5,000,000 | Loan |
| Agricultural and Urban Water Conservation Loan Program | DWR | Proposition 13 | Agricultural and Urban Water Conservation Projects | $16,000,000 for Agriculture $13,000,000 for Urban | | None | Loan |
| Infrastructure State Revolving Loan Program | CA Technology, Trade and Commerce Agency | | Water treatment and distribution | | Monthly basis | $20,000,000 | Loan |
| Focused Research in Air Quality and Produced Water Management in Oil and Gas Exploration and Production | Department of Energy | | Oil field produced water management research | $7,000,000 | Maximum 80% of estimated project costs for 1 to 3 years | $1,500,000 | Grant |

#### 12.1.2.1 U.S. Bureau of Reclamation

The U.S. Bureau of Reclamation's water reclamation and reuse grant program was developed via the Reclamation Wastewater and Groundwater Study and Feasibility Act of 1992 (Title XVI of Public Law [P.L.] 102-575, as amended). This program investigates and identifies opportunities for reclamation and reuse of municipal, industrial, domestic, and agricultural wastewater, and naturally impaired ground and surface waters, for the design and construction of demonstration and permanent facilities to reclaim and reuse wastewater, and to conduct research, including desalting, for the reclamation of wastewater and naturally impaired ground and surface water. The Act also provides a program for federal participation (through cost sharing) of specific water reuse projects up to certain amounts specified in the Act. Construction funds can be provided only for projects specifically authorized by Congress pursuant to Title XVI.

CLWA is currently attempting to obtain Congressional authorization for its recycled water program. Authorization is currently included in HR 1245 (McKeon) and HR 2404 (Miller), which were introduced in the 107th Congress; however, this legislation appears inactive until the CALFED reauthorization bills (S 1768 [Feinstein] and HR 3208 [Calvert]) are addressed. The CALFED bills also include expanded federal programs for recycled water.

#### 12.1.2.2 U.S. Department of Energy National Energy Technology Laboratory

The U.S. Department of Energy (DOE) National Energy Technology Laboratory is currently soliciting applications for cost-shared research projects that address produced water management issues of the oil and gas industry under its Focused Research in Air Quality and Produced Water Management in Oil and Gas Exploration and Production program. The goal of the program is to provide solutions to issues that are limiting domestic production, such as reinjecting oil field produced water. DOE is seeking applicants who can develop technologies to allow the economic beneficial use of produced water, such as landscape irrigation, so as to avoid disposing or reinjecting produced water. DOE is currently anticipating that it will award three to seven projects for a period ranging from one to three years. They are planning approximately $7 million in funding over a 3-year period for this solicitation. Project awards will range from $100,000-$500,000 per year. The minimum required cost share by the project proponents is twenty percent.

#### 12.1.2.3 State Water Resources Control Board

The March 2000 approval of Proposition 13 (2000 Water Bond) provided funds to be allocated by SWRCB for local water-related projects. Roughly $763.9 million was allocated to be available through various bond programs.

The Water Recycling Financial Assistance Program provides grants and low-interest loans for design and construction of water recycling facilities, grants for water recycling facilities planning studies, and grants for recycling research and studies. A total of $53.2 million is available for grants for construction of facilities, $49.5 million in loans for facilities and grants for planning, and $3.2 million for research and studies. The program provides both low-interest loans and grants to local agencies to construct water recycling facilities, provides grants up to $75,000 to local agencies for planning of water recycling facilities, and provides funds for research and studies. Proposition 13 rolls the funds for water recycling from the 1988 Bond Law and 1996 Bond Law into a new Proposition 13 subaccount. Proposition 13 also requires that 60 percent of the funds for design and construction of facilities be allocated to projects in the Counties of

Riverside, Ventura, Los Angeles, San Diego, Orange, or San Bernardino, and that 40 percent of the funds be allocated to projects in the remaining counties. The 1984 Bond Law remains separate, provides low-interest loans up to $10 million for design and construction of facilities, and has no geographic restrictions. Loan applications are supported by facilities planning report demonstrating that the proposed project is cost effective. Loans may be for a period of up to 20 years with an interest rate of 50 percent of the interest rate paid by the state on the most recent sale of State General Obligation Bonds. There is a $15 million limit per project on loans.

#### 12.1.2.4 California Department of Water Resources

DWR has several grant programs available to assist in funding local studies, programs, and projects to better manage California's water resources. It is the primary intent of these programs to fund local activities that will enhance water supply reliability and increase the beneficial use of existing supplies.

The Proposition 13 Water Conservation Program provides low interest loans and grants for construction projects, and grants for feasibility studies to public agencies and incorporated mutual water companies. The Proposition 204 Local Projects program provides low interest loans and grants to local public agencies for water supply construction projects and feasibility studies. The Proposition 82 Local Water Supply program provides only loans for construction projects and feasibility studies.

The Urban and Agricultural Water Conservation Program provides loans to public agencies, and incorporated mutual water companies to finance feasible, cost effective water conservation projects or programs to improve water use efficiency. Projects involving construction of recycled water distribution systems for reuse in lieu of existing potable water supplies are eligible for funding under this program.

The Local Water Supply Construction Loan Program provides loans for the construction of water reclamation facilities to communities for the purpose of supplying additional new local water supplies. Construction of water reclamation storage and distribution facilities, as well as the purchase of land and land easements, is eligible for funding. The maximum loan is $5 million and the interest rate is equal to the most recent California General Obligation Bond sale.

#### 12.1.2.5 California Technology, Trade and Commerce Agency

The Infrastructure State Revolving Fund Program provides low-cost financing to public agencies in amounts ranging from $250,000 to $20,000,000, with a term of up to 30 years. This program supports a variety of projects, including water treatment and distribution.

### 12.1.3 Certificates of Participation

Certificates of Participation (COP) have been previously utilized to finance capital improvement projects. With a COP, the public entity is not the immediate owner of the facility, but rather becomes the lessee. Another public or private entity may be identified to function as the lessor. The lessor will arrange the financing and construction of the project and then lease it to CLWA. The government unit (such as CLWA) which proposes to occupy or to use the facility initiates the process by agreeing in principle to enter into a contract to lease certain specified property (either real or personal) from lessor. The contract provides the terms and circumstances under which the purchase is divided into periodic installment payments. The payments will include an interest component which may be made annually, semi-annually, or more frequently. To

finance the lease, the lessor may then assign to a third party (trustee) its right to receive the installment payments, and the trustee, in turn, provides the financing. The trustee then carves the lease into smaller interests (represented by the certificates) which are underwritten by investment bankers and sold to investors.

The COPs represent (or certify) each investor's percentage ownership in the lease and the entitlement to receive his/her portion of principal and interest payments. Most frequently, certificates are issued in $5,000 denominations. The public agency (lessee) is obligated under the agreement to make the lease payments from lawfully available annual appropriations. Neither the full faith and credit nor taxing power of the lessee is pledged; however, the lease agreement provides that the lessee shall take action each year to include rental payments in its budget. If CLWA is to consider and become a lessee under this type of financing, it must address the source and flow of annual revenues to make rental payments. Installments due under a lease for the facilities would be payable from gross revenues of CLWA. These can include operating revenues, facility capacity fees, and property taxes.

### 12.1.4 Revenue Sources for Loan/Debt Service Repayment

Capital costs and debt services associated with CLWA's capital improvement program are allocated to existing users and new growth. Costs attributable to existing users are funded by operating revenues and their proportion of the 1 percent property tax, interest on investment, reserves, and standby charges, if levied. Costs attributable to new growth are funded by facility capacity fees and its proportion of the 1 percent property tax interest on investment, reserves, and standby charges if levied.

### 12.1.5 Recommended Alternative

Due to the numerous grant options and low interest loan programs, CLWA should consider maintaining its accumulated reserves for other purposes and finance the recycled water project through available grant monies and loan programs. It should be noted that a close review of project planning and construction documents is conducted upon application for existing grant and loan programs. Such programs require that the most cost-effective alternative be utilized. The loan programs and majority of grant programs are not retroactive; therefore, the sponsoring agency must approve the project prior to the applicable phase (e.g., feasibility study, planning, construction). It is recommended that coordination with each sponsoring agency listed in Table 12-1 occur immediately following project approval.

## 12.2 Water Rate Policy

To encourage its use, recycled water should be available at a lower rate to users than potable water. Because recycled water is a reliable source of supply, this cost differential should provide potential customers with the necessary encouragement to use recycled water. The wholesale rate of potable water currently averages $145 per acre-foot among the three purveyors. The retail rate of potable water in the Santa Clarita Valley is approximately double the wholesale rate. The principal wholesale rate strategies for recycled water are discussed below.

### 12.2.1 Rates Based on Costs of Service

The wholesale recycled water rate could be set at a level to recover costs of furnishing the recycled water. The estimated annualized capital and operating cost of the recycled water system in 2002 dollars is approximately $818 per acre-foot, which is significantly greater than the $145 per acre-foot wholesale or current retail rate for potable water.

Regardless of the program utilized to finance the recycled water system, the basic source of funds is the facility capacity fees, standby charges, property taxes, and water rates currently collected by CLWA. Therefore, it is not necessary to include annualized capital in the cost of service since the capital costs do not need to be recovered. The estimated cost for the recycled water system excluding annualized capital costs is approximately $48 per acre-foot (2002 dollars), which is actually lower than the current wholesale rate for potable water.

### 12.2.2 Rates Based on Percentage of Potable Water Rate

Although the wholesale recycled water rate should reflect the actual cost of providing service, it may be preferable for CLWA to base its recycled water rate on a percentage of the potable water rate. This is desirable when a straightforward method of calculation is preferred. Often, this method is necessary because the rate based upon costs of service exceeds the potable water rate. Based on the need to provide an incentive to utilize recycled water, a recycled water rate of 70 to 90 percent of the potable water rate is typical.

### 12.2.3 Rates by User Class

A method used by some water agencies for setting recycled water rate is to establish different rates for various user categories. For example, the Irvine Ranch Water District charges a rate for commercial/landscape users, including homeowner associations, that is approximately nine percent greater than the rate charged for the larger/agricultural users. Because the cost of furnishing recycled water would not differ substantially between types of customers, it seems appropriate for users of CLWA's recycled water system to be initially charged at the same rate. However, a rate surcharge may be appropriate for users of high-pressure water since pumping costs are higher.

### 12.2.4 Recommended Rate Policy

It is recommended that CLWA utilize a wholesale recycled water rate equivalent to the potable water rate of $145 per acre-foot and that the water purveyors utilize a retail recycled water rate equivalent to the potable water rate. The estimated cost of service for the recycled water system is $818 per acre-foot (2002 dollars) as discussed in Section 10. Utilizing the potable rate for recycled water allows CLWA to recover the cost of recycled water service while avoiding potential problems that investor-owned water companies may face when presenting a recycled water rate case to the Public Utilities Commission and while assuring that the water purveyors experience no loss in revenue.

In order to provide an incentive to recycled water users, it is recommended that the CLWA issue a monthly rebate directly to each recycled water user. The recommended initial rebate is $60 per acre-foot. Based on existing retail potable water rates, the rebate would result in a cost incentive for recycled water users of 20 to 25 percent over potable water rates.

# Section 13: Implementation Plan

Section 10 identified recommended infrastructure improvements for a recycled water system in the CLWA service area. This section presents a plan for implementing the recommended system. The discussion focuses on the implementation plan, permit requirements, other institutional issues and the implementation schedule.

## 13.1 Implementation Considerations

In order to implement each phase, several development activities need to occur and issues need to be addressed. Many of the implementation elements apply to all the phases; however, some issues are unique to individual phases or facilities. The following is a listing of the major activities and issues to be addressed which are common to all phases. The activities are generally listed in order of occurrence; however, most would require concurrent effort through the duration of implementation.

- Customer Development - Verify demands, customer commitment, connection locations, retrofit requirements, and DHS approvals.
- Preliminary Design/Engineering Feasibility - Evaluate alternative pipeline routes, collect detailed utility and traffic information, prepare updated cost estimates, and update with new information from customer development activities. Preliminary design can be initiated following initial verification of customer information, provided updated customer information does not identify other significant issues.
- Regulatory Approvals - Identify required permits and regulatory approvals, including DHS, RWQCB, CEQA, and construction permits. Develop management plan and schedule to obtain regulatory approvals, considering appropriate review periods for regulatory agencies. Regulatory activities should be initiated concurrently with preliminary design and continue through implementation and operation.
- Design/Construction - Incorporate any updated customer information, regulatory requirements, and community concerns. Reevaluate economics with updated information and design level cost estimate. Design and construction efforts can begin immediately following preliminary design.
- Training – Provide training and guidance to the site supervisors assigned by each recycled water user. Educate site supervisors on the proper use of recycled water, recycled water regulations, and basic principles of backflow prevention and cross-connection control.

## 13.2 Phasing Plan

WRP production is not anticipated to be adequate to meet the total demands of the system. However, as potable water demands increase and, consequently, recycled water production increases, the water available to meet system demands would also increase. Therefore, it is recommended that construction of the recycled water system be phased to utilize the increases in plant production.

Oil field produced water and treated perchlorate contaminated water would also not be available immediately, nor would they be available as permanent sources of supply. Instead, these alternative water sources will be used as interim supplies when inadequate recycled water is available from Valencia WRP. Oil field produced water is anticipated to be available as a long-term supply – approximately 20 years – and perchlorate contaminated water for only 2 to 3 years. The phasing considers when these water sources would be available.

Phasing implementation of the recycled water system is recommended for the following reasons:

- A number of the potential recycled water users are future users that do not yet need recycled water.
- The current flow of the Valencia WRP is not adequate to meet the total demands of the recycled water users.
- Capital requirements would be spread over CLWA's current planning period.
- Oil field produced water and treated perchlorate-contaminated water are not immediately available.
- Newhall Ranch is anticipated to have an initial increase in demand, peaking in 2015, then decreasing and leveling off.

The recycled water system is divided into implementation phases based primarily on service zone boundaries.

In general, the following factors should be considered in developing a phasing plan:

- Ease or willingness of customers to connect to recycled water
- Retrofit costs
- Regulatory requirements
- Community impacts and development requirements
- Water utility involvement/cooperation
- Funding availability
- Reliability and operational costs considerations
- System flexibility

The implementation phases are prioritized based on the status of the users (existing or future), the anticipated construction schedule of future users, and the proximity of the users to the non-potable water source (e.g., Valencia WRP, Placerita Oil Field, perchlorate treatment plant). It is recommended that the recycled water system be implemented as shown in Table 13-1.

The phasing sequence shown in Table 13-1 is a recommendation based on existin and current information. Actual development of future users may necessitate modi phasing sequence.

**TABLE 13-1**
**IMPLEMENTATION PHASES**

| Phase | Zone | Year | Water Demand (AF/yr)[a] |
|---|---|---|---|
| 1A | 1430 | Existing/In Progress | 880 |
| 1B | 1430 | 2003 | 3,862 |
| 2 | 1430 | 2003 | 1,236 |
| 3 | 1430 | 2004 | 4,644 |
| 4 | 1430 | 2005 | 401 |
| 5 | 1680 | 2006 | 658 |
| 6 | 1680 | 2007 | 722 |
| 7 | 1430 | 2008 | 3,892 |
| 8 | 1430 | 2008 | 171 |
| 9 | 1680 | 2009 | 351 |
| 10 | 1680 | 2010 | 227 |
| 11 | 1430 | 2011 | 399 |
| | Total | | 17,441 |

Note: (a) Demands by phase include both existing and future demands. Not all future demands would be on-line when the phase is implemented.

Implementation phases are delineated on Figure 13-1 and described in the following sections. Recycled water users and facility requirements with preliminary capital and O&M cost estimates for each phase are summarized in Tables 13-2, 13-3, and 13-4.

### 13.2.1 Phase 1A

Phase 1A is ~~currently in progress~~ and includes the proposed Westridge Golf Course located in the vicinity of the Valencia WRP.

Based on the Reclaimed Water Master Plan prepared in 1993, CLWA has constructed ~~or is in the process of constructing~~ the Phase 1 improvements, including a 4,000 gpm recycled water pump station at the Valencia WRP, 15,600 LF of 20- and 24-inch ductile iron pipe from the Valencia WRP recycled water pump station to recycled water reservoir no. 1 (Recycled water pipeline IA-2), and recycled water reservoir no. 1, a 1.5 mg aboveground steel reservoir located near the proposed Westridge Golf Course.

Environmental documentation for Phase 1 was completed in 1991 and consisted of two primary documents:

- CLWA's "Final Program EIR for the Capital Program and Water Plan including Acquisition of Supplemental Water and Proposed Second Plant Site."
- CLWA's "Site Specific Mitigated Negative Declaration for Construction of a Reclaimed Water Distribution System."

Construction of Phase 1 improvements is anticipated to be completed in 2002.

TABLE 13-2
POTENTIAL RECYCLED WATER USERS BY PHASE

Existing Phase 1A

| Map Location # | User Name | Address | Chosen Annual Demand (AF/Yr) | Peak Monthly Demand (AF/Mo) | Peak Daily Demand (AF) | Peak Daily Demand (1000 gls) | Peak Hourly Demand (GPM) |
|---|---|---|---|---|---|---|---|
| 60 | Westridge Golf Course | | 880 | 165.00 | 5.43 | 1768.9 | 3,276 |
| | **Total** | | **880** | **165** | **5** | **1,769** | **3,276** |

Phase 1B

| Map Location # | User Name | Address | Chosen Annual Demand (AF/Yr) | Peak Monthly Demand (AF/Mo) | Peak Daily Demand (AF) | Peak Daily Demand (1000 gls) | Peak Hourly Demand (GPM) |
|---|---|---|---|---|---|---|---|
| 31 | Magic Mountain Resort Golf Course | | 429 | 80.44 | 2.65 | 862.3 | 1,597 |
| 32 | Magic Mountain Amusement Park | 26101 Magic Mountain Pkwy, Valencia | 476 | 89.25 | 2.94 | 956.8 | 1,595 |
| 16 | Helmers Elementary | 27300 Grandview Drive, Valencia | 5 | 1.00 | 0.03 | 10.7 | 30 |
| 25 | Valencia High | 27801 Dickason Drive, Valencia | 100 | 26.00 | 0.86 | 278.7 | 774 |
| 34 | Valencia Country Club/Golf Course | 27330 Tourney Rd, SC | 590 | 76.10 | 2.50 | 815.8 | 1,511 |
| 36 | Santa Clarita Sports Complex | 26407 Golden Valley Road, SCTA | 50 | 9.38 | 0.31 | 100.5 | 168 |
| 39 | North River Industrial | | 105 | 19.69 | 0.65 | 211.1 | 586 |
| 40 | North River High School | | 135 | 25.31 | 0.83 | 271.4 | 754 |
| 41 | North River Jr. High School | | 60 | 11.25 | 0.37 | 120.6 | 335 |
| 42 | North River Golf Course | | 600 | 112.50 | 3.70 | 1206.0 | 2,233 |
| 43 | North River Commercial | | 45 | 8.44 | 0.28 | 90.5 | 251 |
| 44 | Lago de Valencia - Commercial | McBean/Newhall Ranch Rd(E corner), N Valencia | 29 | 5.44 | 0.18 | 58.3 | 162 |
| 51 | South River Village - Commercial | NW corner McBean Pkwy & MM Pkwy, N Valencia | 44 | 8.25 | 0.27 | 88.4 | 246 |
| 52 | Valencia Industrial Center | 24800 block of Tibbetts Avenue, N Valencia | 27 | 5.06 | 0.17 | 54.3 | 151 |
| 113 | North River Commercial | | 24 | 4.50 | 0.15 | 48.2 | 134 |
| 262 | Area Wide District LMD | N Newhall Ranch Rd | 11 | 2.06 | 0.07 | 22.1 | 61 |
| 263 | Area Wide District LMD | Btwn McBean Pkwy&Bouquet Canyon on river | 11 | 2.06 | 0.07 | 22.1 | 61 |
| 273 | Corporate Center | Sprinfield Court | 4 | 0.75 | 0.02 | 8.0 | 22 |
| 282 | Northbridge | 24000 Newhall Ranch Rd | 373 | 69.94 | 2.30 | 749.8 | 2,083 |
| 308 | North Valencia Jr HS | undetermined | 50 | 9.38 | 0.31 | 100.5 | 279 |
| 309 | North Valencia Eastcreek Community Park | McBean & Newhall Ranch Rd | 40 | 7.50 | 0.25 | 80.4 | 134 |
| 310 | N Valencia Decoro Park-Business Park | Dickason Dr | 247 | 46.31 | 1.52 | 496.5 | 1,379 |
| 314 | North Valencia Village Center (Eastcreek) | Decoro Dr & McBean | 9 | 1.69 | 0.06 | 18.1 | 50 |
| 315 | North Valencia Eastcreek County Park | McBean Pkwy | 9 | 1.69 | 0.06 | 18.1 | 30 |
| 316 | N Valencia Decoro Park-Commercial | Newhall Ranch Rd & Copper Hill Dr | 5 | 0.94 | 0.03 | 10.1 | 28 |
| 317 | North Valencia Decoro Park Private Park | Copper Hill Drive | 4 | 0.75 | 0.02 | 8.0 | 13 |
| 319 | Northpark School | 27300 Grandview, SC | 5 | 1.00 | 0.03 | 10.7 | 30 |
| 335 | SunCal/Tesoro, LLC Development | Copperhill and Avenida Rancho Tesoro | 375 | 79.38 | 2.61 | 850.9 | 1,576 |
| | **Total** | | **3,862** | **536** | **18** | **5,750** | **16,273** |

Phase 2

| Map Location # | User Name | Address | Chosen Annual Demand (AF/Yr) | Peak Monthly Demand (AF/Mo) | Peak Daily Demand (AF) | Peak Daily Demand (1000 gls) | Peak Hourly Demand (GPM) |
|---|---|---|---|---|---|---|---|
| 33 | Valencia Interchange | Valencia Blvd & MM Pkwy | 6 | 1.13 | 0.04 | 12.1 | 34 |
| 6 | **Newhall School District** Office | 25375 Orchard Village Rd, Valencia | 6 | 1.00 | 0.03 | 10.7 | 30 |
| 9 | Valencia Valley Elementary | 23601 Carrizo Drive, Valencia | 18 | 3.00 | 0.10 | 32.2 | 89 |
| 61 | Vista Valencia Golf Course | 24700 W Trevino Dr, SC | 36 | 6.75 | 0.22 | 72.4 | 134 |
| 63 | Old Orchard Elementary | 25141 Avenue Rondel, Newhall | 17 | 3.00 | 0.10 | 32.2 | 89 |
| 64 | Old Orchard Park (City) | 25023 Avenida Rotella, Valencia | 24 | 4.00 | 0.13 | 42.9 | 71 |
| 65 | Orchard Village Road Tree Farm | | 6 | 1.13 | 0.04 | 12.1 | 34 |
| 66 | Henry Mayo Hospital | 23845.5 McBean Pkwy, Valencia | 153 | 23.00 | 0.76 | 246.6 | 685 |
| 67 | College of the Canyons/Academy of the Canyons | 25455 N. Rockwell Canyon Rd, Valencia | 213 | 39.94 | 1.31 | 428.1 | 1,189 |
| 71 | Hart High School | 24825 Newhall Avenue, Newhall | 31 | 14.00 | 0.46 | 150.1 | 417 |
| 72 | H.M. Newhall Memorial Park (City) | 24923 Newhall Avenue, Newhall | 49 | 8.00 | 0.26 | 85.8 | 143 |
| 73 | Placerita Jr. High/Learning Post | 25015 Newhall Avenue, Newhall | 53 | 9.94 | 0.33 | 106.5 | 296 |
| 74 | Valencia Glenn City Park | 23750 Via Gavola, Valencia | 29 | 5.00 | 0.16 | 53.6 | 89 |
| 76 | Peachland Elementary | 24800 Peachland Avenue, Newhall | 30 | 5.63 | 0.19 | 60.3 | 168 |
| 79 | Valencia Meadows Elementary | 25577 Fedala Rd, Valencia | 16 | 3.00 | 0.10 | 32.2 | 89 |
| 80 | Valencia Meadows Park (City) | 25671 Fedala Rd, Valencia | 6 | 1.00 | 0.03 | 10.7 | 18 |
| 94 | Summit Common Area (N & S) | | 157 | 29.44 | 0.97 | 315.6 | 877 |
| 99 | Almendra Park (City) | 23420 Alta Madera Drive, SCTA | 11 | 2.02 | 0.07 | 21.6 | 36 |
| 136 | Apple Park | 24829 Apple Street-Z, Newhall | 7 | 1.00 | 0.03 | 10.7 | 18 |
| 139 | Park - Adjacent to Valencia Valley Elem? | 23645 Carrizo Drive, Valencia | 11 | 2.00 | 0.07 | 21.4 | 36 |
| 168 | Peachland Owners Assoc | 25003-39 Peachland, Newhall | 26 | 4.00 | 0.13 | 42.9 | 119 |
| 264 | Area Wide District LMD | Near Henry Mayo Hospital | 11 | 2.06 | 0.07 | 22.1 | 61 |
| 266 | Old Orchard | 23600 Lyons Ave | 13 | 2.44 | 0.08 | 26.1 | 73 |
| 267 | Valencia Hills | 23000 Wiley Canyon Rd | 19 | 3.56 | 0.12 | 38.2 | 106 |
| 268 | Valencia Meadows | S 25500 McBean Pkwy | 6 | 1.13 | 0.04 | 12.1 | 34 |
| 269 | Valencia Glen | N Orchard Village Rd | 10 | 1.88 | 0.06 | 20.1 | 56 |
| 270 | South Valley HOA | 25700 McBean Pkwy | 6 | 1.00 | 0.03 | 10.7 | 30 |
| 272 | Valencia Summit | Rockwell Canyon&McBean Pkwy (center) | 252 | 47.25 | 1.55 | 506.5 | 1,407 |
| 329 | City of Santa Clarita | 23647 Carrizo Dr | 14 | 2.75 | 0.09 | 29.5 | 82 |
| | **Total** | | **1,236** | **230** | **8** | **2,466** | **6,508** |

Phase 3

| Map Location # | User Name | Address | Chosen Annual Demand (AF/Yr) | Peak Monthly Demand (AF/Mo) | Peak Daily Demand (AF) | Peak Daily Demand (1000 gls) | Peak Hourly Demand (GPM) |
|---|---|---|---|---|---|---|---|
| 5 | Live Oak Elementary | 27715 Saddleridge Road, Castaic | 21 | 6.00 | 0.20 | 64.3 | 179 |
| 35 | Honor Rancho Golf Course | | 450 | 84.38 | 2.78 | 904.5 | 1,675 |
| 104 | Hasley Canyon Park (County) | 28700 W. Quincy Street, Castaic | 17 | 3.19 | 0.10 | 34.2 | 57 |
| 332 | Newhall Ranch | | 3691 | 692.06 | 22.77 | 7419.2 | 5,152 |
| 333 | Hasley Canyon Golf Course | | 450 | 84.38 | 2.78 | 904.5 | 1,508 |
| 336 | USPS Regional Processing and Distribution Center | 28201 Franklin Pkwy. | 15 | 1.25 | 0.04 | 13.4 | 56 |
| | **Total** | | **4,644** | **871** | **29** | **9,340** | **8,626** |

**Phase 4**

| Map Location # | User Name | Address | Chosen Annual Demand (AF/Yr) | Peak Monthly Demand (AF/Mo) | Peak Daily Demand (AF) | Peak Daily Demand (1000 gls) | Peak Hourly Demand (GPM) |
|---|---|---|---|---|---|---|---|
| 11 | Newhall SD Transp/Maintenance | 26501 Golden Valley, SCTA | 4 | 1.00 | 0.03 | 10.7 | 30 |
| 19 | Rio Vista Elementary | 20417 Cedarcreek, CC | 23 | 6.00 | 0.20 | 64.3 | 179 |
| 29 | Bowman High | 21508 Redview Drive, SCTA | 9 | 1.69 | 0.06 | 18.1 | 50 |
| 49 | Pony League - Pony League Ballfields | Valencia Blvd/SC & S Fork River, N Valencia | 43 | 8.06 | 0.27 | 86.4 | 144 |
| 50 | Pony League - Commercial | Valencia Blvd/SC & S Fork River, N Valencia | 33 | 6.19 | 0.20 | 66.3 | 184 |
| 53 | Civic Center | | 4 | 0.75 | 0.02 | 8.0 | 22 |
| 57 | City Civic Center | | 125 | 23.44 | 0.77 | 251.3 | 698 |
| 59 | City Center Commercial | | 5 | 0.94 | 0.03 | 10.1 | 28 |
| 271 | Central & North Valley | 26500 McBean Pkwy | 35 | 6.56 | 0.22 | 70.4 | 195 |
| 296 | Porta Bella Recreational | Soledad Canyon Rd | 14 | 2.63 | 0.09 | 28.1 | 47 |
| 299 | Porta Bella-Soledad Community Center | Soledad Canyon Rd | 31 | 5.81 | 0.19 | 62.3 | 173 |
| 301 | Porta Bella Office Park | Soledad Canyon Rd | 14 | 2.63 | 0.09 | 28.1 | 78 |
| 302 | Porta Bella Office Park | Soledad Canyon Rd | 12 | 2.25 | 0.07 | 24.1 | 67 |
| 303 | Porta Bella Office Park | San Fernando Rd | 19 | 3.56 | 0.12 | 38.2 | 106 |
| 304 | Porta Bella Business Park | Soledad Canyon Rd | 30 | 5.63 | 0.19 | 60.3 | 168 |
| | **Total** | | **401** | **77** | **3** | **827** | **2,169** |

**Phase 5**

| Map Location # | User Name | Address | Chosen Annual Demand (AF/Yr) | Peak Monthly Demand (AF/Mo) | Peak Daily Demand (AF) | Peak Daily Demand (1000 gls) | Peak Hourly Demand (GPM) |
|---|---|---|---|---|---|---|---|
| 45 | Lago de Valencia - Elementary School | North Valencia Phase II | 16 | 3.05 | 0.10 | 32.7 | 91 |
| 46 | Lago de Valencia - park/rec | Newhall Ranch Rd/N SC River, Valencia | 46 | 8.63 | 0.28 | 92.5 | 154 |
| 48 | Bouquet South - Commercial | Bouquet Canyon Rd/Newhall Ranch Rd, N Valencia | 48 | 9.00 | 0.30 | 96.5 | 268 |
| 56 | Panhandle Commercial | | 15 | 2.81 | 0.09 | 30.2 | 84 |
| 58 | City Center Commercial | | 10 | 1.88 | 0.06 | 20.1 | 56 |
| 127 | Bridgeport Park (City) | 23520 Bridgeport Lane, SCTA | 44 | 8.25 | 0.27 | 88.4 | 147 |
| 132 | Northbridge Park | Grandview Drive, E of McBean Pkwy | 22 | 4.13 | 0.14 | 44.2 | 74 |
| 143 | Legacy Academy | North Valencia Phase II | 16 | 3.05 | 0.10 | 32.7 | 91 |
| 334 | Panhandle Golf Course | | 440 | 5.04 | 0.17 | 54.0 | 100 |
| | **Total** | | **658** | **46** | **2** | **491** | **1,064** |

**Phase 6**

| Map Location # | User Name | Address | Chosen Annual Demand (AF/Yr) | Peak Monthly Demand (AF/Mo) | Peak Daily Demand (AF) | Peak Daily Demand (1000 gls) | Peak Hourly Demand (GPM) |
|---|---|---|---|---|---|---|---|
| 14 | Emblem Elementary | 22685 Espuella, Saugus | 13 | 3.00 | 0.10 | 32.2 | 89 |
| 17 | Highlands Elementary | 27332 Catala, Saugus | 18 | 4.00 | 0.13 | 42.9 | 119 |
| 20 | Rosedell Elementary | 27583 Urbandale Ave, Saugus | 21 | 5.00 | 0.16 | 53.6 | 149 |
| 21 | Santa Clarita Elementary | 27177 Seco Canyon Rd, Saugus | 13 | 2.00 | 0.07 | 21.4 | 60 |
| 26 | Arroyo Seco Jr. High | 22171 Vista Delgado, Saugus | 60 | 11.25 | 0.37 | 120.6 | 335 |
| 54 | Saugus High | 21900 Centurion Way, Saugus | 110 | 20.63 | 0.68 | 221.1 | 614 |
| 55 | Rio Vista Center | | 300 | 56.25 | 1.85 | 603.0 | 1,675 |
| 102 | Santa Clarita Park (City) | 27285 Seco Canyon Road, Saugus | 19 | 3.52 | 0.12 | 37.7 | 63 |
| 125 | Central Park (City) | 27150 Bouquet Canyon Rd, Saugus | 140 | 26.25 | 0.86 | 281.4 | 469 |
| 254 | City of Santa Clarita | 27285 Seco Canyon Rd | 28 | 5.25 | 0.17 | 56.3 | 156 |
| | **Total** | | **722** | **137** | **5** | **1,470** | **3,729** |

**Phase 7**

| Map Location # | User Name | Address | Chosen Annual Demand (AF/Yr) | Peak Monthly Demand (AF/Mo) | Peak Daily Demand (AF) | Peak Daily Demand (1000 gls) | Peak Hourly Demand (GPM) |
|---|---|---|---|---|---|---|---|
| 98 | Golden Oak Ranch | 19802 Placerita Canyon Road, Newhall | 632 | 118.50 | 3.90 | 1270.4 | 3,529 |
| 68 | Newhall Elementary | 24607 Walnut Street, Newhall | 63 | 11.81 | 0.39 | 126.6 | 352 |
| 69 | William S. Hart Park (City) | 24151 N. San Fernando Rd, Newhall | 707 | 132.56 | 4.36 | 1421.1 | 2,369 |
| 70 | College of the Masters (Masters College) | 21726 Placerita Canyon Rd, Valencia | 24 | 5.00 | 0.16 | 53.6 | 149 |
| 78 | Tract 32365 Common Area (Palmer) | | 108 | 20.25 | 0.67 | 217.1 | 603 |
| 126 | Creekview Park (City) | 22200 Park Street, SCTA | 13 | 2.44 | 0.08 | 26.1 | 44 |
| 144 | Valencia Vista HOA | Nandina&Valle Del Oro Irrigation, Newhall | 10 | 2.00 | 0.07 | 21.4 | 60 |
| 145 | Valencia Vista HOA | Valle Del Oro @ Pool, Newhall | 9 | 1.00 | 0.03 | 10.7 | 30 |
| 146 | Valencia Vista HOA | Valle Del Oro, Newhall | 11 | 2.00 | 0.07 | 21.4 | 60 |
| 147 | Valencia Vista HOA | Leonard Tree Irrigation, Newhall | 15 | 2.00 | 0.07 | 21.4 | 60 |
| 149 | Valencia Vista HOA | Valle Del Oro, Newhall | 21 | 3.00 | 0.10 | 32.2 | 89 |
| 150 | Valencia Vista HOA | Valle Del Oro, Newhall | 9 | 2.00 | 0.07 | 21.4 | 60 |
| 161 | Lantana Hills HOA | 23818.5 Oakhurst Dr, Newhall | 26 | 6.00 | 0.20 | 64.3 | 179 |
| 162 | Lantana Hills HOA | 23804.5 Oakhurst Dr, Newhall | 17 | 4.00 | 0.13 | 42.90 | 119 |
| 163 | Lantana Hills HOA | 23800.5 Oakleaf Cyn Dr, Newhall | 18 | 4.00 | 0.13 | 42.9 | 119 |
| 165 | Lantana Hills HOA | 21101.5 Oakriver Ln, Newhall | 7 | 2.00 | 0.07 | 21.4 | 60 |
| 166 | Lantana Hills HOA | 23712.5 Oakhurst Dr., Newhall | 6 | 2.00 | 0.07 | 21.4 | 60 |
| 167 | Lantana Hills HOA | 21100.5 Oakleaf Cyn Dr, Newhall | 12 | 4.00 | 0.13 | 42.9 | 119 |
| 197 | The Terrace (Apts?) | 21421 Plane Tree Dr, Newhall | 7 | 1.00 | 0.03 | 10.7 | 30 |
| 198 | The Terrace (Apts?) | Grape Lily (Irigtn), Newhall | 8 | 1.00 | 0.03 | 10.7 | 30 |
| 199 | The Terrace (Apts?) | Valle Del Oro, Newhall | 15 | 4.00 | 0.13 | 42.9 | 119 |
| 200 | The Terrace (Apts?) | Valle Del Oro, Newhall | 16 | 4.00 | 0.13 | 42.9 | 119 |
| 201 | The Terrace (Apts?) | Bottletree (Irigtn), Newhall | 11 | 2.00 | 0.07 | 21.4 | 60 |
| 202 | The Terrace (Apts?) | Ficus 21211-21-24334 Choke Cherry, Newhall | 9 | 1.00 | 0.03 | 10.7 | 30 |
| 203 | The Terrace (Apts?) | Ficus (Irigtn), Newhall | 6 | 1.00 | 0.03 | 10.7 | 30 |
| 204 | The Terrace (Apts?) | Fern Drive, Newhall | 9 | 1.00 | 0.03 | 10.7 | 30 |
| 208 | Coastal Meadowridge | 23645 Meadowridge S/S Co, Newhall | 14 | 4.00 | 0.13 | 42.9 | 119 |
| 251 | City of Santa Clarita | Newhall & San Fern S/W Crn, Newhall | 32 | 6.00 | 0.20 | 64.3 | 179 |
| 252 | City of Santa Clarita | 24242 Railroad Ave, Newhall | 165 | 24.00 | 0.79 | 257.3 | 715 |
| 253 | City of Santa Clarita | 22200 Park St., Newhall | 1614 | 277.00 | 9.11 | 2969.5 | 8,249 |
| 311 | Golden Valley Ranch Commercial | | 113 | 21.19 | 0.70 | 227.1 | 631 |
| 312 | Golden Valley Ranch Elementary School | Golden Valley Rd | 27 | 4.97 | 0.16 | 53.3 | 148 |
| 313 | Golden Valley Ranch Park | Golden Valley Rd & Placerita Canyon Rd | 25 | 4.69 | 0.15 | 50.3 | 84 |
| 325 | Golden Valley Ranch Commercial | | 113 | 21.19 | 0.70 | 227.1 | 631 |
| | **Total** | | **3,892** | **703** | **23** | **7,532** | **19,259** |

**Phase 8**

| Map Location # | User Name | Address | Chosen Annual Demand (AF/Yr) | Peak Monthly Demand (AF/Mo) | Peak Daily Demand (AF) | Peak Daily Demand (1000 gls) | Peak Hourly Demand (GPM) |
|---|---|---|---|---|---|---|---|
| 100 | Driving Range | | 24 | 4.50 | 0.15 | 48.2 | 89 |
| 292 | Institutional (Porta Bella Dvlpmt) | Via Princessa & Santa Clarita Pkwy | 10 | 1.88 | 0.06 | 20.1 | 56 |
| 293 | Porta Bella Park | Santa Clarita Pkwy | 55 | 10.31 | 0.34 | 110.6 | 184 |
| 294 | Porta Bella Park | S of Santa Clarita Pkwy | 9 | 1.69 | 0.06 | 18.1 | 30 |
| 297 | Porta Bella Recreational | S of Soledad Canyon Rd | 14 | 2.63 | 0.09 | 28.1 | 47 |
| 300 | Porta Bella-Neighborhood Community Center | Via Princessa & Santa Clarita Pkwy | 21 | 3.94 | 0.13 | 42.2 | 117 |
| 305 | Porta Bella Business Park | S of Soledad Canyon Rd | 14 | 2.63 | 0.09 | 28.1 | 78 |
| 306 | Porta Bella Business Park | S of Soledad Canyon Rd | 10 | 1.88 | 0.06 | 20.1 | 56 |
| 307 | Porta Bella Business Park | S of Soledad Canyon Rd | 14 | 2.63 | 0.09 | 28.1 | 78 |
| | **Total** | | **171** | **32** | **1** | **344** | **736** |

**Phase 9**

| Map Location # | User Name | Address | Chosen Annual Demand (AF/Yr) | Peak Monthly Demand (AF/Mo) | Peak Daily Demand (AF) | Peak Daily Demand (1000 gls) | Peak Hourly Demand (GPM) |
|---|---|---|---|---|---|---|---|
| 278 | American Beauty | Fanchon Lane | 13 | 2.44 | 0.08 | 26.1 | 73 |
| 13 | Cedar Creek Elementary | 27792 Camp Plenty, CC | 12 | 3.00 | 0.10 | 32.2 | 89 |
| 27 | Sierra Vista Jr. High | 19425 Stillmore Street, CC | 55 | 10.31 | 0.34 | 110.6 | 307 |
| 28 | Canyon High | 19300 Nadal Street, CC | 110 | 20.63 | 0.68 | 221.1 | 614 |
| 101 | North Oaks Park (City) | 27824 Camp Plenty Road, SCTA | 6 | 1.08 | 0.04 | 11.6 | 19 |
| 108 | Canyon Country Park (City) | 17615 Soledad Canyon Road, CC | 43 | 8.06 | 0.27 | 86.4 | 144 |
| 141 | Santa Clarita Christian School (k-12) | 27249 Luther Drive, SCTA | 6 | 1.13 | 0.04 | 12.1 | 34 |
| 234 | Canyon Springs Elementary | 19059 Vicci Street, CC | 8 | 1.50 | 0.05 | 16.1 | 45 |
| 235 | Leona Cox Elementary | 18643 Oakmoor Street, CC | 8 | 1.50 | 0.05 | 16.1 | 45 |
| 237 | Mitchell Elementary | 16821 Goodvale Road, CC | 8 | 1.50 | 0.05 | 16.1 | 45 |
| 256 | City of Santa Clarita Park | Meadow Drive | 25 | 4.69 | 0.15 | 50.3 | 140 |
| 257 | Sierra Heights Lndscp Maintnc Dist (LMD) | Canvas Street | 4 | 0.75 | 0.02 | 8.0 | 22 |
| 279 | Shangri-La | Shangri-La Drive | 40 | 7.50 | 0.25 | 80.4 | 223 |
| 321 | LA Co Parks and Rec | Grand Canyon (across from Lot 40) | 9 | 2.00 | 0.07 | 21.4 | 36 |
| 323 | Sulfur Springs USD District Office | 24930 Ave Stanford, SC | 4 | 1.03 | 0.03 | 11.0 | 31 |
| | **Total** | | **351** | **67** | **2** | **719** | **1,866** |

**Phase 10**

| Map Location # | User Name | Address | Chosen Annual Demand (AF/Yr) | Peak Monthly Demand (AF/Mo) | Peak Daily Demand (AF) | Peak Daily Demand (1000 gls) | Peak Hourly Demand (GPM) |
|---|---|---|---|---|---|---|---|
| 30 | La Mesa Jr. High | 26623 May Way, SCTA | 55 | 10.31 | 0.34 | 110.6 | 307 |
| 84 | Friendly Valley Golf Course | 19345 W. Avenue of the Oaks, Newhall | 107 | 20.06 | 0.66 | 215.1 | 398 |
| 258 | Sunset Hills LMD | 19500 Via Princessa | 34 | 6.38 | 0.21 | 68.3 | 190 |
| 265 | Area Wide District LMD | Blackbird Lane | 11 | 2.06 | 0.07 | 22.1 | 61 |
| 320 | LA Co Parks and Rec | 14519 Stoneridge - Slope | 15 | 2.00 | 0.07 | 21.4 | 36 |
| 322 | LA Co Parks and Rec | 29364 Canyon Rim (across Street) | 5 | 1.00 | 0.03 | 10.7 | 18 |
| | **Total** | | **227** | **42** | **1** | **448** | **1,010** |

**Phase 11**

| Map Location # | User Name | Address | Chosen Annual Demand (AF/Yr) | Peak Monthly Demand (AF/Mo) | Peak Daily Demand (AF) | Peak Daily Demand (1000 gls) | Peak Hourly Demand (GPM) |
|---|---|---|---|---|---|---|---|
| 298 | Porta Bella Town Center | N. San Fernando Rd | 62 | 11.63 | 0.38 | 124.6 | 346 |
| 95 | Ridgedale Common Area | | 214 | 40.13 | 1.32 | 430.2 | 1,195 |
| 128 | Circle J Park (City) | 22651 Via Princessa, SCTA | 15 | 2.81 | 0.09 | 30.2 | 50 |
| 280 | Circle J Ranch | Circle J Rd | 74 | 13.88 | 0.46 | 148.7 | 413 |
| 281 | Circle J Ranch | Circle J Rd | 21 | 3.94 | 0.13 | 42.2 | 117 |
| 295 | Porta Bella Park | San Fernando Rd | 13 | 2.44 | 0.08 | 26.1 | 44 |
| | **Total** | | **399** | **75** | **2** | **802** | **2,165** |

**TABLE 13-3**
**FACILITY REQUIREMENTS AND COST BY PHASE**

| | Pipelines | | | | Reservoirs | | | Pump Stations | | | Freeway or River Crossings | | Total Costs | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Phase 1A** | **Material** | **Diameter (In.)** | **Length (Ft.)** | **Cost ($)** | **Number** | **Volume** | **Cost** | **Pump Station** | **Flow Rate** | **Cost** | **Crossing** | **Cost** | | |
| **Existing** | Steel | 20 | 11,577 | | 1 | 1.5 mg | $731,000.00 | Valencia WRP | 2000 gpm | $1,093,000.00 | | | Total Costs* | $3,690,320.00 |
| | Steel | 24 | 3,991 | | | | | | | | | | *Not included in Grand Total | |
| | DIP | 36 | 90 | | | | | | | | | | | |
| | | **Subtotal** | 15658 | $1,866,320 | | | | | | | | | | |
| **Phase 1B** | PVC | 8 | 8,110 | $527,150 | 2 | 3.0 mg | $960,000.00 | | | | Rye. Cyn. Rd. | $73,779.00 | Subtotal | $4,379,507 |
| | PVC | 14 | 6,441 | $611,895 | | | | | | | | | Flush/Disinfec. | $35,375 |
| | PVC | 20 | 8,106 | $1,199,688 | | | | | | | | | **Total** | **$4,414,882** |
| | PVC | 24 | 6,103 | $1,006,995 | | | | | | | | | | |
| | | **Subtotal** | 28760 | **$3,345,728** | | | | | | | | | | |
| **Phase 2** | PVC | 10 | 9,014 | $721,097 | 3 | 3.5 mg | $980,000.00 | Valencia WRP | Up to 10,000 gpm | $465,000.00 | Valencia Blvd. | $110,668.00 | Subtotal | $10,257,998 |
| | PVC | 14 | 5,386 | $511,650 | | | | | | | | | Flush/Disinfec. | $50,763 |
| | PVC | 24 | 14,222 | $2,346,609 | | | | | | | | | **Total** | **$10,308,761** |
| | Steel | 36 | 12,649 | $5,122,975 | | | | | | | | | | |
| | | **Subtotal** | 41271 | **$8,702,330** | | | | | | | | | | |
| **Phase 3** | PVC | 8 | 11,569 | $751,985 | 4 | 3.0 mg | $960,000.00 | Valencia WRP | Up to 12,000 gpm | $465,000.00 | Old Road/ S.C. River | $73,779.00 | Subtotal | $8,731,503 |
| | PVC | 10 | 4,382 | $350,560 | | | | | | | Old Road/Castaic Creek | $51,645.00 | Flush/Disinfec. | $76,959 |
| | PVC | 12 | 5,337 | $485,667 | | | | | | | | | **Total** | **$8,808,462** |
| | PVC | 14 | 1,935 | $183,825 | | | | | | | | | | |
| | PVC | 16 | 4,032 | $451,584 | | | | | | | | | | |
| | PVC | 18 | 15,008 | $1,936,032 | | | | | | | | | | |
| | PVC | 20 | 19,347 | $2,863,356 | | | | | | | | | | |
| | PVC | 24 | 958 | $158,070 | | | | | | | | | | |
| | | **Subtotal** | 62568 | **$7,181,079** | | | | | | | | | | |
| **Phase 4** | PVC | 8 | 1,170 | $76,050 | 5 | 3.5 mg | $980,000.00 | | | | | | Subtotal | $12,398,465 |
| | PVC | 24 | 2,506 | $413,490 | | | | | | | | | Flush/Disinfec. | $37,713 |
| | Steel | 36 | 26,985 | $10,928,925 | | | | | | | | | **Total** | **$12,436,178** |
| | | **Subtotal** | 30661 | **$11,418,465** | | | | | | | | | | |
| **ASR** | | | | | | | | ASR | 13500 gpm | $8,093,893 | | | **Total** | **$8,093,893** |
| **Phase 5** | PVC | 16 | 6,914 | $774,368 | | | | | | | McBean Pkwy. | $132,802.00 | Subtotal | $1,684,365 |
| | Steel | 36 | 1,919 | $777,195 | | | | | | | | | Flush/Disinfec. | $10,865 |
| | | **Subtotal** | 8833 | **$1,551,563** | | | | | | | | | **Total** | **$1,695,230** |
| **Phase 6** | PVC | 8 | 12,575 | $817,375 | 6 | 3.25 mg | $975,000.00 | | | | | | Subtotal | $4,545,878 |
| | PVC | 12 | 8,068 | $734,188 | | | | | | | | | Flush/Disinfec. | $35,259 |
| | PVC | 24 | 5,125 | $845,625 | | | | | | | | | **Total** | **$4,581,137** |
| | PVC | 36 | 2,898 | $1,173,690 | | | | | | | | | | |
| | | **Subtotal** | 28666 | **$3,570,878** | | | | | | | | | | |
| **Phase 7** | PVC | 12 | 6,786 | $760,032 | 7 | 3.5 mg | $980,000.00 | Berry Petroleum | 1250 gpm | $437,500.00 | Placerita Cyn. Rd./ 14 | $61,482 | Subtotal | $8,958,959 |
| | PVC | 20 | 13,265 | $1,963,220 | | | | | | | | | Flush/Disinfec. | $39,109 |
| | PVC | 36 | 11,745 | $4,756,725 | | | | | | | | | **Total** | **$8,998,069** |
| | | **Subtotal** | 31796 | **$7,479,977** | | | | | | | | | | |
| **Phase 8** | PVC | 8 | 7,093 | $461,045 | | | | Honby | 5000 gpm | $1,042,500.00 | | | Subtotal | $5,271,005 |
| | PVC | 24 | 3,236 | $533,940 | | | | | | | | | Flush/Disinfec. | $22,525 |
| | Steel | 36 | 7,984 | $3,233,520 | | | | | | | | | **Total** | **$5,293,530** |
| | | **Subtotal** | 18313 | **$4,228,505** | | | | | | | | | | |
| **Phase 9** | PVC | 8 | 4,420 | $287,300 | 8 | 3.25 mg | $975,000.00 | | | | Sierra Hwy. | $60,253.00 | Subtotal | $1,742,643 |
| | PVC | 24 | 2,546 | $420,090 | | | | | | | | | Flush/Disinfec. | $8,568 |
| | | **Subtotal** | 6966 | **$707,390** | | | | | | | | | **Total** | **$1,751,211** |
| **Phase 10** | PVC | 14 | 17,990 | $1,709,050 | | | | | | | | | Subtotal | $1,709,050 |
| | | | **Subtotal** | **$1,709,050** | | | | | | | | | Flush/Disinfec. | $22,128 |
| | | | | | | | | | | | | | **Total** | **$1,731,178** |
| **Phase 11** | PVC | 10 | 9,106 | $728,480 | | | | | | | | | Subtotal | $728,480 |
| | | | **Subtotal** | **$728,480** | | | | | | | | | Flush/Disinfec. | $11,200 |
| | | | | | | | | | | | | | **Total** | **$739,680** |
| | | | | | | | | | | | | | Grand Total | **$68,852,210** |

Note: ASR is not included in these cost figures.

**TABLE 13-4**
**O&M COST ESTIMATES BY IMPLEMENTATION PHASE**

| | | | Annual O&M Cost | | | | Including Annual Capital Cost | | Excluding Annual Capital Cost | |
|---|---|---|---|---|---|---|---|---|---|---|
| Phase | Recycled Water Demand (AF/yr) | Annualized Capital Cost 1 | Pumping Cost 2 | Parts Cost 3 | Labor Cost 4 | Total O&M Cost | Total Annual Cost | Cost Per AF | Total Annual Cost | Cost Per AF |
| 1A | 880 | $380,000 | $11,611 | $13,527 | $11,520 | $36,659 | $416,659 | $473 | $36,659 | $42 |
| 1B | 3862 | $399,000 | $50,958 | $4,306 | $11,520 | $66,784 | $465,784 | $121 | $66,784 | $17 |
| 2 | 1236 | $903,000 | $16,309 | $14,332 | $11,520 | $42,161 | $945,161 | $765 | $42,161 | $34 |
| 3 | 4644 | $784,000 | $61,276 | $12,791 | $11,520 | $85,588 | $869,588 | $187 | $85,588 | $18 |
| 4 | 401 | $1,086,000 | $5,291 | $12,398 | $11,520 | $29,210 | $1,115,210 | $2,781 | $29,210 | $73 |
| 5 | 658 | $150,000 | $8,682 | $1,552 | $11,520 | $21,754 | $171,754 | $261 | $21,754 | $33 |
| 6 | 722 | $402,000 | $9,527 | $4,546 | $11,520 | $25,592 | $427,592 | $592 | $25,592 | $35 |
| 7 | 3892 | $798,000 | $107,279 | $12,835 | $11,520 | $131,634 | $929,634 | $239 | $131,634 | $34 |
| 8 | 171 | $462,000 | $7,636 | $14,654 | $11,520 | $33,809 | $495,809 | $2,899 | $33,809 | $198 |
| 9 | 351 | $154,000 | $15,673 | $1,682 | $11,520 | $28,876 | $182,876 | $521 | $28,876 | $82 |
| 10 | 227 | $152,000 | $10,136 | $1,709 | $11,520 | $23,365 | $175,365 | $773 | $23,365 | $103 |
| 11 | 399 | $66,000 | $5,265 | $728 | $11,520 | $17,513 | $83,513 | $209 | $17,513 | $44 |
| **Total** | **17443** | **$5,736,000** | **$309,644** | **$95,061** | **$138,240** | **$542,945** | **$6,278,945** | **$818** | **$542,945** | **$59** |

Notes:
1. Adds the capital cost of ASR as a function of the AF/Yr of water used ($42.63/AF-Yr.).
2. Assumes 20 year period at 6% interest rate.
3. Assumes 82% pump efficiency, 95% motor efficiency, and electricity cost of $0.12 per KWH.
4. Assumes annual parts cost to be 1% of construction costs of pumping stations, plus 0.1% of construction costs of storage reservoirs and pipelines.
5. Assumes 3 man-days per month at $40 per hour.
6. Does not include water cost
7. Capital costs for phase plus ASR portion (determined by AF used) annualized over 20 years
8. Pumping Costs for Phase plus ASR pumping costs (determined by AF used) annualized over 20 years

### 13.2.2 Phase 1B

Phase 1B is consistent with the phasing presented in the 1993 Reclaimed Water Master Plan, although potential additional users have been identified within the Phase 1B area. Potential recycled water users to be served as part of Phase 1B include Magic Mountain Amusement Park and proposed Magic Mountain Gold Course, as well as schools and parks in the North River and North Valencia areas. Phase 1B would also serve the proposed Suncal/Tesoro development.

Phase 1B improvements include a 3.0 mg reservoir and 29,000 LF of pipelines ranging in size from 10 to 24 inches. Phase 1B would be implemented in 2003 at an estimated total cost of $4.4 million in 2002 dollars.

### 13.2.3 Phase 2

Phase 2 includes a variety of recycled water uses in the existing developed area between the I-5 Freeway and the Valencia City Center. Potential users primarily include parks, schools, and homeowner's associations.

Phase 2 improvements include a 6,000 gpm expansion of the existing Valencia recycled water pump station, a 3.5 mg reservoir, and 62,000 LF of pipelines, ranging in size from 8 to 36 inches. Phase 2 would be implemented in 2003. The total cost of Phase 2 is estimated to be $10.3 million in 2002 dollars.

### 13.2.4 Phase 3

The largest potential user identified for Phase 3 is the proposed Newhall Ranch development. Newhall Ranch anticipates that its ultimate recycled water requirements from CLWA (Newhall Ranch would also have its own WRP) would be 3,691 AF/yr. However, its recycled water demands would increase to a peak in 2019, and subsequently level off. Other users identified as part of Phase 3 include two golf courses (one existing, one future), a park, and a school. The total projected Phase 3 demand is 4,644 AF/yr.

Planned improvements for Phase 3 include more than 50,000 LF of pipeline, ranging from 8 to 24 inches, a new 3.0 mg reservoir, and expansion of the Valencia WRP pump station to 12,000 gpm. Newhall Ranch plans to develop their own daily storage facilities within their boundaries. Recycled water would be delivered to Newhall Ranch at three connection points. Phase 3 would be implemented in 2004. The total cost of Phase 3 is estimated to be $8.8 million in 2002 dollars.

### 13.2.5 Phase 4

Phase 4 proposes to provide recycled water to a mix of existing and planned users in the Civic Center and Porta Bella areas. Potential users include schools, playing fields, commercial and office park landscaping, and the civic center itself. A total demand of 401 AF/yr has been identified.

Planned improvements for Phase 4 include almost 30,000 LF of 8-, 20- and 36-inch pipeline and a new 3.5 mg reservoir. The total cost of Phase 4 is estimated to be $12.4 million in 2002 dollars. Phase 4 is planned to be implemented in 2005.

### 13.2.6 Phase 5

Phase 5 would serve a variety of existing and planned users in the north-central part of the CLWA service area, including the "panhandle" area. Potential users include schools, commercial development, parks, a golf course, and City of Santa Clarita landscape management districts.

Phase 5 would be implemented in 2006, with 8,800 LF of pipeline ranging from 8 to 24 inches. The total cost of Phase 5 is estimated to be $1.7 million in 2002 dollars.

### 13.2.7 Phase 6

Phase 6 would serve a variety of existing and planned users in the North Valencia area, including schools, parks, and a golf course. Phase 6 would be implemented in 2007. Improvements for Phase 6 include 29,000 LF of pipeline ranging from 8 to 36 inches and a 3.5 MG reservoir. The total cost of Phase 6 is estimated to be $4.6 million in 2002 dollars.

### 13.2.8 Phase 7

In 2008, the Placerita Canyon Oil Field Produced Water Treatment Facility is projected to come on-line. This new source of recycled water would help serve Phase 7, which includes a mix of existing and planned users in the southern part of the CLWA service area near the 14 Freeway and the Placerita Canyon Oil Field. Potential users include schools, parks, homeowners' associations, and commercial development at Golden Valley Ranch.

Phase 7 improvements include a pump station for the 1,250-gpm oil field produced water treatment facility, a 3.25 mg reservoir, and 31,800 LF of pipeline ranging from 8 to 36 inches. The total cost of Phase 7 is estimated to be $9.0 million in 2002 dollars.

### 13.2.9 Phase 8

Phase 8 primarily includes future users in the Porta Bella development, which would be completed by Phase 8 implementation in 2008. Phase 8 improvements include 18,000 LF of pipeline ranging from 8 to 36 inches, and the modification of Honby pump station to provide 5,000 gpm of booster pumping capacity. The total cost of Phase 6 is estimated to be $5.3 million in 2002 dollars.

### 13.2.10 Phase 9

Phase 9 includes schools, parks, and landscaping in the Canyon Country area toward the eastern end of the CLWA service area. Proposed Improvements include 7,000 LF of 8- to 24-inch pipeline and one 3.25 MG reservoir. Phase 9 would be implemented in 2009. The total cost of Phase 9 is estimated to be $1.8 million.

### 13.2.11 Phase 10

Phase 10 includes parks, schools, a golf course, and several landscape maintenance districts for a total demand of 227 AF/yr. Improvements for Phase 10 include 18,000 LF of 14-inch pipe, with a total estimated cost of $1.7 million in 2002 dollars. Phase 10 would be implemented in 2010.

### 13.2.12 Phase 11

Phase 11 would serve users such as the Circle J and portions of the Porta Bella area. Phase 11 improvements include 9,100 LF of 10-inch PVC pipe for a total estimated cost of $0.7 million. Phase 11 would be implemented in 2011.

## 13.3 Implementation Schedule

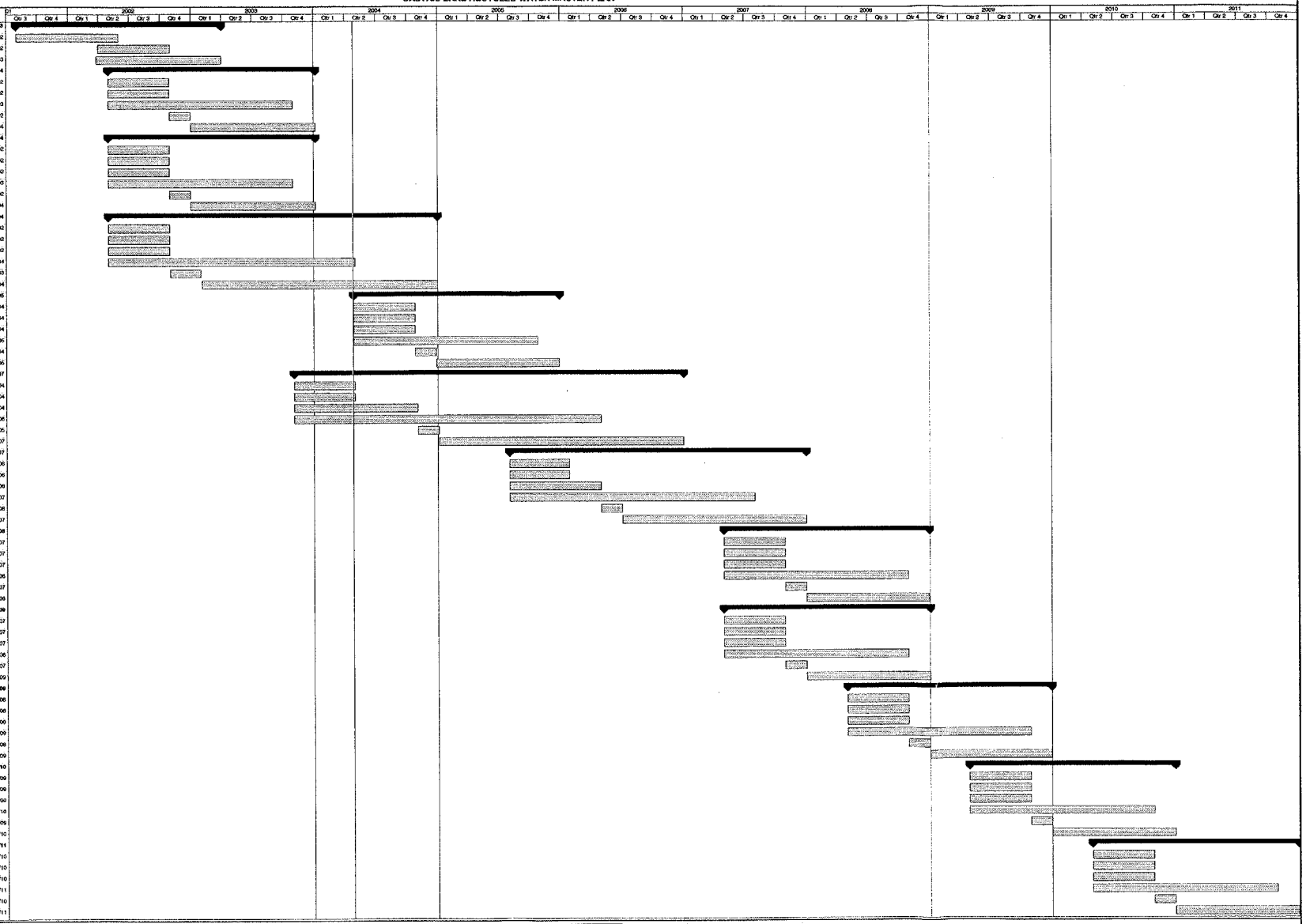
To encourage the development of recycled water systems within new development, a 10-year implementation schedule is recommended. Under the Water Recycling in Landscaping Act (SB 2095, Johnson), once a recycled water producer determines that they will produce recycled water within the boundaries of a local agency, the local agency is required to adopt and enforce a recycled water ordinance. The ordinance must condition new development to utilize recycled water for landscaping purposes.

Implementation of the eleven recycled water phases described previously would occur from the present through 2011. The implementation schedule is presented in Figure 13-2.

2014

**FIGURE 13-2**
**IMPLEMENTATION SCHEDULE**
**CASTAIC LAKE RECYCLED WATER MASTER PLAN**

| ID | Task Name | Duration | Start | Finish |
|---|---|---|---|---|
| 1 | **Phase 1A** | **435 days** | **Wed 8/1/01** | **Tue 4/1/03** |
| 2 | Phase 1A-2 Construction | 43.6 wks | Wed 8/1/01 | Fri 5/31/02 |
| 3 | Reservoir No. 1 Construction | 30.8 wks | Mon 4/1/02 | Thu 10/31/02 |
| 4 | Environmental Impact Report for Phases 2-11 | 265 days | Wed 3/27/02 | Tue 4/1/03 |
| 5 | **Phase 1B** | **440 days** | **Wed 5/1/02** | **Tue 1/6/04** |
| 6 | Funding | 26 wks | Wed 5/1/02 | Tue 10/29/02 |
| 7 | Design | 26 wks | Wed 5/1/02 | Tue 10/29/02 |
| 8 | Permits | 392 days | Wed 5/1/02 | Thu 10/30/03 |
| 9 | Bid/Award | 9 wks | Wed 10/30/02 | Tue 12/31/02 |
| 10 | Construction | 265 days | Wed 1/1/03 | Tue 1/6/04 |
| 11 | **Phase 2** | **440 days** | **Wed 5/1/02** | **Tue 1/6/04** |
| 12 | Environmental Documentation | 26 wks | Wed 5/1/02 | Tue 10/29/02 |
| 13 | Funding | 26 wks | Wed 5/1/02 | Tue 10/29/02 |
| 14 | Design | 26 wks | Wed 5/1/02 | Tue 10/29/02 |
| 15 | Permits | 392 days | Wed 5/1/02 | Thu 10/30/03 |
| 16 | Bid/Award | 9 wks | Wed 10/30/02 | Tue 12/31/02 |
| 17 | Construction | 265 days | Wed 1/1/03 | Tue 1/6/04 |
| 18 | **Phase 3** | **894 days** | **Wed 5/1/02** | **Fri 12/31/04** |
| 19 | Environmental Documentation | 26.2 wks | Wed 5/1/02 | Wed 10/30/02 |
| 20 | Funding | 26.2 wks | Wed 5/1/02 | Wed 10/30/02 |
| 21 | Design | 26.2 wks | Wed 5/1/02 | Wed 10/30/02 |
| 22 | Permits | 523 days | Wed 5/1/02 | Fri 4/30/04 |
| 23 | Bid/Award | 13 wks | Fri 11/1/02 | Thu 1/30/03 |
| 24 | Construction | 500 days | Mon 2/3/03 | Fri 12/31/04 |
| 25 | **Phase 4** | **439 days** | **Tue 4/27/04** | **Fri 12/30/05** |
| 26 | Environmental Documentation | 26 wks | Tue 4/27/04 | Mon 10/25/04 |
| 27 | Funding | 26 wks | Tue 4/27/04 | Mon 10/25/04 |
| 28 | Design | 26 wks | Tue 4/27/04 | Mon 10/25/04 |
| 29 | Permits | 78.2 wks | Tue 4/27/04 | Tue 10/25/05 |
| 30 | Bid/Award | 9 wks | Tue 10/26/04 | Mon 12/27/04 |
| 31 | Construction | 264 days | Tue 12/28/04 | Fri 12/30/05 |
| 32 | **Phase 5** | **627 days** | **Mon 11/3/03** | **Tue 1/2/07** |
| 33 | Environmental Documentation | 26 wks | Mon 11/3/03 | Fri 4/30/04 |
| 34 | Funding | 26 wks | Mon 11/3/03 | Fri 4/30/04 |
| 35 | Design | 262 days | Mon 11/3/03 | Tue 11/2/04 |
| 36 | Permits | 651 days | Mon 11/3/03 | Mon 5/1/06 |
| 37 | Bid/Award | 9 wks | Wed 11/3/04 | Tue 1/4/05 |
| 38 | Construction | 520 days | Wed 1/5/05 | Tue 1/2/07 |
| 39 | **Phase 6** | **631 days** | **Mon 6/1/06** | **Mon 12/31/07** |
| 40 | Environmental Documentation | 26 wks | Mon 6/1/06 | Fri 1/27/06 |
| 41 | Funding | 26 wks | Mon 6/1/06 | Fri 1/27/06 |
| 42 | Design | 196 days | Mon 6/1/06 | Mon 5/1/06 |
| 43 | Permits | 523 days | Mon 6/1/06 | Wed 6/1/07 |
| 44 | Bid/Award | 9 wks | Tue 5/2/06 | Mon 7/3/06 |
| 45 | Construction | 390 days | Tue 7/4/06 | Mon 12/31/07 |
| 46 | **Phase 7** | **436 days** | **Tue 5/1/07** | **Tue 12/30/08** |
| 47 | Environmental Documentation | 26 wks | Tue 5/1/07 | Mon 10/29/07 |
| 48 | Funding | 26 wks | Tue 5/1/07 | Mon 10/29/07 |
| 49 | Design | 26 wks | Tue 5/1/07 | Mon 10/29/07 |
| 50 | Permits | 392 days | Tue 5/1/07 | Wed 10/29/08 |
| 51 | Bid/Award | 9 wks | Tue 10/30/07 | Mon 12/31/07 |
| 52 | Construction | 261 days | Tue 1/1/08 | Tue 12/30/08 |
| 53 | **Phase 8** | **436 days** | **Tue 5/1/07** | **Fri 12/30/09** |
| 54 | Environmental Documentation | 26 wks | Tue 5/1/07 | Mon 10/29/07 |
| 55 | Funding | 26 wks | Tue 5/1/07 | Mon 10/29/07 |
| 56 | Design | 26 wks | Tue 5/1/07 | Mon 10/29/07 |
| 57 | Permits | 392 days | Tue 5/1/07 | Wed 10/29/08 |
| 58 | Bid/Award | 9 wks | Tue 10/30/07 | Mon 12/31/07 |
| 59 | Construction | 264 days | Tue 1/1/08 | Fri 1/2/09 |
| 60 | **Phase 9** | **436 days** | **Thu 5/1/08** | **Thu 12/31/09** |
| 61 | Environmental Documentation | 26 wks | Thu 5/1/08 | Wed 10/29/08 |
| 62 | Funding | 26 wks | Thu 5/1/08 | Wed 10/29/08 |
| 63 | Design | 26 wks | Thu 5/1/08 | Wed 10/29/08 |
| 64 | Permits | 392 days | Thu 5/1/08 | Fri 10/30/09 |
| 65 | Bid/Award | 9 wks | Thu 10/30/08 | Wed 12/31/08 |
| 66 | Construction | 261 days | Thu 1/1/09 | Thu 12/31/09 |
| 67 | **Phase 10** | **436 days** | **Fri 5/1/09** | **Fri 12/31/10** |
| 68 | Environmental Documentation | 26 wks | Fri 5/1/09 | Thu 10/29/09 |
| 69 | Funding | 26 wks | Fri 5/1/09 | Thu 10/29/09 |
| 70 | Design | 26 wks | Fri 5/1/09 | Thu 10/29/09 |
| 71 | Permits | 391 days | Fri 5/1/09 | Fri 10/29/10 |
| 72 | Bid/Award | 9 wks | Fri 10/30/09 | Thu 12/31/09 |
| 73 | Construction | 261 days | Fri 1/1/10 | Fri 12/31/10 |
| 74 | **Phase 11** | **436 days** | **Fri 4/30/10** | **Fri 12/30/11** |
| 75 | Environmental Documentation | 26 wks | Fri 4/30/10 | Thu 10/28/10 |
| 76 | Funding | 26 wks | Fri 4/30/10 | Thu 10/28/10 |
| 77 | Design | 26 wks | Fri 4/30/10 | Thu 10/28/10 |
| 78 | Permits | 391 days | Fri 4/30/10 | Fri 10/28/11 |
| 79 | Bid/Award | 9 wks | Fri 10/29/10 | Thu 12/30/10 |
| 80 | Construction | 261 days | Fri 12/31/10 | Fri 12/30/11 |




Project: Figure13-2_V2
Date: Fri 4/23/04

Task | Split | Progress | Milestone | Summary | Project Summary | External Tasks | External Milestone | Deadline

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# Appendix A

Potential Recycled Water Users

# APPENDIX A
## POTENTIAL RECYCLED WATER USERS

| Map Location # | User Name | Address | Annual Demand (AF/Yr) | Average Monthly Demand | Peak Monthly Demand (AF/Mo) | Peak Daily Demand (AF) | Peak Daily Demand (1000 gls) | Peak Hourly Demand (GPM) |
|---|---|---|---|---|---|---|---|---|
| 1 | High Desert Jr. High | 3620 Antelope Woods Rd, Acton | | | | | | |
| 2 | Vasquez High | 3620 Antelope Woods Rd, Acton | | | | | | |
| 3 | Castaic Middle | 28900 Hillcrest Pkwy, Castaic | 8 | 0.64 | 2.00 | 0.07 | 21.4 | 119 |
| 4 | Castaic Elementary | 30455 Park Vista Drive, Castaic | 29 | 2.20 | 7.00 | 0.23 | 75.0 | 417 |
| 5 | Live Oak Elementary | 27715 Saddleridge Road, Castaic | 21 | 1.81 | 6.00 | 0.20 | 64.3 | 357 |
| 7 | Stevenson Ranch Elementary-North | 26995 Poe Pkwy, SR | 10 | 0.80 | 2.00 | 0.07 | 21.4 | 119 |
| 8 | Stevenson Ranch Elementary-Central | 25820 Carroll Lane, SR | 18 | 1.39 | 3.00 | 0.10 | 32.2 | 179 |
| 9 | Valencia Valley Elementary | 23601 Carrizo Drive, Valencia | 18 | 1.34 | 3.00 | 0.10 | 32.2 | 179 |
| 10 | Park (Newhall School District) | 26239 Faulkner Drive, SR | 14 | 1.10 | 3.00 | 0.10 | 32.2 | 107 |
| 11 | Transp/Maintenance | 26501 Golden Valley, SCTA | 4 | 0.39 | 1.00 | 0.03 | 10.7 | 60 |
| 12 | Bouquet Canyon Elementary | 28110 Wellston, Saugus | 8 | 0.85 | 2.00 | 0.07 | 21.4 | 119 |
| 13 | Cedar Creek Elementary | 27792 Camp Plenty, CC | 12 | 1.20 | 3.00 | 0.10 | 32.2 | 179 |
| 14 | Emblem Elementary | 22685 Espuella, Saugus | 13 | 1.35 | 3.00 | 0.10 | 32.2 | 179 |
| 15 | James Foster Elementary | 22500 Pamplico, Saugus | 17 | 1.67 | 4.00 | 0.13 | 42.9 | 238 |
| 16 | Helmers Elementary | 27300 Grandview Drive, Valencia | 5 | 0.51 | 1.00 | 0.03 | 10.7 | 60 |
| 17 | Highlands Elementary | 27332 Catala, Saugus | 18 | 1.82 | 4.00 | 0.13 | 42.9 | 238 |
| 18 | Mountain View Elementary | 22201 Cypress Place, Saugus | 31 | 2.82 | 5.00 | 0.16 | 53.6 | 298 |
| 19 | Rio Vista Elementary | 20417 Cedarcreek, CC | 23 | 2.31 | 6.00 | 0.20 | 64.3 | 357 |
| 20 | Rosedell Elementary | 27583 Urbandale Ave, Saugus | 21 | 2.10 | 5.00 | 0.16 | 53.6 | 298 |
| 21 | Santa Clarita Elementary | 27177 Seco Canyon Rd, Saugus | 13 | 1.30 | 2.00 | 0.07 | 21.4 | 119 |
| 22 | Skyblue Mesa Elementary | 28040 Hardesty, CC | 7 | 0.75 | 3.00 | 0.10 | 32.2 | 179 |
| 23 | Plum Canyon Elementary | 28360 Alfred Way, SCTA | 15 | 1.58 | 3.00 | 0.10 | 32.2 | 179 |
| 24 | Sulphur Srpings Elementary | 16628 Lost Canyon Road, CC | 10 | 0.83 | 1.13 | 0.04 | 12.1 | 67 |
| 25 | Valencia High | 27801 Dickason Drive, Valencia | 100 | 7.76 | 26.00 | 0.86 | 278.7 | 1,549 |
| 26 | Arroyo Seco Jr. High | 22171 Vista Delgado, Saugus | 60 | 5.00 | 9.38 | 0.31 | 100.5 | 558 |
| 27 | Sierra Vista Jr. High | 19425 Stillmore Street, CC | 55 | 4.58 | 3.94 | 0.13 | 42.2 | 235 |
| 28 | Canyon High | 19300 Nadal Street, CC | 110 | 9.17 | 19.69 | 0.65 | 211.1 | 1,173 |
| 29 | Bowman High | 21508 Redview Drive, SCTA | 9 | 0.75 | 11.25 | 0.37 | 120.6 | 670 |
| 30 | La Mesa Jr. High | 26623 May Way, SCTA | 55 | 4.58 | 112.50 | 3.70 | 1206.0 | 6,700 |
| 31 | Magic Mountain Resort Golf Course | | 429 | 35.75 | 0.92 | 0.03 | 9.9 | 37 |
| 32 | Magic Mountain Amusement Park | 26101 Magic Mountain Pkwy, Valencia | 476 | 39.67 | 1.88 | 0.06 | 20.1 | 67 |
| 33 | Valencia Interchange | Valencia Blvd & MM Pkwy | 6 | 0.50 | 0.70 | 0.02 | 7.5 | 42 |
| 34 | Valencia Country Club/Golf Course | 27330 Tourney Rd, SC | 590 | 49.17 | 76.10 | 2.50 | 815.8 | 3,022 |
| 35 | Honor Rancho Golf Course | | 450 | 37.50 | 1.17 | 0.04 | 12.5 | 46 |
| 36 | Santa Clarita Sports Complex | 26407 Golden Valley Road, SCTA | 50 | 4.17 | 20.06 | 0.66 | 215.1 | 717 |
| 37 | Lagoon Landscape | | 180 | 15.00 | 0.63 | 0.02 | 6.8 | 38 |
| 38 | Northlake Development | 32115.5 N Ridge Route, Castaic | 21 | 1.75 | 4.50 | 0.15 | 48.2 | 268 |
| 39 | North River Industrial | | 105 | 8.75 | 7.50 | 0.25 | 80.4 | 447 |
| 40 | North River High School | | 135 | 11.25 | 5.44 | 0.18 | 58.3 | 324 |
| 41 | North River Jr. High School | | 60 | 5.00 | 3.05 | 0.10 | 32.7 | 181 |
| 42 | North River Golf Course | | 600 | 50.00 | 0.88 | 0.03 | 9.4 | 35 |
| 43 | North River Commercial | | 45 | 3.75 | 13.88 | 0.46 | 148.7 | 826 |
| 44 | Lago de Valencia - Commercial | McBean/Newhall Ranch Rd(E corner), N Valencia | 29 | 2.42 | 3.94 | 0.13 | 42.2 | 235 |
| 45 | Lago de Valencia - Elementary School | North Valencia Phase II | 16 | 1.35 | 8.63 | 0.28 | 92.5 | 514 |
| 46 | Lago de Valencia - park/rec | Newhall Ranch Rd/N SC River, Valencia | 46 | 3.83 | 0.94 | 0.03 | 10.1 | 34 |
| 48 | Bouquet South - Commercial | Bouquet Canyon Rd/Newhall Ranch Rd, N Valenci | 48 | 4.00 | 69.94 | 2.30 | 749.8 | 4,165 |
| 49 | Pony League - Pony League Ballfields | Valencia Blvd/SC & S Fork River, N Valencia | 43 | 3.58 | 4.69 | 0.15 | 50.3 | 168 |
| 50 | Pony League - Commercial | Valencia Blvd/SC & S Fork River, N Valencia | 33 | 2.75 | 1.78 | 0.06 | 19.1 | 106 |
| 51 | South River Village - Commercial | NW corner McBean Pkwy & MM Pkwy, N Valencia | 44 | 3.67 | 0.61 | 0.02 | 6.5 | 36 |
| 52 | Valencia Industrial Center | 24800 block of Tibbetts Avenue, N Valencia | 27 | 2.25 | 5.63 | 0.19 | 60.3 | 335 |
| 53 | Civic Center | | 4 | 0.33 | 2.06 | 0.07 | 22.1 | 123 |
| 54 | Saugus High | 21900 Centurion Way, Saugus | 110 | 9.17 | 33.75 | 1.11 | 361.8 | 2,010 |
| 55 | Rio Vista Center | | 300 | 25.00 | 1.50 | 0.05 | 16.1 | 89 |

## APPENDIX A
## POTENTIAL RECYCLED WATER USERS

| Map Location # | User Name | Address | Annual Demand (AF/Yr) | Average Monthly Demand | Peak Monthly Demand (AF/Mo) | Peak Daily Demand (AF) | Peak Daily Demand (1000 gls) | Peak Hourly Demand (GPM) |
|---|---|---|---|---|---|---|---|---|
| 56 | Panhandle Commercial | | 15 | 1.25 | 1.31 | 0.04 | 14.1 | 78 |
| 57 | City Civic Center | | 125 | 10.42 | 1.31 | 0.04 | 14.1 | 78 |
| 58 | City Center Commercial | | 10 | 0.83 | 1.31 | 0.04 | 14.1 | 78 |
| 59 | City Center Commercial | | 5 | 0.42 | 1.88 | 0.06 | 20.1 | 112 |
| 60 | Westridge Golf Course | | 880 | 73.33 | 1.17 | 0.04 | 12.5 | 46 |
| 61 | Vista Valencia Golf Course | 24700 W Trevino Dr, SC | 36 | 3.00 | 1.42 | 0.05 | 15.2 | 56 |
| 62 | Wiley Canyon Elementary | 24240 La Glorita Circle, Newhall | 62 | 5.17 | 3.13 | 0.10 | 33.5 | 186 |
| 63 | Old Orchard Elementary | 25141 Avenue Rondel, Newhall | 17 | 1.25 | 3.00 | 0.10 | 32.2 | 179 |
| 64 | Old Orchard Park (City) | 25023 Avenida Rotella, Valencia | 24 | 1.83 | 4.00 | 0.13 | 42.9 | 143 |
| 65 | Orchard Village Road Tree Farm | | 6 | 0.50 | | 0.00 | 0.0 | 0 |
| 66 | Henry Mayo Hospital | 23845.5 McBean Pkwy, Valencia | 153 | 12.74 | 23.00 | 0.76 | 246.6 | 1,370 |
| 67 | College of the Canyons/Academy of the Canyons | 25455 N. Rockwell Canyon Rd, Valencia | 213 | 17.75 | 56.25 | 1.85 | 603.0 | 3,350 |
| 68 | Newhall Elementary | 24607 Walnut Street, Newhall | 63 | 5.25 | 0.88 | 0.03 | 9.4 | 52 |
| 69 | William S. Hart Park (City) | 24151 N. San Fernando Rd, Newhall | 707 | 58.92 | 6.75 | 0.22 | 72.4 | 241 |
| 70 | College of the Masters (Masters College) | 21726 Placerita Canyon Rd, Valencia | 24 | 1.88 | 5.00 | 0.16 | 53.6 | 298 |
| 71 | Hart High School | 24825 Newhall Avenue, Newhall | 31 | 2.41 | 14.00 | 0.46 | 150.1 | 834 |
| 72 | H.M. Newhall Memorial Park (City) | 24923 Newhall Avenue, Newhall | 49 | 3.87 | 8.00 | 0.26 | 85.8 | 286 |
| 73 | Placerita Jr. High/Learning Post | 25015 Newhall Avenue, Newhall | 53 | 4.42 | 25.31 | 0.83 | 271.4 | 1,508 |
| 74 | Valencia Glenn City Park | 23750 Via Gavola, Valencia | 29 | 2.22 | 5.00 | 0.16 | 53.6 | 179 |
| 75 | California Institute of the Arts | 24700 McBean Pkwy, Valencia | 76 | 6.33 | 23.44 | 0.77 | 251.3 | 1,396 |
| 76 | Peachland Elementary | 24800 Peachland Avenue, Newhall | 30 | 2.50 | 3.02 | 0.10 | 32.3 | 180 |
| 77 | McBean Interchange | McBean Pkwy & I5 | 6 | 0.50 | 1.24 | 0.04 | 13.3 | 74 |
| 78 | Tract 32365 Common Area (Palmer) | | 108 | 9.00 | 1.40 | 0.05 | 15.0 | 83 |
| 79 | Valencia Meadows Elementary | 25577 Fedala Rd, Valencia | 16 | 1.22 | 3.00 | 0.10 | 32.2 | 179 |
| 80 | Valencia Meadows Park (City) | 25671 Fedala Rd, Valencia | 6 | 0.47 | 1.00 | 0.03 | 10.7 | 36 |
| 81 | Valencia Marketplace | | 30 | 2.50 | 1.69 | 0.06 | 18.1 | 101 |
| 82 | S.R Phase I Slopes | | 190 | 15.83 | 1.69 | 0.06 | 18.1 | 101 |
| 83 | Valley View Elementary | 19414 W. Sierra Estates Drive, Newhall | 7 | 0.58 | 110.63 | 3.64 | 1185.9 | 6,589 |
| 84 | Friendly Valley Golf Course | 19345 W. Avenue of the Oaks, Newhall | 107 | 8.92 | 1.22 | 0.04 | 13.0 | 48 |
| 85 | 1st Financial Park/Schools | | 90 | 7.50 | 1.13 | 0.04 | 12.1 | 40 |
| 86 | 1st Financial Multi Family | | 80 | 6.67 | 2.57 | 0.08 | 27.5 | 153 |
| 87 | 1st Financial Commercial | | 30 | 2.50 | 2.44 | 0.08 | 26.1 | 145 |
| 88 | S.R. Phase I Park | | 50 | 4.17 | 1.69 | 0.06 | 18.1 | 101 |
| 89 | S.R. Phase II Slopes | | 350 | 29.17 | 0.94 | 0.03 | 10.1 | 56 |
| 90 | S.R. Phase II Park | | 88 | 7.33 | 0.75 | 0.02 | 8.0 | 45 |
| 91 | S.R. Phase II School | | 25 | 2.08 | 1.10 | 0.04 | 11.8 | 66 |
| 92 | Lyons Interchange | | 6 | 0.50 | 2.68 | 0.09 | 28.7 | 159 |
| 94 | Summit Common Area (N & S) | | 157 | 13.08 | 2.70 | 0.09 | 28.9 | 161 |
| 95 | Ridgedale Common Area | | 214 | 17.83 | 1.85 | 0.06 | 19.8 | 110 |
| 96 | Sunset Point Common Area | | 33 | 2.75 | 1.58 | 0.05 | 16.9 | 94 |
| 97 | S.F. Mortgage Common Area | | 35 | 2.92 | 1.04 | 0.03 | 11.1 | 62 |
| 98 | Golden Oak Ranch | 19802 Placerita Canyon Road, Newhall | 632 | 52.67 | 0.81 | 0.03 | 8.7 | 48 |
| 99 | Almendra Park (City) | 23420 Alta Madera Drive, SCTA | 11 | 0.90 | 28.67 | 0.94 | 307.3 | 1,024 |
| 100 | Driving Range | | 24 | 2.00 | 0.70 | 0.02 | 7.5 | 28 |
| 101 | North Oaks Park (City) | 27824 Camp Plenty Road, SCTA | 6 | 0.48 | 39.94 | 1.31 | 428.1 | 1,427 |
| 102 | Santa Clarita Park (City) | 27285 Seco Canyon Road, Saugus | 19 | 1.56 | 11.81 | 0.39 | 126.6 | 422 |
| 103 | Bouquet Canyon Park (City) | 28127 Wellston Drive, Saugus | 28 | 2.29 | 132.56 | 4.36 | 1421.1 | 4,737 |
| 104 | Hasley Canyon Park (County) | 28700 W. Quincy Street, Castaic | 17 | 1.42 | 4.23 | 0.14 | 45.3 | 151 |
| 105 | Val Verde Park (County) | 30300 W. Arlington Street, Val Verde | 14 | 1.17 | 5.42 | 0.18 | 58.1 | 194 |
| 106 | Pamplico Drive Park (City) | 22444 Pamplico Drive, SCTA | 15 | 1.25 | 8.71 | 0.29 | 93.3 | 311 |
| 107 | Plum Canyon Park (County) | 28222 N Via Joyce Drive, SCTA | 33 | 2.75 | 9.94 | 0.33 | 106.5 | 355 |
| 108 | Canyon Country Park (City) | 17615 Soledad Canyon Road, CC | 43 | 3.58 | 5.00 | 0.16 | 53.5 | 178 |
| 109 | Camino Del Valle Park (County) | 28201 W. Sloan Canyon, Castaic | 27 | 2.08 | 4.70 | 0.15 | 50.4 | 168 |

## APPENDIX A
## POTENTIAL RECYCLED WATER USERS

| Map Location # | User Name | Address | Annual Demand (AF/Yr) | Average Monthly Demand | Peak Monthly Demand (AF/Mo) | Peak Daily Demand (AF) | Peak Daily Demand (1000 gls) | Peak Hourly Demand (GPM) |
|---|---|---|---|---|---|---|---|---|
| 110 | Begonias Lane Park (City) | 14911 Begonias Lane, SCTA | 24 | 1.84 | 4.00 | 0.13 | 42.9 | 143 |
| 111 | Oak Spring Canyon Park (City) | Oak Spring Canyon Rd and Aida, CC (FY 02) | 13 | 1.08 | 1.13 | 0.04 | 12.1 | 40 |
| 112 | Windmill Hilltop Tree Farm | | 54 | 4.50 | | 0.00 | 0.0 | 0 |
| 113 | North River Commercial | | 24 | 2.00 | 2.63 | 0.09 | 28.1 | 156 |
| 114 | North River Commercial | | 15 | 1.25 | 2.63 | 0.09 | 28.1 | 156 |
| 115 | S.R. Phase V Golf Course | | 450 | 37.50 | 1.55 | 0.05 | 16.6 | 92 |
| 116 | S.R. Phase V Community Park | 1 mi W of I5 & Pico Canyon Rd, SR | 40 | 3.33 | 0.83 | 0.03 | 8.9 | 50 |
| 118 | S.R. Phase V Multi Family | | 95 | 7.92 | 0.88 | 0.03 | 9.4 | 52 |
| 119 | S.R. Phase V Public Facilities | | 20 | 1.67 | 0.77 | 0.03 | 8.2 | 46 |
| 120 | S.R. Phase IV Slopes | | 225 | 18.75 | 2.57 | 0.08 | 27.5 | 153 |
| 121 | S.R. Phase V Slopes | | 225 | 18.75 | 21.19 | 0.70 | 227.1 | 1,262 |
| 122 | Pan Pacific Golf Course | | 465 | 38.75 | 0.99 | 0.03 | 10.6 | 39 |
| 124 | Valley Gateway | | 78 | 6.50 | 11.63 | 0.38 | 124.6 | 692 |
| 125 | Central Park (City) | 27150 Bouquet Canyon Rd, Saugus | 140 | 11.67 | 20.25 | 0.67 | 217.1 | 724 |
| 126 | Creekview Park (City) | 22200 Park Street, SCTA | 13 | 1.08 | 2.75 | 0.09 | 29.4 | 98 |
| 127 | Bridgeport Park (City) | 23520 Bridgeport Lane, SCTA | 44 | 3.67 | 1.06 | 0.03 | 11.3 | 38 |
| 128 | Circle J Park (City) | 22651 Via Princessa, SCTA | 15 | 1.25 | 5.63 | 0.19 | 60.3 | 201 |
| 129 | Robinson Ranch Mtn Golf Course | 27734 Sand Canyon Rd, SCTA | 430 | 35.83 | 1.04 | 0.03 | 11.1 | 41 |
| 130 | Castaic Lake State Recreation Area | 32132 Ridge Route Rd, Castaic | 6222 | 518.50 | 35.63 | 1.17 | 381.9 | 1,273 |
| 131 | Castaic Sports Complex | 31320 N Castaic Rd, Castaic | 63 | 5.25 | 1.31 | 0.04 | 14.1 | 47 |
| 132 | Northbridge Park | Grandview Drive, E of McBean Pkwy | 22 | 1.83 | 16.88 | 0.56 | 180.9 | 603 |
| 134 | Richard Rio Memorial Park | 26233 W Faulkner Drive, SR | 40 | 3.33 | 15.00 | 0.49 | 160.8 | 536 |
| 136 | Apple Park | 24829 Apple Street-Z, Newhall | 7 | 0.57 | 1.00 | 0.03 | 10.7 | 36 |
| 138 | MRCA LA River Center | 23801.5 The Old Road, Newhall | 7 | 0.55 | 3.00 | 0.10 | 32.2 | 107 |
| 139 | Park - Adjacent to Valencia Valley Elem? | 23645 Carrizo Drive, Valencia | 11 | 0.81 | 2.00 | 0.07 | 21.4 | 71 |
| 141 | Santa Clarita Christian School (k-12) | 27249 Luther Drive, SCTA | 6 | 0.50 | 9.00 | 0.30 | 96.5 | 536 |
| 143 | Legacy Academy | North Valencia Phase II | 16 | 1.35 | 8.06 | 0.27 | 86.4 | 480 |
| 144 | Valencia Vista HOA | Nandina&Valle Del Oro Irrigation, Newhall | 10 | 0.73 | 2.00 | 0.07 | 21.4 | 119 |
| 145 | | Valle Del Oro @ Pool, Newhall | 9 | 0.69 | 1.00 | 0.03 | 10.7 | 60 |
| 146 | | Valle Del Oro, Newhall | 11 | 0.87 | 2.00 | 0.07 | 21.4 | 119 |
| 147 | | Leonard Tree Irrigation, Newhall | 15 | 1.15 | 2.00 | 0.07 | 21.4 | 119 |
| 149 | | Valle Del Oro, Newhall | 21 | 1.59 | 3.00 | 0.10 | 32.2 | 179 |
| 150 | | Valle Del Oro, Newhall | 9 | 0.70 | 2.00 | 0.07 | 21.4 | 119 |
| 151 | Pacific Bay Homes | 29352.5 Mammoth Ln, Newhall | 4 | 0.31 | 1.00 | 0.03 | 10.7 | 60 |
| 152 | | 14278.5 Sequoia Rd, Canyon Country | 17 | 1.34 | 3.00 | 0.10 | 32.2 | 179 |
| 153 | | 14272.5 W. Sequoia Rd, Canyon Country | 17 | 1.27 | 3.00 | 0.10 | 32.2 | 179 |
| 154 | | 14410 Grandifloras Lot 36, CC | 12 | 0.90 | 2.00 | 0.07 | 21.4 | 119 |
| 155 | California Canyon HOA | Jasmine Vly & Sunrose, Canyon Country | 24 | 1.83 | 4.00 | 0.13 | 42.9 | 238 |
| 156 | | 30541 Jasmine Vly-Just L, CC | 3 | | | 0.00 | 0.0 | 0 |
| 157 | Collage West HOA | 14830 Willow Glen R/C of L, CC | 20 | 1.52 | 3.00 | 0.10 | 32.2 | 179 |
| 158 | | 30015 Sunridge Pl R/C of L, CC | 10 | 0.76 | 1.00 | 0.03 | 10.7 | 60 |
| 159 | | 29940.5 Grandifloras L/S, CC | 10 | 0.77 | 1.00 | 0.03 | 10.7 | 60 |
| 160 | Northlake HOA | 32115.5 N Ridge Route, Castaic | 21 | 1.62 | 4.00 | 0.13 | 42.9 | 238 |
| 161 | Lantana Hills HOA | 23818.5 Oakhurst Dr, Newhall | 26 | 2.00 | 6.00 | 0.20 | 64.3 | 357 |
| 162 | | 23804.5 Oakhurst Dr, Newhall | 17 | 1.27 | 4.00 | 0.13 | 42.9 | 238 |
| 163 | | 23800.5 Oakleaf Cyn Dr, Newhall | 18 | 1.39 | 4.00 | 0.13 | 42.9 | 238 |
| 165 | | 21101.5 Oakriver Ln, Newhall | 7 | 0.53 | 2.00 | 0.07 | 21.4 | 119 |
| 166 | | 23712.5 Oakhurst Dr., Newhall | 6 | 0.44 | 2.00 | 0.07 | 21.4 | 119 |
| 167 | | 21100.5 Oakleaf Cyn Dr, Newhall | 12 | 0.93 | 4.00 | 0.13 | 42.9 | 238 |
| 168 | Peachland Owners Assoc | 25003-39 Peachland, Newhall | 26 | 2.00 | 4.00 | 0.13 | 42.9 | 238 |
| 169 | Newhall Hdn Vly HOA | Thornewood Crn of Lot 26&35, Newhall | 5 | 0.36 | 1.00 | 0.03 | 10.7 | 60 |
| 170 | | Sagebrush Crn of Lot 65, Newhall | 5 | 0.41 | 1.00 | 0.03 | 10.7 | 60 |
| 173 | | Maple & Windcrest Lot 66, Newhall | 8 | 0.61 | 2.00 | 0.07 | 21.4 | 119 |

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|---|---|---|---|---|---|---|---|---|
| 174 | | Maple Crn of Lot 4, Newhall | 7 | 0.52 | 1.00 | 0.03 | 10.7 | 60 |
| 175 | | Windcrest btwn Lot 10 & 11, Newhall | 5 | 0.39 | 1.00 | 0.03 | 10.7 | 60 |
| 177 | Oaks At Newhall HOA | Valley Oak & Calgrove Corner, Newhall | 7 | 0.52 | 1.00 | 0.03 | 10.7 | 60 |
| 178 | | Calgrove & White Oak, Newhall | 5 | 0.63 | 1.00 | 0.03 | 10.7 | 60 |
| 182 | | White Oak Ct Btwn Lots 26&27, Newhall | 7 | 0.54 | 1.00 | 0.03 | 10.7 | 60 |
| 185 | | Ebelden Btwn Lots 25 & 26, Newhall | 4 | 0.31 | 1.00 | 0.03 | 10.7 | 60 |
| 187 | Hidden Vly HOA | Crestview Corner of lot 69, Newhall | 6 | 0.44 | 1.00 | 0.03 | 10.7 | 60 |
| 188 | | Calgrove & Creekside S/E Crn, Newhall | 6 | 0.46 | 3.00 | 0.10 | 32.2 | 179 |
| 189 | | 24260 Creekside Dr, Newhall | 15 | 1.14 | 3.00 | 0.10 | 32.2 | 179 |
| 192 | | Briardale N/S of Rd to #8 Tank, Newhall | 4 | 0.31 | 1.00 | 0.03 | 10.7 | 60 |
| 193 | | Mentry At Lot 71, Newhall | 4 | 0.28 | 1.00 | 0.03 | 10.7 | 60 |
| 197 | The Terrace | 21421 Plane Tree Dr, Newhall | 7 | 0.55 | 1.00 | 0.03 | 10.7 | 60 |
| 198 | | Grape Lily (Irigtn), Newhall | 8 | 0.62 | 1.00 | 0.03 | 10.7 | 60 |
| 199 | | Valle Del Oro, Newhall | 15 | 1.19 | 4.00 | 0.13 | 42.9 | 238 |
| 200 | | Valle Del Oro, Newhall | 16 | 1.20 | 4.00 | 0.13 | 42.9 | 238 |
| 201 | | Bottletree (Irigtn), Newhall | 11 | 0.82 | 2.00 | 0.07 | 21.4 | 119 |
| 202 | | Ficus 21211-21-24334 Choke Cherry, Newhall | 9 | 0.70 | 1.00 | 0.03 | 10.7 | 60 |
| 203 | | Ficus (Irigtn), Newhall | 6 | 0.46 | 1.00 | 0.03 | 10.7 | 60 |
| 204 | | Fern Drive, Newhall | 9 | 0.66 | 1.00 | 0.03 | 10.7 | 60 |
| 206 | Castaic CDC Partners | 28409.5 Oak Valley Rd, Castaic | 4 | 0.29 | 1.00 | 0.03 | 10.7 | 60 |
| 208 | Coastal Meadowridge | 23645 Meadowridge S/S Co, Newhall | 14 | 1.07 | 4.00 | 0.13 | 42.9 | 238 |
| 234 | Canyon Springs Elementary | 19059 Vicci Street, CC | 8 | 0.67 | 20.63 | 0.68 | 221.1 | 1,228 |
| 235 | Leona Cox Elementary | 18643 Oakmoor Street, CC | 8 | 0.67 | 1.69 | 0.06 | 18.1 | 101 |
| 236 | Mint Canyon Elementary | 16400 Sierra Hwy, CC | 7 | 0.58 | 10.31 | 0.34 | 110.6 | 614 |
| 237 | Mitchell Elementary | 16821 Goodvale Road, CC | 8 | 0.67 | 80.44 | 2.65 | 862.3 | 4,791 |
| 238 | Pinetree Elementary | 29156 Lotus Garden Drive, CC | 7 | 0.58 | 89.25 | 2.94 | 956.8 | 5,316 |
| 239 | Potrero Canyon Community Park | Potrero Village | 303 | 25.25 | 29.44 | 0.97 | 315.6 | 1,052 |
| 240 | Mesas Community Park | Mesas Village | 63 | 5.25 | 40.13 | 1.32 | 430.2 | 1,434 |
| 241 | Co LA Dist #36 | Quail Valley Rd, Castaic | 19 | 1.44 | 4.00 | 0.13 | 42.9 | 238 |
| 243 | Co LA | 29305.5 Mammoth Ln, Canyon Country | 8 | 0.62 | 1.00 | 0.03 | 10.7 | 60 |
| 244 | Co LA | 100 N/O Soledad Cnyn, CC | 7 | 0.52 | 1.00 | 0.03 | 10.7 | 60 |
| 245 | Co LA | 14324 Sequoia/NO S/O Lot, CC | 30 | 2.34 | 4.00 | 0.13 | 42.9 | 238 |
| 246 | Co LA | Yellowstone and Everglades btwn 44&45, CC | 12 | 0.93 | 2.00 | 0.07 | 21.4 | 119 |
| 247 | Co LA | 14325.5 Sequoia Rd, CC | 9 | 0.67 | 1.00 | 0.03 | 10.7 | 60 |
| 248 | Co LA | Rushmore End of Culdesac, CC | 31 | 2.35 | 7.00 | 0.23 | 75.0 | 417 |
| 249 | Co LA | 29452.5 Mammoth Ln, CC | 9 | 0.69 | 2.00 | 0.07 | 21.4 | 119 |
| 250 | Co LA | 14433.5 Colorado Pl, CC | 6 | 0.48 | 1.00 | 0.03 | 10.7 | 60 |
| 251 | City of Santa Clarita | Newhall & San Fern S/W Crn, Newhall | 32 | 2.49 | 6.00 | 0.20 | 64.3 | 357 |
| 252 | City of Santa Clarita | 24242 Railroad Ave, Newhall | 165 | 12.68 | 24.00 | 0.79 | 257.3 | 1,429 |
| 253 | City of Santa Clarita | 22200 Park St., Newhall | 1614 | 124.21 | 277.00 | 9.11 | 2969.5 | 16,497 |
| 254 | City of Santa Clarita | 27285 Seco Canyon Rd | 28 | 2.33 | 5.27 | 0.17 | 56.4 | 314 |
| 255 | City of Santa Clarita Park | Wellston Drive | 25 | 2.08 | 4.68 | 0.15 | 50.2 | 279 |
| 256 | City of Santa Clarita Park | Meadow Drive | 25 | 2.08 | 4.14 | 0.14 | 44.4 | 247 |
| 257 | Sierra Heights Lndscp Maintnc Dist (LMD) | Canvas Street | 4 | 0.33 | 2.09 | 0.07 | 22.4 | 125 |
| 258 | Sunset Hills LMD | 19500 Via Princessa | 34 | 2.83 | 1.51 | 0.05 | 16.2 | 90 |
| 259 | Canyon Crest LMD | 2800 Whites Canyon | 12 | 1.00 | 5.29 | 0.17 | 56.7 | 315 |
| 260 | Area Wide District LMD | N Rye Canyon Rd | 67 | 5.58 | 1.55 | 0.05 | 16.6 | 92 |
| 261 | | McBean Pkwy & San Francisco Canyon Rd | | 0.00 | 1.08 | 0.04 | 11.6 | 64 |
| 262 | | N Newhall Ranch Rd | | 0.00 | 5.60 | 0.18 | 60.1 | 334 |
| 263 | | Btwn McBean Pkwy&Bouquet Canyon on river | | 0.00 | 28.53 | 0.94 | 305.9 | 1,699 |
| 264 | | Near Henry Mayo Hospital | | 0.00 | 279.47 | 9.19 | 2996.1 | 16,645 |
| 265 | | Blackbird Lane | | 0.00 | 5.25 | 0.17 | 56.3 | 313 |
| 266 | Old Orchard | 23600 Lyons Ave | 13 | 1.08 | 4.69 | 0.15 | 50.3 | 279 |

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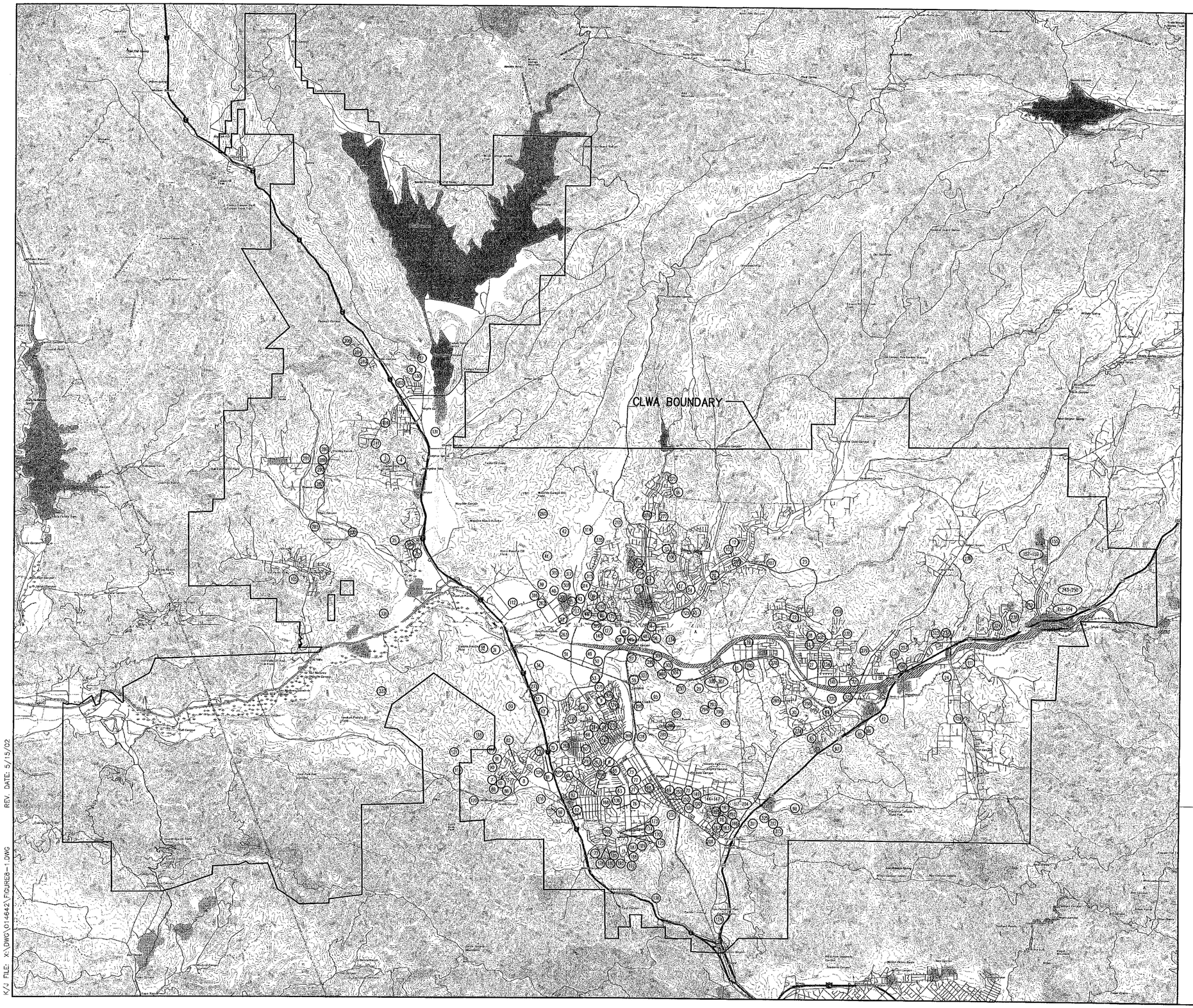
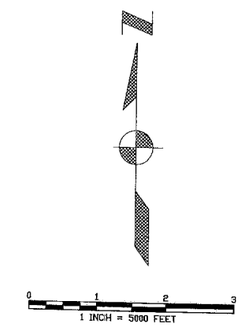
|---|---|---|---|---|---|---|---|---|
| 267 | Valencia Hills | 23000 Wiley Canyon Rd | 19 | 1.58 | 4.69 | 0.15 | 50.3 | 279 |
| 268 | Valencia Meadows | S 25500 McBean Pkwy | 6 | 0.50 | 0.75 | 0.02 | 8.0 | 45 |
| 269 | Valencia Glen | N Orchard Village Rd | 10 | 0.83 | 6.38 | 0.21 | 68.3 | 380 |
| 270 | South Valley HOA | 25700 McBean Pkwy | 6 | 0.33 | 1.00 | 0.03 | 10.7 | 60 |
| 271 | Central & North Valley | 26500 McBean Pkwy | 35 | 2.92 | 2.25 | 0.07 | 24.1 | 134 |
| 272 | Valencia Summit | Rockwell Canyon&McBean Pkwy (center) | 252 | 21.00 | 12.56 | 0.41 | 134.7 | 748 |
| 273 | Corporate Center | Sprinfield Court | 4 | 0.33 | 0.00 | 0.00 | 0.0 | 0 |
| 274 | Rainbow Glen | Golden Glen Court | 9 | 0.75 | 0.00 | 0.00 | 0.0 | 0 |
| 275 | Mountain View | N Seco Canyon Rd | 192 | 16.00 | 0.00 | 0.00 | 0.0 | 0 |
| 276 | Mountain View Condos | Banyan Place | 25 | 2.08 | 0.00 | 0.00 | 0.0 | 0 |
| 277 | Seco Villas | Copper Hill Drive | 7 | 0.58 | 0.00 | 0.00 | 0.0 | 0 |
| 278 | American Beauty | Fanchon Lane | 13 | 1.08 | 2.44 | 0.08 | 26.1 | 145 |
| 279 | Shangri-La | Shangri-La Drive | 40 | 3.33 | 3.56 | 0.12 | 38.2 | 212 |
| 280 | Circle J Ranch | Circle J Rd | 74 | 6.17 | 1.13 | 0.04 | 12.1 | 67 |
| 281 | Circle J Ranch | Circle J Rd | 21 | 1.75 | 1.88 | 0.06 | 20.1 | 112 |
| 282 | Northbridge | 24000 Newhall Ranch Rd | 373 | 31.08 | 0.74 | 0.02 | 8.0 | 44 |
| 283 | Co LA/Castaic LLA District #40 | Green Hill Dr, Castaic | 10 | 0.79 | 1.00 | 0.03 | 10.7 | 60 |
| 284 | Co LA/Castaic LLA District #40 | Green Hill Dr, Castaic | 4 | 0.27 | 0.50 | 0.02 | 5.4 | 30 |
| 285 | LA District #36 | 30000 block of W Hasley Cyn Rd | 30 | 2.50 | 0.75 | 0.02 | 8.0 | 45 |
| 287 | LA District #36 | 30500 block of N Sloan Cyn Rd | 11 | 0.92 | 1.69 | 0.06 | 18.1 | 101 |
| 288 | LA District #36 | 30900 block of N Sloan Cyn Rd | 8 | 0.67 | 36.00 | 1.18 | 385.9 | 2,144 |
| 289 | LA District #36 | 31300 block of N Sloan Cyn Rd | 7 | 0.58 | 4.69 | 0.15 | 50.3 | 279 |
| 290 | LA District #36 | 30700 block of N Sloan Cyn Rd | 7 | 0.58 | 1.31 | 0.04 | 14.1 | 78 |
| 291 | LA District #36 | 30700 block of N Romero Cyn Rd | 7 | 0.58 | 2.44 | 0.08 | 26.1 | 145 |
| 292 | Institutional (Porta Bella Dvlpmt) | Via Princessa & Santa Clarita Pkwy | 10 | 0.83 | 5.06 | 0.17 | 54.3 | 302 |
| 293 | Porta Bella Park | Santa Clarita Pkwy | 55 | 4.58 | 6.19 | 0.20 | 66.3 | 221 |
| 294 | Porta Bella Park | S of Santa Clarita Pkwy | 9 | 0.75 | 6.56 | 0.22 | 70.4 | 235 |
| 295 | Porta Bella Park | San Fernando Rd | 13 | 1.08 | 118.50 | 3.90 | 1270.4 | 4,235 |
| 296 | Porta Bella Recreational | Soledad Canyon Rd | 14 | 1.17 | 2.02 | 0.07 | 21.6 | 72 |
| 297 | Porta Bella Recreational | S of Soledad Canyon Rd | 14 | 1.17 | 4.50 | 0.15 | 48.2 | 161 |
| 298 | Porta Bella Town Center | N. San Fernando Rd | 62 | 5.17 | 5.81 | 0.19 | 62.3 | 346 |
| 299 | Porta Bella-Soledad Community Center | Soledad Canyon Rd | 31 | 2.58 | 3.94 | 0.13 | 42.2 | 235 |
| 300 | Porta Bella-Neighborhood Community Center | Via Princessa & Santa Clarita Pkwy | 21 | 1.75 | 2.63 | 0.09 | 28.1 | 156 |
| 301 | Porta Bella Office Park | Soledad Canyon Rd | 14 | 1.17 | 2.25 | 0.07 | 24.1 | 134 |
| 302 | Porta Bella Office Park | Soledad Canyon Rd | 12 | 1.00 | 3.56 | 0.12 | 38.2 | 212 |
| 303 | Porta Bella Office Park | San Fernando Rd | 19 | 1.58 | 5.63 | 0.19 | 60.3 | 335 |
| 304 | Porta Bella Business Park | Soledad Canyon Rd | 30 | 2.50 | 2.63 | 0.09 | 28.1 | 156 |
| 305 | Porta Bella Business Park | S of Soledad Canyon Rd | 14 | 1.17 | 1.88 | 0.06 | 20.1 | 112 |
| 306 | Porta Bella Business Park | S of Soledad Canyon Rd | 10 | 0.83 | 2.63 | 0.09 | 28.1 | 156 |
| 307 | Porta Bella Business Park | S of Soledad Canyon Rd | 14 | 1.17 | 9.38 | 0.31 | 100.5 | 558 |
| 308 | North Valencia Jr HS | undetermined | 50 | 4.17 | 0.75 | 0.02 | 8.0 | 45 |
| 309 | North Valencia Eastcreek Community Park | McBean & Newhall Ranch Rd | 40 | 3.33 | 3.52 | 0.12 | 37.7 | 126 |
| 310 | N Valencia Decoro Park-Business Park | Dickason Dr | 247 | 20.58 | 21.19 | 0.70 | 227.1 | 1,262 |
| 311 | Golden Valley Ranch Commercial | | 113 | 9.42 | 4.97 | 0.16 | 53.3 | 296 |
| 312 | Golden Valley Ranch Elementary School | Golden Valley Rd | 27 | 2.21 | 20.63 | 0.68 | 221.1 | 1,228 |
| 313 | Golden Valley Ranch Park | Golden Valley Rd & Placerita Canyon Rd | 25 | 2.08 | 3.19 | 0.10 | 34.2 | 114 |
| 314 | North Valencia Village Center (Eastcreek) | Decoro Dr & McBean | 9 | 0.75 | 7.50 | 0.25 | 80.4 | 447 |
| 315 | North Valencia Eastcreek County Park | McBean Pkwy | 9 | 0.75 | 1.08 | 0.04 | 11.6 | 39 |
| 316 | N Valencia Decoro Park-Commercial | Newhall Ranch Rd & Copper Hill Dr | 5 | 0.42 | 46.31 | 1.52 | 496.5 | 2,758 |
| 317 | North Valencia Decoro Park Private Park | Copper Hill Drive | 4 | 0.33 | 5.16 | 0.17 | 55.3 | 184 |
| 319 | Northpark | 27300 Grandview, SC | 5 | 0.49 | 1.00 | 0.03 | 10.7 | 60 |
| 320 | LA Co Parks and Rec | 14519 Stoneridge - Slope | 15 | 1.14 | 2.00 | 0.07 | 21.4 | 71 |
| 321 | LA Co Parks and Rec | Grand Canyon (across from Lot 40) | 9 | 0.69 | 2.00 | 0.07 | 21.4 | 71 |

## APPENDIX A
## POTENTIAL RECYCLED WATER USERS

| Map Location # | User Name | Address | Annual Demand (AF/Yr) | Average Monthly Demand | Peak Monthly Demand (AF/Mo) | Peak Daily Demand (AF) | Peak Daily Demand (1000 gls) | Peak Hourly Demand (GPM) |
|---|---|---|---|---|---|---|---|---|
| 322 | LA Co Parks and Rec | 29364 Canyon Rim (across Street) | 5 | 0.37 | 1.00 | 0.03 | 10.7 | 36 |
| 323 | District Office | 24930 Ave Stanford, SC | 4 | 0.39 | 1.03 | 0.03 | 11.0 | 61 |
| 324 | Park Entrance | 25045 Ave Rotella | 4 | 0.34 | 1.00 | 0.03 | 10.7 | 36 |
| 325 | Golden Valley Ranch Commercial | | 113 | 9.42 | 4.69 | 0.15 | 50.3 | 279 |
| 326 | Riverwood Community Park | Riverwood Village | 320 | 26.67 | 1.13 | 0.04 | 12.1 | 40 |
| 328 | Junior High (Newhall USD) | Oak Valley Village | 50 | 4.17 | 6.19 | 0.20 | 66.3 | 369 |
| 329 | City of Santa Clarita | 23647 Carrizo Dr | 14 | 1.06 | 2.75 | 0.09 | 29.5 | 164 |
| 330 | Newhall Ranch | | 9035 | | | | | |
| 331 | Newhall Ranch High School | Potrero Village | 100 | 8.33 | 8.25 | 0.27 | 88.4 | 491 |
| 333 | Hasley Canyon Golf Course | | 450 | 3.91 | 0.13 | 41.88 | 41.9 | 78 |
| 334 | Panhandle Golf Course | | 440 | 3.91 | 0.13 | 41.88 | 41.9 | 78 |
| 335 | SunCal/Tesoro, LLC Development | Copperhill and Avenida Rancho Tesoro | 375 | 79.38 | 2.61 | 850.93 | 850.9 | 1,576 |
| 336 | Santa Clarita Post Office | Franklin Pkwy | 15 | 2.81 | 0.09 | 30.20 | 30.2 | 56 |
| | **Total** | | 34,514 | 2,088 | 2,805 | 1,057 | 31,002 | 151,606 |




Kennedy/Jenks Consultants

Castaic Lake Water Agency
Recycled Water Master Plan

**Potential Recycled Water Users**

May 2002
K/J 014642.00

Figure 8–1

**4.10-A**

K/J FILE: X:\DWG\014642\FIGURE8-1.DWG REV DATE: 5/15/02

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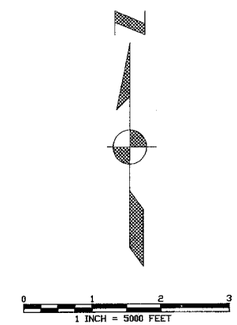


Kennedy/Jenks Consultants

Castaic Lake Water Agency
Recycled Water Master Plan

**Proposed Recycled Water Users**

May 2002
K/J 014642.00

Figure 8–2

**4.10-B**

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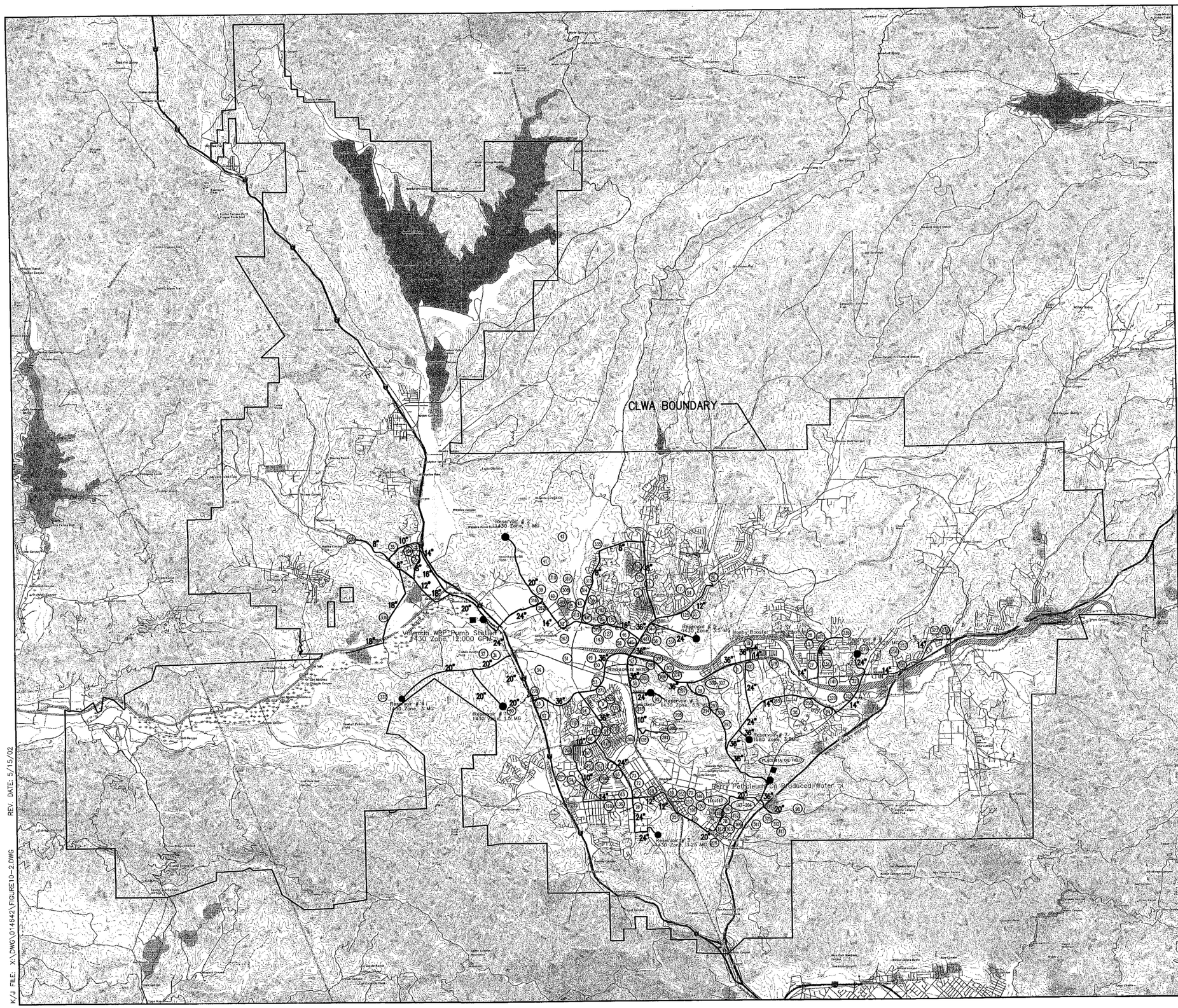
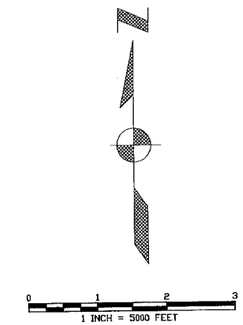
K/J FILE: X:\DWG\014642\FIGURE8-2.DWG REV. DATE: 5/15/02




LEGEND

- EXISTING PIPELINE
- PROPOSED PIPELINE
- RECYCLED WATER SOURCE AND PUMP STATION
- PROPOSED RESERVOIR
- PRESSURE REDUCING VALVE
- BOOSTER PUMP STATION

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Castaic Lake Water Agency
Recycled Water Master Plan

Proposed Recycled Water System

May 2002
K/J 014642.00

Figure 10–2

4.10-C

K/J FILE: X:\DWG\014642\FIGURE10-2.DWG REV. DATE: 5/15/02

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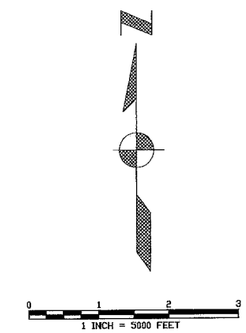


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Castaic Lake Water Agency
Recycled Water Master Plan

Proposed Recycled Water System
Pressure Zones

May 2002
K/J 014642.00

Figure 10–3

4.10-D

K/J FILE: X:\DWG\014642\FIGURE10-3.DWG REV. DATE: 5/15/02

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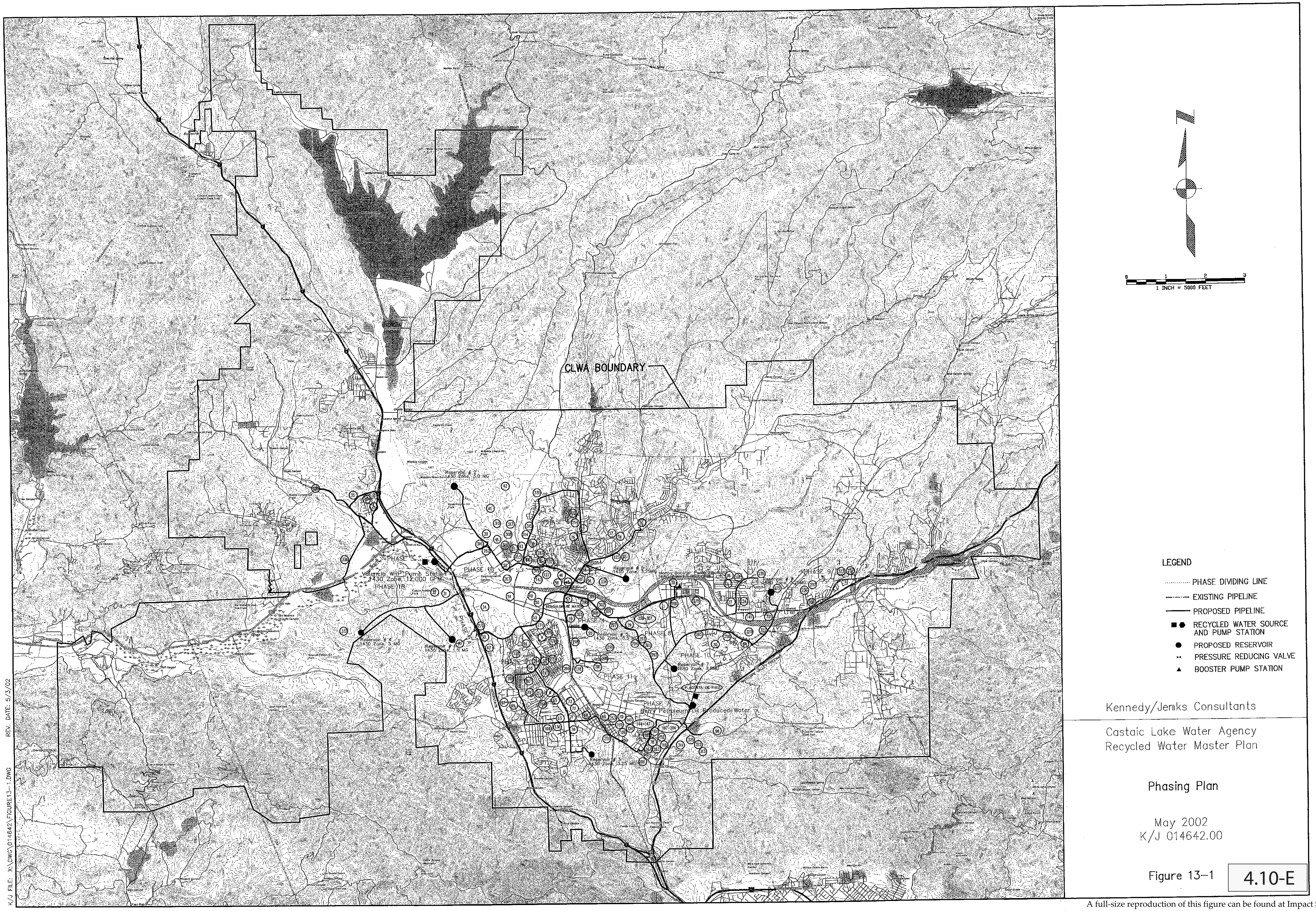



Figure 13–1

4.10-E

A full-size reproduction of this figure can be found at Impact Sciences.

**Impact and Response to Perchlorate Contamination,**
**Valencia Water Company Well Q2**
**Dated April 2005**

# Impact and Response to Perchlorate Contamination

# Valencia Water Company Well Q2

*prepared for*

Valencia Water Company

*prepared by*

Luhdorff & Scalmanini,
Consulting Engineers

**April 2005**

LUHDORFF & SCALMANINI
CONSULTING ENGINEERS

# *Table of Contents*

**Page**

**I. Introduction and Background.....1**

**II. Impact of Water Supply .....3**
Adequacy of Source Capacity.....3
Sustainability of Groundwater .....5
Protection of Other Sources (Wells).....8

**III. Response Plan for Well Q2.....10**

**IV. Protection Plan for Non-Impacted Wells.....12**

**V. Status of Saugus Restoration and Containment.....13**

**VI. References .....16**

# *List of Figures and Tables*

**Figure** **After Page**

I-1 Well Location Map .....1

**Table** **Page**

II-1 Active Groundwater Source Capacity .....4
II-2 Turnout Connections to CLWA Treated Water Distribution .....5

# *I. Introduction and Background*

Perchlorate has been a water quality concern in the Santa Clarita Valley since 1997 when it was originally detected in four Saugus wells operated by the municipal water purveyors in the eastern part of the Saugus Formation, near the former Whittaker-Bermite facility. In late 2002, perchlorate was detected in a fifth municipal well, in this case an Alluvial well also located near the former Whittaker-Bermite site. The five perchlorate-impacted wells have been removed from active water supply service.

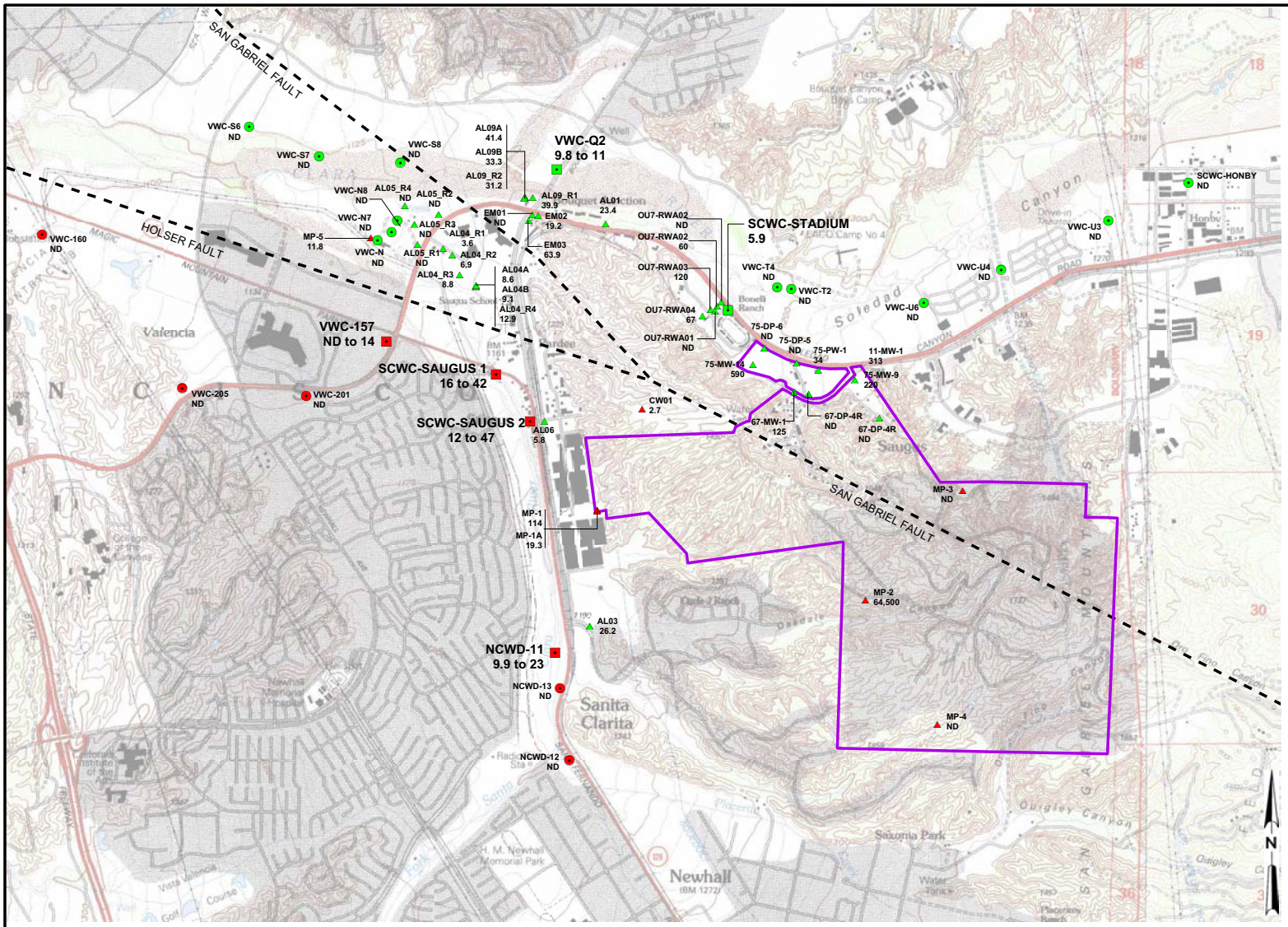
At present, perchlorate is not a regulated chemical in drinking water. However, the state Department of Health Services (DHS) requires that water utilities test their water sources for certain unregulated chemicals, and perchlorate is one of those chemicals. The DHS "notification level" for perchlorate is 6 micrograms per liter (ug/l).[1] DHS currently anticipates proposing a Maximum Contaminant Level (MCL) for perchlorate in 2005.

Since the detection of perchlorate and resultant inactivation of impacted wells, the Purveyors have been conducting regular monitoring of active wells near the Whittaker-Bermite site. In late March 2005, that monitoring detected the presence of perchlorate in Valencia Water Company's Well Q2, an alluvial well located immediately northwest of the confluence of Bouquet Creek and the Santa Clara River (Figure I-1). The initial detection of perchlorate was at a concentration of 11 ug/l; two confirmation samples in the first two weeks of April detected perchlorate at concentrations of 9.8 and 10 ug/l, respectively. As a result of the detection and confirmation of perchlorate in its Well Q2, Valencia has removed the well from active service and is pursuing rapid permitting and installation of wellhead treatment, as described herein, in order to return the well to water supply service.

For several years prior to the recent detection of perchlorate in Valencia's Well Q2, the water Purveyors have recognized that, among other aspects of an overall remediation program, such a program would most likely include an element of pumping from impacted wells, or from other wells in the immediate area, to establish hydraulic conditions that would control the migration of contamination from further impacting the aquifer in a downgradient (westerly) direction. The overall program would also include the installation of treatment to allow the restored pumping capacity to be used for municipal supply. In cooperation with state regulatory agencies and

---

[1] "Notification level" means the concentration level of a contaminant in drinking water delivered for human consumption that DHS has determined, based on available specific information, does not pose a significant health risk but warrants notification pursuant to applicable law. Notification levels are nonregulatory, health-based advisory levels established by DHS for contaminants in drinking water for which maximum contaminant levels have not been established. Notification levels are established as precautionary measures for contaminants that may be considered candidates for establishment of maximum contaminant levels, but have not yet undergone or completed the regulatory standard setting process prescribed for the development of maximum contaminant levels. Notification levels are not drinking water standards.




## LEGEND

**CONTAMINATED PRODUCTION WELL**

- ALLUVIUM
- SAUGUS

**UNCONTAMINATED PRODUCTION WELL**

- ALLUVIUM
- SAUGUS

**MONITORING WELL**

- ALLUVIUM
- SAUGUS
- WHITTAKER-BERMITE PROPERTY BOUNDARY

**NOTES:**

1. VALUES PRESENTED UNDER WELL SYMBOLS REPRESENT PERCHLORATE CONCENTRATION IN GROUNDWATER (µg/L).
2. ND = PERCHLORATE NOT DETECTED IN GROUNDWATER SAMPLE.
3. µg/L = MICROGRAMS PER LITER.

**FIGURE 1-1**
**WELL LOCATION MAP**
SANTA CLARITA, CALIFORNIA

CH2MHILL

RDD \\ODIN\PROJ2\55\SANTACLARITA_MOU\FIGURES\MXD\042205\FIG01.MXD FIG01.PDF 04/22/2005

investigators working for Whittaker-Bermite, Castaic Lake Water Agency (CLWA) and the Purveyors, including Valencia Water Company, have developed an off-site plan that will include installation of water treatment facilities to remove perchlorate and restore operation of two of the initially impacted Saugus wells through that treatment process. The operation of those two wells with treatment, scheduled to be in service in 2006, will hydraulically contain the perchlorate contamination moving from the former Whittaker-Bermite site and protect downgradient non-impacted wells. It will also restore the annual volumes of water that were pumped from the impacted wells before they were inactivated. In concert with the installation of treatment and the return of certain impacted wells to active water supply service, the balance of total pumping capacity from the impacted wells will be restored by constructing replacement wells in a non-impacted portion of the basin west of Interstate 5.

The development of the control and restoration plan for the initially impacted wells included consideration that it should fit within the larger scale of on-site and possibly other off-site remediation activities. While such activities did not specifically anticipate the treatment of VWC's Well Q2 as described herein, utilization of the same treatment methodology and operation of the well to contain perchlorate from contamination of downgradient wells, are consistent with currently planned and other potential on-site and off-site remediation activities.

# *II. Impact of Water Supply*

As a result of the recent detection of perchlorate, Valencia Water Company has removed Well Q2 from active water supply service until it can install wellhead treatment for perchlorate removal, as described herein, such that the well can be returned to service. Although it is expected that the permitting and installation of wellhead treatment can be accomplished by mid-summer, in advance of the peak water demand season, it is appropriate to assess the impact of the removal of Well Q2 on the overall adequacy of Valencia's water supply until such treatment is in place and the well is returned as part of Valencia's total water supply.

The overall adequacy of water supply derives from three considerations: 1) sufficient source capacity (wells and pumps, plus other sources such as, in this case, connections to CLWA's treated surface water distribution system); 2) sustainability of the groundwater resource to meet the demand of Valencia and other pumpers in the basin on a renewable basis; and 3) protection of groundwater sources (wells) from known contamination, or provisions for treatment in the event of contamination. All three considerations are discussed in the following sections.

**Adequacy of Source Capacity**

The temporary removal of Well Q2 from active service represents a reduction of 1,200 gpm of source capacity. After that removal, Valencia still has a total of 19 active operational wells, 14 wells completed in the Alluvial aquifer and 5 wells completed in the Saugus Formation. The combined pumping capacities of the 14 Alluvial wells is slightly more than 20,000 gpm, and the combined pumping capacities of the 5 Saugus wells is slightly more than 10,000 gpm. The individual pumping capacity of each Valencia well is listed in Table II-1.

In addition to its water supply wells, Valencia has six connections to CLWA's system that distributes treated surface water from the State Water Project to the various municipal purveyors in the Valley. The combined capacity of those four connections (Turnouts V2, V4, V5, V6, V7 and V8) is 26,500 gpm. The individual capacity of each CLWA turnout connection to the Valencia distribution system is listed in Table II-2.

The combined source capacity of Valencia's active wells, after temporary inactivation of Well Q2, and its CLWA turnouts is thus a total of about 57,000 gpm.

As part of recent review of its overall water supply, Valencia examined its maximum day demand in the last year, 2004. The maximum day demand occurred in July, when the largest historical single day demand of 143.3 acre-feet was experienced. That volumetric demand equates to an average flow on that day of nearly 32,500 gpm.

**Table II-1**
**Active Groundwater Source Capacity**
***Valencia Water Company***

| Well | Pump Capacity (gpm) | Maximum Annual Capacity (af) | Normal Year Production[1] (af) | Dry Year Production[1] (af) |
|---|---|---|---|---|
| **Alluvium** | | | | |
| Well D | 1,050 | 1,690 | 690 | 690 |
| Well N | 1,250 | 2,010 | 620 | 620 |
| Well N7 | 2,500 | 4,030 | 1,160 | 1,160 |
| Well N8 | 2,500 | 4,030 | 1,160 | 1,160 |
| Well S6 | 2,000 | 3,220 | 865 | 865 |
| Well S7 | 2,000 | 3,220 | 865 | 865 |
| Well S8 | 2,000 | 3,220 | 865 | 865 |
| Well T2 | 800 | 1,290 | 460 | 460 |
| Well T4 | 700 | 1,120 | 460 | 460 |
| Well U4 | 1,000 | 1,610 | 935 | 935 |
| Well U6 | 1,250 | 2,010 | 825 | 825 |
| Well W9 | 800 | 1,290 | 600 | 600 |
| Well W10 | 1,600 | 2,410 | 865 | 865 |
| Well W11 | 1,000 | 1,610 | 350 | 350 |
| **Alluvial Subtotal** | **20,350** | **32,760** | **10,720** | **10,720** |
| **Saugus Formation** | | | | |
| 159 | 500 | 800 | 50 | 50 |
| 160 | 2,000 | 3,220 | 1,000 | 1,330 |
| 201 | 2,400 | 3,670 | 100 | 3,577 |
| 205 | 2,700 | 4,350 | 1,000 | 3,827 |
| 206 | 2,500 | 4,030 | 1,175 | 3,500 |
| **Saugus Subtotal** | **10,100** | **16,270** | **3,325** | **12,284** |
| **Total Active Capacity** | **30,450** | **49,030** | **14,045** | **23,004** |

1. based on recent actual annual pumping; also as simulated in perchlorate containment analysis (CH2M Hill, 2004).

**Table II-2**
**Turnout Connections to CLWA Treated Water Distribution**
***Valencia Water Company***

| Station Number | Number of Pumps and Total Horsepower | Capacity (gpm) |
|---|---|---|
| V2 | Pressure Regulating Station | 3,000 |
| V4 | 3 – 195 | 4,500 |
| V5 | 3 – 155 | 4,500 |
| V6 | 2 – 25 | 1,500 |
| V7 | Pressure Regulating Station | 5,000 |
| V8 | 3 – 300 | 8,000 |
| | **Total** | **26,500** |

In accordance with the provisions of the Waterworks Standards in the California Health and Safety Code, and also in accordance with the provisions of the State Public Water Commission, the source capacity of a municipal water purveyor should be adequate to meet maximum day demand. Generally accepted engineering practice adds a factor of safety to those minimum requirements to account for possible outages of one or more supply sources during a period of maximum day demand. With total source capacity of about 57,000 gpm, after temporary deactivation of Well Q2, Valencia has sufficient source capacity to meet its maximum day demand of 32,500 gpm with allowance for potential outage of one or more individual sources (wells) or treated surface water connections. As a result, the temporary deactivation of Well Q2 does not adversely impact Valencia's ability to meet existing demands; in fact, Valencia has sufficient surplus source capacity to meet future increases in maximum day demand with existing sources, to be increased by returning Q2 to service after installation of treatment as described herein.

**Sustainability of Groundwater**

In contrast to assessing the adequacy of Valencia's source capacity by examining the total capacity of its water sources and comparing it to Valencia's maximum day demand, the sustainability of groundwater resources in the Valley is more appropriately assessed by

examining the response of the groundwater basin to the collective pumping demands placed on it for municipal and ongoing agricultural water supply. Until recently, the long-term renewability of Alluvial groundwater was empirically determined from approximately 60 years of recorded experience: long-term stability in groundwater levels and storage, with some dry period fluctuations in the eastern part of the basin, over a historical range of Alluvial pumpage from as low as about 20,000 afy to as high as about 43,000 afy. The long-term sustainability of Saugus groundwater was empirically determined from a more historical record that shows fairly low annual pumping in most years, with one four-year period of increased pumping up to about 15,000 afy, that produced no long-term depletion of the substantial groundwater storage in the Saugus. Those empirical observations in both the Alluvium and the Saugus Formation have now been complemented by the development and application of a numerical groundwater flow model, which has been used to predict aquifer response to the planned operating ranges of pumping from both aquifers for both municipal and agricultural water supply. The numerical groundwater flow model has also been used to analyze the control of contaminant migration under selected pumping conditions that would restore, with treatment, pumping capacity that has been inactivated due to perchlorate contamination detected in some wells in the basin as described herein.

To examine the yield of the Alluvium or, in other words, the sustainability of Alluvium on a renewable basis, the groundwater flow model was used to examine long-term projected response of the aquifer to pumping for municipal and agricultural uses in the 30,000 to 40,000 afy range under average/normal and wet conditions, and in the 30,000 to 35,000 afy range under locally dry conditions. To examine the response of the entire aquifer system, the model also incorporated pumping from the Saugus Formation in accordance with the normal (7,500-15,000 afy) and dry year (15,000-35,000 afy) operating plan for that aquifer. The preceding ranges of pumping from the two aquifer systems, commonly known locally as the operating plan for groundwater supply, are described in detail in the Amended 2000 Urban Water Management Plan prepared by CLWA and the municipal Purveyors in the Valley. The model was run over a 78 year hydrologic period which was selected from actual historical hydrology (i.e., precipitation) to examine a number of hydrologic conditions that would be expected to affect both groundwater pumping and groundwater recharge. The selected 78 year simulation period was assembled from an assumed recurrence of 1980 to 2003 hydrologic conditions, followed by an assumed recurrence of 1950 to 2003 hydrologic conditions. The 78 year period was analyzed to define both local hydrologic conditions (normal vs. dry), which affect the rate of pumping from the Alluvium, and hydrologic conditions that affect State Water Project operations, which in turn affect the rate of pumping from the Saugus.

The resultant pumping cycles are summarized as follows:

- Twenty-four years of dry year Alluvial pumping at 30,000 to 35,000 afy,

- One drought of four consecutive dry years of Alluvial pumping at 30,000 to 35,000 afy,

- Two droughts of three consecutive dry years each, with Alluvial pumping at 30,000 to 35,000 afy,

- Three selected years with assigned dry-year Alluvial pumping despite near-normal or above-normal rainfall because each selected year was preceded by a multi-year drought,

- Eighteen years of dry-year pumping from the Saugus, or an average of one dry year approximately every four years,

- Two droughts lasting three years, plus (in both cases) a dry year that occurs two years before the beginning of each three-year drought and another dry year that begins one year after each three-year drought has ended; Saugus pumping increased into the 15,000 to 35,000 afy range in all those years,

- Two droughts lasting two years; Saugus pumping increased into the 15,000 to 25,000 afy range in those years,

- Sixty years of normal-year Saugus pumping, 7,500 to 15,000 afy.

The preceding ranges of Saugus pumping included the planned restoration of recent historic pumping from the perchlorate-impacted wells. That pumping was analyzed to assess, in addition to the overall recharge of the Saugus, the effectiveness of controlling the migration of perchlorate by extracting and treating contaminated water close to the source of contamination.

Simulated Alluvial aquifer response to the preceding range of hydrologic conditions and pumping stresses was essentially a long-term repeat of the historical conditions that have resulted from similar pumping over the last several decades. The resultant response consisted of: 1) generally constant groundwater levels in the middle to western portion of the Alluvium, and fluctuating groundwater levels in the eastern portion of the Alluvium as a function of wet and dry hydrologic conditions, 2) variations in recharge that directly correlate with wet and dry hydrologic conditions, and 3) no long-term decline in groundwater levels or storage. Based on the combination of actual experience with Alluvial aquifer pumping at capacities similar to those planned for the future and the resultant sustainability (recharge) of groundwater levels and storage, complemented by modeled projections of aquifer response to planned pumping rates that also show no depletion of groundwater, the Alluvial aquifer can be considered a sustainable water supply source to meet the Alluvial portion of the operating plan for the groundwater basin.

Simulated Saugus Formation response to the ranges of pumping under assumed recurrent historical hydrologic conditions was consistent with actual experience under smaller pumping rates. The response consisted of: 1) short-term declines in groundwater levels and storage near pumped wells during dry-period pumping, 2) rapid recovery of groundwater levels and storage after cessation of dry-period pumping, and 3) no long-term decreases or depletion of groundwater levels or storage. The combination of actual experience with Saugus pumping and recharge up to about 15,000 afy, now complemented by modeled projections of aquifer response that show long-term utility of the Saugus at 7,500 to 15,000 afy in normal years and rapid recovery from higher pumping rates during intermittent dry periods, shows that the Saugus Formation can be considered a sustainable water supply source to meet the Saugus portion of the operating plan for the groundwater basin.

**Protection of Other Sources (Wells)**

Some detail of the overall perchlorate contamination issue, which has had a larger impact on the Saugus Formation than on the Alluvium, is included in **Status of Saugus Restoration and Containment** below. As detailed in that section, there has been extensive investigation of the extent of perchlorate contamination which, in combination with the groundwater modeling described above, has led to the current plan for integrated control of contamination migration and restoration of impacted pumping (well) capacity by 2006. While most of the perchlorate control and restoration plan is focused on the Saugus Formation, part of that plan includes induced capture of potentially contaminated groundwater in the Alluvium by pumping of selected Saugus wells. Specific long-term resolution of perchlorate contamination in the Alluvium, which had previously impacted just one water supply well, is currently expected to focus on source control through on-site treatment in the northern Alluvium (at the north of the former Whittaker-Bermite site) and subsequent restoration of the contaminated Stadium Well. In the interim, the questions are how the recently impacted Well Q2 will be resolved, and whether other active Alluvial wells could be contaminated and, if so, what effect that might have on the adequacy of Alluvial groundwater supplies.

Until the recent detection of perchlorate in Valencia's Well Q2, ongoing monitoring of all active municipal wells near the Whittaker-Bermite site had shown no detections of perchlorate in any active Alluvial wells. However, based on a combination of proximity to the Whittaker-Bermite site and prevailing groundwater flow directions, there was logical concern that perchlorate could contaminate nearby, downgradient Alluvial wells, and, as a result, there have been provisions in place to respond to perchlorate contamination if it should occur. The groundwater model was used to examine capture zones around Alluvial wells under planned operating conditions (pumping capacities and volumes) for the time period through currently scheduled restoration of impacted contaminated wells by 2006. That capture zone analysis of Alluvial wells generally near the Whittaker-Bermite site suggested that inflow to those wells would either be upgradient

of the contamination site, or would be from the Alluvium beyond where perchlorate is most likely to be transported.

At the time of the preceding analysis, a noted possible exception to its conclusions involved Valencia Water Company's Pardee wellfield, which includes its Wells N, N7, and N8. Although the capture zone analysis did not show the Pardee wells to be impacted, they were considered to be at some potential risk due to the proximity of their capture zone to the Whittaker-Bermite site. Other nearby Alluvial wells, including Valencia's Well Q2, were considered to be at lesser risk due to their distances from the site, orientation to groundwater flow near the site, and other factors such as the presence of the Santa Clara River between the wells and the Whittaker-Bermite site.

With recognition that potentially at-risk wells such as Valencia's Pardee wellfield could be readily replaced on an interim basis by utilizing some of the surplus capacity among all the other Alluvial wells, Valencia has planned for some time that, if the Pardee wells were impacted by perchlorate contamination, it has made site provisions at those wells for installation of wellhead treatment. Such treatment would be the same methodology as planned for long-term treatment of the contaminated Saugus wells. With treatment installed, Valencia would retain the wells in service for the same objectives as planned for restoring impacted Saugus pumping capacity by extracting contaminated water, treating it for beneficial (drinking water) use, and controlling local groundwater flow to protect further downgradient wells. The response to perchlorate detection in Well Q2 is identical to what was envisioned in the event of contamination at the Pardee wells.

## *III. Response Plan for Well Q2*

As described in the status discussion below, one of the completed tasks in the overall response to perchlorate contamination of four Saugus wells has been the evaluation of alternative treatment methodologies and the selection of ion exchange for removal of perchlorate from water to be pumped from the two impacted wells that will be used for a combination of containment and capture of perchlorate contamination. As a result of that completed work, Valencia was in a position to immediately respond to the confirmed detection of perchlorate in Well Q2 by opening contract discussions with a selected contractor who can furnish, install and operate the same ion exchange treatment methodology which has been selected for the impacted Saugus wells.

In light of the preceding, after detection of perchlorate in its Well Q2, Valencia contacted USFilter to prepare a complete turnkey service contract to install and maintain treatment facilities capable of removing perchlorate pumped from the well to a non-detectable level. USFilter would cover all major components and estimate of installation materials and labor for start-up. The specific Q2 treatment system will incorporate USFilter HP1220HF ion exchange pressure vessels operating in a lead/lag configuration. The vessels are 12 feet in diameter and each will contain a selective resin designed to remove perchlorate. There is no waste brine generated from this treatment system. If resign replacement is necessary, USFilter will remove the resin from the treatment system and destroy it by incineration at an approved waste site.

Well Q2 is located along Bouquet Canyon Road adjacent to the Rio Vista Pump Station owned by CLWA. The treatment system will be located on the existing well site property which is owned by Valencia or, if necessary, use a small portion of land owned by CLWA. Valencia is preparing a site plan that will require constructing a concrete foundation for the ion exchange pressure vessels and other ancillary equipment and controls required to integrate the treatment system into its water supply operations.

Installing wellhead treatment at Well Q2 will require review and approval by the California Department of Health Services (DHS). Valencia will prepare and submit an application to amend Valencia's water supply permit allowing wellhead treatment at Well Q2. DHS approval is expected since ion exchange technology is recognized by DHS as "best available technology" for perchlorate removal, and multiple ion exchange treatment systems have been approved and permitted by DHS for drinking water systems. Also, the Department of Toxic Substances Control (DTSC) will include this project as part of the interim actions required to address perchlorate contamination in the Northern Alluvium. Their review was contemplated under the existing Environmental Oversight Agreement between the water purveyors and DTSC.

Since Valencia is able to rapidly respond to the contamination of its Well Q2 by installation of site modifications and turnkey contracting for treatment equipment, it intends to cooperatively pursue the amended water supply permit so it can return the well to service as soon as possible.

## *IV. Protection Plan for Non-Impacted Wells*

As noted above, based on a combination of proximity to the Whittaker-Bermite site and prevailing groundwater flow directions, there is a logical concern that perchlorate could impact nearby downgradient Alluvial wells, the closest of which are owned and operated by Valencia. As part of assessing their overall groundwater supply during the period before the impacted Saugus wells are restored in 2006, the Purveyors commissioned the use of the groundwater flow model to examine capture zones around nearby Alluvial wells under planned pumping operations through that time period. The results of that work, as reported in the CH2M Hill Technical Memorandum "*Analysis of Near-Term Groundwater Capture Areas for Production Wells Located Near the Whittaker-Bermite Property*" (Santa Clarita, California), suggested that inflow to the nearby Alluvial wells would either be upgradient of the contamination site, or would be from the Alluvium beyond where perchlorate is most likely to be transported. However, again due primarily to proximity, in this case between the capture zones and the Whittaker-Bermite site, the nearest Valencia Pardee wellfield (Wells N, N7 and N8) was considered to be at some potential risk because perchlorate had been detected in nearby Alluvial monitoring wells that were installed as part of a federally funded investigation of the extent and nature of contamination by the Army Corps of Engineers. As previously described, the other nearby Alluvial wells, including Valencia's Well Q2, were considered to be at lesser risk. Ultimately, irrespective of model simulations or other considerations, Valencia has responsibilities to supply both adequate and safe municipal water and, as a result, is prepared to respond to impacts at any of its nearby Alluvial wells in a similar manner as described for Well Q2 herein.

Thus, the response by Valencia to any future well impacted by perchlorate contamination will be to install wellhead treatment as soon as practicable, thereby ensuring adequate supplies of high quality water to its customers. Toward that end, Valencia has already dedicated space at each of the nearest well sites for addition of wellhead treatment facilities, as will be installed at Well Q2, if necessary. This short-term response plan complements the longer term actions being taken by the property owner under supervision of DTSC. For example, studies conducted by consultants under contract with the property owner have completed successful testing of in-situ groundwater remediation of perchlorate. It is anticipated this program along with several other measures approved by DTSC will be implemented over time to contain and remove perchlorate from the Northern Alluvium. Once this is accomplished, the detection of perchlorate in the Northern Alluvium is expected to decline below detectable levels over time. Successful groundwater remediation will ultimately result in the removal of wellhead treatment at wells no longer impacted by perchlorate contamination.

## *V. Status of Saugus Restoration and Containment*

From the outset of dealing with the detection of perchlorate in the four Saugus wells in 1997, the Purveyors have recognized that, among other aspects of an overall remediation programs, such a program would most likely include an element of pumping from impacted wells, or from other wells in the immediate area, to establish hydraulic conditions that would control the migration of contamination from further impacting the aquifer in a downgradient (westerly) direction. Thus, the Purveyors expected that, as the regulatory process moved forward, the overall perchlorate remediation program could include dedicated pumping from some or all of their impacted wells, with appropriate treatment, such that two desirable objectives could both be achieved: control of subsurface flow and protection of downgradient wells, and restoration of some or all impacted water supply. Not all impacted capacity is required, however, for control of groundwater flow. As a result, the remaining capacity would be replaced by construction of replacement wells at other non-impacted locations.

In cooperation with state regulatory agencies and investigators working for Whittaker-Bermite, CLWA and the water Purveyors in the Santa Clarita Valley have developed an off-site plan that focuses on the above concepts of groundwater flow control and restored pumping capacity, and also fits within the larger scale of on-site and possibly other off-site remediation activities. As specifically relates to water supply, the plan includes the following:

- constructing and operating a water treatment process that removes perchlorate from two contaminated wells such that the produced water can be used for municipal supply,

- hydraulically containing the perchlorate contamination moving from the Whittaker-Bermite site toward the impacted wells by pumping the wells at rates that will capture water from all directions around them,

- protecting the downgradient non-impacted wells via the same hydraulic containment that results from pumping two of the contaminated wells,

- restoring the annual volumes of water that were pumped from the impacted wells before they were inactivated, and also restoring the wells' total capacity to produce water in a manner consistent with the Purveyor's operational plan for groundwater supply.

The schedule for implementation of the plan to restore the initially impacted wells is that permitting, design and construction is to be complete by 2006.

Returning any of the contaminated wells to municipal water supply service by installing treatment requires issuance of a permit from DHS before the water can be considered potable and safe for delivery to consumers. The permit requirements, contained in DHS Policy Memo 97-005 for direct domestic use of impaired water sources, include formal studies and engineering work to demonstrate that pumping these wells and treating the water will be protective of public health for users of the water. The policy memo requires that DHS review the water purveyor's plan, establish appropriate permit conditions for the wells and treatment system, and provide overall approval of returning the contaminated wells to service for potable use. Ultimately, the Purveyor's plan and the DHS requirements are intended to ensure that the water introduced to the potable water distribution system has no detectable concentration of perchlorate.

As part of the formal permitting for use of impacted wells with treatment, DHS Policy 97-005 requires an analysis to demonstrate contaminant capture and protection of other nearby water supply wells. The development and calibration of a numerical groundwater flow model of the entire basin was initiated as a result of a 2001 Memorandum of Understanding among the Upper Basin Water Purveyors (CLWA, CLWA Santa Clarita Water Division, Los Angeles County Waterworks District 36, and Valencia Water Company) and the United Water Conservation District in Ventura County. Although the groundwater model was initially intended for use in analyzing the yield and sustainability of groundwater in the basin, it was adaptable to analyze both the sustainability of groundwater under an operational scenario that included the full restoration of perchlorate-impacted supply, and the containment of perchlorate near the Whittaker-Bermite property (i.e. by pumping some of the impacted wells), including preventing the movement of perchlorate contamination to other portions of the aquifer system. DTSC reviewed and approved the construction and calibration of the regional model as described in the final model report "*Regional Groundwater Flow Model for the Santa Clarita Valley, Model Development and Calibration*" (CH2M Hill, April, 2004).

After DTSC approval of the model, it was used to simulate the capture and control of perchlorate via restoration of contaminated wells, with treatment, as described above. The results of that work are summarized in a second report "*Analysis of Perchlorate Containment in Groundwater Near the Whittaker-Bermite Property, Santa Clarita, California*" (CH2M Hill, September 2004). The modeling analysis indicated that the pumping of contaminated wells SCWC-Saugus1 and SCWC-Saugus2 at rates of 1,200 gpm each on a nearly continual basis will effectively contain perchlorate migrating westward in the Saugus Formation from the Whittaker-Bermite property. The analysis also indicated that 1) no new production wells are needed in the Saugus Formation to meet the perchlorate containment objective, 2) impacted well NCWD-11 is not a required component of the containment program, and 3) the use of other water supplies in lieu of pumping at SCWC-Saugus1 and SCWC-Saugus2 would likely be detrimental to the long-term quality of groundwater in the Saugus Formation because pumping at SCWC-Saugus1 and SCWC-Saugus2 is necessary to prevent migration of perchlorate to other portions of the Saugus Formation.

The perchlorate containment report also includes the general design of a sentinel groundwater monitoring network and program required by DHS as part of its 97-005 permitting. The perchlorate containment report was approved by DTSC in November 2004. With that approval, the model is now being used to support the source water assessment and the balance of the permitting process required by DHS under is 97-005 policy.

A detailed history of the perchlorate issue and its impact on municipal water supply in the Valley is included in the Amended 2000 Urban Water Management Plan for the Valley. Included in that history are discussions of the detection of perchlorate in municipal supply wells, investigation and oversight by regulatory agencies, federally funded investigation of the extent and nature of contamination, litigation by the affected Purveyors, and cooperative settlement work toward selection and implementation of solutions that will restore impacted municipal groundwater supply and control the migration of perchlorate, the latter to protect downgradient wells. As noted above, the overall schedule for installation of treatment and return of impacted wells to service has been that those facilities be operational by 2006. The most current status of overall work toward that schedule was prepared in early April 2005. As of that date, the treatment and well reoperation project description has been finalized, and final settlement discussions were proceeding between the Purveyors and the Whittaker-Bermite parties. A draft Remedial Action Plan (RAP) has been completed; finalization of the RAP is pending determination of requirements by DTSC. A final report on the federally funded conceptual hydrogeology investigation prepared by the Army Corps of Engineers was completed in January 2005; funding is in place for limited monitoring of existing test wells in the next fiscal year. Draft reports on Source Water Assessment, Water Quality Investigation, and Source Protection Plan, all part of the DHS 97-005 approval process, are complete and in review. Draft reports on Effective Monitoring and Treatment, Human Health Risk, and Alternatives Evaluation are scheduled for completion in early May and June, respectively. CEQA review is scheduled for completion by the first of July. In the general area of design and construction, pipeline alignment studies have been completed, and work is continuing on final treatment process selection. The start of construction is scheduled for October 2005, with startup of the restored wells and new treatment facilities scheduled for February 2006. Thus, the descriptions of planned perchlorate containment, restoration of impacted wells, and adequacy of water supply in the interim remain as detailed in the Amended 2000 Urban Water Management Plan. The response plan for Valencia's Well Q2, as detailed herein, is consistent with maintaining the planned volumes and distribution of Alluvial pumping that are part of the overall restoration of perchlorate-impacted groundwater supply in the Valley.

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**Groundwater Management Plan, Santa Clara River Valley Groundwater Basin**
**Dated December 2003**

# Groundwater Management Plan

## Santa Clara River Valley Groundwater Basin, East Subbasin

## Los Angeles County, California

CASTAIC LAKE WATER AGENCY

December, 2003

LUHDORFF & SCALMANINI
CONSULTING ENGINEERS

# *Table of Contents*


Page

I. Introduction ..... 1
- Castaic Lake Water Agency ..... 1
- Santa Clara River Valley Groundwater Basin, East Subbasin ..... 1
- Overview of Water Requirements and Supplies ..... 2
- Water Code Section 10753 ..... 2

II. Management Objectives (Goals) for the Basin ..... 7

III. Groundwater Basin Conditions ..... 10
- Occurrence of Groundwater ..... 10
- Historical Groundwater Development ..... 11
- Groundwater Monitoring Network and Program ..... 12
- Groundwater Levels and Storage ..... 13
- Groundwater Quality ..... 15
- Areas of Concern and Identified Problems ..... 17

IV. Historical and Projected Water Requirements and Supplies ..... 19
- Historical Water Requirements ..... 19
- Projected Water Requirements ..... 20
- Existing and Projected Water Supplies ..... 21

V. Elements of the Groundwater Management Plan ..... 24
- Primary Element 1 - Monitoring of Groundwater Levels, Quality, Production, and Subsidence ..... 26
- Primary Element 2 - Monitoring and Management of Surface Water Flows and Quality ..... 27
- Primary Element 3 - Determination of Basin Yield and Avoidance of Overdraft ..... 29
- Primary Element 4 - Development of Regular and Dry Year/Emergency Water Supply ..... 30
- Primary Element 5 - Continuation of Conjunctive Use Operations ..... 30
- Primary Element 6 - Long Term Salinity Management ..... 32
- Primary Element 7 - Integration of Recycled Water ..... 32

## *Table of Contents, cont.*

Page

Primary Element 8 - Identification and Mitigation of Soil and Groundwater Contamination . . . . . 33
Primary Element 9 - Development and Continuation of Local, State and Federal Agency Relationships . . . . . 35
Primary Element 10 - Groundwater Management Reports . . . . . 37
Secondary Element 1 - Continuation of Public Education and Water Conservation Programs . . . . . 38
Secondary Element 2 - Identification and Management of Recharge Areas and Wellhead Protection Areas . . . . . 39
Secondary Element 3 - Identification of Well Construction, Abandonment and Destruction Policies . . . . . 42
Secondary Element 4 - Provisions to Update the Groundwater Management Plan . . . . . 42

VI. References

Appendices

I. Groundwater and Surface Water Monitoring Protocols
II. Comments and Responses (separately bound)

# *Figures and Tables*

**Figures** **Afer Page**


1-1 CLWA and Purveyors' Service Areas . . . . . 1
1-2 Santa Clara River Valley East Ground-Water Subbasin . . . . . 2
3-1 Alluvial and Saugus Formations . . . . . 11
3-2 Historical Groundwater Elevations . . . . . 13
3-3 Historical Groundwater Quality . . . . . 14
4-1 Historical Groundwater Production . . . . . 18
4-2 Historical and Projected Water Use . . . . . 19
5-1 Water Level Monitoring Well Network . . . . . 26
5-2 Water Quality Monitoring Network . . . . . 26
5-3 Average of Daily Mean Streamflow over the Water Year . . . . . 26
5-4 Historical and Projected Water Use . . . . . 29


**Tables** **Page**


4-1 Projected Normal/Average Year Water Demands . . . . . 21

# I. Introduction

**Castaic Lake Water Agency**

Castaic Lake Water Agency (CLWA) was formed in 1962 as a State Water Project Contractor to provide wholesale water supply from the State Water Project (SWP) to retail water purveyors in the Upper Santa Clara River area, most notably to Newhall County Water District, Los Angeles County Waterworks District No. 36, Santa Clarita Water Company and Valencia Water Company. In 2001, as part of legislation authorizing CLWA to provide retail water service to individual municipal customers in addition to its ongoing wholesale water supply, Assembly Bill 134 included a requirement that CLWA prepare a groundwater management plan in accordance with the provisions of Water Code Section 10750 et seq., which was originally enacted by, and is commonly known as, Assembly Bill 3030. This groundwater management plan has been prepared to satisfy the requirements of AB 134 and to both complement and formalize a number of existing water supply and water resource planning and management activities in the CLWA service area.

The CLWA service area encompasses all of the existing and currently planned municipal water service areas of the Upper Santa Clara River area, i.e. the suburban areas generally proximate to the Santa Clara River in Los Angeles County, generally between hills of the San Gabriel Mountains and the Santa Susana Mountains on the north and south, and between the Los Angeles/Ventura County line and Lang Station on the west and east, respectively. The extent of the CLWA service area and the geographical locations of the individual water purveyors within the CLWA service area are illustrated in Figure 1-1.

**Santa Clara River Valley Groundwater Basin, East Subbasin**

The groundwater basin generally beneath the CLWA service area, identified in DWR Bulletin 118 as the Santa Clara River Valley Groundwater Basin, East Subbasin (Basin No. 4-4.07), is comprised of two aquifer systems, the Alluvium generally underlying the Santa Clara River and its several tributaries, and the Saugus Formation which underlies much of the entire Upper Santa Clara River area. The mapped extent of the Santa Clara River Valley East Subbasin in Bulletin 118, which is approximately the outer extent of the Alluvium and the Saugus Formation, and its

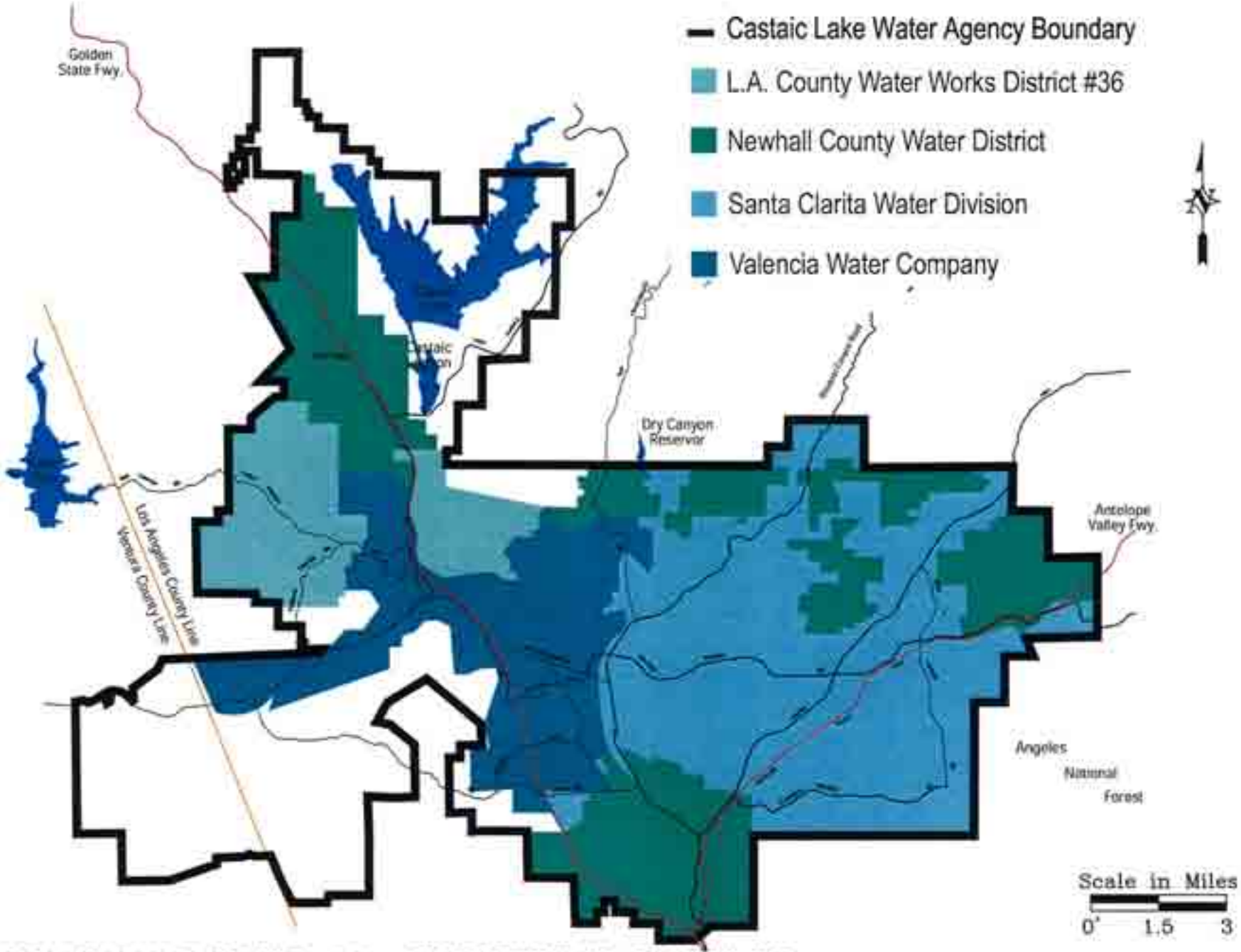


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**Figure 1-1**
**CLWA and Purveyors' Service Areas**

relationship to the extent of the CLWA service area are illustrated in Figure 1-2.

The two aquifer systems that comprise the groundwater basin are described in detail in this plan. For purposes of this plan, the groundwater basin is encompassed by the CLWA service area, and CLWA is the logical public water supply agency to prepare and implement a groundwater management plan for the Santa Clara River Valley East groundwater subbasin.

**Overview of Water Requirements and Supplies**

Historically, while development of local water supplies dates back at least 100 years, the earliest complete records of water use in the basin date from the late 1940's, when practically all water demand was for agricultural use. From that time through the early 1960's, agricultural water use, which was solely supplied by local groundwater, ranged from about 27,000 to about 42,000 acre-feet per year (afy). Over the succeeding three decades, agricultural water use progressively declined, into the range of about 8,000 to 10,000 afy, followed by a slight increase into the range of about 12,000 to 15,000 afy over the last ten years. Current projections are for agricultural water use to substantially decline, to about 7,000 afy, over the next 20 years.

Significant municipal water use in the basin did not begin until the early 1960's, when municipal uses, which were met exclusively at that time by local groundwater, were in the range of about 5,000 to 10,000 afy. By 1980, when supplemental surface water from the State Water Project (SWP) began to be imported to the basin, municipal water demands had increased to about 22,000 afy. Since then, municipal water demands have further increased, to their current level of about 61,000 afy, about 60 percent of which is supplied by SWP water, with the balance supplied by local groundwater. Current projections are for municipal water requirements to increase to about 106,000 afy over the next 20 years.

Historical and projected water requirements and supplies in the basin are discussed in more detail in Section IV of this Plan.

**Water Code Section 10750 et. seq.**

In 1992, the California State Legislature adopted Assembly Bill 3030 (AB 3030); that legislation was subsequently incorporated into the Water Code, Section 10750 et seq., to encourage local public agencies/water purveyors to adopt a formal plan to manage groundwater resources within

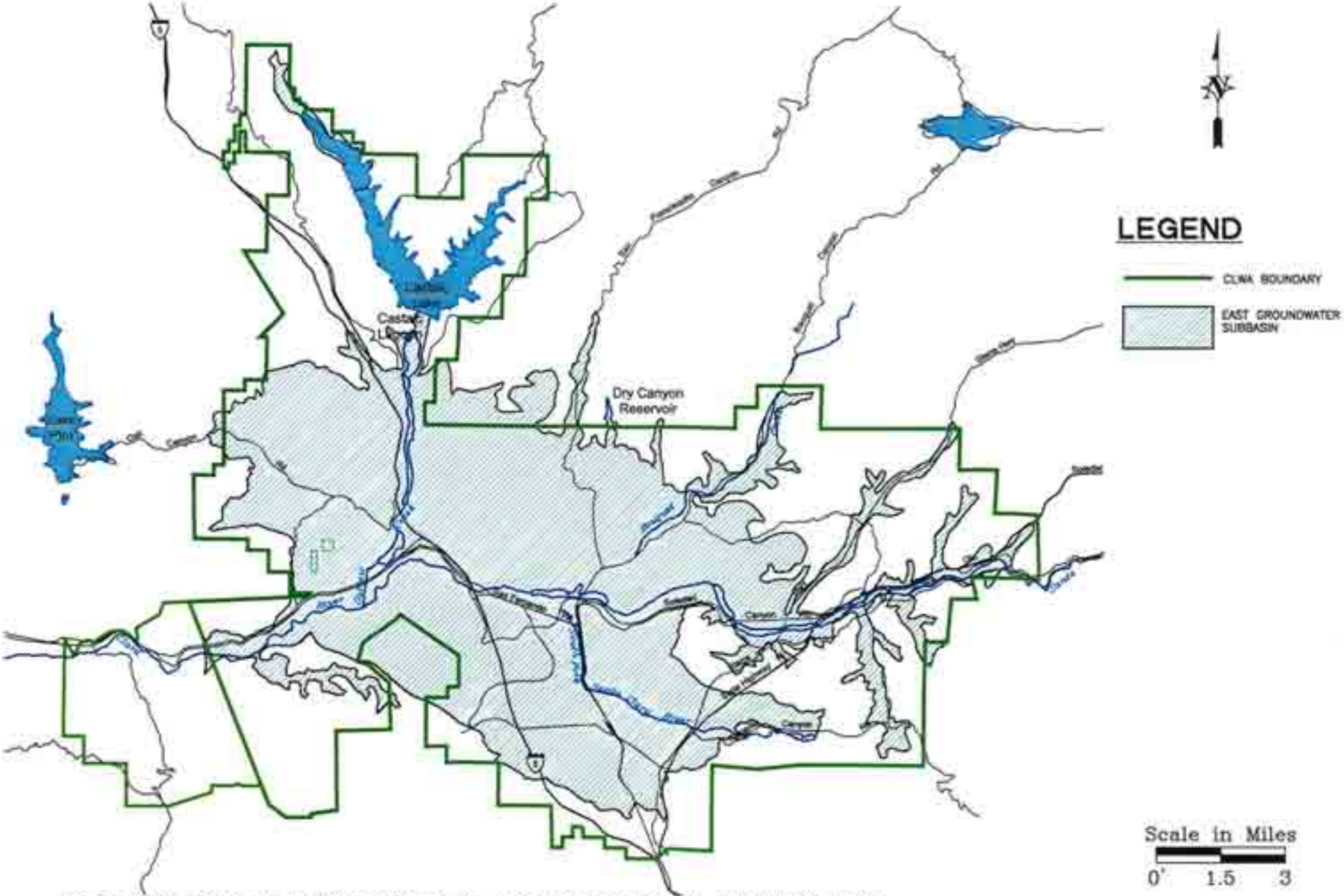


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**Figure 1-2**
**Santa Clara River Valley**
**East Groundwater Subbasin**

their jurisdictions. Within the scope of Water Code Section 10753.8, a local groundwater management plan can potentially include up to twelve specific components. Although the plan need not be restricted to those specific components, the listed components are quite broad and cover essentially all of the groundwater management elements which are part of this plan or are likely to be considered for implementation into this plan in the foreseeable future. To a considerable extent, a number of the groundwater management activities listed in Water Code Section 10753.8 have been implemented in the Santa Clara River Valley East groundwater subbasin as part of an organized effort by the local municipal water purveyors, including CLWA, to manage the groundwater basin within its sustainable yield for the benefit of local water supply, and also to integrate management of the basin with the management of surface and groundwater immediately downstream on the Santa Clara River, in this case specifically with United Water Conservation District in Ventura County, as discussed in more detail herein.

The potential components of a groundwater management plan listed in Water Code Section 10753.8 include:

- the control of saline water intrusion.
- identification and management of wellhead protection areas and recharge areas.
- regulation of the migration of contaminated groundwater.
- the administration of a well abandonment and well destruction program.
- mitigation of conditions of overdraft.
- replacement of groundwater extracted by water producers.
- monitoring of groundwater levels and storage.
- facilitating conjunctive use operations.
- identification of well construction policies.
- the construction and operation by the local agency of groundwater contamination cleanup, recharge, storage, conservation, water recycling, and extraction projects.
- the development of relationships with state and federal regulatory agencies.
- the review of land use plans and coordination with land use planning agencies to assess activities which create a reasonable risk of groundwater contamination.

In 2002, the Legislature adopted Senate Bill 1938 (SB 1938) to amend and add to Water Code Section 10750 et seq. regarding the implementation of local groundwater management plans. While the provisions of SB 1938 did not alter the potential components of a local groundwater management plan, as listed above, it did add the following notable provisions:

- The local agency, in preparing a groundwater management plan, shall make available to the public a written statement describing how interested parties may participate in developing the plan; for purposes of carrying out the preceding requirement, the local agency may appoint, and consult with, a technical advisory committee consisting of interested parties. AB 134 actually anticipated this last item by requiring CLWA to form an Advisory Committee to review its Plan. The membership of the Advisory Committee was specified to consist of one representative from each retail water purveyor within CLWA and one representative from each groundwater producer within CLWA who pumped more than 100 acre-feet in the preceding water year (2000). In conformance with that requirement, CLWA formed an Advisory Committee consisting of representatives from the following organizations, who collectively fulfill the description of the membership specified in AB134:

    - CLWA Santa Clarita Water Division
    - Los Angeles County Sheriff's Department
    - Los Angeles County Waterworks District No. 36
    - Newhall County Water District
    - Newhall Land and Farming Company
    - Robinson Ranch
    - Valencia Water Company

- In order to qualify for funding assistance for groundwater projects or groundwater quality projects, for funds administered by DWR, a local agency must accomplish all the following relative to groundwater management:

    - prepare and implement, or participate in, or consent to be subject to, a groundwater management plan, a basin-wide management plan, or other integrated regional water management program or plan that meets the provisions listed below.

    - include groundwater management components that address monitoring and management of water levels, groundwater quality degradation, inelastic land subsidence, and changes in surface flows and quality that either affect groundwater or are affected by groundwater pumping.

- include provisions to cooperatively work with other public (and presumably private) entities whose service area or boundary overlies the groundwater basin.

- include mapping of the groundwater basin, as defined in DWR's Bulletin 118, and the boundaries of the local agency subject to the plan, plus the boundaries of other local agencies that overlie the basin.

- adopt monitoring protocols designed to detect changes in groundwater levels, groundwater quality, inelastic land subsidence (for basins where subsidence has been identified as a potential problem), and flow and quality of surface water that either directly affect groundwater, or are directly affected by groundwater pumping.

Of the potential groundwater management activities listed in Water Code Section 10753.8, those already being investigated and actively implemented as part of less formal groundwater management by the purveyors include avoidance of overdraft, implementation of conjunctive use, monitoring of groundwater levels and quality, initiation of groundwater contamination control, analysis of basin yield for ongoing avoidance of overdraft, and annual analysis and reporting on basin conditions. The historic focus of informal groundwater management in the Santa Clara River Valley East groundwater subbasin has been on water supply, quantity and quality, to avoid conditions of overdraft, primarily by augmenting local groundwater supplies with a supplemental, imported surface water supply from the State Water Project. More recently, efforts have been added to include ongoing monitoring and the compilation of data into a data management system that is integrated with a comparable database system for the downstream surface water resources and groundwater basins on the Santa Clara River. Recent efforts have also included initiation of a process to develop a numerical groundwater flow model of the basin for analysis of basin response to various water supply, recharge, and conjunctive use management alternatives that might be applicable for the basin. The potential groundwater management provisions not historically implemented have been those more focused on groundwater contamination; however, very recent activities have added this component to local groundwater management as a result of impacts on several municipal water supply wells from a former munitions manufacturing site in the basin, as discussed in more detail herein.

In summary, in many respects, the local municipal water purveyors, including CLWA, have

already begun developing and implementing important parts of a formal local groundwater management program as part of developing reliable water supplies for in-basin needs. To ensure the reliability of the groundwater component of water supplies to meet existing and projected demands, those parts of local groundwater management planning already include monitoring, formulation of a data base, and integration with the database for adjoining downstream basins, analysis of groundwater conditions and annual reporting on water conditions in the basin, initiation of groundwater flow modeling, ongoing conjunctive use of local groundwater and imported SWP supplies, and initiation of investigation and control of localized groundwater contamination. The groundwater management plan described herein can be envisioned as a formalization, and some expansion, of those ongoing management efforts in the Santa Clara River Valley East groundwater subbasin.

The balance of this plan is organized to first establish a set of management objectives, or goals, for the basin; to then describe existing groundwater basin conditions, including areas of concern and identified problems; to present historical and projected water demands in the basin; and to finally present a set of groundwater management actions which, in aggregate, are the elements of this groundwater management plan.

## *II. Management Objectives (Goals) for the Basin*

Prior to 1980, all water supplies in the Upper Santa Clara River Area were developed from local groundwater. Since 1980, the major water purveyors within the CLWA service area have developed their water supplies from a combination of local groundwater and imported supplemental surface water from the State Water Project (SWP). CLWA is the state SWP Contractor which holds the contract for SWP water. CLWA also operates the treatment and distribution system for delivery of SWP water to the local purveyors. Some imported SWP water has historically been delivered for non-municipal uses although, in aggregate, total non-municipal uses have been almost negligible (less than one percent).

A relatively small fraction of water supply in the area is still devoted to agricultural and other irrigation, and essentially all of that remains developed from groundwater. Over the last two decades, that use has been in a range between about 10,000 and 17,000 acre-feet per year.

The development and importation of a supplemental surface water supply from the State Water Project represents the first of a number of water resource and water supply management actions, all of which are formalized in this plan, aimed at what can be considered to be the overall goals or objectives for the basin. In no priority, those management objectives for the basin can be expressed as follows:

1. Development of an integrated surface water, groundwater, and recycled water supply to meet existing and projected demands for municipal, agricultural, and other water supply; since pumpage for other uses is from the same aquifer system, this objective includes agricultural, small community, non-agricultural irrigation, and individual domestic uses.

2. Assessment of groundwater basin conditions to determine a range of operational yield values that will make use of local groundwater conjunctively with SWP and recycled water to avoid groundwater overdraft and the undesirable effects associated with it. In effect, this objective equates to more detailed quantification of the yield of the basin in order to continue to avoid overdraft, consistent with what has historically been the case in the basin. In addition to avoiding the traditional overdraft symptoms

and effects, e.g. chronic water level decline, loss of groundwater storage, onset of land subsidence, groundwater quality degradation, a corresponding basin objective is to manage groundwater levels and associated groundwater discharge to the Santa Clara River at the west end of the basin, and thus not adversely impact surface and groundwater discharges to the downstream basin(s).

3. Preservation of groundwater quality for beneficial use in the basin, and for beneficial use of surface water and groundwater discharges from the basin. Included in this management goal will be the active characterization and solution of any groundwater contamination problems, through cooperation with responsible parties or through independent action if timely action by responsible parties is not forthcoming and the preceding management objectives are thereby impacted or constrained.

4. Preservation of interrelated surface water resources. Included in this management goal will be the maintenance of appropriate surface water flows and non-degradation of surface water quality as a result of managing groundwater conditions to meet the other management goals for the basin.

Quantitatively, the preceding goals translate into general preservation of groundwater levels and quality in the Alluvial aquifer system consistent with the last 30 years, including fluctuations through seasonal demands and local hydrologic variations (wet and dry periods). As discussed in more detail in the next chapter, the hydrogeologic setting in the area has resulted in smaller Alluvial groundwater level fluctuations toward the western half of the basin (generally west of Bouquet Canyon), and larger fluctuations to the east. However, largely due in part to the importation of supplemental surface water over the last 20 years, and the integrated or conjunctive use of that supplemental water with local groundwater, there has been no chronic decline in groundwater levels or storage. A continuation of such basin conditions, possibly complemented by management actions to decrease the historical water level fluctuations in the eastern part of the basin, will accomplish the second basin objective (continued avoidance of overdraft as has been the ongoing historical condition in the basin) while continuing to utilize local groundwater to meet part of projected water requirements. Corresponding management actions to sustain recharge and not overdraft groundwater storage will accomplish the third basin objective by replenishing the aquifer system with sufficient water to sustain what has been generally consistent quality of groundwater on a long-term basis.

In general, the same goals of preservation of groundwater levels and quality pertain to the Saugus Formation as well as to the Alluvium. However, while those goals are generally expected to equate to Alluvial pumping rates comparable to recent historical pumping, the Saugus Formation may be intermittently utilized at higher than historical pumping rates for dry-period and/or emergency water supply. Interpretation of historical pumping fluctuations and corresponding aquifer response suggests that such intermittent utilization of a small fraction of the Saugus' large storage capacity can successfully contribute to a firming of local water supplies while still accomplishing all the management objectives listed above, primarily via reduction in Saugus pumping during wet-normal conditions, possibly complemented by management actions to accelerate recharge of the Saugus.

# *III. Groundwater Basin Conditions*

**Occurrence of Groundwater**

Groundwater in the Santa Clara River Valley East groundwater subbasin occurs in two aquifer systems, the Alluvium associated with the Santa Clara River and its tributaries, and the Saugus Formation. There are also some scattered outcrops of Terrace deposits in the basin that likely have the capacity to contain limited amounts of groundwater; however, since these deposits are located in limited areas that are situated at elevations above the regional water table and are also of limited thickness, they are of no practical significance as aquifers and have consequently not been developed for water supply.

The Alluvial aquifer system, of Quaternary to Holocene (Recent) geologic age, consists primarily of stream channel and flood plain deposits of the Santa Clara River and its tributaries. The Alluvium is deepest along the center of the present river channel, with a maximum thickness of about 200 feet near the area known as Saugus. It thins toward the flanks of the adjoining hills and toward the eastern and western boundaries of the basin and, in the tributaries, becomes a mere veneer in their upper reaches. The spatial extent of the Alluvium throughout the basin is illustrated in Figure 3-1.

The Alluvium is the most permeable of the local aquifer units. Based on well yields and aquifer testing, transmissivity values in the range of 50,000 to 500,000 gallons per day per foot (gpd/ft) have been reported for the Alluvium, with the higher values where the Alluvium is thickest in the center of the valley and generally west of Bouquet Canyon (Slade 1986 and 2002). The amount of groundwater in storage can vary considerably because of the effects of recharge, discharge and pumping from the aquifer. The maximum storage capacity of the Alluvium has been estimated to be about 240,000 acre-feet (af) (Slade, 1986 and 2002).

The Saugus Formation, of Pliocene to Pleistocene geologic age, has traditionally been divided into two stratigraphic units: the lowermost, geologically older Sunshine Ranch member, which is of mixed marine to terrestrial (non-marine) origin; and the overlying, or upper, portion of the Formation which is entirely terrestrial in origin. The Sunshine Ranch Member of the Saugus Formation has a maximum thickness of about 3,000 to 3,500 feet in the central part of the valley;

however, due to its marine origin and fine-grained nature, it is not considered to be a viable source of groundwater for municipal or other comparable supply. Above the Sunshine Ranch Member, the Saugus Formation is coarser grained, consisting mainly of lenticular beds of sandstone and conglomerate that are interbedded with lesser amounts of sandy mudstone, which were deposited in stream channels, flood plains, and alluvial fans by one or more ancestral drainage systems in the valley. The sand and gravel units that represent aquifer materials in the upper part of the Saugus Formation are generally located between depths of about 300 and 2,500 feet. The spatial extent of the Saugus Formation throughout the basin is illustrated in Figure 3-1.

While much thicker and more spatially extensive throughout the basin when compared to the Alluvium, and while significant in terms of groundwater storage and individual well capacity, the Saugus Formation has typically lower values of transmissivity, in the range of 80,000 to 160,000 gpd/ft, with the higher values in the upper portions of the Formation (Slade, 1988 and 2002). The storage capacity of the Saugus has most recently been estimated to be 1.65 million acre-feet between depths of 300 feet and 2,500 feet (or the base of the Saugus or the base of fresh water if shallower than 2,500 ft.) (Slade, 2002).

**Historical Groundwater Development**

Of the two aquifer systems in the basin, the predominant development of groundwater for agricultural and municipal water supply has historically been from the Alluvium, a condition that remains the case at present. Prior to 1980, all water supply in the valley was developed from local groundwater; since 1980, local groundwater has been supplemented by imported surface water from the State Water Project. Details of historical water requirements, and water supplies to meet those requirements, are discussed and illustrated in Chapter IV of this Plan.

In general, over the last two decades, since the inception of SWP deliveries in 1980, total pumpage from the Alluvium has ranged from a low of about 20,000 afy (in 1983) to slightly more than 43,000 afy (in 1999). For comparison, agricultural pumpage from the Alluvium throughout the 1950's was consistently in the range of about 33,000 to 41,000 afy. During that same time, municipal pumpage was quite small, less than 4,000 afy. Overall, over the last two decades, there has been a change in municipal/agricultural pumping distribution, toward a slightly higher fraction for municipal water supply (from about 50% to nearly 60% of alluvial pumpage) which is indicative of the general land use changes in the area.

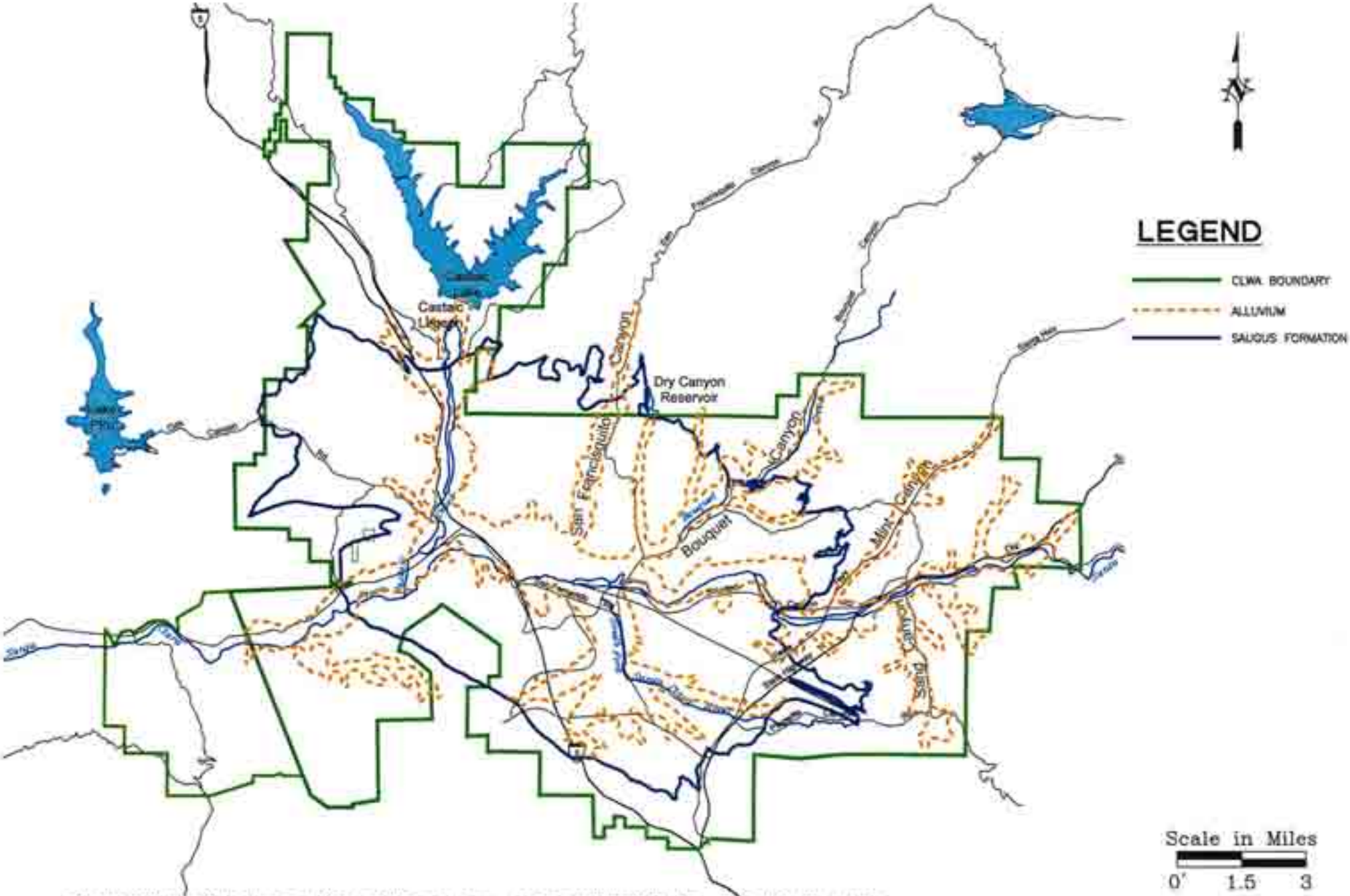


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**Figure 3-1**
**Alluvial and Saugus Formations**
**Santa Clara River Valley East Groundwater Subbasin**

Since 1980, total pumpage from the Saugus Formation has ranged between about 3,850 afy and nearly 15,000 afy; average pumpage over that period has been about 6,900 afy. The great majority of pumpage from the Saugus is for municipal supply (nearly 6,300 afy, or 92 percent, on average). For comparison, although historical Saugus pumping records prior to 1980 are limited, there appears to have been essentially no pumping from the Saugus prior to 1960 (on the order of about 100 af in most years, beginning in 1948), and some increased pumping for agricultural water supply beginning in about 1962 (about 900 af). The largest amount of agricultural pumping from the Saugus was during the mid-1960's, when annual Saugus pumpage was about 3,000 af. Agricultural pumping from the Saugus declined to near zero by the late 1970's, but has been generally in the 500 to 1,000 afy range since 1982. There was no Saugus pumpage for municipal supply in the early 1960's; limited data suggests that municipal pumping from the Saugus began in the 1970's, and reached nearly 5,000 afy by 1980-81. The most significant period of Saugus pumpage was 1991 through 1994, when pumpage ranged from 10,600 afy to nearly 15,000 afy and averaged over 12,000 afy, during which time SWP water deliveries were reduced at the end of extended drought conditions.

**Groundwater Monitoring Network and Program**

There is no formal groundwater monitoring network of wells for groundwater level measurements and/or groundwater quality sampling in the basin. Consequently, one component of this Plan is to formalize both a network of wells for groundwater monitoring and a program for water level measurements, water quality sampling, and other pertinent groundwater data collection (Primary Plan Element 1). Despite the lack of an existing formal groundwater monitoring network and program, however, there is a significant amount of historical groundwater data, some of which dates back into the 1940's, on which to base reasonable assessments of groundwater conditions in the basin. For example, groundwater level measurements have been made over varying periods of record in a total of 154 wells, mostly alluvial wells, throughout the basin. Similarly, groundwater quality data, consisting of varying numbers of constituents analyzed, are available from some wells, but a much smaller number than is the case for groundwater level data. These data, along with direct measurements or indirect estimates of pumpage, primarily from high capacity municipal and agricultural wells, allow for analysis of groundwater basin conditions, as discussed in this Plan, and also provide the bases on which a groundwater model can be developed (Primary Plan Element 3) and on which various management criteria such as operational yield, baseline groundwater quality, etc. can be determined (Primary Plan Elements 3, 6, etc.).

**Groundwater Levels and Storage**

Groundwater level data in various parts of the basin illustrate basin response to the historical pumpage from the Alluvium. Organized into hydrograph form (depth to groundwater or groundwater elevation vs. time), historical groundwater levels were lower in the 1950's and 60's than current levels in the middle to western part of the basin, logically in response to the higher pumpage of the 1950's before the importation of SWP water and the associated increase in return flows to the river that have augmented groundwater recharge in that part of the basin. Groundwater levels in those areas notably recovered as pumpage declined through the 1960's and 1970's. They have subsequently sustained generally high levels for much of the last 30 years, with two dry-period exceptions: mid-1970's and late 1980's - early 1990's; recoveries to previous high groundwater levels have followed both of those dry-period declines. Based on this data, there is no evidence of any historic or recent trend toward permanent water level or storage decline. In general, throughout the Alluvium, groundwater levels have been generally higher over the last 30 years than was consistently the case for the preceding 20 years (1950's - 60's).

During the last 20 to 30 years, in essentially all the alluvial portions of the basin, groundwater levels have fluctuated from near the ground surface when the basin is full, to as much as 100 feet lower during intermittent dry periods of reduced recharge. Selected hydrographs of groundwater elevations illustrate the above described conditions throughout the basin. Figure 3-2 illustrates groundwater level conditions and trends at multiple locations in the Alluvium along the main channel of the Santa Clara River, from east near the mouth of Sand Canyon, to the area between Mint Canyon and Bouquet Canyon, to farther west immediately below the mouth of Bouquet Canyon. Similar long-term conditions are evident in the tributary canyons.

A comment about some of the groundwater fluctuations illustrated in Figure 3-2 is appropriate since they are illustrative of the most substantial intermittent changes in the basin. As noted above, the Alluvium has historically experienced a number of alternating wet and dry hydrologic conditions as illustrated in Figure 3-2. Since the Alluvium is thinner to the east, the fluctuations in water levels of 75 to 100 feet impact well yields and pumping capacities when water levels are occasionally lower. When that occurs, as is currently the case due to locally dry hydrologic conditions, the affected purveyors shift a portion of their water demands to imported SWP water, thus reducing pumpage and reducing drawdown of water levels. Recovery of groundwater levels

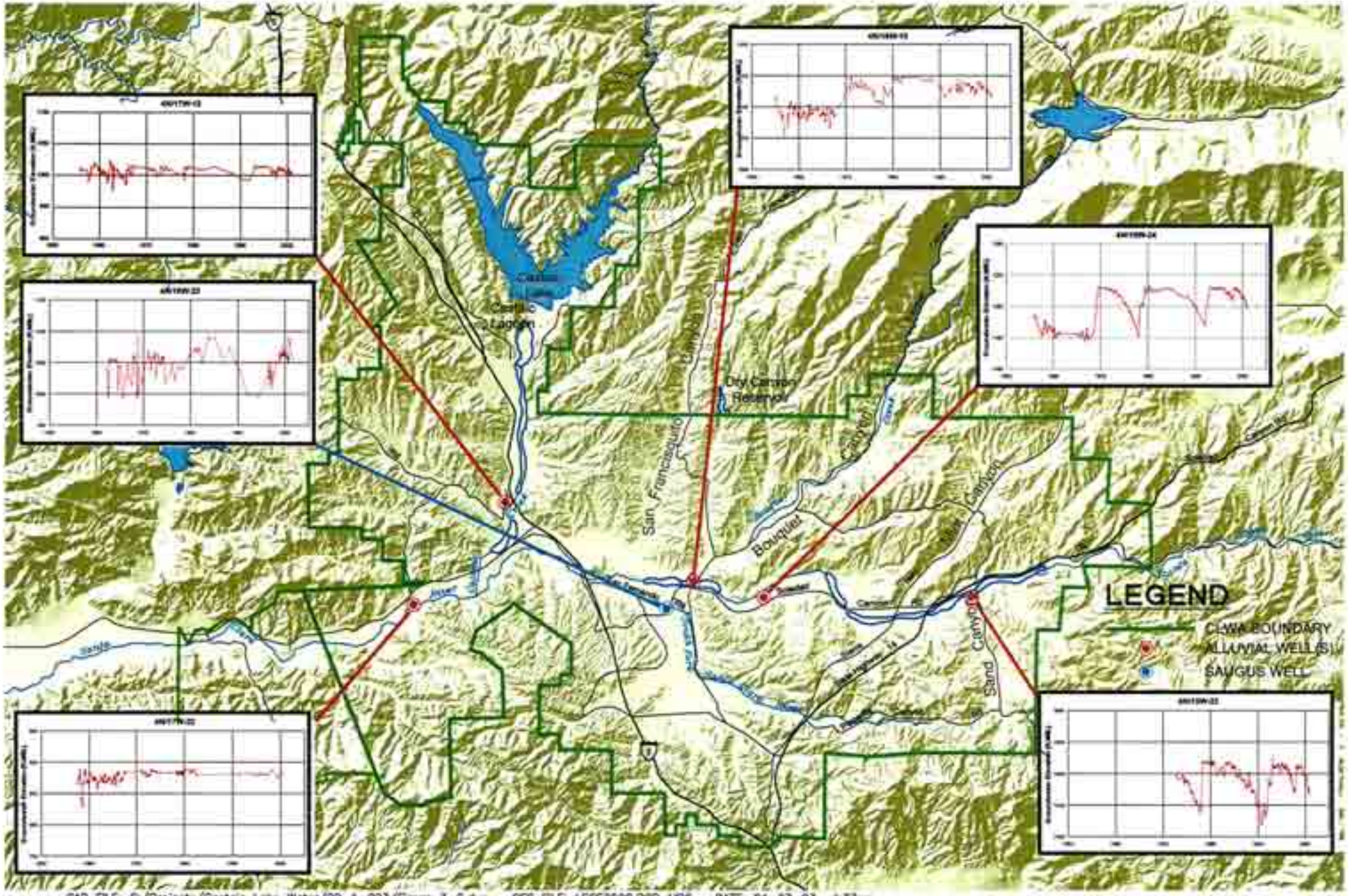


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**Figure 3-2**
**Historical Groundwater Elevations**
**Santa Clara River Valley East Groundwater Subbasin**

and storage occurs upon a return of stream flow to contribute to natural recharge.

Depending on the period of available data, all the hydrographs of alluvial groundwater levels show the same general picture: recent (last 30 years) groundwater levels are generally higher than over the preceding 20 years. In some locations, there are intermittent dry-period declines (and an associated use of some groundwater from storage) followed by wet-period recoveries (and associated refilling of storage space). On a long-term basis, whether over the last 20 years since the inception of conjunctive use via importation of SWP water, or over the last 40 to 50 years, the Alluvium shows no signs of water level-related overdraft, i.e., no trend toward decreasing groundwater levels and storage, a condition that is intended to be maintained via implementation of this Plan, e.g. via Primary Plan Elements 3 and 5.

Unlike the Alluvium, there are limited Saugus water level data; however, the limited data indicate that, although there have been seasonal water level changes in response to pumpage, the long-term trend in the Saugus (over the last 35 to 40 years) has been one of relative groundwater level stability (see, for example, Figure 3-2). There is no trend toward a sustained decline in Saugus water levels or storage that would be indicative of overdraft.

Land subsidence as a result of groundwater extractions is a concern in a number of groundwater basins in California. The potential for land subsidence caused by groundwater extractions derives from a combination of the geologic makeup of the aquifer materials and the history of groundwater level fluctuations. In the Santa Clara Valley East Subbasin, the most notable groundwater level fluctuations have occurred in the Alluvium to the east of Bouquet Canyon, with the greatest fluctuations (up to nearly 100 feet) recorded in the vicinity of Sand Canyon. Fortunately, those fluctuations have been intermittent, and have varied directly with local wet and dry conditions. From a subsidence perspective, they have also fluctuated in an unconfined aquifer that is comprised of essentially all coarse-grained material. The lack of any significant fine-grained material in the aquifer where groundwater levels have fluctuated results in two notable local conditions in regards to subsidence: there is no recorded historical subsidence or indirect evidence of its occurrence, i.e. subsidence-related impacts on surface structures, drainage facilities, etc.; and there is minimal potential for inelastic subsidence to occur in response to ongoing groundwater level fluctuations in the Alluvium.

The Saugus Formation contains a greater fraction of fine-grained material interbedded with the coarser aquifer materials that yield water to wells. Consequently, the Saugus has a greater

potential to undergo consolidation, with attenuant subsidence impacts at the ground surface, if groundwater levels are substantially lowered for long time periods. Historical Saugus pumping has not caused such conditions to occur. Current water supply planning, as described in this Plan, is to rely on the Saugus Formation for a relatively small component of water supply on an ongoing basis, with intermittent increased pumping during dry periods.

The long-term objective for groundwater management, as described in this Plan, is to not overdraft either the Alluvium or the Saugus, i.e. to not chronically lower groundwater levels. Satisfaction of the latter objective will have the correlative impact of minimizing the potential for inelastic land subsidence attributable to pumping from the Saugus Formation; combined with the lack of fine-grained material in the Alluvium, satisfaction of that objective will also have the correlative impact of ensuring the improbability of any subsidence attributable to pumping from that aquifer.

**Groundwater Quality**

Groundwater quality is, or course, a key factor in assessing both the Alluvial aquifer and the Saugus Formation as municipal and agricultural water supplies. At present, however, there is no convenient long-term record of water quality, i.e. water quality data in one or more wells that span several decades and continue to the present. Thus, in order to examine a long-term record of water quality in the Alluvium, an integration of individual records from several wells, completed in the same aquifer materials and in close proximity to each other, can be used to generally show long-term trends in groundwater quality. Figure 3-3 illustrates groundwater quality conditions and trends at multiple locations in the Alluvium along the main channel of the Santa Clara River from the area near the mouth of Mint Canyon, to areas immediately above and near the mouth of Bouquet Canyon, to the area below San Francisquito Canyon. Based on these records of groundwater quality, there have been historical fluctuations in concentrations of total dissolved solids (TDS), as well as corresponding fluctuations of individual constituents of TDS. In general, however, and similar to groundwater levels, there has been no long-term trend toward groundwater quality degradation.

Groundwater quality variations are common throughout the Alluvium and generally correlate inversely with precipitation and stream flow: wet periods have produced substantial recharge of higher quality (low TDS) water and dry periods have resulted in the notable declines in water levels described above, with a corresponding increase in TDS (and individual component

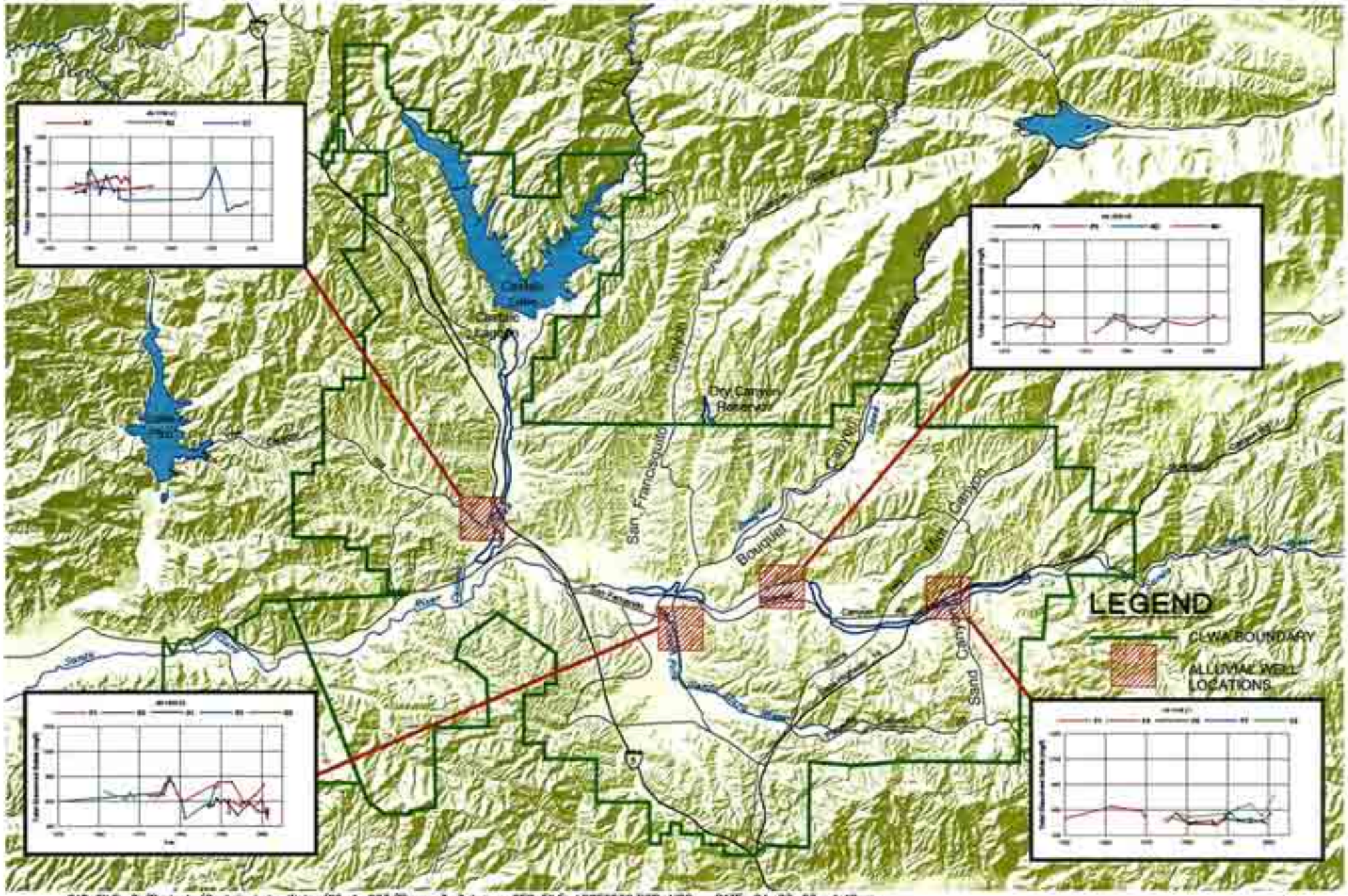


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**Figure 3-3**
**Historical Groundwater Quality by Section**
**Santa Clara River Valley East Groundwater Subbasin**

constituents) in the deeper parts of the Alluvium.

Due to a much more limited number of wells and the limited spatial extent of groundwater development in the Saugus Formation, long-term Saugus groundwater quality data are not sufficiently extensive to permit any sort of basin-wide analysis or assessment of pumping-related impacts on quality. Based on the most complete historical record, over the last 35 years, however, groundwater quality in the Saugus has remained generally constant. The Saugus Formation is, on a groundwater quality basis, a viable agricultural and municipal water supply.

The most notable groundwater quality issue in the basin centers around the detection and impact of perchlorate on several Saugus wells and one Alluvial well in the central part of the basin near the location of the former Whittaker Bermite facility, which is immediately southeast of the confluence of the main Santa Clara River and its South Fork tributary. In 1997, routine water quality sampling detected the presence of perchlorate in four municipal wells completed in the Saugus Formation (CLWA Santa Clarita Water Division Saugus Wells 1 and 2, Newhall County Water District Well 11, and Valencia Water Company Well 157). While there remains no primary or secondary drinking water standard for perchlorate, and although only some of the detected concentrations of perchlorate in the Saugus wells exceeded the Action Level established by the State Department of Health Services at that time (18 ug/l), all those wells were inactivated by their respective owners after detection of perchlorate; those wells remain out of municipal water supply service since then.

More recently, in late 2002, routine water quality sampling of Alluvial wells detected perchlorate in one of them (CLWA Santa Clarita Water Division Stadium Well) at a concentration which slightly exceeds the current Action Level (4 ug/l). This well has also been voluntarily inactivated, and remains removed from municipal water supply service.

This Plan, notably through Primary Plan Elements 1, 6 and 8, is intended to incorporate both short-term and long-term groundwater quality considerations in the management of the groundwater basin in order to formalize groundwater quality monitoring and assessment, to investigate and correct groundwater contamination problems, and to preserve or improve groundwater quality for ongoing water supply as well as for avoiding adverse water quality impacts on interconnected surface waters.

**Areas of Concern and Identified Problems**

A number of concerns have been expressed about groundwater conditions in the basin. While not all of the expressed concerns have been substantiated, they are listed and briefly discussed here, and they are addressed in the management objectives for the basin, intended to be achieved via implementation of the various primary and secondary elements in this Plan.

At present, the most notable concern in the basin is the impact of perchlorate contamination on a number of municipal water supply wells, thus affecting the available pumping capacity from some municipal wells. While perchlorate impacts on a few wells do not preclude the ability to pump groundwater in accordance with existing water supply plans, activities to characterize the contamination, and ultimately to control it and treat it, have been initiated in order to return the impacted wells' pumping capacity to water supply service. Primary Element 8 is included in this Plan to formalize the addressing of groundwater contamination issues in the basin.

Concern has also been expressed that groundwater development in the basin will adversely impact the quantity and/or quality of surface flows leaving the basin via the Santa Clara River. Such concern extends to the potential impact on groundwater in the next downstream basin, the Piru Basin in Ventura County. While there are no established provisions regarding surface flows out of the Santa Clara River Valley East subbasin, Primary Element 2 is included in this Plan to formally address the monitoring and management of surface water flows and quality within, and flowing out of, the basin. Some work is already ongoing related to this area of concern via a Memorandum of Understanding (MOU) among CLWA, other retail water purveyors within CLWA's service area, and United Water Conservation District, which manages surface water and groundwater in the downstream basins on the Santa Clara River in Ventura County. That cooperative effort, which is incorporated into this Plan via Primary Element 9, includes integration of databases, development of a numerical groundwater flow model, and interpretation and reporting on surface water and groundwater conditions.

A third expressed concern in the basin, is that groundwater is already overdrafted. Associated with that expressed concern is a related issue that reliance on overdrafted groundwater results in an overstated water supply in the basin. As discussed earlier in this section, long-term groundwater levels, storage, and quality all indicate the basin is in balance (i.e., no overdraft exists). As also discussed above, the importation of supplemental surface water over the last 23 years, and the associated initiation of conjunctive use operations have directly resulted in an

overall adequacy of water supplies while sustaining an undepleted groundwater supply. Primary Elements 3, 4 and 5 are key parts of this Plan to more formally quantify the yield of the groundwater basin, and to continue to meet overall water requirements via continuation of conjunctive use of local groundwater with imported supplemental surface water, ultimately complemented by integration of recycled water for non-potable water supply (Primary Element 7).

Finally with regard to areas of concern in the basin, the historically larger fluctuations in the eastern part of the basin have been highlighted for their impacts on private wells in that area. Some focused study has been done to address whether certain pumping directly affects private wells in Sand Canyon; its conclusions were that such direct effects were not occurring. Subsequently, a nearby development contracted for delivery of up to 120 acre-feet of imported SWP water from CLWA in order to reduce its use of groundwater for domestic and irrigation water supply. Primary Element 1 is partly intended to acquire site-specific data regarding private wells, their locations, the aquifers in which they are completed, their yields and pumping capacities as well as their quality, and their water level records. Primary Element 3 is partly intended to analyze such data in order to assess whether local aquifer depletion is occurring and, if so, what remedy is appropriate.

# *IV. Historical and Projected Water Requirements and Supplies*

**Historical Water Requirements**

The initial development of water supplies in the Santa Clarita area began in the 1800's for irrigation on the San Francisquito Ranch after its purchase by Henry Mayo Newhall. While there are some records in the form of waterworks drawings that show early diversion and distribution facilities on the ranch in 1911 and some mapping of well locations in the 1930's, the earliest complete records of water use date from shortly after the end of World War II. From 1947 through the mid 1960's, groundwater pumping for agriculture ranged from about 27,000 to about 42,000 acre-feet per year (afy). For most of the same period, until 1960, there are no detailed records of water use for municipal supply. The first records of municipal water use begin in 1960, when municipal water requirements were about 5,000 afy; by the mid-1960's, municipal water requirements had increased to about 10,000 afy. Throughout that time, all municipal water supply was from local groundwater.

From the mid-1960's through about 1980, groundwater pumping for agricultural water supply declined into the range of about 10,000 to 15,000 afy. In the late 1980's through the early 1990's, agricultural groundwater pumping further declined into the range of about 8,000 to 10,000 afy; over about the last ten years, agricultural water requirements, which continue to be fully met by local groundwater pumping, have been in the range of about 12,000 to 15,000 afy. The history and trends of agricultural water use in the basin are illustrated in Figure 4-1.

Detailed records of municipal water use are not available from the mid-1960's through 1980, when imported surface water was first used in the basin for municipal water supply. However, the available municipal water use data at the beginning and at the end of that period, combined with estimated declining agricultural water use for the same period, suggest there was a generally steady increase in municipal water use from about 11,000 af in 1966 to about 22,000 af in 1980. Since then, municipal water use has increased to about 68,000 afy. With the addition of imported surface water from the State Water Project beginning in 1980, however, groundwater pumping for municipal supply declined in the early 1980's. Throughout the 1990's, municipal

pumping fluctuated between about 27,000 and 32,000 afy. The history and trend of municipal groundwater use in the basin are illustrated in Figure 4-1.

As noted above, until 1980, all water supply in the basin was from local groundwater. Imported surface water was first available from the State Water Project (SWP) in 1980, when a total of 1,125 af were imported into the basin. Since then, importations of SWP water have increased in two separate steady trends, interrupted by a notable decrease at the end of, and following, the 1987-1992 drought period: a steady increase beginning in 1980, to about 21,600 afy in each of 1989 and 1990, followed by a substantial decrease, to less than 8,000 af in 1991, and then a steady increase back to about 21,000 afy in 1997 and 1998, followed by further increases to nearly 42,000 af in 2002. The history and trends in importation of SWP water to the basin are illustrated in Figure 4-2, which also illustrates the historical trends in groundwater pumping and total water use in the basin since the importation of SWP water.

In the context of this groundwater management plan, the historical utilization of imported SWP water to augment local groundwater represents the initiation of conjunctive use of surface water and groundwater supplies, a groundwater management principle which is intended to be continued via adoption of Primary Element 5 of this plan.

**Projected Water Requirements**

Detailed projections of municipal water requirements were most recently completed as part of the Urban Water Management Plan prepared by CLWA and the municipal water purveyors (Newhall County Water District, Santa Clarita Water Company, and Valencia Water Company) in 2000. Those projections, which are forecast for a 20-year period, also recognize an ongoing but decreasing agricultural water demand over the same period, from about 15,000 afy in 2005 to about 7,000 afy by 2020. The municipal water demand projections in the Urban Water Management Plan are derived from utilization and interpretation of multiple projection methods, including per-capita water-use applied to population projections; extrapolation of number of service connections (using two different projection techniques, an average rate and an accelerated rate projection) applied to the rate of service connection additions since 1990; and land use projections combined with unit water use factors on multiple land use categories (urban, including residential, commercial, industrial and recreational; irrigated agricultural; and vacant and open space). The water demand projections in the Urban Water Management Plan also consider weather effects (variations due to hot-dry years vs. cool-wet years) and conservation

Historical Groundwater Production
Upper Santa Clara Valley Groundwater Basin
East Subbasin
Production (Ac-Ft)
45,000
40,000
35,000
30,000
25,000
20,000
15,000
10,000
5,000
0
1940
1950
1960
1970
1980
1990
2000
2010
Year
Agricultural
Agricultural (Estimated)
Municipal/Industrial

Figure 4-1

effects on water usage.

The net result of application and interpretation of the various water demand projection methods in the 2000 Urban Water Management Plan is summarized in Figure 4-2, which reflects projected urban and agricultural water demand through 2020, absent potential increased conservation savings, which are estimated to be ten percent of urban water demand. Numerically, urban water use without increased conservation savings is projected to increase to nearly 67,000 afy by 2005, and then continue to increase to 106,000 afy by 2020. As noted above, agricultural water use over the same period is projected to decrease to 15,000 afy by 2005, followed by an ongoing decrease to 7,100 afy by 2020. In addition to the graphical presentation of projected water demands in the basin through 2020 in Figure 4-2, projected water demands are tabulated, both with and without potential increased conservation savings, in Table 4-1.

**Table 4-1**
**Projected Normal/Average Year Water Demands**
(acre-feet per year)

| | **2005** | **2010** | **2015** | **2020** |
|---|---|---|---|---|
| Urban<br>Agriculture | 66,600<br>15,100 | 77,700<br>12,400 | 90,900<br>9,800 | 106,000<br>7,100 |
| **Total Projected Demand** | **81,700** | **90,100** | **100,700** | **113,100** |
| Increased Conservation Savings | 6,600 | 7,700 | 9,100 | 10,600 |
| **Total Projected Demand** *(with increased conservation)* | **75,100** | **82,400** | **91,600** | **102,500** |

**Existing and Projected Water Supplies**

As noted above, existing water supplies to meet current water demands are comprised of local groundwater and imported SWP surface water. In 2001, for example, to meet a total water demand of nearly 76,800 af, local groundwater pumping amounted to 41,400 af, (about 54% of total demand) and imported SWP water amounted to 35,400 af (about 46% of total demand).

Water supplies to meet projected water demands are expected to continue to be primarily a combination of local groundwater and imported SWP surface water, augmented by local recycled

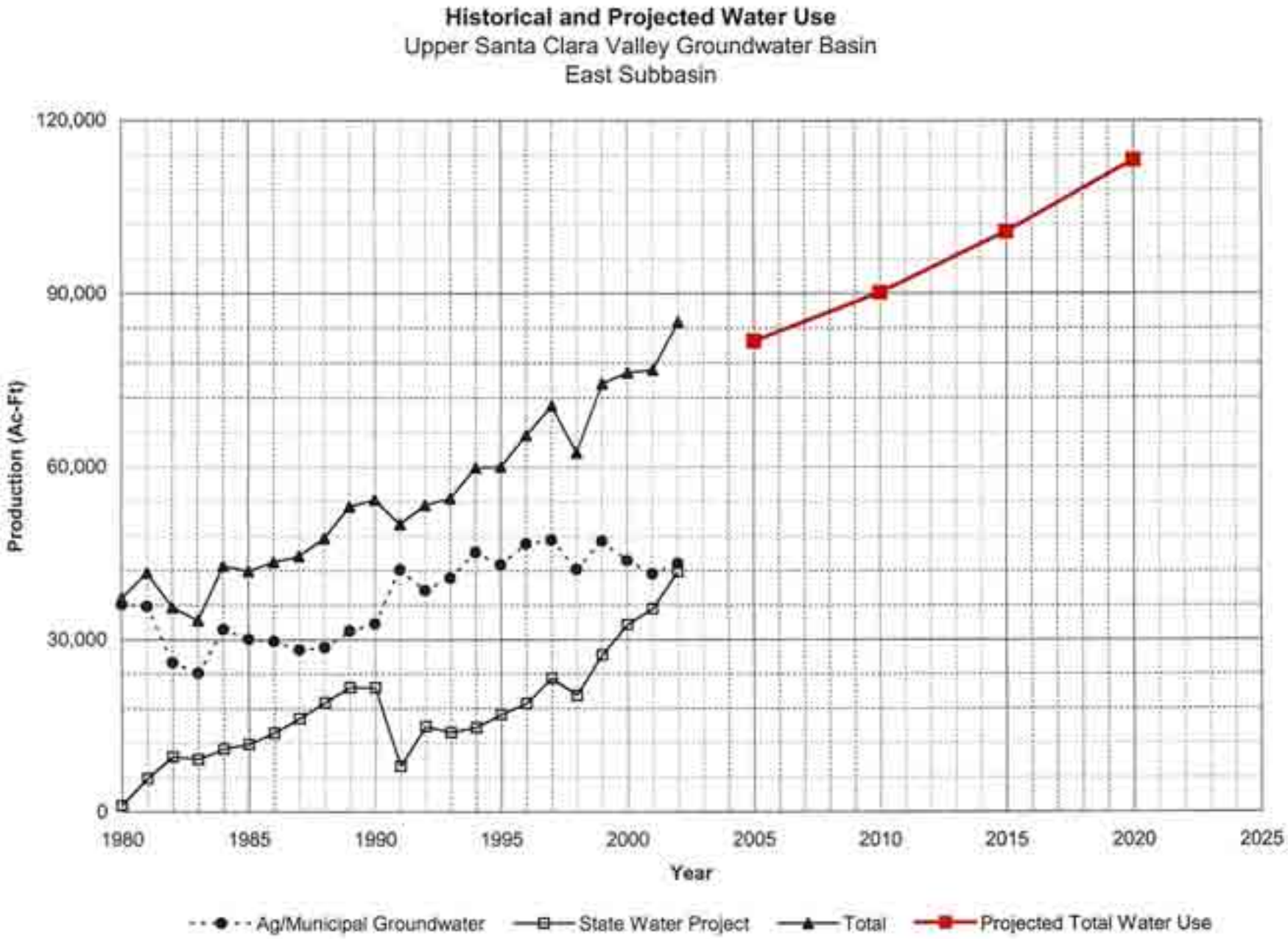
Historical and Projected Water Use
Upper Santa Clara Valley Groundwater Basin
East Subbasin
120,000
90,000
60,000
30,000
0
Production (Ac-Ft)
1980
1985
1990
1995
2000
2005
2010
2015
2020
2025
Year
Ag/Municipal Groundwater
State Water Project
Total
Projected Total Water Use

Figure 4-2

water and possibly some water supply derived from water transfers and desalination outside the basin.

**Local Groundwater** - Local groundwater has historically been developed from the two aquifers that comprise the groundwater basin, the Alluvium that underlies the Santa Clara River and its tributaries, and the Saugus Formation that underlies much of the CLWA service area. Those two aquifers, and the groundwater basin they comprise, are the focus of this groundwater management plan. Based on historical experience and observation of groundwater conditions, it is currently expected that ongoing utilization of local groundwater will continue to be in amounts that are generally comparable to what has historically been pumped, 30,000 to 40,000 afy from the Alluvium and 7,500 to 15,000 afy from the Saugus Formation. It is also expected that there is some additional development potential in the Saugus Formation, in the range of 10,000 to 20,000 af which might be intermittently extracted during one or more dry years when supplemental imported water supplies might be reduced. Ultimately, it is expected that local groundwater will continue to be a component of water supply in the basin at appropriate production levels from both aquifers. The intent of this groundwater management plan is to ensure that ongoing utilization of local groundwater continues to result in acceptable aquifer conditions, i.e. avoidance of overdraft (Primary Plan Element 3), no degradation of quality (Primary Plan Element 6), no adverse impacts to surface waters (Primary Plan Element 2), all via continuation of conjunctive use operations that have been ongoing since the initial importation of supplemental surface water in 1980 (Primary Plan Element 5) and via monitoring and interpretation of surface water and groundwater conditions on an ongoing basis (Primary Plan Elements 1 and 2).

**Supplemental (SWP) Surface Water** - CLWA has a Table A contract amount of 95,200 af of water from the SWP. CLWA's original contract, signed in 1963, was for 23,000 af; that Table A amount was later increased to 41,500 af. In 1988, CLWA purchased a Table A amount of 12,700 af from Devil's Den Water District, and it acquired another 41,000 af of Table A amount in 1999 from Kern County Water Agency and its member district, the Wheeler Ridge-Maricopa Water Storage District. There is ongoing CEQA-related litigation over the most recent acquisition of the 41,000 af Table A amount. However, there has been no invalidation of the completed agreement to transfer the 41,000 af Table A amount to CLWA and current water supply planning includes that Table A amount as CLWA corrects the CEQA technicality by preparing a new EIR to address the environmental consequences of the transfer.

**Recycled Water** - In 1993, CLWA prepared a draft Recycled Water System Master Plan that outlined a multi-phase program to integrate recycled water into the overall water supply system in the basin. Phase I of that project, which will deliver approximately 1,700 afy, began deliveries of recycled water for golf course irrigation in mid-2003. Overall, by 2020, recycled water is expected to ultimately reclaim up to 17,000 afy of treated waste water suitable for irrigation of golf courses, landscaping, and other non-potable uses.

# *V. Elements of the Groundwater Management Plan*

As part of long-term water supply planning in the Santa Clara River Valley East groundwater subbasin, Castaic Lake Water Agency (CLWA) and the municipal water purveyors in the basin, in concert with other groundwater pumpers in the basin, began conjunctive use operations in 1980 by importing supplemental surface water from the State Water Project and integrating it with local groundwater to meet all the water requirements in the basin. Prior to that time, and continuing to the present, various groundwater pumpers and other entities in the basin, including CLWA, have collected groundwater and related data on which historical and ongoing analyses of groundwater basin conditions have been made. Those monitoring efforts and basin analyses have allowed CLWA and other entities in the basin to progressively define and understand basin conditions, and to continue to meet increasing water demands over the last 23 years. Information derived from the monitoring and management efforts to date has allowed the various public and private pumpers in the basin to continue to rely on the groundwater basin for some or all of their water supply without significant concern that the resource was either overdrafted or otherwise negatively impacted.

In light of the preceding, complemented most recently by the Memorandum of Understanding process that has initiated integrated management with United Water Conservation District, which serves as the manager of adjacent downstream basins on the Santa Clara River (as described in Primary Element 9), local groundwater management has already been initiated consistent with the opportunity provided by Water Code Section 10753. However, despite those ongoing accomplishments, CLWA recognizes the concerns and issues that are discussed herein relative to groundwater and the adequacy of water supplies in the basin. With that recognition, and in part prompted by the requirements of AB 134, CLWA has prepared this broader-based groundwater management plan.

To continue historical groundwater management activities and to address identified concerns and issues related to groundwater and water supply in the area, this Groundwater Management Plan has been developed to provide a framework for present and future actions. As has been the case for the groundwater management activities by CLWA and other local entities over the past 23 years, it is expected that this plan will be updated as new data are developed, particularly in light

of the key role that groundwater monitoring (water levels and quality) has played, and will continue to play, in defining groundwater conditions and aquifer response to management actions.

The management objectives, or goals, for the Santa Clara River East groundwater basin include the following:

**Goal 1:** Development of Local Groundwater for Water Supply
**Goal 2:** Avoidance of Overdraft and Associated Undesirable Effects
**Goal 3:** Preservation of Groundwater Quality
**Goal 4:** Preservation of Interrelated Surface Water Resources

To accomplish those goals, with recognition of the opportunities encouraged by Water Code Section 10750 et seq. for local agency management of groundwater resources, this plan incorporates a number of components which are divided into primary, or essential, elements and secondary, or potential, elements. In both categories, the elements formally recognize the effectiveness of a number of ongoing water resource management activities. They recognize the need for additional activity, such as expanded conjunctive use of supplemental surface water, and recycled water, with local groundwater. They also reflect the wider focus on local groundwater management, such as continuing cooperation with the municipal water purveyors and other pumpers in the basin, and with other water resource management entities on the Santa Clara River, most notably United Water Conservation District, to address the impacts of regional resource opportunities and/or challenges. In summary, this Groundwater Management Plan will enable CLWA, the retail water purveyors, and their neighbors to continue use of local groundwater for regular water supply, to expand their use of local groundwater during dry periods or emergencies, and to work with other agencies via implementation of the following management plan elements.

**Primary (Essential) Plan Elements**

1. Monitoring of Groundwater Levels, Quality, Production and Subsidence
2. Monitoring and Management of Surface Water Flows and Quality
3. Determination of Basin Yield and Avoidance of Overdraft
    - wet and dry period pumping
    - control of well field drawdown

4. Development of Regular and Dry Year/Emergency Water Supply
5. Continuation of Conjunctive Use Operations
6. Long Term Salinity Management
7. Integration of Recycled Water
8. Identification and Mitigation of Soil and Groundwater Contamination
    - involvement with other local agencies in investigation, cleanup, and closure
9. Development and Continuation of Local, State and Federal Agency Relationships
10. Groundwater Management Reports

**Secondary (Potential) Elements**

1. Continuation of Public Education and Water Conservation Programs
2. Identification and Management of Recharge Areas and Wellhead Protection Areas
    - involvement in land use planning process
3. Identification of Well Construction, Abandonment, and Destruction Policies
    - water quality protection
    - manage vertical distribution of pumpage
4. Provisions to Update the Groundwater Management Plan

**Primary Element 1 - Monitoring of Groundwater Levels, Quality, Production, and Subsidence**

Prior to 1980, all water supply in the Upper Santa Clara River Area was developed from local groundwater; since 1980, imported surface water has become an increasing component of overall water supply in the area, but groundwater continues to meet all agricultural water demand and a significant part of municipal water demand. As a result of the long term development and use of groundwater in the area, there is a fairly substantial amount of historical groundwater level data, and a useful amount of groundwater quality data and groundwater pumping data that has been collected in the basin. All the available historical groundwater level, quality, and pumping data have been organized into a computerized data base for the Upper Santa Clara River Area. That data base, while separate, has been coordinated with an equivalent data base maintained by United Water Conservation District for the downstream basins on the Santa Clara River. The intent of database coordination has been to facilitate interpretation and reporting on groundwater and other water resource related issues by the respective agencies overlying the various basins along the river.

The networks of wells from which groundwater level and groundwater quality data have been collected are illustrated in Figures 5-1 and 5-2. The networks are comprised of a combination of active production wells, inactive production wells, and dedicated monitoring wells, shown on Figures 5-1 and 5-2. Data collection has historically varied from randomly infrequent to regularly scheduled but infrequent (e.g. semi-annual). The historical data collection efforts cannot be classified as an organized area-wide program of groundwater data collection, there are generally sufficient data available on which to interpret basin conditions. Ultimately, it is recognized that monitoring of existing wells, and expansion of the network of both production and monitoring wells, are key to accomplishing all the goals for the basin in this management plan. Monitored groundwater levels, quality, and pumping will collectively provide the basis for defining basin conditions and developing operational protocols that allow conjunctive use to support ongoing groundwater supply while avoiding undesirable conditions such as chronically depressed groundwater levels or degraded groundwater quality. Thus, a primary element of this plan is to develop and implement a groundwater monitoring program that is comprised of a network of wells, mostly as illustrated in Figures 5-1 and 5-2, but possibly expanded to include some dedicated monitoring wells as well as some potential new production wells. The frequencies and types of groundwater data collection will vary as a function of specific monitoring objectives in various parts of the basin. For initial implementation purposes , basin-wide groundwater monitoring protocols (locations and types of measurements, frequencies, etc.) are included in the Appendix to this Plan.

It should be noted, in light of the lack of historical subsidence and the low potential for it to occur as discussed in Section III above, that no formal subsidence monitoring is planned, i.e. no extensometers, fixed-point ground surveys or remote sensing. However, if the analysis of planned additional dry-year pumping indicates the potential for subsidence attributable to lower groundwater levels, monitoring or other appropriate action (e.g. re-distributed or reduced pumping) will be undertaken.

**Primary Element 2 - Monitoring and Management of Surface Water Flows and Quality**

The geologic and hydrologic configuration of the groundwater basin and the Santa Clara River system that overlies the aquifers in the basin is such that the River and the Alluvial aquifer can directly interact. Further, although the Saugus Formation has hydraulic characteristics that indicate it to be locally confined, groundwater can move between the Alluvium and the Saugus. The net result of the overall river-aquifer configuration is that groundwater is readily recharged

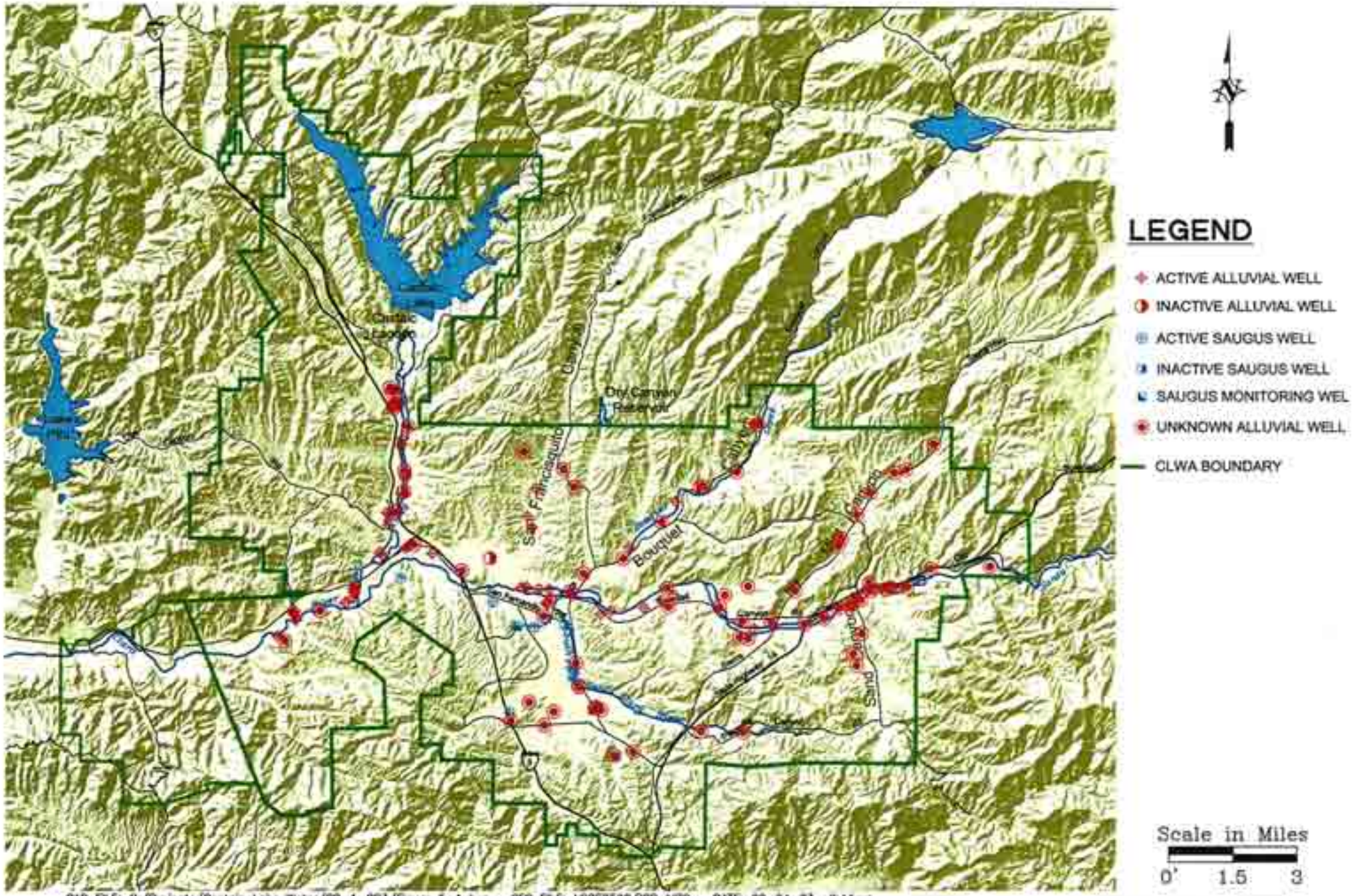


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**Figure 5-1**
**Water Level Monitoring Well Network**
**Santa Clara River Valley East Groundwater Subbasin**

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**Figure 5-2**
**Water Quality Monitoring Network**
**Santa Clara River Valley East Groundwater Subbasin**

by periodic natural surface water flows in parts of the basin, generally to the east of Bouquet Canyon; and groundwater discharges to the river in other parts of the basin, generally to the west of Bouquet Canyon. As a result of the latter groundwater discharges to the river, in combination with treated waste water discharges from the two local regional treatment plants, there is a significant surface water outflow from the basin in the Santa Clara River. That surface water flow to the west across the County line has increased over the last 20 years (Figure 5-3).

When considered in concert with the other elements of this groundwater management plan, a number of challenges related to surface water flow and quality are evident. First, knowledge of surface flow rates and quality, and variations in both, will be essential to incorporating surface water considerations into management of the interconnected aquifer system. Thus, monitoring of surface water flows and quality will be part of this plan; and the resultant data will be incorporated in the database of groundwater data that results from implementation of this element and Primary Element 1.

Secondly, continuation of some surface flow and non-degradation of surface water quality would appear to be appropriate objectives, particularly as recycled water use is integrated into the overall water supply in the basin, and as dry-year dependence on groundwater increases. Those issues have begun to be addressed in the MOU process with neighboring United Water Conservation District, as described in Primary Element 9 of this Plan, but they will be addressed on a more comprehensive basis as monitored data is collected, as a numerical groundwater flow model is developed and utilized (Primary Element 3), and as recycled water becomes part of the integrated water supply (Primary Element 7). Basin management of surface water flows and quality will also relate to potential groundwater management actions intended to augment yield, e.g. artificial groundwater recharge (Primary Elements 3 and 5), and groundwater management actions intended to preserve groundwater quality (Primary Element 6). For initial implementation purposes, surface water monitoring protocols (locations and types of measurements, frequencies, etc.) are included in the Appendix to this Plan.

In light of the preceding, this plan element is included in the overall groundwater management plan to address surface water flows and quality in concert with analysis and management of groundwater levels and quality. The implementation of this plan element will be essential to accomplishment of the fourth management objective (goal) for the basin.

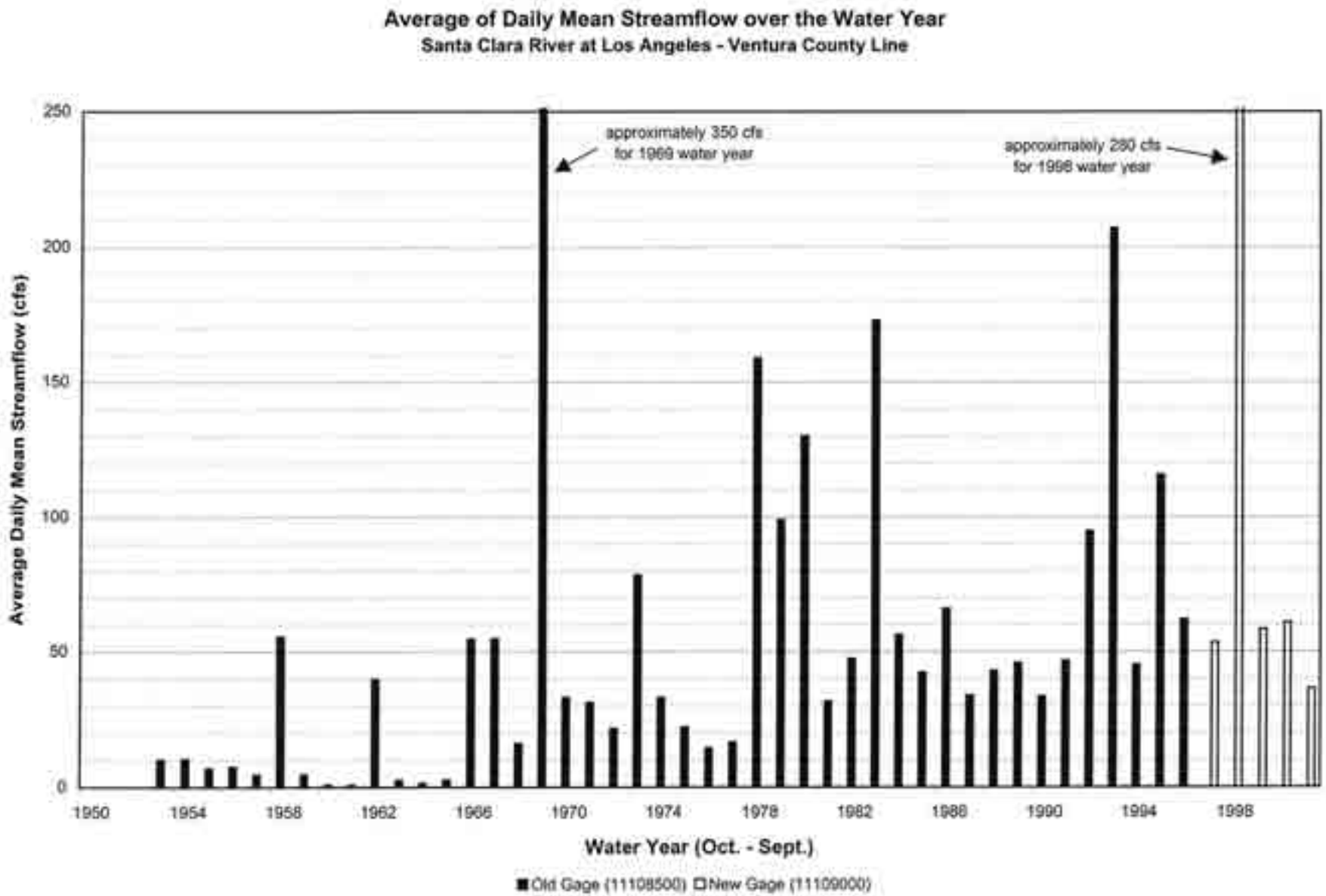

Average of Daily Mean Streamflow over the Water Year
Santa Clara River at Los Angeles - Ventura County Line
approximately 350 cfs
for 1969 water year
approximately 280 cfs
for 1998 water year
Average Daily Mean Streamflow (cfs)
250
200
150
100
50
0
1950
1954
1958
1962
1966
1970
1974
1978
1982
1986
1990
1994
1998
Water Year (Oct. - Sept.)
Old Gage (11108500)
New Gage (11109000)

Figure 5-3

**Primary Element 3 - Determination of Basin Yield and Avoidance of Overdraft**

In order to accomplish all the goals for the basin, it will be essential to determine what yield can be developed on both a regular and an intermittent (dry period or emergency) basis. Such a determination of basin yield will be made to accomplish the main objective of operating within the yield of the groundwater basin, avoidance of overdraft.

On a long-term basis, there has not been any widespread, steady degradation of groundwater conditions that might be indicative of overdraft, i.e. decrease in groundwater levels or storage as a result of pumping in excess of the yield of the basin. There have been, and continue to be, short-term fluctuations in groundwater levels that are basically related to variations in local hydrological conditions, alternating increases and decreases in storage in response to wet and dry conditions (and associated fluctuations in recharge and pumping). Such fluctuations are typical of groundwater basin conditions in any conjunctive use setting, such as in this basin; groundwater is utilized from storage during dry years, or dry periods, and that storage is replenished during alternate wet years, or periods. The observation of these historical groundwater conditions, in combination with knowledge of pumpage from both the Alluvial and Saugus Aquifers, has led to current operational practices as well as general expectations regarding the approximate yield of the local groundwater system.

While historical operating experience, complemented by observed groundwater conditions, is an appropriate basis for generally planning for available groundwater supplies, it is possible and appropriate to more precisely analyze the basin to determine values or ranges of yield under varying hydrologic conditions, and to assess the impacts of various management actions that might be implemented in the basin. The MOU process described in Primary Element 9 of this Plan includes the development of a numerical groundwater flow model which is intended to be utilized for determination of the yield of the basin under existing land use and under existing groundwater and surface water development conditions. It is also expected to be used for implementation of this Plan Element to assess the yield of the basin under future land use conditions as well as future ranges of surface water importation, groundwater development, and recycled water use through varying hydrologic conditions, i.e. wet and dry periods that affect the availability of imported surface water.

The ultimate intent of this Plan Element is to develop an understanding and quantification of the yield of the basin, under varying hydrologic conditions and developing local cultural conditions,

so that groundwater development and use can be managed in such a way to meet an appropriate fraction of total water demand while avoiding levels of groundwater use that would result in overdraft conditions. Thus, implementation of this Plan Element is essential to accomplishing the first and second management objectives (goals) for the basin.

**Primary Element 4 - Development of Regular and Dry Year/Emergency Water Supply**

The most recent updated Urban Water Management Plan (UWMP, December 2000) prepared by CLWA and the retail water purveyors in the basin (Newhall County Water District, Santa Clarita Water Company and Valencia Water Company) includes plans to develop 30,000 to 40,000 acre-feet per year (afy) from the Alluvial aquifer and 7,500 to 15,000 afy from the Saugus Formation in average/normal years. Both ranges of numbers are consistent with recent historical pumping that has not resulted in any indication of overdraft or other undesirable conditions. The UWMP also includes plans to slightly reduce Alluvial pumping in dry years (in recognition of historical experience with decreased groundwater levels in the eastern part of the basin during dry periods) to 30,000 to 35,000 afy, while potentially increasing dry-period Saugus pumping to 21,000 to 35,000 afy depending on the duration of dry conditions.

A major consideration in this plan is the accomplishing ~~of~~ this element in concert with Primary Element 3, i.e. development of both regular and dry year/emergency groundwater supply within the yield of the basin in order to avoid overdraft. Toward that goal, the model described in Primary Element 3 will be used to analyze projected results, i.e. groundwater levels, storage and stream flow impacts, in order to design the optimal distribution of pumpage or to refine the ranges of regular or dry period/emergency pumping volumes. The result will facilitate a water transmission and distribution design, and will also facilitate planning for supplemental water supplies and planning for proactive recharge activities to augment basin yield as necessary to meet water supply requirements. Thus, implementation of this Plan Element, within the confines of Primary Element 3, will be essential to accomplishment of the first management objective (goal) for the basin.

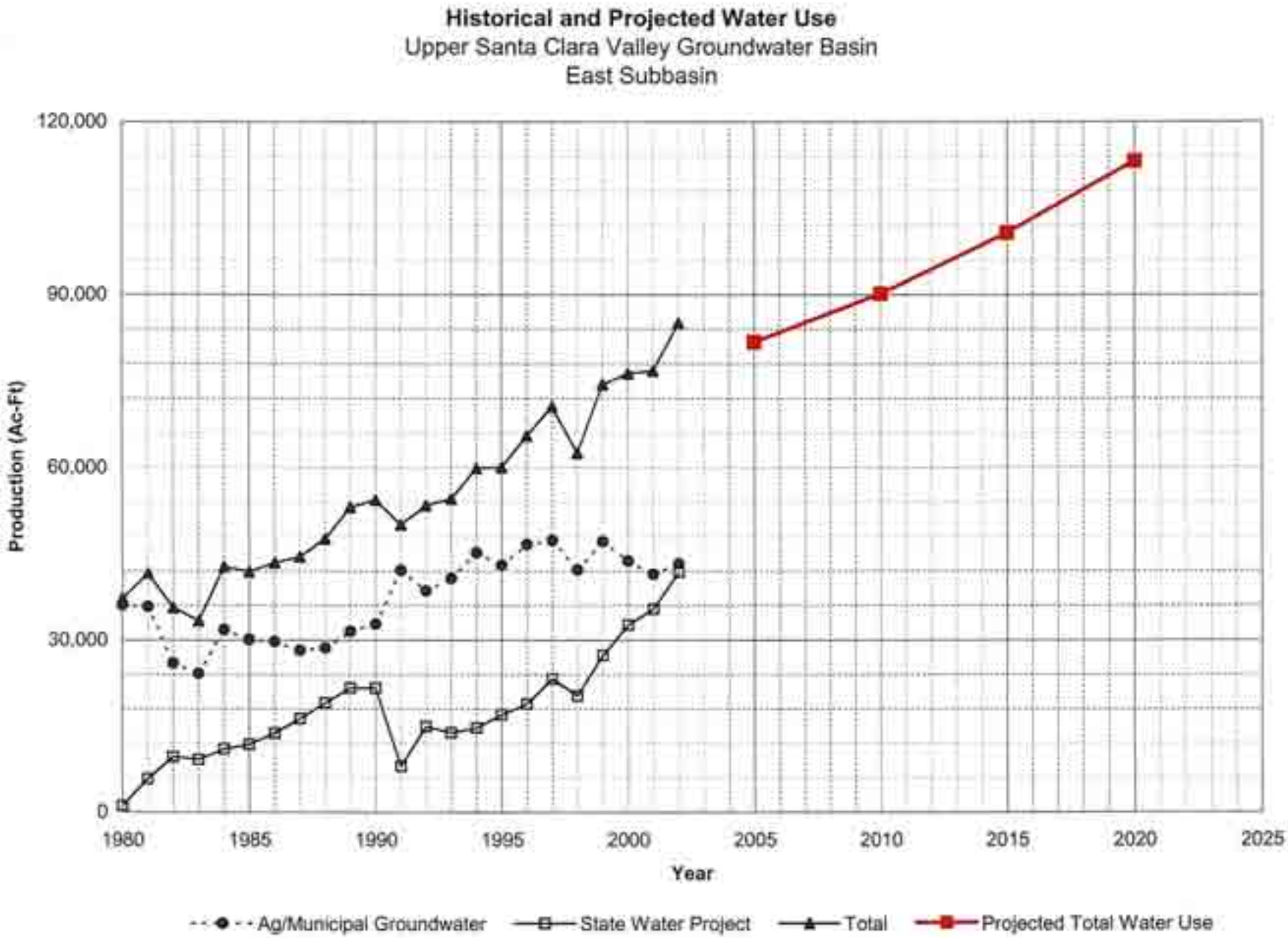
**Primary Element 5 - Continuation of Conjunctive Use Operations**

Beginning with the initial delivery of imported surface water from the State Water Project (SWP) in 1980, CLWA and the retail water purveyors in the basin have been practicing the conjunctive

use of imported surface water and local groundwater. Conjunctive use in this setting has consisted of meeting water demands with a combination of imported surface water and local groundwater. Groundwater pumping has remained within a range that has not caused any evidence of overdraft, or associated undesirable impacts, and has fluctuated within that range to meet a larger fraction of water demand during periods of reduced surface water availability, such as at the end of the 1987-1992 drought and for several years immediately thereafter. Imported surface water use, on the other hand, progressively increased from 1980 through 1990, substantially decreased in the early 1990's due to extended drought conditions in Northern California, returned slowly to pre-drought levels over about a five year period, and has progressively increased again since 1996. The historical trend in water demand and the trends in groundwater and imported (SWP) surface water use to meet that demand are illustrated in Figure 5-4.

Conjunctive use of local groundwater and imported surface water will continue to be a key element in meeting all the goals for the basin, most notably utilizing groundwater for water supply without overdrafting the basin. Historical experience with groundwater pumping and aquifer response to varying hydrologic conditions has shown that the groundwater basin can support notable variations in pumping during wet and dry periods, but it cannot support continuous pumping at rates high enough to meet total local water demand. Thus, utilization of imported surface water in conjunction with local groundwater is essential to the management of groundwater for water supply without overdrafting that resource.

As part of conjunctively using surface water and groundwater, it is recognized that, particularly when the surface water supply is imported from the State Water Project, there will be variations in the amount of available surface water supply from year to year. Similarly, there are expected to be variations in local groundwater conditions as a function of local hydrologic conditions which affect, among other things, the natural recharge to the groundwater basin from year to year. In the case of this basin, local (Southern California) hydrology which affects local groundwater conditions may not necessarily be the same as the hydrology in a distant (i.e., northern California) location that directly affects the availability of supplemental, imported surface water in any given year. Thus, conjunctive use management is necessary to ensure that the groundwater basin is maintained to meet a regular component of water supply and to also provide a larger component of water supply during "dry periods" that affect supplemental surface water availability. Conjunctive use management is similarly important to ensure that local groundwater can be replenished, via reduced pumping and/or as a result of wetter local


Historical and Projected Water Use
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120,000
90,000
60,000
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0
Production (Ac-Ft)
1980
1985
1990
1995
2000
2005
2010
2015
2020
2025
Year
Ag/Municipal Groundwater
State Water Project
Total
Projected Total Water Use

Figure 5-4

hydrologic conditions, during periods of wet/normal surface water availability. In light of all the preceding, implementation of this Plan Element is essential to accomplishing all the management objectives (goals) for the basin.

**Primary Element 6 - Long Term Salinity Management**

In general, groundwater quality in the basin is such that groundwater supplies meet standards for beneficial use in the basin, most of which is for municipal (domestic) use but some of which remains for agricultural and some other irrigation (non-domestic) use. There also have been no notable historical trends of groundwater quality degradation in the basin over time. However, a number of geologic and hydrologic factors suggest that observations and interpretation of groundwater quality warrant attention to ensure long-term preservation of groundwater quality. Notable among those geologic and hydrologic factors are: 1) the largely "closed" geologic nature of the aquifer system at the western limit of the basin (other than a thin section of Alluvium beneath the Santa Clara River, there is no continuity of aquifer materials between the Santa Clara River Valley East groundwater subbasin and the next downstream groundwater basin on the Santa Clara River, the Piru Basin in Ventura County); 2) the predominant groundwater flow direction in the basin toward the west, where there is the lack of continuity of aquifer materials for groundwater outflow; 3) a certain amount of rising groundwater discharge into the Santa Clara River; and 4) an increasing discharge of treated waste water into the Santa Clara River toward the western end of the basin which, when accounting for the planned use of a substantial amount of recycled water in the Basin (Primary Element 7) will result in higher salt concentrations than other sources of water supply in the Basin. The combination of the preceding factors suggests that, on a long-term basis, there could be an accumulation of dissolved minerals in the aquifer system if salinity is not managed in a way to avoid undesirable groundwater quality degradation. Consequently, this primary element is included in the overall groundwater management plan to include the interpretation of groundwater quality data (Primary Element 1) and to incorporate groundwater quality as an important consideration in the implementation of the other elements of the plan, most notably Continuation of Conjunctive Use Operations (Primary Element 5), Integration of Recycled Water (Primary Element 7), and Identification and Cleanup of Contaminated Groundwater (Primary Element 8). The Long Term Salinity Management element of the plan is essential to accomplishing the third management objective (goal) of preserving groundwater quality in the basin.

**Primary Element 7 - Integration of Recycled Water**

In 1993, CLWA prepared a Reclaimed Water System Master Plan that outlined a multi-phase program to deliver highly treated, recycled water in the Valley. At that time, potential recycled water uses in excess of 10,000 afy, of which about 9,000 afy were located within the CLWA service area, were identified. The first phase of the Reclaimed Water System Master Plan to deliver 1,700 afy has been environmentally reviewed and is being implemented, with initial deliveries having commenced in August 2003.

The 1993 recycled water plan expected to reclaim up to 10,000 afy. CLWA has been updating that plan to ultimately provide up to about 17,000 afy for irrigation and other non-potable uses. It has also been recognized that, if the Newhall Ranch project is approved, total annual demands for recycled water in the area could ultimately approach 20,000 afy.

This plan element is included in the groundwater management plan primarily because recycled water use in the Valley will supplant a substantial fraction of fresh water demand that would otherwise be met with potable water from some combination of pumped groundwater and imported surface (SWP) water. With total municipal, agricultural and other water demands projected to increase from about 75,000 afy at present to slightly more than 100,000 afy by 2020, the progressive increase in recycled water use from 1,700 afy to as much as 17,000 to 20,000 afy, recycled water use would reduce demands on potable sources (groundwater and imported SWP water) by up to nearly 20 percent. Accomplishment of this Plan Element will benefit the accomplishment of Elements 3 and 4, and will also contribute to the accomplishment of all four of the Basin Goals.

**Primary Element 8 - Identification and Mitigation of Soil and Groundwater Contamination**

As in numerous other groundwater basins in California, there have been a number of leaking underground storage tanks or other similar situations which have released organic constituents into soil, and possibly into groundwater, in the basin. None of those has impacted municipal or other water supply wells and, consequently, there has been no adverse impact on groundwater supply in municipal or other water supply systems in the basin. However, the detection of perchlorate in the discharge from four Saugus wells (CLWA Santa Clarita Water Division Saugus Wells 1 and 2, Newhall County Water District Well 11, and Valencia Water Company Well 157) in 1997, followed by the detection of perchlorate in one Alluvial well (CLWA Santa Clarita Water Division Stadium Well) in 2002, has led to the inactivation of all those wells.

They remain out of municipal water supply service to date.

Experts retained by CLWA have opined that the cause of perchlorate contamination in the Saugus Formation is former operations associated with munitions manufacturing on property formerly owned by Whittaker-Bermite Corporation, which is immediately adjacent to all the impacted wells. Investigation and characterization of the perchlorate contamination, and initiation of control and cleanup are ongoing; however, remediation actions have not yet commenced. Consequently, the municipal water purveyors continue to be impacted by the loss of water supply capacity of the impacted wells. Associated with that loss is a concern about the migration of perchlorate contamination in a generally downgradient direction, toward other active wells completed in the Saugus Formation and the Alluvium and toward other potential well sites. In light of both the inactivation of wells and the potential downgradient impact on the aquifers, CLWA and the other retail water purveyors had initiated both legal action against responsible parties and technical investigation of the contamination. Recently the parties have entered into an interim settlement agreement which is intended to complete investigation and characterization of the contamination in a collaborative effort. This effort will facilitate and expedite remediation actions.

The primary purpose for technical investigation of the perchlorate contamination by CLWA and the other municipal purveyors is to ultimately recover the currently unavailable water supply capacity that has resulted from the inactivation of impacted wells. Conceptually, that may be accomplished by some combination of reactivation of impacted wells and new well construction. CLWA has joined with the U.S. Army Corps of Engineers in a study to develop information about the contamination. CLWA and the retail water purveyors have also independently commissioned an assessment to conclude what treatment technology is appropriate for removal of perchlorate from pumped groundwater; they have also independently commissioned the application of a numerical groundwater flow and quality model to determine an optimal pumping program for 1) perchlorate removal from the aquifer, 2) control of its migration in the aquifer, and 3) restoration of impacted pumping capacity for water supply. With data derived from that work, CLWA and the other purveyors are preparing to submit an application to the State Department of Health Services, by late 2004, for a permit to return to pumping from the locally impaired Saugus Formation. The proposed pumping would be combined with approved wellhead treatment to render the treated water suitable for municipal supply. In addition to the latter objective to recover currently inactivated water supply, the proposed pumping would be designed and operated to remove contaminated groundwater and to control any further migration

of contaminated groundwater toward other Saugus wells to the west. CLWA and the retail water purveyors then expect to be able to design and implement, alone or in concert with responsible parties, a contamination control and treatment program at or near their impacted wells that can, in part, make groundwater available for municipal or other beneficial use. They also expect that such a program will provide some hydraulic and associated water quality protection for other parts of the aquifer system to keep contamination from impacting other wells or other parts of the aquifers in which water supply wells might be completed.

Regarding the balance of the aquifer system, water supply planning to date (i.e. the current Urban Water Management Plan) includes expanded development of the Saugus Formation for dry-period and emergency water supply. Data development and control and treatment of groundwater contamination in the Saugus Formation will be critical to accomplishing that water supply plan. In terms of this groundwater management plan, accomplishment of this plan element will contribute to the accomplishment of all four management objectives (goals) for the basin.

**Primary Element 9 - Development and Continuation of Local, State and Federal Agency Relationships**

As the local SWP contractor, CLWA has long-established working relationships with local and state agencies that will continue on an ongoing basis. By nature of its primary function, CLWA will continue to interact with state agencies, most notably the Department of Water Resources, on the operation of the State Water Project. The latter, of course, has been the source of supplemental imported surface water that has made the initiation and continuation of conjunctive use operations possible since 1980. It will also be the primary component, with local groundwater, in continuation of conjunctive use operations in the future (Primary Element 5 of this Plan).

CLWA is the treated surface water provider to all the retail water purveyors, including Newhall County Water District, Los Angeles County Waterworks District No. 36, Valencia Water Company, and its own Santa Clarita Water Division. CLWA has a historical and ongoing working relationship with all those local agencies, as well as with other local groundwater pumpers, to manage water supplies to effectively meet water demands within the available yields of imported surface water and local groundwater. In fact, the Advisory Council convened to assist in the preparation of this Plan is comprised representatives of all the local water purveyors

and significant groundwater pumpers.

A local Memorandum of Understanding (MOU) process among CLWA, other purveyors within CLWA's service area, and United Water Conservation District (UWCD) in neighboring Ventura County is a classic illustration of a local agency relationship that has produced the beginnings of local groundwater management, now embodied in this comprehensive plan, most notably in Primary Elements 1 through 5. In 2001, out of a willingness to seek opportunities to work together and develop programs that mutually benefit the region as well as their individual communities, those agencies prepared and executed the MOU that initiated a collaborative and integrated approach to several of the aspects of water resource management that are now included in this Plan. UWCD manages surface water and groundwater resources in seven groundwater basins, all located in Ventura County, downstream of the East Subbasin of the Santa Clara River Valley that is the focus of this Plan. United is thus a logical partner in the cooperation of management efforts to accomplish the objectives (goals) for this basin, particularly as they relate to preservation of surface water resources that flow through the respective basins. As a result of that MOU, the cooperating agencies have integrated their database management efforts (part of Primary Elements 1 and 2 of this Plan), have initiated the development of a numerical groundwater flow model (for utilization in Primary Elements 3, 4 and 5 of this Plan), and are continuing to prepare reports on the status of basin conditions, as well as on geologic and hydrologic aspects of the overall stream-aquifer system.

A local extension of the interaction among CLWA, the retail water purveyors, and UWCD is an ongoing working relationship with the City of Santa Clarita. CLWA and the retail water purveyors meet regularly with City staff and also present water supply conditions via study sessions with the City Council on a routine basis. It is expected that the implementation of this Plan will result in the availability of a broader range of information transfer with the City relative to the existing and future water supply to its residents. An additional expectation of this Plan with respect to the relationship among CLWA, the retail water purveyors, and the City is the intent of CLWA and the purveyors to provide input to the City as a reviewer of proposed development relative to any potential contamination of groundwater associated with such proposed development. CLWA provides input to the City, as suggested in Water Code Section 10753.8, via review of land use plans and coordination with the City Planning Department to identify and assess any development-related activities which might pose a risk of groundwater contamination. By expressing this expectation of its groundwater management plan, CLWA is not intending to insert itself into the jurisdiction or authorization of any other land use permitting

agency; rather, CLWA is intending to provide review and input to the land use permitting process to protect the groundwater supply against any potential contamination that might occur as a result of any given development project.

This Primary Element is included in this Plan to formalize the historical local and state agency working relationships as part of comprehensively managing local groundwater, in concert with imported surface water and local recycled water, to accomplish all the management objectives (goals) for the basin.

**Primary Element 10 - Groundwater Management Reports**

As briefly described in the Introduction of this Plan, local groundwater management planning already includes, among several other activities, analysis of groundwater conditions and preparation of annual reports on groundwater and all other aspects of water resources and water supplies in the Santa Clara River Valley East groundwater basin. In addition, recently formalized cooperative work with neighboring UWCD includes both regular reporting on the status of groundwater conditions and specific reporting on geologic and hydrologic aspects of the overall stream-aquifer system. For example, documentation of the numerical groundwater modeling work currently in progress is expected to be the first of the latter reports in the next year.

Beginning in 1998, CLWA and the retail water purveyors in the basin have prepared a series of annual reports, known locally as the Santa Clarita Valley Water Report, to describe all aspects of water supply and water resource conditions in the basin. That report provides current information to local City and County land use agencies, and to other interested parties, about current water requirements, use of groundwater and treated imported surface water to meet those water requirements, groundwater conditions (pumping, groundwater levels and quality, etc.), local surface water conditions, the status of imported surface water supplies including details of delivered SWP water in the reported year as well as an up-to-date summary of available imported SWP water for the next year, a short-term projection of water requirements in the next year, and other appropriate details about water requirements and supplies such as, for example, the status of introducing recycled water as a component of non-potable water supply.

*In light of the frequency and comprehensive nature of the annual Water Reports, and also in light of the planned preparation of more detailed technical reports on various aspects of the basin as appropriate, the continued preparation of those reports will serve as regular and*

*complete reporting on all aspects of this groundwater management plan.*

**Secondary Element 1 - Continuation of Public Education and Water Conservation Programs**

CLWA has provided water conservation and public education programs that will continue and will be expanded as a complement to and an element of this groundwater management plan. The expansion of water conservation will largely stem from CLWA's having signed the "Memorandum of Understanding Regarding Water Conservation in California" (Urban MOU) in 2001, which made CLWA a wholesaler member of the California Urban Water Conservation Council. CLWA has thus committed to implementation of cost-effective water conservation measures known as Best Management Practices (BMPs) that are included in the Urban MOU and are intended to reduce California's long-term urban water demands. The BMPs have been incorporated into the water demand management measures section of the Urban Water Management Planning Act.

Water conservation and related public education measures have generally been developed in California to achieve the following goals:

- meet legal mandates
- reduce average annual potable water demands
- reduce sewer flows
- reduce water demands during peak seasons
- meet drought restrictions.

As a wholesaler of imported surface water CLWA has implemented the following BMPs for several years prior to signing the MOU:

- distribution system water audits, leak detection and repair
- public information
- school education
- wholesale agency assistance
- conservation pricing
- conservation coordinator.

As a signatory to the MOU, CLWA's water conservation and public education program will expand to include the following BMPs found to be locally cost-effective, as detailed in the 2000 Urban Water Management Plan for CLWA and the Santa Clarita Valley retail purveyors.

- water survey programs for single-family residential and multi-family residential programs
- residential plumbing retrofits
- metering with commodity rates for all new connections and retrofit of existing connections
- large landscape conservation programs and incentives
- high-efficiency washing machine rebate programs (when also provided by local energy providers or wastewater utilities)
- conservation programs for commercial, industrial, and institutional accounts
- wholesale agency programs to financially or otherwise support water conservation efforts by retailers (this measure will be expanded)
- residential ultra-low-flow toilet replacement program.

This Secondary Element, while identical to independent CLWA efforts in water conservation and public education, is incorporated in this Plan to complement other Plan elements, and to move toward accomplishment of all management objectives (goals) for the groundwater basin.

**Secondary Element 2 - Identification and Management of Recharge Areas and Wellhead Protection Areas**

The 1986 Amendments to the federal Safe Drinking Water Act (SDWA) established a new Wellhead Protection Program (WPP) to protect groundwater that supplies drinking water wells for public water systems. Each state was required to prepare a WPP and submit it to the USEPA by June 19, 1989. However, California did not develop an active state-wide Wellhead Protection Program at that time. Subsequently, in 1996, reauthorization of the SDWA established a related program called the Source Water Assessment Program. In 1999, the California Department of Health Services (DHS) Division of Drinking Water and Environmental Management developed its Drinking Water Source Assessment Program (DWSAP), and EPA approved it. The overall objective of the DWSAP is to ensure that the quality of drinking water sources is protected.

As discussed in Section 1 of this Plan, the potential groundwater management plan component

"identification and management of wellhead protection areas and recharge areas" is stated, even in the most recently amended version of Water Code Section 10753.8, as one that "may" be included. However, the wellhead protection aspect of this component, which was optional when AB 3030 was adopted, is now essentially required as a result of the 1996 SDWA reauthorization. In California, the DWSAP satisfies the mandates of both the 1986 and 1996 SDWA amendments. The California DWSAP includes delineation of the areas (i.e., protection areas or Groundwater Protection Zones) surrounding an existing or proposed drinking water source where contaminants have the potential to migrate and reach that source. The program includes preparation of an inventory of activities that may lead to the release of contaminants within these zones. The activities, referred to in the DWSAP as Potentially Contaminating Activities, include such land uses as gas stations and dry cleaners, as well as many other land uses. The activities also include known contaminant plumes regulated by local, state, and federal agencies. The zones, which are calculated based on local hydrogeological conditions and also well operation and construction parameters, represent the approximate area from which groundwater may be withdrawn during 2, 5, and 10 year time periods. These zones also represent the area in which contaminants released to groundwater could migrate and potentially affect the groundwater extracted by wells located within the designated zones. The DWSAP assessment also includes a risk or vulnerability ranking based on a combined numerical score that results from points assigned to various evaluations conducted as part of the DWSAP process. This ranking provides a relative indication of the potential susceptibility of drinking water sources to contamination.

Although DHS is responsible for conducting drinking water source assessments for systems existing prior to the adoption of the California program, DHS has encouraged purveyors to perform their own assessments. Assessments for existing systems were due at the end of 2002; however, DHS received an extension allowing its assessment work to be completed by May 2003. Permitting of a new water supply well requires that a DWSAP be completed as part of the permit process, and this is responsibility of the applicant. Within CLWA, DWSAP assessments have been completed for the three municipal water purveyors who utilize groundwater for some of their water supply, including 15 for the CLWA Santa Clarita Water Division, 20 for Valencia Water Company, and 13 for Newhall County Water District.

The results of the DWSAPs can be used as a planning tool to guide land use development in the vicinity of water sources. The DWSAPs prepared for water sources in the basin should, in some fashion, be reviewed every five years and updated more frequently as appropriate. The collective DWSAP information can also be integrated with other management activities (e.g., the

geographical position of potential or existing contaminating activities can be incorporated in the monitoring program database; plume extents, as available, can be graphically displayed by aquifer and isoconcentrations) to aid siting of new wells, particularly when contaminant migration problems are also evaluated with respect to local hydrogeological conditions and the potential influence of nearby wells on plume migration.

In addition to the wellhead protection program that is focused on wells that are sources of drinking water, a broader aspect of this Plan Element is protection of the overall recharge areas of the aquifer system in the basin. As discussed in Section III, the most developed aquifer, the Alluvium, has experienced historical fluctuations in groundwater levels in the eastern portion of the basin, but has had essentially constant groundwater levels in the western portion of the basin. The characteristic difference between the two portions of the basin, generally divided at the confluence of the Santa Clara River and its Bouquet Canyon tributary, is the perennial flow in the Santa Clara River to the west of that location versus the intermittent flow in the river to the east. The intermittent fluctuations in groundwater levels east of Bouquet Canyon are indicative of rapid response, i.e. recharge, from streamflow when it is present. Similarly, the relatively constant groundwater levels west of Bouquet Canyon are indicative of ongoing response, i.e. recharge, from the perennial flow in the river. In light of those conditions, part of this Plan Element is intended to protect the overall channel system of the Santa Clara River and its tributary system, notably where they overlie Alluvial aquifer materials of significant extent. Protection in this case is intended to mean preservation of the infiltration capacity of the stream channel so that both intermittent and perennial flows can continue to recharge the aquifer as has historically occurred.

Finally, with regard to protection of recharge areas, it is expected that additional exploration and development of the Saugus Formation, for additional water supply as described in this Plan, will lead to further understanding of the locations and mechanisms for recharge of that aquifer, which is exposed at the surface throughout much of the area of this Plan. As that understanding evolves, part of this Plan Element will be to identify means of ensuring that significant portions of Saugus recharge are not compromised by land development activities.

This Plan Element is included to incorporate the DWSAP efforts and the overall protection of groundwater recharge into the local groundwater management plan. Completion of DWSAP efforts to comply with state DHS requirements and preservation of overall aquifer recharge are key parts of accomplishing the first and third management objectives (goals) for the basin.

**Secondary Element 3 - Identification of Well Construction, Abandonment, and Destruction Policies**

Well construction permitting in the basin is administered by the Los Angeles County Health Department, which effectively implements the State Well Standards for water wells, monitoring wells, and cathodic protection wells. Permitting of municipal supply wells is also within the purview of the State Department of Health Services. One goal of this management plan for the area, protection and preservation of groundwater quality requires that all wells be properly constructed and maintained during their operational lives, and properly destroyed after their useful lives, so that they not adversely affect groundwater quality by, for example, serving as conduits for movement of contaminants from the ground surface and/or from a poor quality aquifer to one of good quality. Toward that end, this element is included in the overall plan to support well construction and destruction policies, and to participate in their implementation in the Basin, particularly with regard to surface and inter-aquifer well sealing and proper well destruction, which are critical in the management of a multiple aquifer system that has some connection with the Santa Clara River and its tributaries.

**Secondary Element 4 - Provisions to Update the Groundwater Management Plan**

The primary and secondary elements of this local area groundwater management plan reflect the current understanding of the occurrence of groundwater in the Santa Clara River East Valley groundwater subbasin, and specific problems or areas of concern about that resource. Those management elements are designed to achieve specified goals to develop local groundwater for regular and dry year/emergency water supply while protecting and preserving groundwater quantity and quality for overlying beneficial use into the foreseeable future, and while also protecting and preserving valuable surface water resources that are directly related or connected to groundwater. While the groundwater management plan provides a framework for present and future actions, new data will be developed as a result of implementing the plan. That new data could define conditions which will require modifications to currently definable management actions. As a result, this plan is intended to be a flexible document which will be reviewed and updated to modify existing elements and/or incorporate new elements as appropriate in order to recognize and respond to future groundwater and surface water conditions. Although not intended to be a rigid schedule, review and updating of this plan will initially be conducted in five years, with subsequent future updates scheduled as appropriate at that time. In accordance with Primary Element 10, the retail purveyors and CLWA will continue to produce the Santa

Clarita Valley Water Report on an annual basis. Data and information from these reports will be compiled and utilized as part of the review and updating of this plan.

# Appendix I

# Groundwater and Surface Water Monitoring Protocols

The CLWA Groundwater Management Plan includes two Elements (Primary Elements 1 and 2) that relate directly to ongoing, and expanded as appropriate, monitoring of key hydrologic quantities associated with the implementation of the Plan. Notable among the data to be collected are groundwater levels, groundwater quality, pumpage from water supply wells, and surface water flows and quality. Other hydrologic data such as precipitation are intended to be measured and maintained in accordance with the standards in place for the respective precipitation gage stations in the Valley; consequently, this Appendix does not address the specific establishment of protocols for precipitation gaging. On another matter of hydrologic data, land subsidence, the Plan discusses the low probability for subsidence in the Valley, particularly as related to historical groundwater pumping from both the Alluvial and Saugus Formation aquifers. Consequently, the Appendix does not address the establishment of protocols for measuring land subsidence. As noted in the Plan, if future analysis of increased pumping from the Saugus Formation, as currently planned, suggests changes in groundwater levels that might be conducive to inelastic subsidence, the need for subsidence monitoring will be reconsidered at that time; and some combination of land surface elevation surveying, remote sensing of land surface deformation, and measurement of earth consolidation via extensometers would be considered as part of establishing protocols for monitoring subsidence.

**Groundwater Monitoring**

For purposes of Plan implementation, the most essential groundwater-related data are water levels, water quality, and pumpage. Consequently, the following discussion of monitoring protocols focuses on those hydrologic parameters.

**Groundwater Levels** - The distribution and frequency of current groundwater level measurements in Alluvial wells and in Saugus Formation wells are illustrated in Figures A1 and A2, respectively. Tables A1, A1a and A2 show the dates that groundwater level measurements were made in Alluvial and Saugus Formation wells. As discussed in the Plan, for the Alluvium, the distribution of monitoring is sufficient to interpret water level and groundwater storage trends. Thus, it is intended that the fundamental distribution and frequency of Alluvial groundwater level measurements remain generally as illustrated in Figure A1: general semi-annual measurements complemented by some quarterly measurements disbursed throughout the Alluvial aquifer. The only exception to the preceding intention is in the western-most portion of the Alluvium, where agricultural pumping remains the water supply objective and water level measurements are primarily annual. In part to conform to the balance of Alluvial groundwater

level measurements, and more importantly to monitor stream-aquifer connection near the western, or downgradient, end of the Alluvium in the basin, it is the intent of Plan implementation to increase that water level monitoring to semi-annual to quarterly frequency.

In the Saugus Formation, the distribution of groundwater level measurements is limited by the number and location of wells: the locations in Figure A2 reflect where the Saugus has been developed for water supply. Ultimately, as future exploration and development of the Saugus expand, it is expected that the distribution of groundwater level measurements will expand to those future well locations. For Plan implementation purposes, the existing monthly frequency of water level monitoring is intended to continue.

Water level measurement methodology, which is dominated by utilization of electric sounders, is expected to remain largely unchanged. Some calibrated airlines and possibly some dedicated electro-hydraulic transducers are expected to complement electric sounders in certain wells. All those water level measurement methods are sufficiently accurate to satisfy the needs to which the resultant data is to be put.

**Groundwater Quality** - The distribution and frequency of current groundwater quality monitoring in Alluvial wells and in Saugus Formation wells are illustrated in Figures A3 and A4, respectively. Tables A3 and A4 show the dates that groundwater quality (total dissolved solids) was monitored in Alluvial and Saugus wells. For the most part, the distribution and frequency of water quality sampling are sufficient to interpret general quality trends. One notable constraint in the Alluvium, however, is the discontinuation of water quality data collection in some wells since 1988, mostly toward the western, or downgradient, end of the basin. In order to restore an ongoing historical record, part of Plan implementation will be to attempt to re-establish regular, i.e. yearly to triennial, water quality sampling and analyses in those wells with some form of historical water quality record. In the same vein, part of Plan implementation will include selection of a number of wells in key locations, e.g. near the mouths of canyons, for semi-annual analysis of indicator parameters as a basis for assessing seasonal or other variations in groundwater quality.

Finally with regard to groundwater quality, the spatial limitations on Saugus water quality data are comparable to the limitations related to Saugus groundwater levels, but as a result of the limited, localized development of the Saugus for water supply. While the regular monitoring of quality will continue via Plan implementation, the expansion of Saugus water quality data is expected to follow the expanded exploration and development of that aquifer as described for

groundwater levels above.

**Production (Pumpage)** - The great majority of water supply wells in the basin are now dedicated to municipal supply; consequently, those wells are equipped with production meters which allow direct monitoring of pumpage on any desired frequency, e.g. instantaneous flow rate, or cumulative volumes on a daily, monthly, or other frequency. A few wells remain dedicated to agricultural water supply, and those wells are not equipped with flow meters. However, long-standing practice at all those wells has been to meter power consumption for each well and to combine that data with the results of annual pump performance testing in order to indirectly compute approximate pumpage from each agricultural well. That methodology is sufficiently accurate for ongoing documentation of pumpage and interpretation of basin response to pumping; it is also sufficiently accurate for groundwater flow model input as part of assessing basin yield, all as part of this Plan. Consequently, implementation of this Plan includes regular reading of flow meters on municipal supply wells and continued indirect computation of agricultural pumpage from the remaining agricultural water supply wells in the basin.

**Surface Water Monitoring**

Part of Plan implementation is the development of a surface water quality monitoring network. Of particular concern is establishing a surface water quality data set that, combined with groundwater data, will allow for a more detailed analysis of stream-aquifer interactions. The data of primary interest for this and other Plan purposes are surface water flow and surface water quality, discussed below.

**Surface Water Flow** - The existing surface water flow monitoring network within the basin consists of stream flow gaging stations along the Santa Clara River and its tributaries, and measurements of discharge to the River from the Saugus and Valencia Water Reclamation Plants. Monitoring of stream flow gages along the River and its tributaries has been mostly sporadic and limited to times prior to 1977, although measurements at some gages resumed in 2002. One exception is the gage at the Los Angeles-Ventura County line, where the daily mean stream flow was monitored from 1953 to 1996; the gage was replaced with one downstream near Piru in 1996. The Los Angeles County Sanitation Districts monitors the average discharge flow of treated wastewater from the Saugus and Valencia Water Reclamation Plants to the Santa Clara River.

Plan implementation will include evaluating the distribution, future accessibility and

configuration of the existing stream flow gaging stations to determine if they will be suitable for inclusion in the ongoing surface water flow monitoring network. Plan implementation will further include installation and operation of gage station modifications, as well as installation and operation of additional dedicated gaging stations as determined to be required.

**Surface Water Quality** - Surface water quality has been analyzed at many locations along the Santa Clara River and its tributaries but, with few exceptions, the data is limited to several measurements at each location. Water quality in the Santa Clara River at the Los Angeles-Ventura County line was analyzed on a semi-annual basis from 1951 to 1988, and is currently measured quarterly by United Water Conservation District. Since 2002, the Los Angeles County Department of Public Works has monitored water quality in the Santa Clara River near Interstate 5 during four wet weather events and at two other times each year to comply with the requirements of a National Pollution Discharge Elimination System (NPDES) permit that covers the County and 84 incorporated cities. The Saugus and Valencia Water Reclamation Plants also monitor the quality of the treated wastewater they discharge to the Santa Clara River as part of compliance with the requirements of their NPDES permits

Plan implementation will include identifying key locations for future surface water quality monitoring, identification of constituents of concern and monitoring frequency for each location, and implementation of appropriate sampling and analytical methodology at the selected key sites.

Table A1
Dates of Historic Water Level Measurements in Alluvial Wells
Santa Clara River Valley Groundwater Basin, East Subbasin

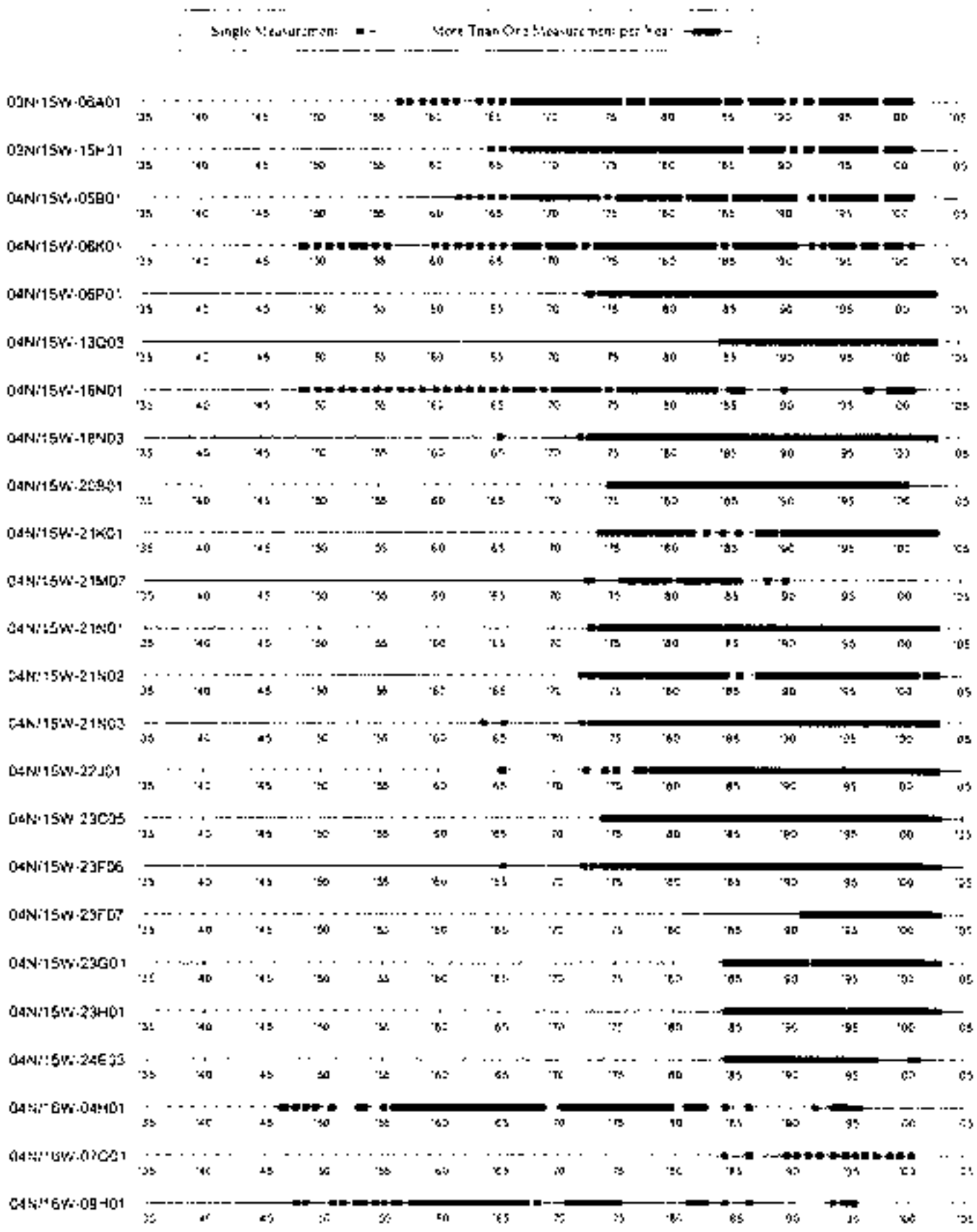


Table A1 - Continued
Dates of Historic Water Level Measurements in Alluvial Wells
Santa Clara River Valley Groundwater Basin, East Subbasin

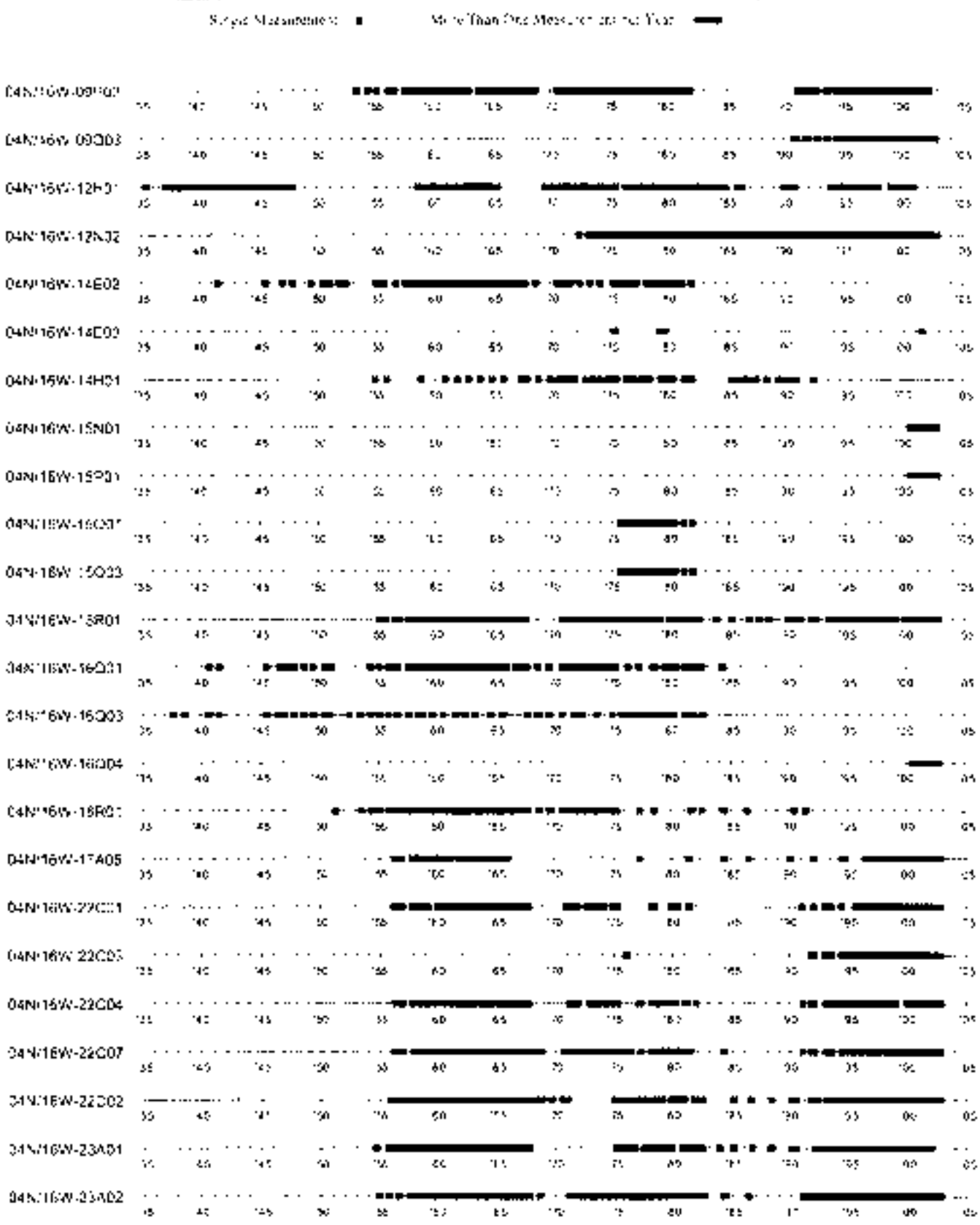


Table A1 - Continued
Dates of Historic Water Level Measurements in Alluvial Wells
Santa Clara River Valley Groundwater Basin, East Subbasin

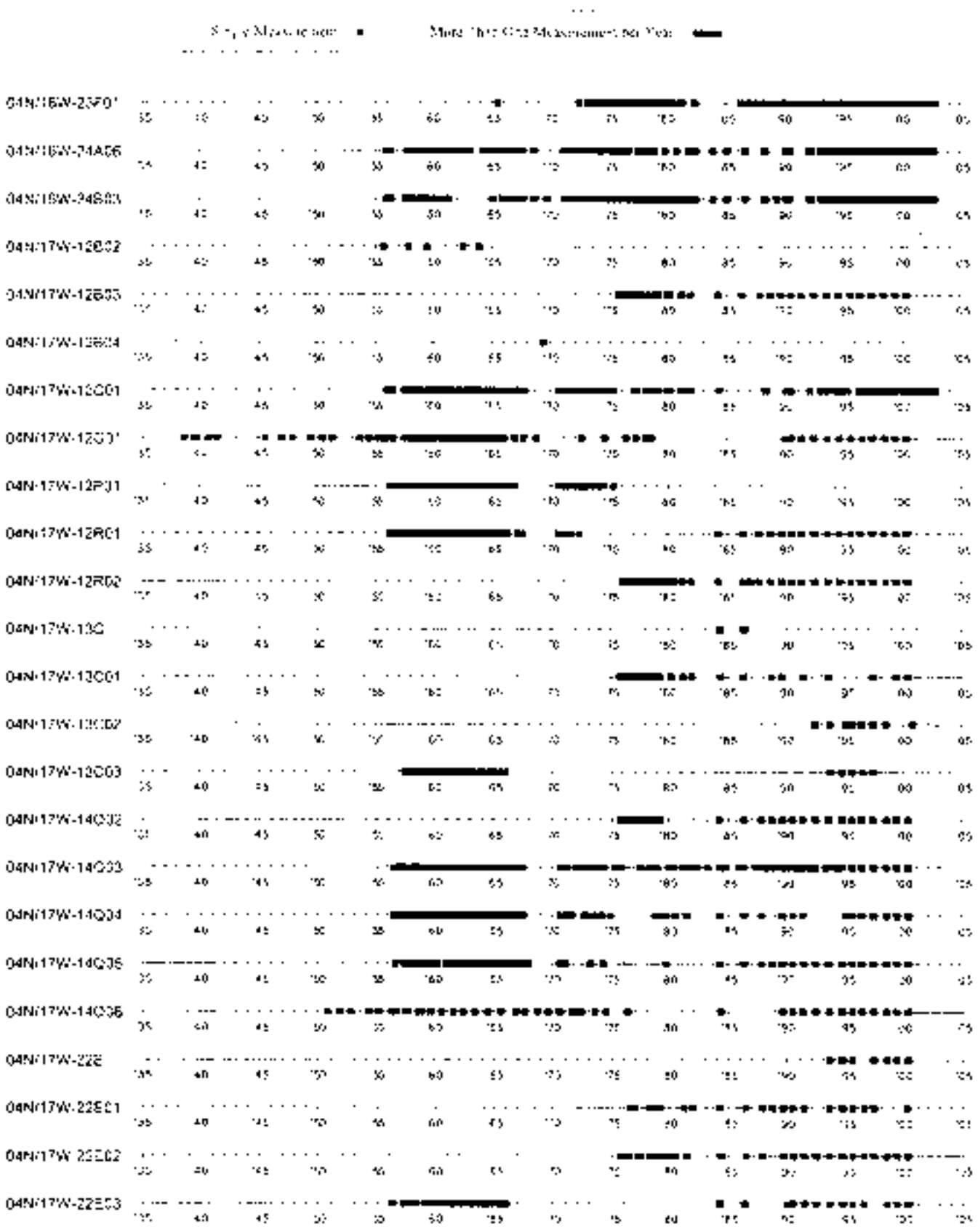


Table A1 - Continued
Dates of Historic Water Level Measurements in Alluvial Wells
Santa Clara River Valley Groundwater Basin, East Subbasin

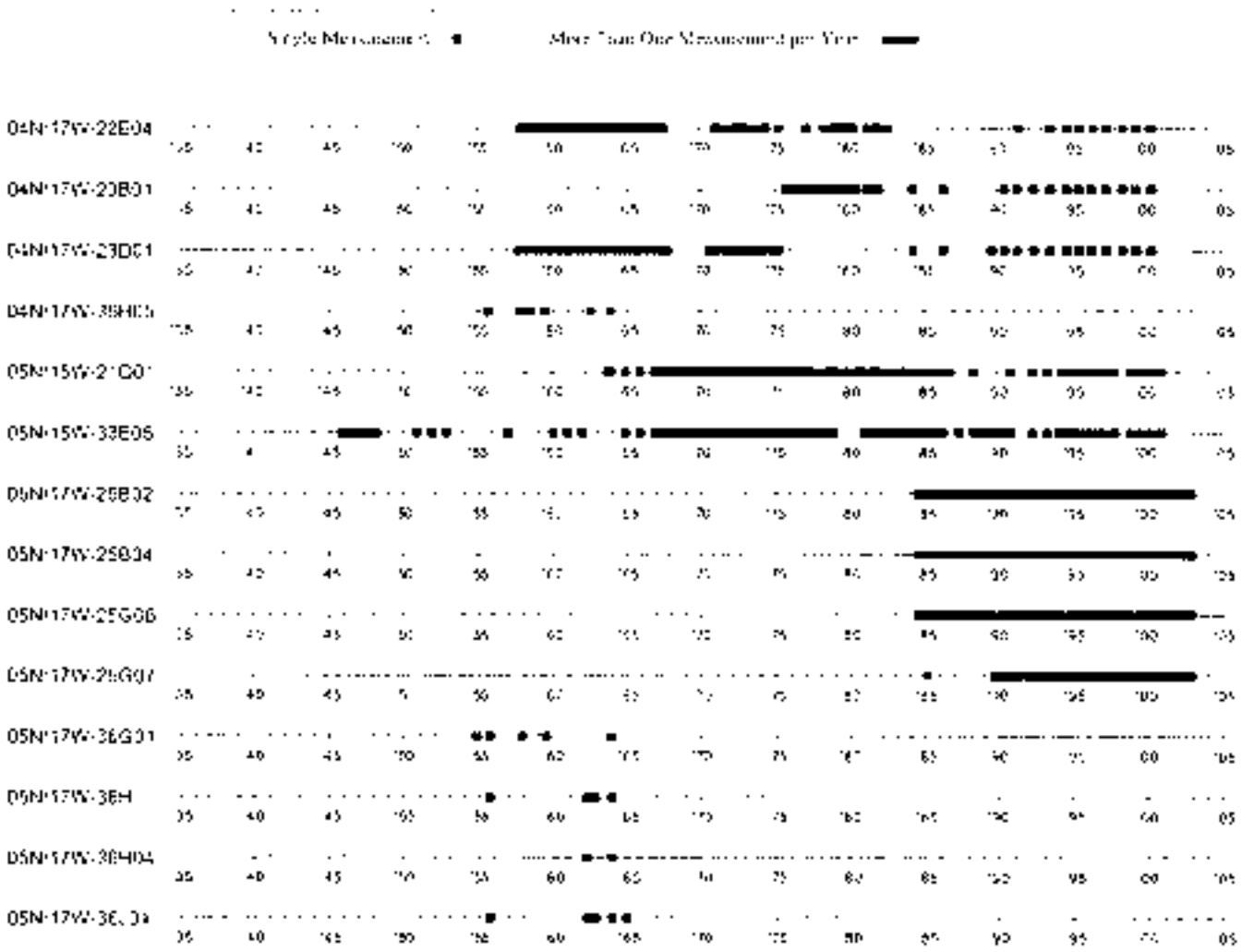


Table A1a
Dates of Historic Water Level Measurements in LACFCD Alluvial Wells
Santa Clara River Valley Groundwater Basin, East Subbbasin

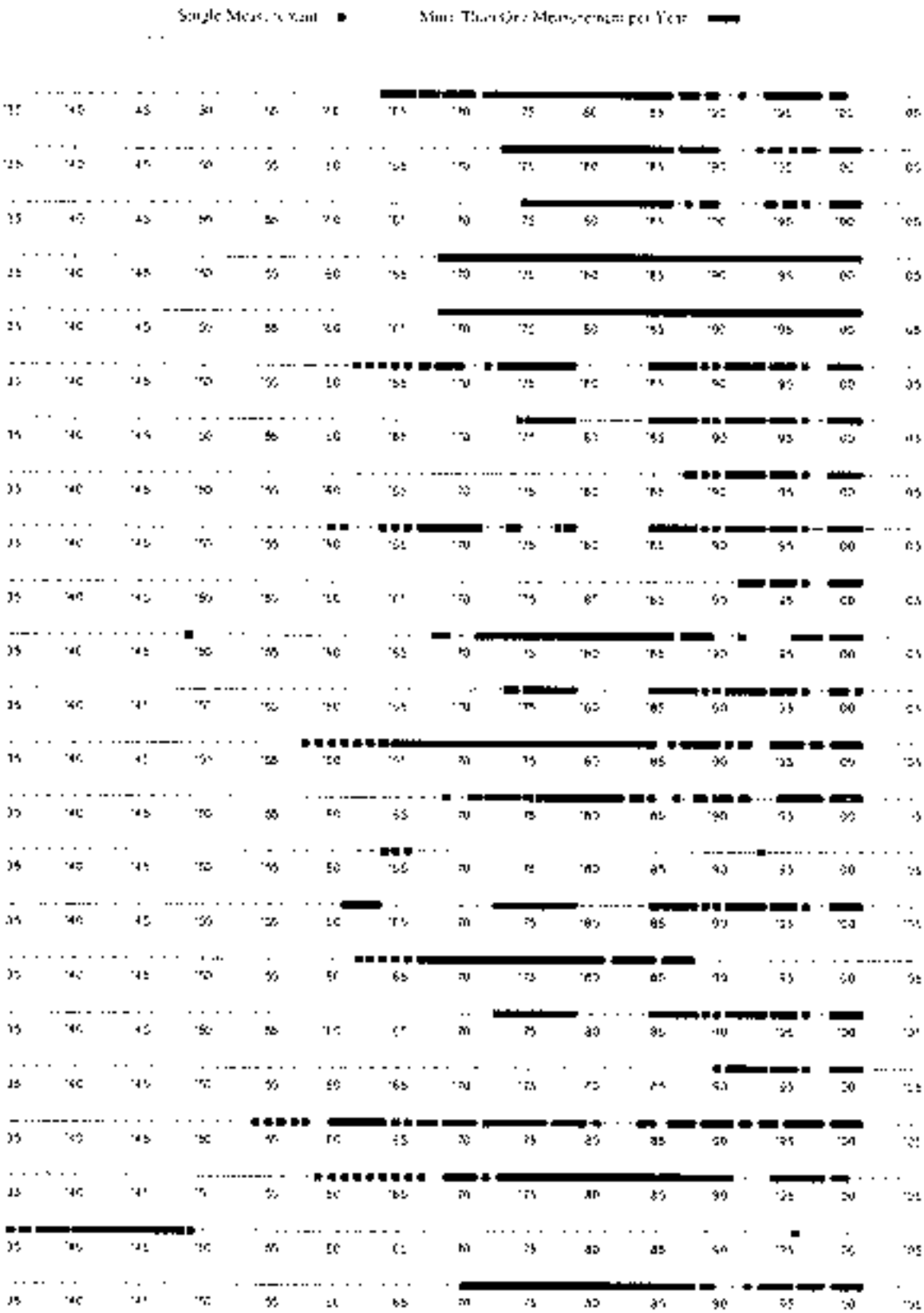


Table A1a - Continued
Dates of Historic Water Level Measurements in LACFCD Alluvial Wells
Santa Clara River Valley Groundwater Basin, East Subbasin

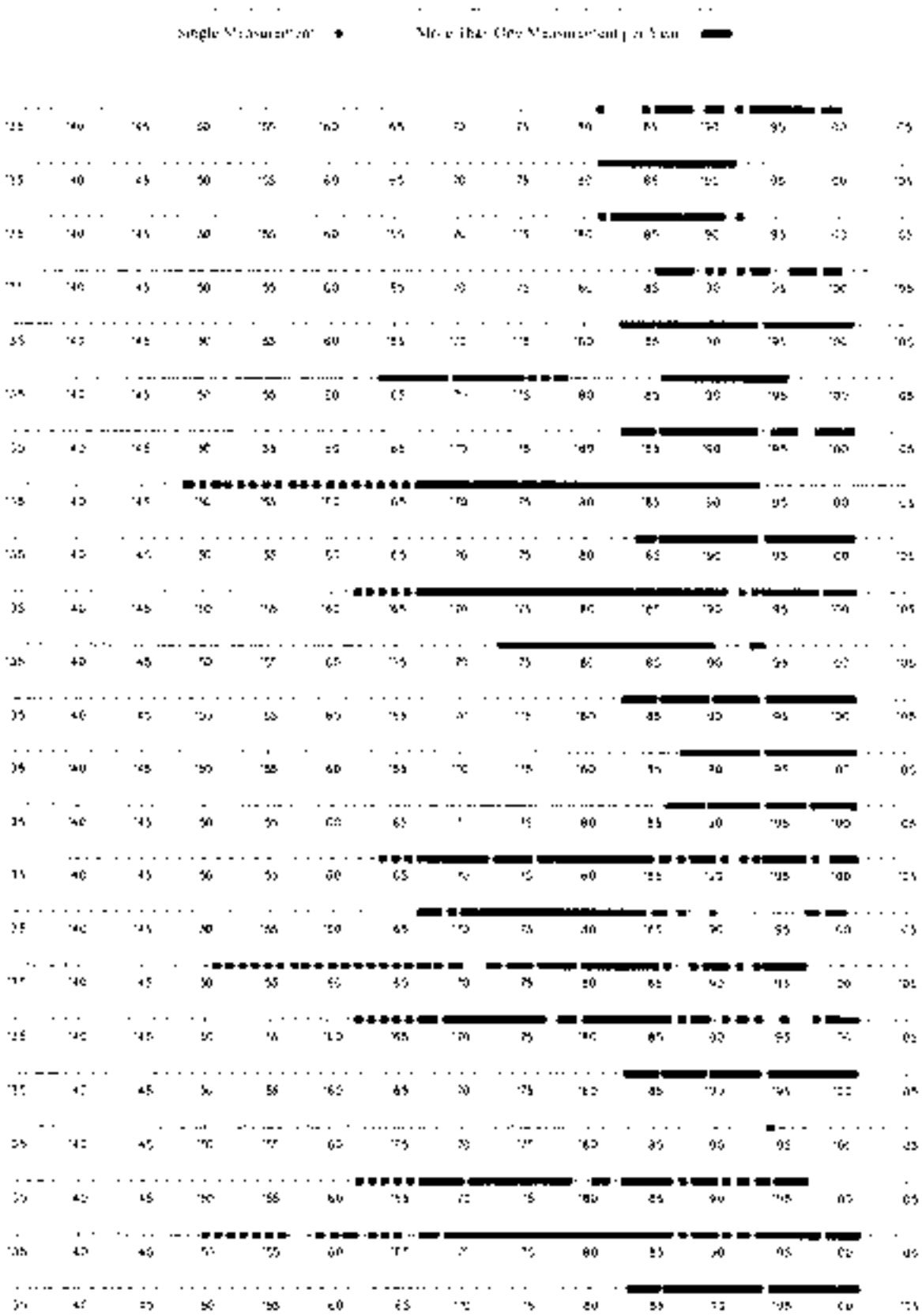


Table A1a - Continued
Dates of Historic Water Level Measurements in LACFCD Alluvial Wells
Santa Clara River Valley Groundwater Basin, East Subbasin

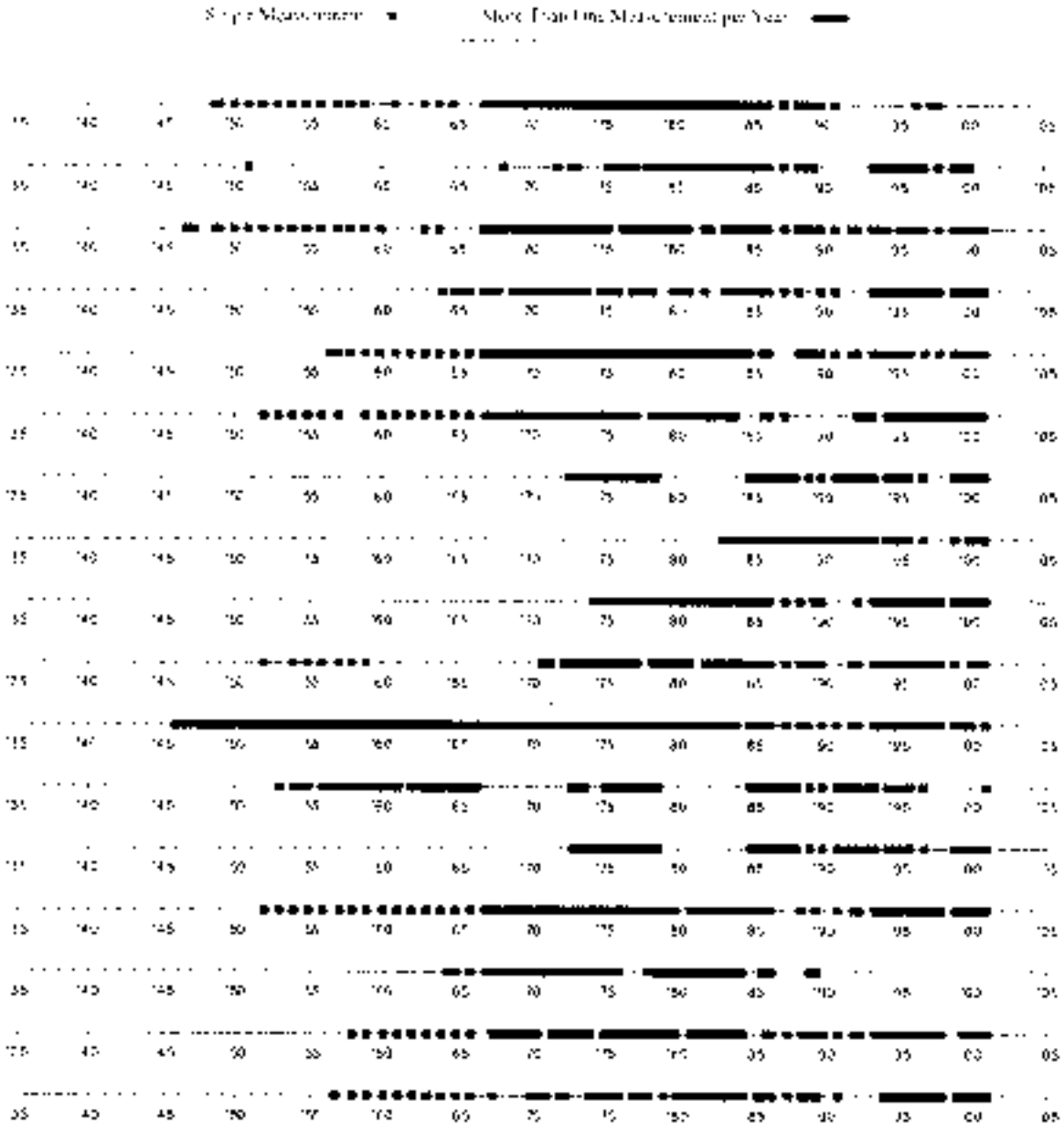


Table A2
Dates of Historic Water Level Measurements in Singles Wells
Santa Clara River Valley Groundwater Basin, East Subbasin

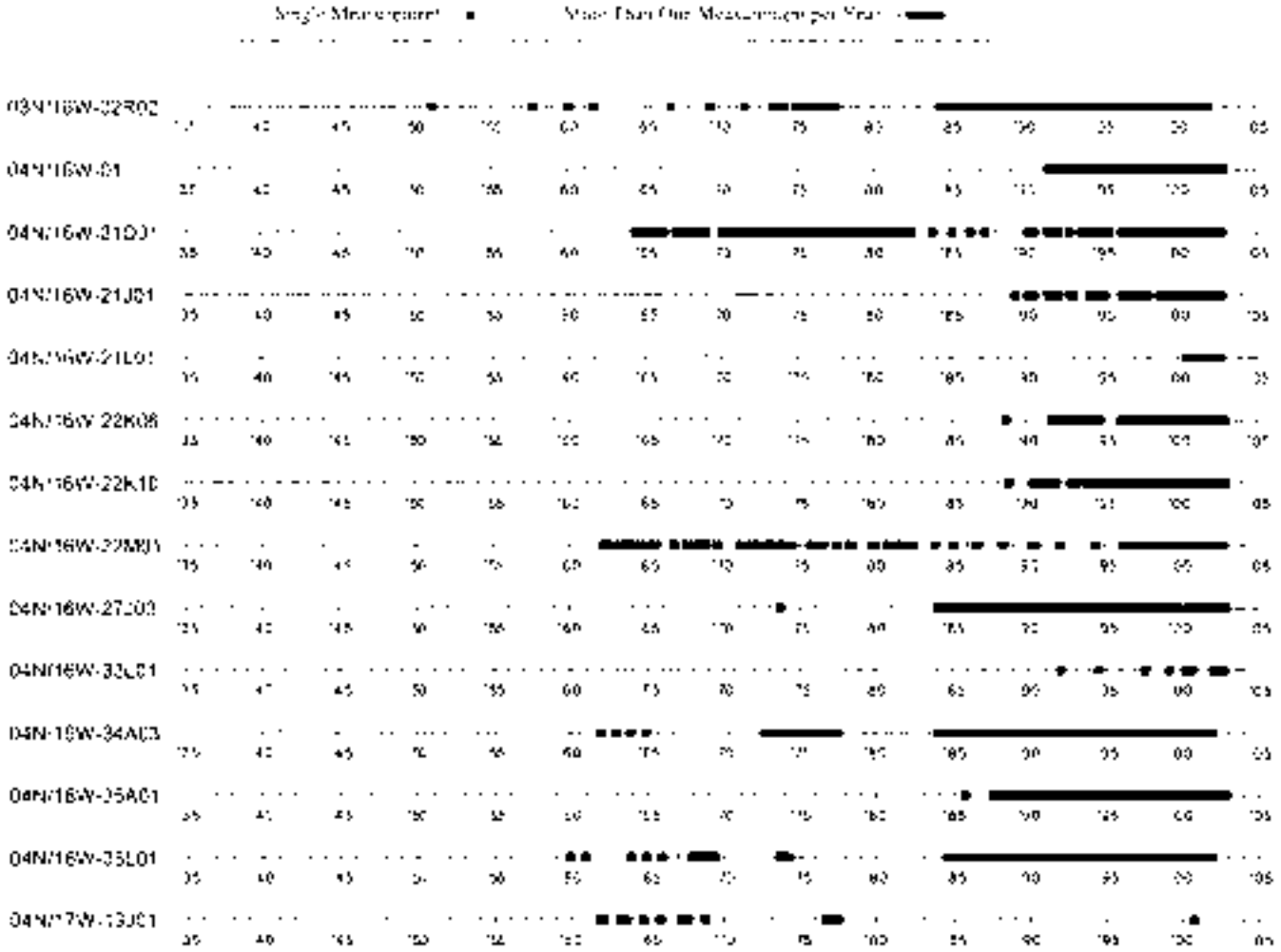


Table A3

Dates of Historic Water Quality Measurements (TDS) in Alluvial Wells

Santa Clara River Valley Groundwater Basin, East Subbasin

Single Measurement ■ Silver Bars on Measurement per Year ▬

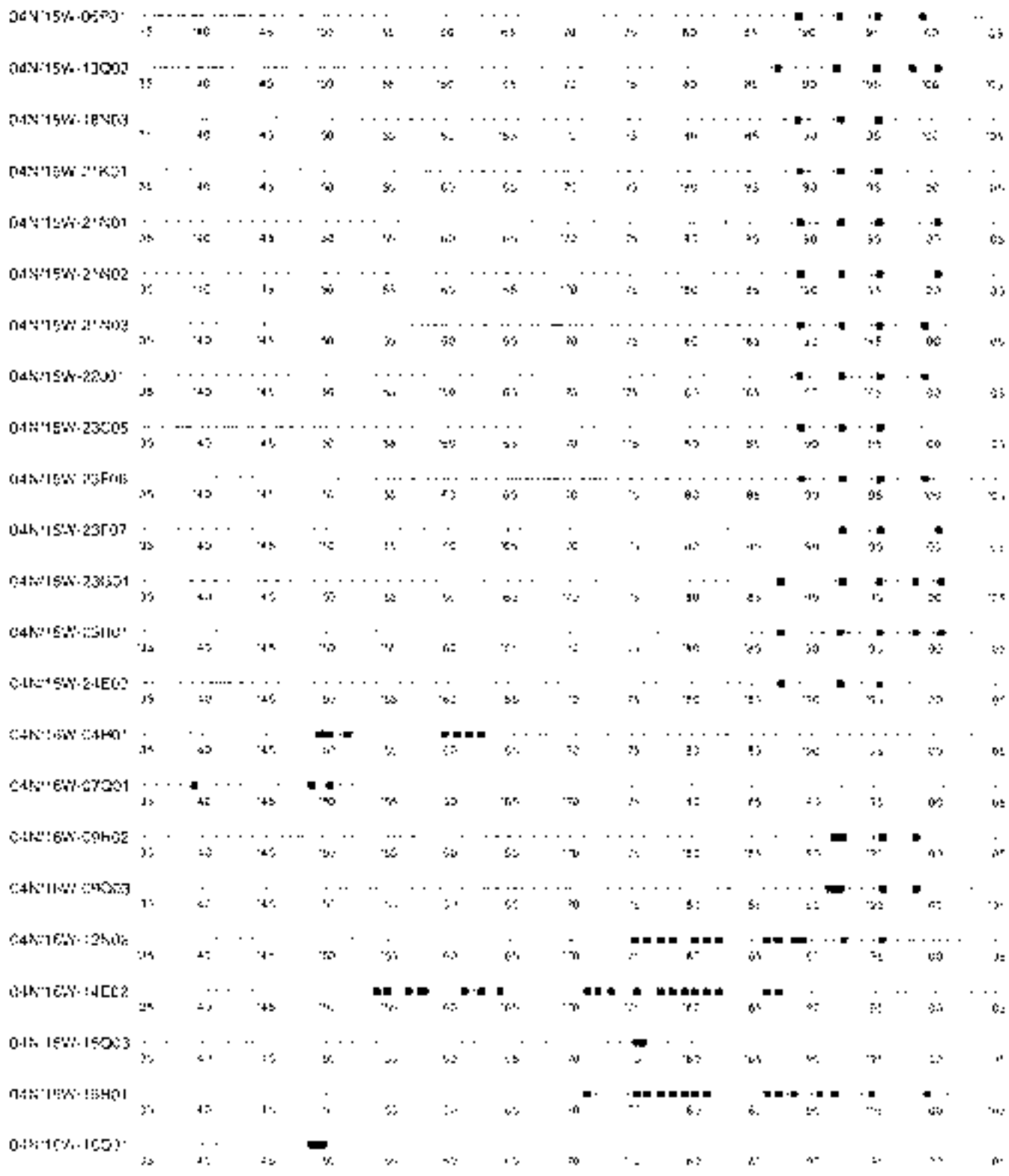


Table A3 Continued
Dates of Historic Water Quality Measurements (TDS) in Alluvial Wells
Santa Clara River Valley Groundwater Basin, East Subbasin

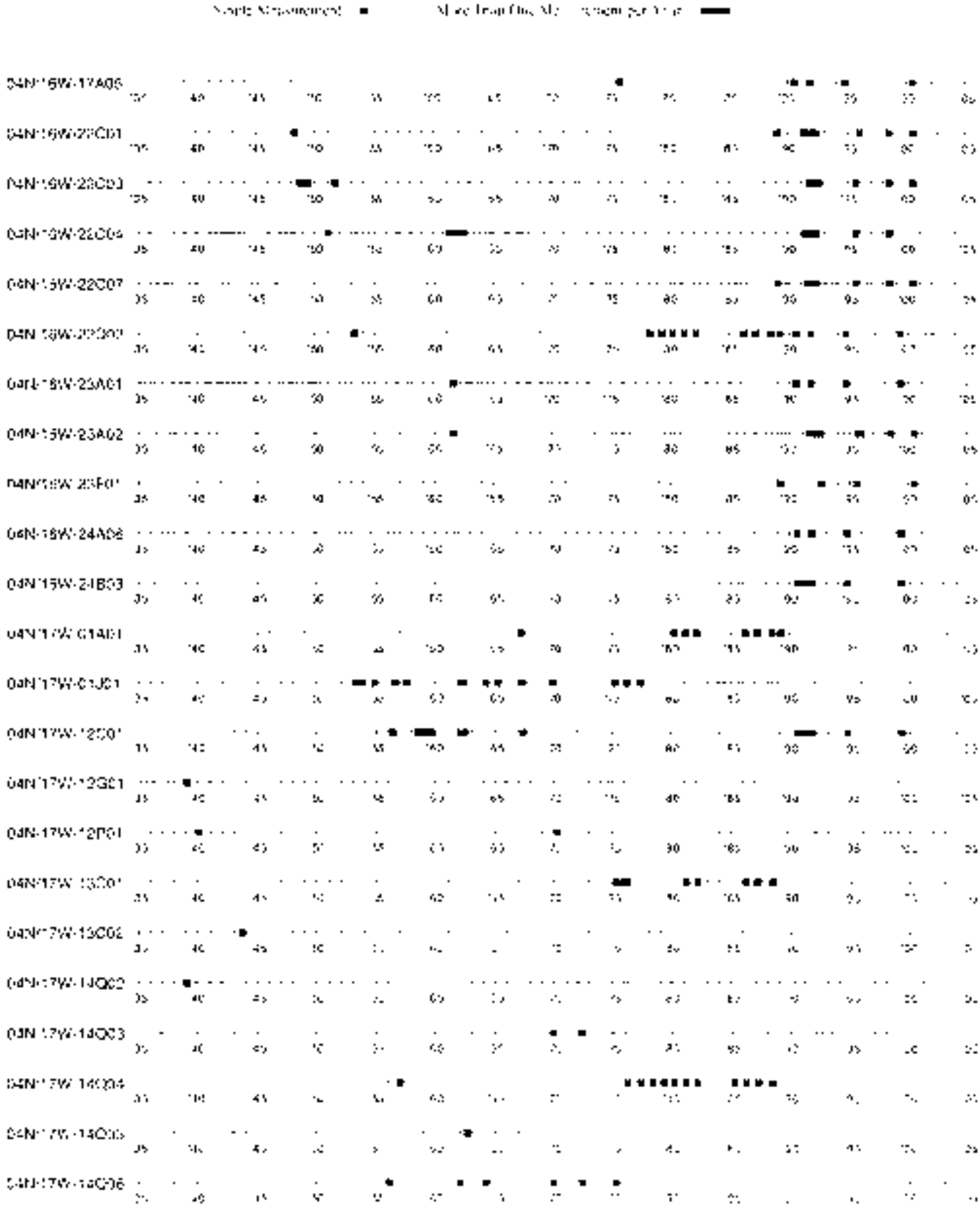
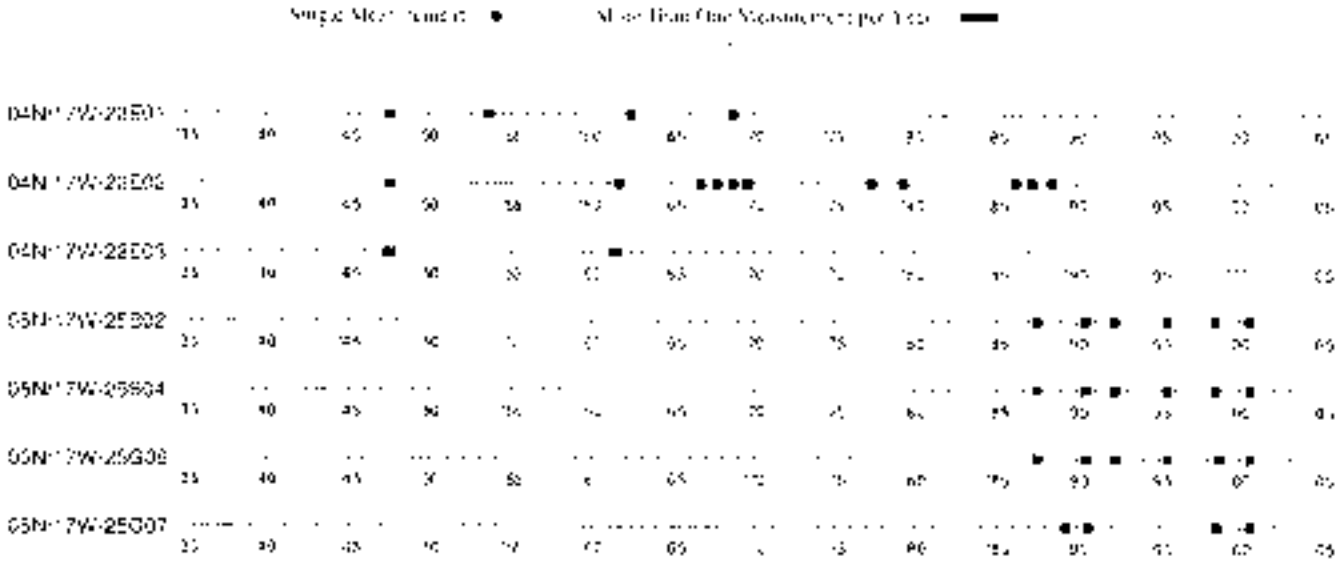
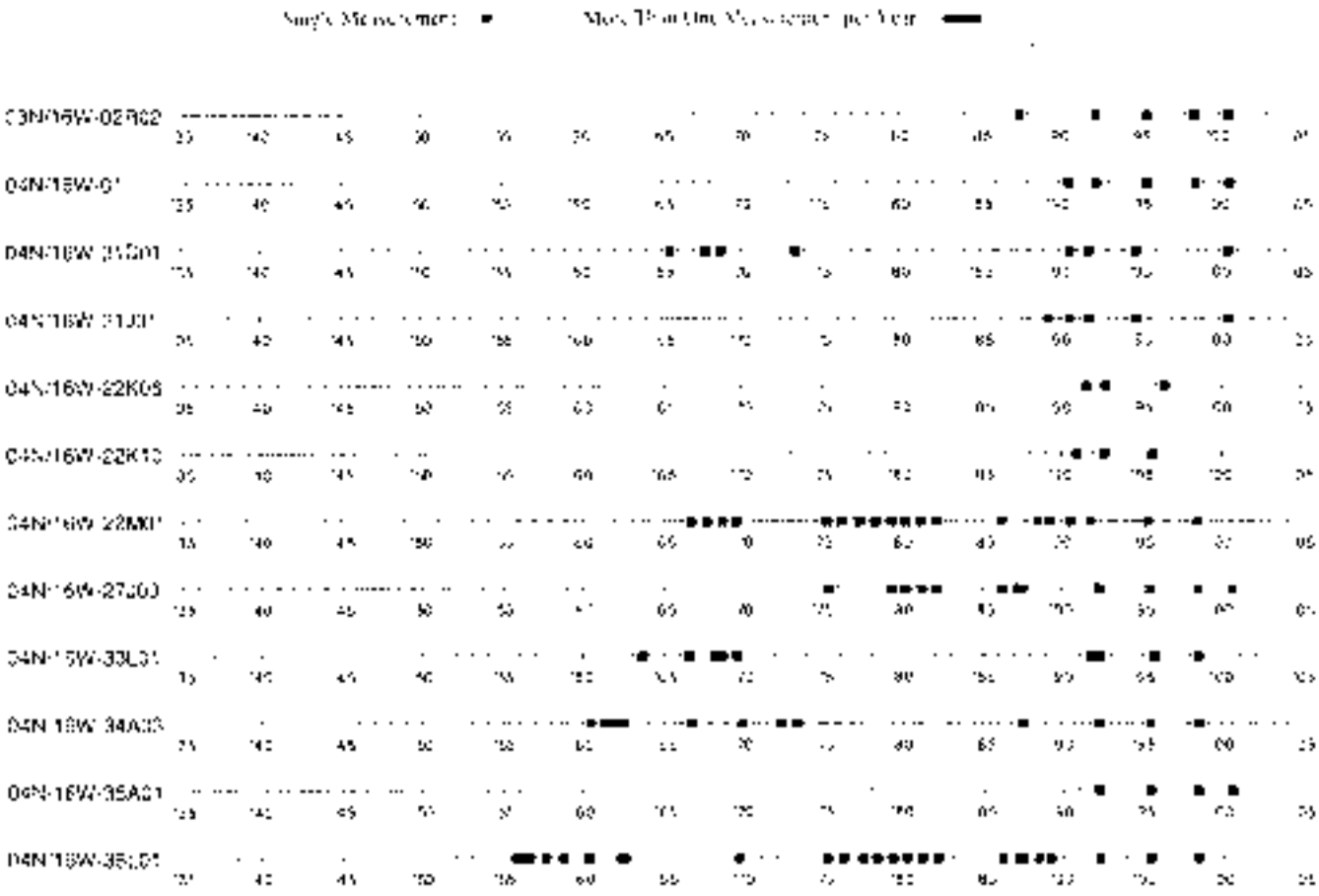
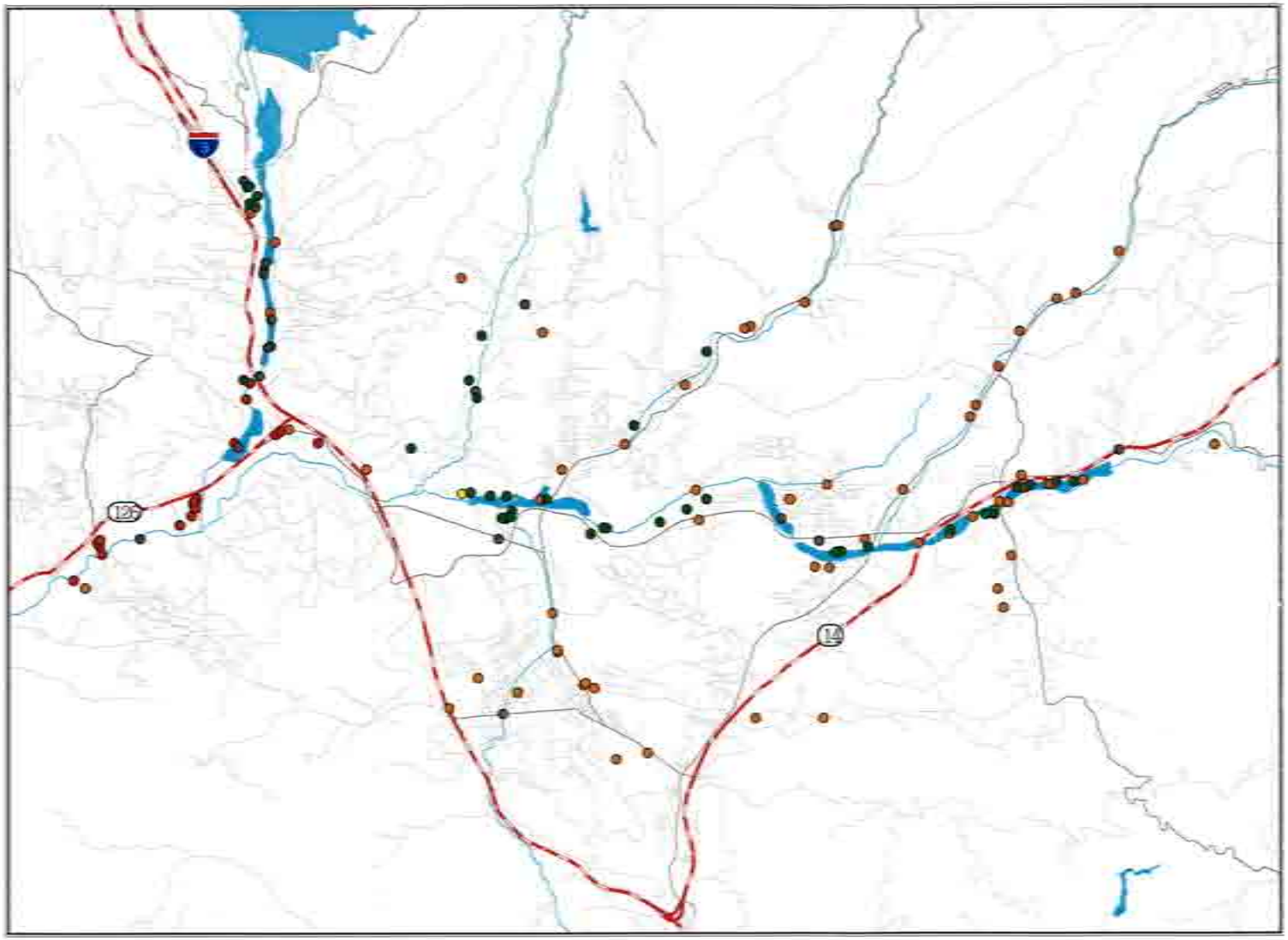


Table A3 - Continued
Dates of Historic Water Quality Measurements (TDS) in Alluvial Wells
Santa Clara River Valley Groundwater Basin, East Subbasin



# Table A4
## Dates of Historic Water Quality Measurements (TDS) in Stategis Wells
## Santa Clara River Valley Groundwater Basin, East Subbasin






**LEGEND**

- Monthly
- Quarterly
- Twice Yearly
- Yearly
- Unknown Status

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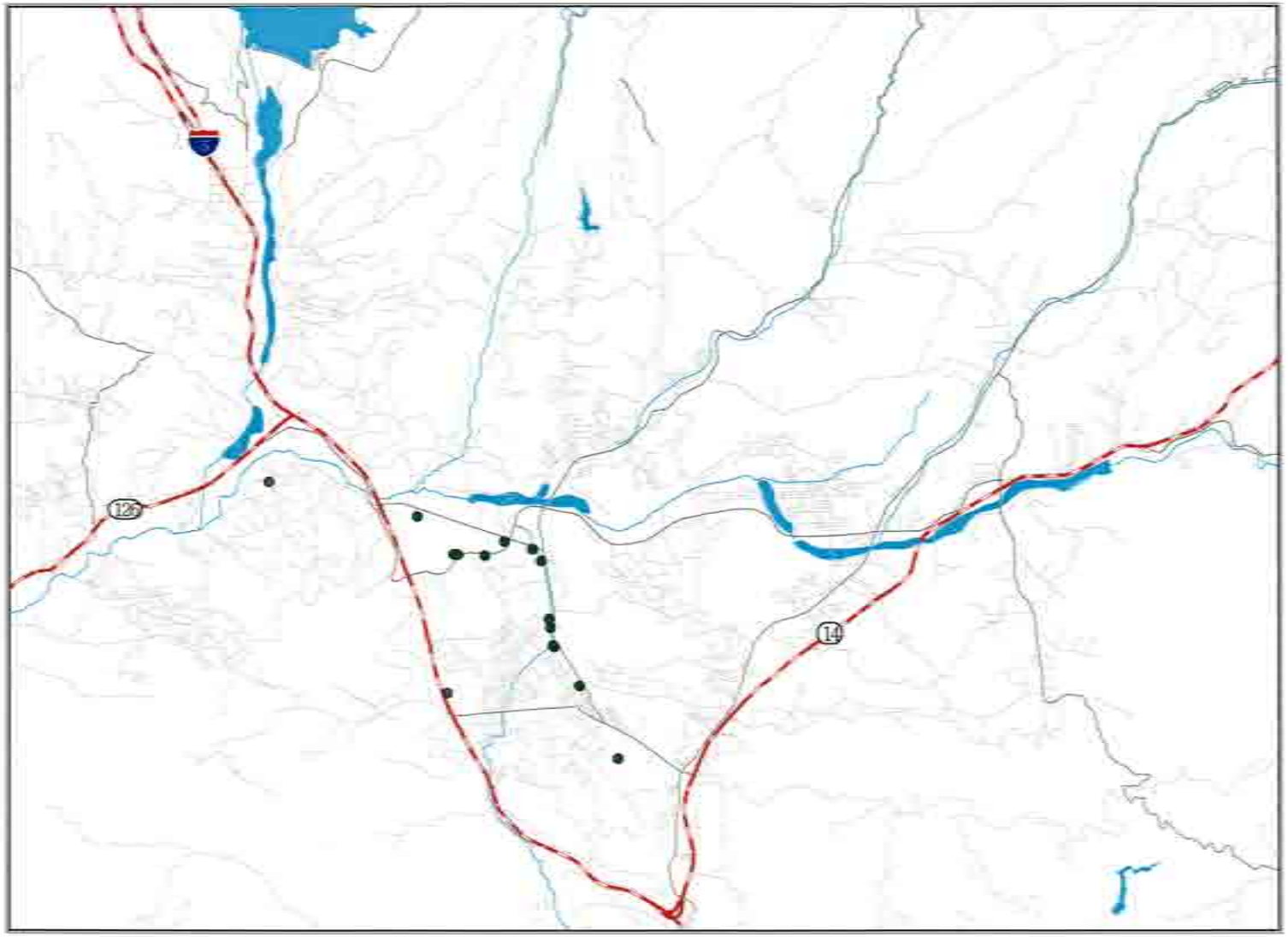
CONSULTING ENGINEERS

**Figure A1**
**Frequency of Water Level Measurements in Alluvial Wells**
**Santa Clara River Valley Groundwater Basin, East Subbasin**




**LEGEND**

- Monthly
- Unknown Status

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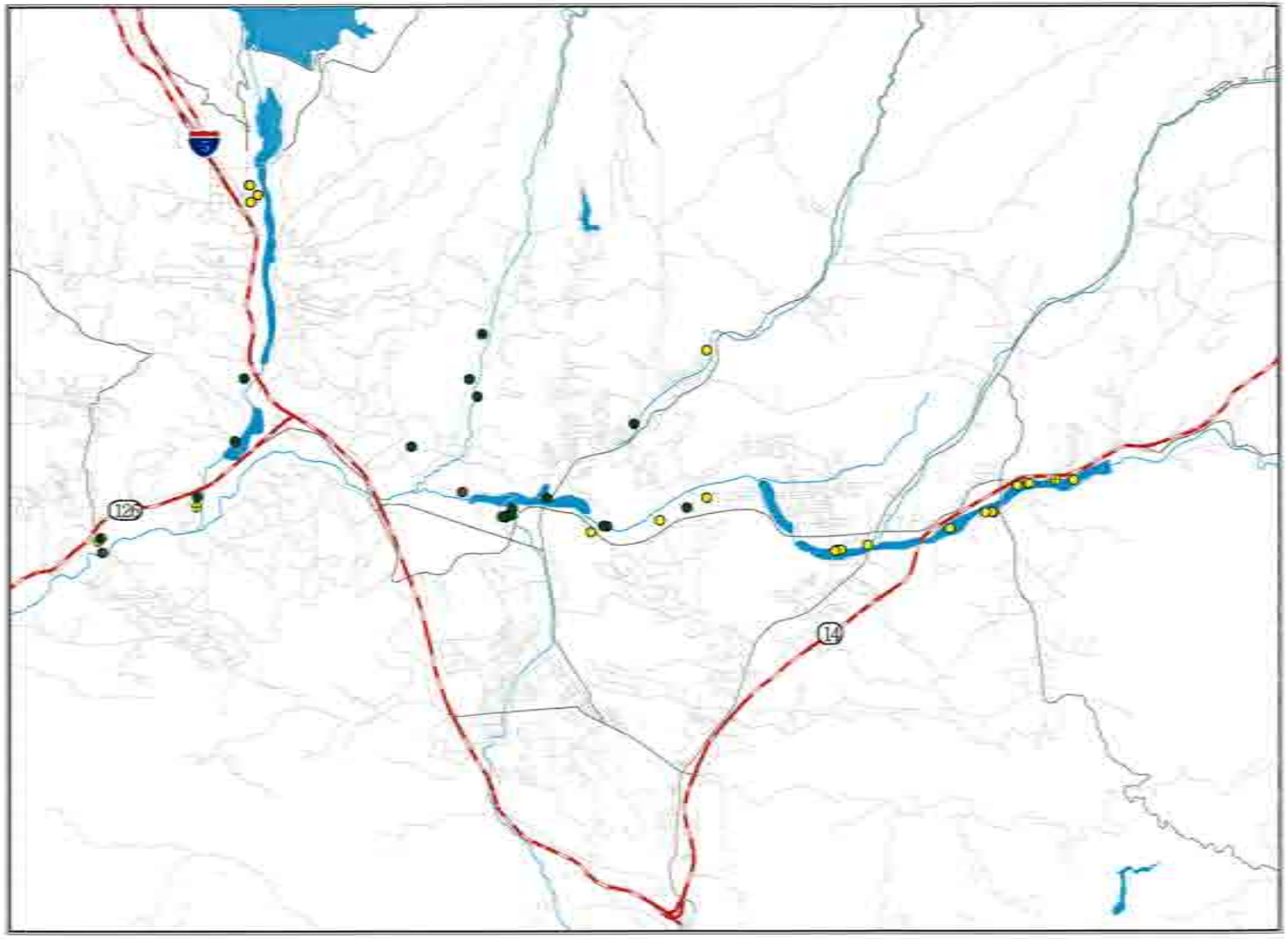
CONSULTING ENGINEERS

**Figure A2**
**Frequency of Water Level Measurements in Saugus Wells**
**Santa Clara River Valley Groundwater Basin, East Subbasin**




## LEGEND

- Every 1 to 3 Years
- Every 1 to 3 Years (through 1988)
- Every 3 Years
- Every 3 Years (through 1988)
- Some Historic

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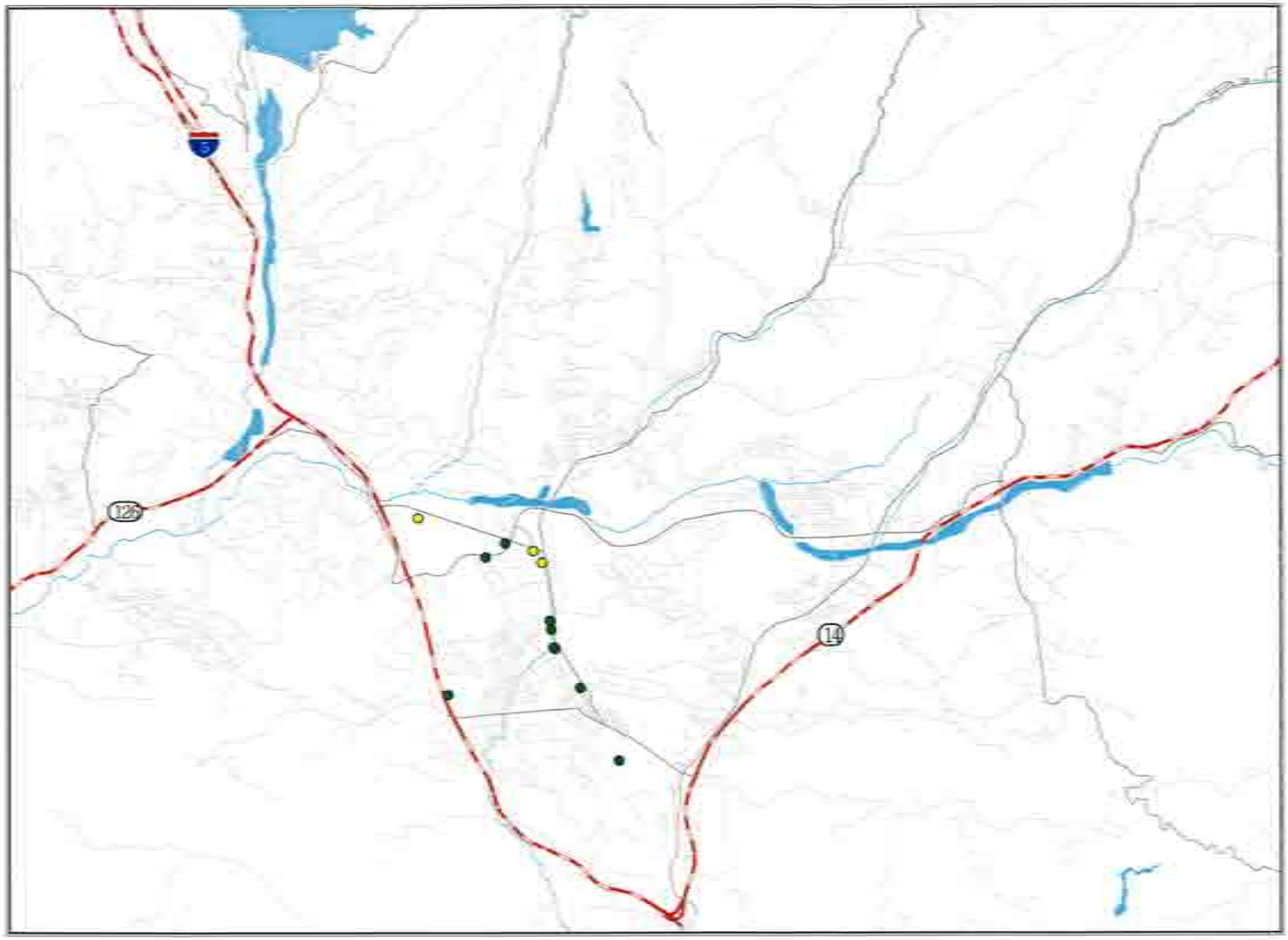
**Figure A3**
**Frequency of Water Quality Measurements in Alluvial Wells**
**Santa Clara River Valley Groundwater Basin, East Subbasin**




**LEGEND**

- Every 1 to 3 Years
- Every 3 Years

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**Figure A4**
**Frequency of Water Quality Measurements in Saugus Wells**
**Santa Clara River Valley Groundwater Basin, East Subbasin**

# Appendix II

# Groundwater Management Plan
# Public Comments

| PARTY | COMMENT | APPLICABLE GWMP SECTION/ COMPLIANCE[1] | RESPONSE |
|---|---|---|---|
| UWCD #5 | Under Primary Element 2 related to surface flows, in addition to SWP water contributing to the increased flow of the Santa Clara River, other considerations should be noted (hydrologic cycle, Alluvial pumping). | Primary Element 2 | As noted above, discussion of groundwater related conditions is included in the Plan as a frame of reference for the Plan objectives and elements. Future interpretation and reporting will take such details as the impacts of the hydrologic cycle and Alluvial pumping into account |
| Santa Clarita Organization for Planning and the Environment #1 | Extensive pumping and lack of protection of recharge areas have resulted in almost complete elimination of surface flows and summer ponding necessary to wildlife as well as massive water level drops in wells that have resulted in water quality and availability problems for small users | Section III (Groundwater Levels and Storage) and (Groundwater Quality) and Primary Elements 1, 2 and 3 | See responses to SCOPE Comments 5, 6 and 9, Sand Canyon Comments 1 and 7, and Sierra Club Comment 3 regarding pumping within basin yield, avoidance of overdraft, preservation of recharge areas, and consideration of reported conditions. |
| SCOPE #2 | Concern that environmental organizations, small well owners, City of Santa Clarita, LA County, and others were not included on the Advisory Board | Water Code Appendix § 103 15.1(e)(2) | CLWA legal counsel has confirmed that CLWA complied with the requirements of AB 134 regarding the composition of the Advisory Council. LA County was represented by LA Co. WWD #36 and LA County Sheriff's Department |
| SCOPE #3 | The GWMP should include a timeline for completion of the plan components. | AB 3030[2] and AB 134[3] | AB 3030 and AB 134 do not require the inclusion of a timeline. |
| SCOPE #4 | The GWMP is lacking in the review of land use plans and coordination with land use agencies. Land use issues should be given higher priority. This may include a wellhead protection plan. | Water Code § 10753.8(j), Primary Element 9 and Secondary Element 2 | Primary Element 9 and Secondary Element 2 have been expanded to further address general preservation of recharge areas and appropriate review of land use plans to protect against potential groundwater contamination |
| SCOPE #5 | GWMP should address maintaining tributaries in a natural state to enhance water recharge and quality. | This is not explicitly required by AB 3030 but does relate to Secondary Element 2 | Secondary Element 2 has been expanded to address preservation of mentioned recharge areas in both the Santa Clara River and its tributaries |

[1] Stats. 1992, Ch. 947.
[2] Stats. 2001, Ch. 929.

| PARTY | COMMENT | APPLICABLE GWMP SECTION/ COMPLIANCE[5] | RESPONSE |
|---|---|---|---|
| SCOPE #6 | GWMP should find ways to increase water recharge. Water agencies should also coordinate to prevent paving of prime recharge areas. | This is not explicitly required by AB 3030 but relates to Primary Elements 3, 4 and 5 and Secondary Element 2 | Potentially increasing groundwater recharge will be part of Primary Elements 3, 4 and 5. Prevention of paving prime recharge areas is included in the expanded Secondary Element 2. |
| SCOPE #7 | Number One Goal should not be "Development of Local Groundwater for Water Supply" because groundwater has many other important uses (recreational, biological, etc…) | This is not required by AB 3030 or AB 114. See Section II of GWMP | The text of Section II, Management Objectives (Goals) for the Basin does not indicate a preference of any one objective over the others. The listing is not intended to indicate that any objective will not be attempted, all objectives are intended to be achieved |
| SCOPE #8 | Agricultural water usage in the GWMP is overestimated with the perennial yield (40,000 afy) estimate higher than that in a Richard Slade report, less agricultural runoff water is available for recharge today | Section IV (Existing and Projected Water Supplies) | Reported historical agricultural pumping is consistent with all available records. A perennial yield of 60,000 afy is not included or implied in the GWMP. Rather, estimated ranges of 30,000 to 40,000 afy, depending on hydrologic conditions, are included as expected yield from the Alluvium. That range is consistent with historical reports, and with observations of actual Alluvial aquifer response to pumping in that range for at least the last 50 years |
| SCOPE #9 | Disappearance of year round Santa Clara River flow is indication of overdraft. "There are numerous records and observations by long-time residents indicating that surface flow usually occurred year round." | Section III (Areas of Concern and Identified Problems). Water Code § 10753.8(c). | Disappearance of year round stream flow does not necessarily indicate groundwater overdraft. In fact, stream flow west of Bouquet Canyon is now perennial. Part of implementing Primary Element 1 will be to obtain the "numerous records" of year round stream flow that are noted to have actually occurred. |
| SCOPE #10 | GWMP should disclose the reduction in production capability because of perchlorate contamination. | Primary Element 8, § 10753.8(j). | The GWMP notes the inactivation of wells that have been impacted by perchlorate contamination |
| Sand Canyon Area Well Owners Assoc. #1 | Groundwater is extensively pumped and recharge areas are not adequately protected. water level in four wells has dropped from 12 ft in 1997 to 93 ft currently. | This relates to Primary Elements 1 and 3, and Secondary Element 2 | The noted groundwater level fluctuations are consistent with those described in Section III and illustrated in Figure 3-2 for the Sand Canyon area. Section III also describes and illustrates the historical recovery from such declines. Avoidance of overdraft, i.e. continuous lowering of water levels, and protection of recharge areas are included in Primary Element 3 and Secondary Element 2, respectively. |

| PARTY | COMMENT | APPLICABLE GWMP SECTION/ COMPLIANCE[1] | RESPONSE |
|---|---|---|---|
| Sand Canyon #2 | Advisory board lacks representation by rural well owners. | Water Code Appendix § 103-15.1(e)(2) | CLWA complied with the requirements of AB 134 regarding the composition of the Advisory Council |
| Sand Canyon #3 | GWMP should include timelines for completing its phases. | AB 3030 and AB 134. | Timelines are not required by AB 3030 or AB 134. |
| Sand Canyon #4 | GWMP is lacking in its review of land use plans and coordination with land use agencies. | Water Code § 10753.8(l) | See response to SCOPE Comment 3 above |
| Sand Canyon #5 | Perennial yield estimates for the Santa Clara River are higher than that provided in a Richard Slade report. Agricultural runoff is no longer a factor; agricultural usage was not metered historically, and former recharge areas have been paved | Section IV (Existing and Projected Water Supplies) | See response to SCOPE Comment 8 above. |
| Sand Canyon #6 | Santa Clara River should not be defined in terms of percolating groundwater. GWMP should clarify relationship between river and Saugus formation | Section III | The GWMP is not an appropriate document in which to define the legal classification of groundwater, whether in the Alluvium or the Saugus Formation, consequently, there is no expression in the GWMP to describe the legal classification of groundwater in the basin. The entire focus of the GWMP is management of groundwater toward long-term preservation of both the quantity and quality of the resource |
| Sand Canyon #7 | GWMP's assertions against existence of overdraft or other undesirable conditions are incorrect since water levels in wells have reached historic lows. In addition, riparian conditions on the Santa Clara River and tributaries show signs of water deprivation | Section III (Areas of Concern and Identified Problems) | See response to Sand Canyon Comment 1. Further, intermittent fluctuations reaching the equivalent of historic low levels is not overdraft. Primary Elements 1 and 3 are included to monitor groundwater levels throughout the basin, and to operate in an ongoing manner to avoid overdraft. Finally, the statement that riparian conditions show signs of water deprivation is non-specific as to location and is otherwise unsubstantiated. Primary Elements 1 and 2 are included in the Plan to quantify the existence and extent of such conditions, if they occur. Primary Element 3 is included to avoid overdraft-related conditions of the type noted |

| PARTY | COMMENT | APPLICABLE GWMP SECTION/ COMPLIANCE[1] | RESPONSE |
|---|---|---|---|
| Sand Canyon<br>#8 | GWMP should include reports regarding water contamination from Robinson Ranch. City of Santa Clarita had stipulated that water quality adjacent to the golf course be monitored with results published in a report | Primary Element 1 | See response to UWCD Comment 1 regarding extent of detail regarding occurrence of groundwater as framework for understanding the objectives and elements of the GWMP. As regards this comment, there is no documented groundwater contamination from Robinson Ranch, including that golf course. Required reports on Robinson Ranch have not shown any contamination as alleged in this comment. Monitoring in accordance with Primary Element 1 is intended to detect any groundwater contamination of the nature alleged in this comment |
| **Friends of the Santa Clara River**<br>#1 | Disappointed that GWMP's primary goal is "Development of Local Groundwater for Water Supply" because other objectives should include protection of groundwater resources | AB 3030 and AB 134. Section II of GWMP | See response to SCOPE Comment 7 above regarding lack of priority for all management objectives, and lack of "primary" status for "Development of Local Groundwater for Water Supply". |
| Friends<br>#2 | GWMP should emphasize that paving of streams reduces recharge and should be avoided. Buffer zones around streams should be discussed. | This is not explicitly required by AB 3030 but relates to Primary Elements 3, 4 and 5 and Secondary Element 2 | See response to SCOPE Comments 4, 5 and 6. Further, given the importance of in channel recharge to the yield of the Alluvium, a priority in implementation of the Plan can logically be expected to be avoidance of paving stream channels |
| Friends<br>#3 | Advisory Board should include representatives from environmental groups and county agencies. | Water Code Appendix § 103-15.1(c)(2) | CLWA complied with the requirements of AB 134 regarding the composition of the Advisory Council. |
| **Santa Clarita Sierra Club Group**<br>#4 | GWMP should include timelines for completion of components. | AB 3030 and AB 134. | Timelines are not required by AB 3030 or AB 134 |

| PARTY | COMMENT | APPLICABLE GWMP SECTION/ COMPLIANCE[1] | RESPONSE |
|---|---|---|---|
| Sierra Club #2 | GWMP does not account for loss of groundwater from perchlorate contamination. "The numbers do not adequately represent the real water supply." | Primary Element 8; Water Code §10753.8(j) | See response to SCOPE Comment 10 regarding the inactivation of wells impacted by perchlorate contamination. The inactivation of certain wells impacts pumping capacity until the wells can be reactivated, with treatment if necessary, or replaced. However, perchlorate contamination does not reduce the available yield of the aquifer system, hence, the numbers included in the GWMP accurately reflect the current state of water supply. |
| Sierra Club #3 | Loss of groundwater due to development and pavement is not considered. GWMP must address coordination of land use with water necessities. | This is not explicitly required by AB 3030 but relates to Primary Elements 3, 4 and 5 and Secondary Element 2. | See responses to SCOPE Comments 4 and 6. Further, there has been no "loss" of groundwater due to development or pavement; groundwater conditions remain as generally described in Section III, with nearly constant water levels to the west and repetitive fluctuations to the east (see response to Sand Canyon Comment 1). |
| Sierra Club #4 | Drought planning is inadequate as it fails to take account of loss of primary water sources and reclaimed water. | Primary Element 4, 4, 5 and 7 | Drought planning is embedded in the GWMP in that the Plan is intended to result in groundwater management that ensures adequacy of groundwater supplies through both wet and dry (drought) hydrologic cycles. While "drought planning", per se, relates more specifically to overall water supply planning, of which groundwater is only one component, this Plan is intended to manage groundwater in such a way that it will be a reliable component of overall water supply through dry periods without being overdrafted on a long-term basis, e.g. through wet/normal periods that follow dry periods. Primary Elements 3, 4, 5 and 7 in the Plan relate to drought planning as well as parts of groundwater management through long-term fluctuations in hydrologic conditions. |
| Sierra Club #5 | GWMP does not adequately discuss maintaining river and tributary habitats. Sierra Club supports a citizen monitoring program for water quality. | This is not explicitly required by AB 3030 but does relate to Secondary Element 7 | See response to SCOPE Comment 5 and Friends Comment 2. |

| PARTY | COMMENT | APPLICABLE GWMP SECTION/ COMPLIANCE[1] | RESPONSE |
|---|---|---|---|
| Santa Clara #6 | CLWA should involve the public and other government and private entities in its water supply planning. | Water Code Appendix § 103-15.3(c)(2) | CLWA complied with the requirements of AB 134 regarding the composition of the Advisory Council. |
| Ed & Joan Dunn #1 | Concern because CLWA did not hold more public meetings before release of draft. Concern whether CLWA has regularly met with Advisory Board. | Water Code § 10753 et seq. | CLWA has complied with all requirements thus far regarding public meetings and gone beyond that legally required. |
| Dunn #2 | Doubt regarding replenishment of water in the Alluvial Aquifer. | Primary Elements 3, 4 and 5 | Fundamentally, as discussed in the Plan, the long-term objectives for the basin include utilizing groundwater for water supply while not overdrafting the basin. As also discussed in the Plan, historically, in the western part of the basin there has been sufficient water for recharge to maintain an essentially full basin throughout both wet and dry hydrologic periods. Part of the reference to "sustain recharge" relates to that historical condition. Whether or not additional artificial recharge will be implemented in other parts of the basin, and what water sources might be used for such recharge, are to be addressed via implementation of the Plan, particularly Primary Elements 3, 4 and 5. |
| Dunn #3 | Doubt over Richard Slade's assertion as to Alluvial Aquifer capacity. | This challenges evidence which the GWMP cites. | The analysis and determination of the storage capacity of the Alluvium has been exhaustively described in Slade's reports. The comment conveys no specific aspect of its "question", the commentors are referred to Slade's reports, which address the storage calculations in proper technical detail. |
| Dunn #4 | GWMP should state that SWP water was interrupted for 6 months in 1991. Newspaper clipping is provided for this point. | Primary Elements 3, 4 and 5 | Primary Elements 3, 4 and 5 are included in the GWMP to ensure the maximum reliability of local groundwater in order to endure any future drought-related impacts on SWP deliveries, such as occurred in 1991. |

| PARTY | COMMENT | APPLICABLE GWMP SECTION/ COMPLIANCE[1] | RESPONSE |
|---|---|---|---|
| Dunn #5 | Statement in GWMP that no wells exceeded DHS action level for perchlorate is false. Newspaper clippings provided | Section III (Groundwater Quality) | The Plan has been revised to reflect that, while there remains no primary or secondary drinking water standard for perchlorate, and although only some of the detected concentrations of perchlorate in the Saugus wells exceeded the Action Level established by the State Department of Health Services at that time (18 ug/l), all those wells were inactivated by their respective owners after detection of perchlorate; those wells remain out of municipal water supply service since then |
| Dunn #6 | Statement that perchlorate contamination has not reduced groundwater capacity is misleading | Primary Element 8 | See response to SCOPE Comment 10 and Sierra Club Comment 2 |
| Dunn #7 | The Urban Water Management Plan should not be referred to because it is under legal attack. | While it has been challenged, the UWMP is still a valid document | While it has been challenged, the UWMP is still a valid document and represents the current plan for urban water supply through its 20 year planning horizon. The Kern County Superior Court in February 2003 ruled completely in favor of the water suppliers in their defense of the UWMP litigation. The remaining petitioners have appealed |
| Dunn #8 | The Saugus Formation does NOT underlie the entire CLWA service area | Section I (Santa Clara River Valley Groundwater Basin) | The text of the Plan has been revised to reflect that the Saugus Formation underlies much of the CLWA service area |
| Dunn #9 | GWMP should state CLWA's inability to transport additional SWP to Santa Clarita Valley | Section IV (Existing and Projected Water Supplies) | CLWA does not have an inability to transport additional SWP water to the Santa Clarita Valley. Fundamentally, the comment is erroneous since the State conveys SWP water to CLWA's diversion points from Castaic Lake; from there CLWA has sufficient treatment and conveyance capacity for its current water demands, and is in the process of designing additional treatment plant capacity to treat and distribute additional water to accommodate projected increased demand |

| PARTY | COMMENT | APPLICABLE GWMP SECTION/ COMPLIANCE[1] | RESPONSE |
|---|---|---|---|
| Dunn #10 | CLWA's recycled water program is for private business only, not public agencies. | Primary Element 7 | The recycled water program has no restrictions against use by public agencies. As described in Primary Element 7, the integration of recycled water to meet some non-potable demand is expected to decrease overall demand for potable water by up to 17,000 afy. As public agencies develop capabilities to utilize recycled water for non-potable uses, they are expected to reduce potable water demands by integrating recycled water into their overall water delivery systems. Finally, recycled water service to a specific user or area frees up potable water supplies for other users or areas, thus enhancing the reliability of the overall water supply of the Valley. |
| Dunn #11 | Groundwater production from both the Alluvium and Saugus Formation is overstated | Section IV (Existing and Projected Water Supplies) | The comment is unsubstantiated and includes no support in the form of records or other data to validate it. The historical use of groundwater reported in the Plan is based on a combination of metered pumping and indirect estimation of pumping based on metered power consumption and pump performance testing. There is no basis for claiming that reported groundwater production is "overstated". |
| Dunn #12 | CLWA should develop an emergency plan. | Primary Elements 3, 4 and 5 | Development of an emergency plan, presumably an emergency water supply plan, is beyond the scope of a GWMP. However, Primary Elements 3, 4 and 5 are intended to further develop both a regular and a dry year/emergency component of water supply from local groundwater. |
| Dunn #13 | Chart depicting SWP water received in 1991 is erroneous. Newspaper clipping provided | Figure 4-1 | The final 1991 M&I allocation was 30% (October 1991). CLWA's M&I entitlement at that time was 41,500 af. The total amount made available to CLWA by DWR was 13,050 af. Since by October, CLWA and the retail purveyors had already instituted emergency operations, the entire amount was not used |

| PARTY | COMMENT | APPLICABLE GWMP SECTION/ COMPLIANCE[1] | RESPONSE |
|---|---|---|---|
| Dunn #14 | Claim that CLWA meetings with retail water purveyors, the City, and UWCD have not occurred. | Primary Element 9 | The Commentors' lack of knowledge of such meetings does not mean they have not occurred. Appropriate documentation of such meetings, including presentation materials, discussion topics, and resultant work assignments, are maintained by meeting participants. |
| Dunn #15 | Secret meetings and secret reports related to Primary Element 10 should not be included as part of the GWMP. | Primary Element 10 | The preparation of the annual Water Reports does not indicate that any secret meetings have taken place. Previous Water Reports have been prepared, and future Water Reports are envisioned to be prepared with few, if any, meetings of any type; both public and private meetings have been convened to present and discuss the findings of the various Water Reports, and such meetings are intended to occur in the future for the same purpose. |
| Dunn #16 | CLWA should provide an accounting of water conserved. | N/A | Providing an accounting of water conserved is beyond the scope of the GWMP. More water sales are occurring through time due to increasing demand in the Valley. Water conservation measures result in water savings even though demand is increasing. |
| Diane Trauerman (City Planning Commissioner) #1 | What percentage of water demand will be drawn from local groundwater? | Primary Element 5 | In terms of groundwater management planning, projected urban water demand (the 106,000 afy projected urban demand in 2020) does not represent total valley-wide demand; total projected demand is 113,100 afy, including both urban and agricultural. In that light, on an average basis, local groundwater is expected to be utilized to meet about 40 percent of total water demand. |

| PARTY | COMMENT | APPLICABLE GWMP SECTION/ COMPLIANCE[1] | RESPONSE |
|---|---|---|---|
| Trautman #2 | Will pumping of the Alluvial Aquifer reduce recharge of the Saugus Formation and reduce water that can be produced from the Saugus Formation during dry periods? | Primary Elements 3, 4 and 5 | No. Since the Saugus Formation is recharged over a much larger area, beyond the spatial extent of the Alluvium, there is a limited relationship between Alluvial pumping and recharge to the Saugus Formation. The fundamental tenet of the GWMP is to utilize groundwater for water supply within its sustainable yield (see the Management Objectives, or Goals, for the Basin, GWMP Section II; see also the various GWMP Elements intended to achieve those objectives, GWMP Section V). In that light, it is expected and intended to operate in such a way that recharge to the Saugus Formation will not be "reduced" by pumping from the Alluvial Aquifer and that groundwater will be available in varying amounts, as needed depending on weather year-types, within the sustainable yields of the respective aquifers (i.e. without overdrafting them). |
| Trautman #3 | Does CLWA have sufficient data regarding the Alluvial Aquifer and Saugus Formation, if not, how will it obtain such data? | Section III and Primary Element 1. | The reference to "useful amount of groundwater quality data" in the GWMP includes both Alluvial and Saugus data. However, due to the historically greater development and use of groundwater from the Alluvium (number and distribution of wells, volume of pumping), and due to the historically smaller development and use of the Saugus Formation (fewer wells, smaller geographical distribution of wells, smaller pumping), there is comparatively limited ability to examine relationships among pumping, recharge, and quality in the Saugus Formation. CLWA and the other purveyors intend to expand the overall knowledge of the Saugus Formation as that resource is further explored and developed (number of wells, additional sampling as new wells are added, etc.). All that data will be included in ongoing implementation of GWMP Primary Element 1, Monitoring of Groundwater Levels, Quality and Production. |
| Trautman #4 | The 2002 Water Report indicates that "there are limited Saugus (Formation) water level data." Does CLWA plan to collect more comprehensive data on the Saugus Formation? | Section III and Primary Element 1 | The "limited nature of Saugus water level data" is a result of the same smaller extent of historical Saugus development described in the preceding answer. Acquisition of additional data on the Saugus Formation is planned, as also described in the preceding answer. |

| PARTY | COMMENT | APPLICABLE GWMP SECTION/ COMPLIANCE[1] | RESPONSE |
|---|---|---|---|
| Trautman #5 | Is CLWA sharing detailed information with the City of Santa Clarita regarding contamination risks in relation to existing closed wells? | Primary Element 9 | All publicly available information regarding the investigation of perchlorate contamination, its extent, its impact on water supply, and plans for cleanup, control of migration, etc. is available to the City. Representatives of CLWA and the purveyors meet routinely with City representatives to review the status of perchlorate cleanup and remediation activities. CLWA and the impacted water purveyors will continue to pursue control and cleanup of perchlorate contamination in order to restore impacted groundwater pumping capacity and to ensure the long term quantity and quality of groundwater in accordance with the GWMP. As a practical matter, there are no surface contamination risks relating to perchlorate that would affect land use development adjacent to the impacted wells. |
| Trautman #6 | Where is the Stadium Well located? | Section IV (Groundwater Quality) | The Stadium Well is located on the south side of the Santa Clara River, approximately two miles upstream (east) of its confluence with the South Fork tributary, or about 4,000 feet east of the Bouquet Canyon Road crossing of the Santa Clara River. |
| Trautman #7 | Why isn't conservation a primary element (instead of secondary) since it may reduce water demand by 10%? | Secondary Element 1 | The assignment of "primary" or "secondary" status to any GWMP element is discretionary and certainly not absolute. Secondary status is not intended to indicate that any element of the GWMP will not be implemented, all elements are intended to be implemented. Final status of all GWMP elements will be reviewed by the Advisory Council and the CLWA Board. |

| PARTY | COMMENT | APPLICABLE GWMP SECTION/ COMPLIANCE[1] | RESPONSE |
|---|---|---|---|
| Traubman #8 | How is CLWA delivering recycled water? | Primary Element 7 | Recycled water is being delivered to the TPC golf course, the first customer of the system, via the dedicated, recycled water distribution system, which is also capable of delivering water to other non-potable water users, and which will be expanded in accordance with the Draft Recycled Water Master Plan. The costs and time frame for expanding recycled water distribution and use are included in the Draft Recycled Water Master Plan, which is complementary to, but beyond the scope of the Groundwater Management Plan. The intent is to develop 17,000 afy of recycled water use by 2020. The capital cost of the complete system is estimated to be $68 million, and will be funded through CLWA's connection fee program. |
| Traubman #9 | How is recycled water reprocessed? | Primary Element 7 | Recycled water is not "reprocessed" at points of use such as the TPC golf course. In general, recycled water is highly treated (tertiary treated) waste water. In the case of the Santa Clarita Valley, treatment already occurs at the Valencia Reclamation Plant operated by the Sanitation Districts of Los Angeles County. The treated water, ready for non-potable use, is distributed from the plant site in a dedicated transmission pipeline system to end users such as the TPC. Pesticide and fertilizer uses, as part of cultural practices at end-user locations such as golf courses, are discretionary actions of the respective end users of recycled water. |
| Traubman #10 | What is the average per capita water usage? | N/A | Most water agencies no longer use "per capita" water use as a standard because it is not an accurate representation of actual per person water use, mainly due to the effects of landscape and commercial/industrial water use. (It is also expressed in "gallons per day," rather than "acre-feet per year," since it refers to individual water usage.) In general for the South Coast hydrologic region of California, water use is approximately 200 gallons per person per day (DWR Bulletin 160-98). Per capita use for the Santa Clarita Valley is slightly higher due to landscape irrigation demands caused by local climatic conditions. |

| PARTY | COMMENT | APPLICABLE GWMP SECTION/ COMPLIANCE[1] | RESPONSE |
|---|---|---|---|
| Trautman #21 | The Semitropic Water Bank Transfer is not mentioned in discussion of the Supplemental (SWP) Surface Water on page 21. Is that because it is a relatively short-term water supply? Are any of the other water transfers Kern Water Bank, Kern Delta Water, North Las Posas Water Bank -- as listed on GWMP p. 2-16, of limited duration? And if the Semitropic Water Bank Transfer is short term, how can it be included in the 105,000-106,000 afy need projected for the next 20 years? What will take its place? | Section IV (Existing and Projected Supplies) | The SWP is referred to as "supplemental" water because that is the original purpose of the SWP: to serve as a supply that would "supplement" local supplies (whether groundwater or local surface water or both). The specific amounts referred to in the GWMP are from the contractual terms between CLWA and the California Department of Water Resources. The water banked in the Semitropic Water Storage Program during 2002 is a short-term, dry period supply. The program has a term of ten years (i.e., the water must be returned to CLWA for use in its service area within that time period). Thus it is not included as a supply for long-term needs. However, the other programs listed in the GWMP (most of which, by the way, are not water "transfers," but are instead groundwater banking programs) are long-term sources of supply. CLWA is in the process of designing and implementing a Long-Term Reliability Plan to begin bringing such long-term programs on line as a means to store water available in wet years, for use in later dry years. CEQA analysis, with its accompanying public comment opportunities, will be part of the long-term reliability program approval process. |
| Trautman #12 | What specific efforts will be made to manage salinity? | Primary Element 6 | Primary Element 6 – Long Term Salinity Management is included in the GWMP for the reasons presented in the text discussion of that element. The element recognizes the need to plan for salinity management but also recognizes that, to date, there has been no extraordinary trend of salinity increase. Hence, there are no specific efforts currently in place to "manage" salinity. It is envisioned that specific efforts will be developed over time in response to implementation of the GWMP and, in particular, its Primary Element 6. CLWA is participating in efforts by the Sanitation Districts of Los Angeles County to address the Los Angeles Regional Water Quality Control Board's proposed TMDL standard for chloride in the Santa Clara River. This effort is separate from and beyond the scope of the Groundwater Management Plan. |

UNITED WATER CONSERVATION DISTRICT
Conserving Water Since 1927

August 7, 2003

Dan Masonna
Castaic Lake Water Agency
27234 Bouquet Canyon Road
Santa Clarita, CA 91350

Re: Response on Draft Groundwater Management Plan, Santa Clara River Valley Groundwater Basin, East Sub-basin

Thank you for giving us the opportunity to review and comment on your *Draft Groundwater Management Plan, Santa Clara River Valley Groundwater Basin, East Sub-basin*. United Water considers this plan as one piece of a broader effort at groundwater management that is being accompanied as part of the Memorandum of Understanding between United Water and water purveyors in the Santa Clarita area. We offer some specific comments and suggestions for your consideration.

Comments include:

*Figure 3-2.* The vertical and horizontal scales associated with the hydrographs are very difficult to read. The T4N R17W, Section 22 well, in the western arm of the Alluvial Aquifer does not show data from approximately 1983 through 1997. In previous reports and analyses, the NLF #C5 well was used for this area. This well depicted variable groundwater levels for the period from the mid-1980s to the early 1990s. Because this is the discharge area of the Alluvial Aquifer to the Santa Clara River, we need to understand the response of the system to the onset of agricultural pumping in this area in the mid-1980s. The T4N R17W, Section 22 well does not possess the data needed to show that response.

*Page 13.* The comment near the top of the page that "*over the last 35 years, groundwater quality in the Saugus has remained generally constant*" would be more supportable if it was accompanied by a groundwater quality map similar to Figure 3-5, with a few groundwater quality time-series specific to the Saugus Formation.

*Figure 5-2.* The average daily mean streamflow data appears to be shifted one year on the histogram graph. As an example to show the error, the histograms suggest that there were high flow years in 1966 and 1997. The high flow years were actually 1965 and 1998.

UNITED WATER CONSERVATION DISTRICT

*Page 27 Local Groundwater* – The planned production of 30,000 to 40,000 acre-feet per year from the Alluvial Aquifer and 7,500 to 15,000 acre-feet per year from the Saugus Formation, along with 10,000 to 20,000 acre-feet per year from the Saugus in dry years has not to be implemented. The current development of a regional transient groundwater flow model for the East Sub-basin is for the expressed purpose of evaluating the potential impacts to the basin and surface water outflow into Ventura County, or this increased pumping. Irrespective of the modeling results, only real groundwater and surface water data can verify the influence of significantly increased pumping within the sub-basin and

*Page 29 Primary Element 2 – Monitoring and Management of Surface Water Flows and Quality* – While imported SWP water no doubt contributes to the observed increased flow in the Santa Clara River at the Ventura County line, there exist additional explanations for a portion of the increased flow. Other considerations include:

1. Influence of the hydrologic cycle. The cumulative departure for precipitation was occurring during the 1950s and first half of the 1960s. The cumulative departure improved significantly during the period of 1978 through 1985; and
2. The amount of Alluvial Aquifer pumping may influence flow at the Ventura County Line. During the latter half of the 1960's and through the 1970s, groundwater pumping of the Alluvial Aquifer declined by 50%. Pumping during the 1980s was 30% lower than during the 1950s and early 1960s.

In this particular case, it would be very difficult to differentiate between the influence on streamflow from changes to groundwater pumping and the hydrologic changes.

If you have any questions about United Water's comments, please contact Steve Bachman at (805) 525-4431.

Sincerely,

Dana L. Wisenhart
General Manager

cc: BRRF
Lowell Preston, Ph.D. – Ventura County Water Resources Division

[illegible]

**SCOPE**

**Santa Clarita Organization for Planning and the Environment**

TO PROMOTE, PROTECT AND PRESERVE THE ENVIRONMENT, ECOLOGY AND QUALITY OF LIFE IN THE SANTA CLARITA VALLEY

POST OFFICE BOX 1182 SANTA CLARITA CA 91380

8-6-03

Castaic Lake Water Agency
27234 Bouquet Cyn Rd.
Santa Clarita, Ca. 91350
Faxed to 661 297 1611 Hard copy to follow via regular mail

Re: Comments on Ground Water Management Plan

Dear Sirs

Thank-you for the opportunity to comment on your plan. We are pleased that your agency has begun a ground water management plan in response to the community's concerns over the excessive use of ground water. This extensive pumping and lack of protection of re-charge areas has resulted in almost complete elimination of surface flows and summer ponding necessary to wildlife as well as causing water level drops in wells that have resulted in water quality and availability problems for small users

## General Areas of Concern

We regret that environmental organizations, small well owners, the City of Santa Clarita, the County of Los Angeles (watershed and flood control divisions), Regional Water Quality Control and other members of the community interested in water issues in our valley were not included on your advisory board. We believe that inclusion of these groups early on would have helped resolved some of the issues with your plan at an earlier stage. Including only the water companies, Newhall Land and Robinson Ranch effectively excluded many of the groups and individuals that have voiced strong concerns over your present actions. The water agencies have consistently excluded these groups from all water planning, including water supply reports and the Urban Water Management Plan process. We strongly suggest that a more inclusive committee be formed to include representatives of the environmental community and rural well owners who are now being affected by overdraft of the Santa Clara River

We also note that there are no timelines for completion of any of the components of the plan Without such timelines, it would seem that there is little real intention or commitment to follow through on the various parts of the plan

## The Land Use/Wellhead Protection Component of the Groundwater Management Plan

Perhaps the most significant outcome of a ground water management plan in the Santa Clarita Valley would be implementation of the portion of Section 10753 which requires review of land use plans and coordination with land use agencies. Your plan assigns this area to

"Secondary element 2", an indication that you do not intend to pay much attention to this important component.

The coordination of land use and water planning has been sadly lacking in the Santa Clarita Valley. A simple wellhead protection plan would help decision makers understand the potentially polluting impacts of certain land uses such as gas stations, auto repair shops, etc and how they could negatively affect our water supply. Instead, these uses are routinely permitted next to water supply wells.

Paving over of prime re-charge areas is allowed without a word of protest from the water agencies, even though such loss of recharge capacity will severely affect water availability. Recreational uses should be encouraged in recharge areas that will accommodate and perhaps even enhance water re-charge and thus increase water availability.

Newhall County Water District began a well head protection program and educational presentations with its ground water management plan in the mid 90's, but efforts to both educate the planners and protect re-charge and water supply wells have been stifled by the strong developer involvement with water agency decisions. This involvement has precluded advocacy of long term decisions that would protect water availability and water quality in favor of short term profits for development companies.

The ground water management plan should stress the importance of avoiding the concreting of tributaries when approving new land uses and require adequate set back from natural water courses to allow those blue line streams to remain in a natural state. This will enhance water re-charge (and thus, ensure water availability). It will also aid water quality because riparian vegetation absorbs many pollutants before they can enter the ground water system.

It is an indication of the myopic view of the water agencies that this plan states its number one goal to be "Development of Local Groundwater for Water Supply". There are many other uses of ground water and surface water which are important to the community. These include recreational and aesthetic values, biological value and the quality of the water supply. More pumping will result in diminution of all these other aspects of our ground water resource and ignore the strong protests and demands for their protection which are already being heard from many voices in the community.

## Monitoring of Ground Water and Surface to Establish Safe Yield

**Agricultural Water Usage is Overestimated**

In its presentation, Fulbright and Schumacher revise the previous perennial yield estimate of the Santa Clara River by Richard Slade (perennial yield 32,600 AF, Hydrology of the Alluvial Sediments of the Santa Clara River, 1988, page 109) to approximately 40,000 AF. This revision is based in part on an average agricultural usage from the 1940s to the 1960s. We believe that these calculations are incorrect for three reasons.

1. No inclusion of recharge from agricultural run off was included in the usage calculations as was included in previous reports. Agricultural run-off was a substantial source of re-charge to the river that no longer exists, therefore not as much water is available for extraction.

2. Agricultural withdrawal was not metered, so water usage is merely an estimate based on crops and weather. It appears that estimates of withdrawals may have been over-stated.
3. Agricultural lands provided a source of recharge during wet years. Urbanization has paved over most of this area, so recharge is no longer occurring. This will reduce that amount of recharge to the river alluvium and thus reduce the amount available for extraction. (Slade, 1988, Hydrological Investigation of the Perennial Yield of the Alluvial Aquifer, page 88)

These evaluation errors have caused the water companies to believe that they can withdraw a higher amount of water than can actually occur without causing impacts to public trust matters and small well users.

## Monitoring and Managing Surface Water Flows

**Visual Historical Evidence has been ignored**

There are numerous records and observations by long-time residents indicating that surface flow usually occurred year round. Ponding that harbored fish and amphibians (many of which are listed as threatened or endangered) in areas that did not support year round flow has also been attested to by local residents. The disappearance of year-round flows and ponding is an indication of overdraft of the alluvial system. The impacts to riparian life and water quality are substantial. A goal of returning or replacing these summer surface waters should be incorporated in your plan. Such replacement may help to avoid potential future litigation brought to enforce the Endangered Species Act.

## Water Quality Monitoring

**Water Pollution**

We appreciate that the water agencies have finally admitted that 5 municipal wells are closed and that there is a concern that the pollution plume is moving in a westerly direction (Plan at page 32). It is very regrettable that these facts were not disclosed to decision makers over the past several years and, further, were even denied by representatives of the water agencies.

***However, we believe it is imperative that this plan additionally include a disclosure of the current reduction in production capability due to pollution of the Saugus and alluvial aquifer by ammonium perchlorate.*** Continued pumping may extend the pollution plume and increase clean-up costs. It is important that the extent of the problem be honestly outlined for the public so that alternative remedies may be devised and discussed. Failure to disclose the extent of the pollution problem and its real impact may lead to serious water quality problems if the Saugus aquifer is relied upon for drought supply.

## Conclusion

We submit the following recommendations:

1. We encourage CLWA to re-form its advisory committee to be inclusive of the community and other local agencies.

2. We suggest that the goals of the plan be re-ordered to place land use issues in a position of significance, and include recommendations from other agencies, organizations and individuals that might enhance water availability and water quality
3. A time line must be established, financial commitment discussed and responsibility assigned so that the water management goals will actually be attained.

Sincerely

Pat Salcisure

Cc: City of Santa Clarita
County of Los Angeles
Regional Water Quality Control Board
Local Newspapers

**Sand Canyon Area Well Owners Association**
**c/o 27363 Sand Canyon Road**
**Santa Clarita, CA 91387-3632**

August 8, 2003

Castaic Lake Water Agency
27234 Bouquet Canyon Road
Santa Clarita, CA 91350-2173

RE: Groundwater Management Plan ("AB 3030 Plan")

Gentlemen:

This letter is in response to your letter of June 16, 2003 which solicited comments about the above plan to ensure that the general public has had the opportunity to provide input on this local effort to manage our community's groundwater resources.

We are pleased to respond to your request for public participation. As well using residents of the Sand Canyon area who are affected by ground water use and plans for future use of it, we feel that our interests are very much at stake in determining how our river and ground water is to be used.

Our first and foremost concerns are that both river and ground water is being extensively pumped and that recharge areas are not being adequately protected. Surface flows and summer ponds have virtually vanished from our vicinity. In 1997, the water level in four wells adjacent to Sand Canyon Creek stood at twelve feet. As of last month, those same wells' water level now stands at ninety-three feet.

Other general concerns include the lack of representation on your advisory board by rural well owners. While water companies and the Robinson Ranch Golf Course have their own interests in how our community's water resources are used, many small well users have an equally valid interest in seeing that our area's water resources are managed in an equitable fashion that ensures no entity's use will result in the deprivation of others.

Also, none of we Sand Canyon area small well users have been consulted during the creation of water supply reports or the Urban Water Management Plan, despite the fact we are being affected by an increasingly serious overdraft of the Santa Clara River. Including members of our group in a groundwater management committee will bring important stakeholders to the planning process. We have important data to present.

It is disappointing to note that the ground water management plan specifies no timelines or dates for executing and completing its phases. We question whether there is sincere intent to carry out the plan given the lack of work plan.

On a broader scale, we are deeply concerned about the plan's land use and wellhead protection sections. Section 10753 calls for a review of land us plans and coordination with land use agencies, as stipulated in secondary element 2 of the plan. A critically important aspect of effective ground water management, such coordination has not taken place to any meaningful extent in the Santa Clarita Valley, and more specifically, in the Sand Canyon area. We have noted with dismay that vital recharge areas have been built upon and paved over with no comment from any water agencies, despite an obvious impact on water availability for all water users, particularly small well holders.

While intelligently planned development is meant to result in well designed, livable communities where all inhabitants are assured of fair access to resources, we note that ongoing strong developer involvement with water agency decisions has led to the potential compromise of water availability and quality in exchange for near term profits for developers and increased tax revenues for local governments.

In the draft plan's sections that deal with ground water monitoring to establish a safe yield, we believe that estimates of agricultural water consumption are not accurate. In Richard Slade's 1988 perennial yield estimate of the Santa Clara River, he stated on page 109 that it was approximately 32,000 acre-feet. Yet Lubdroff and Scalmanini raise this estimate to 40,000 acre feet. They base their calculations on data measured for agricultural operations between the 1940's and 1960's.

Since our membership includes individuals who have farmed a large parcel in the Sand Canyon area from 1951, we feel qualified to comment on the above figures.

First, agricultural usage during the reference years was never metered. Usage during this period is estimated based on available crop reports (when they were recorded) and available weather data. A reading of withdrawal estimates raises a suspicion that they are overstated.

Second, the upward revision of Slade does not include agricultural runoff. Since agriculture in our area has virtually disappeared, it is no longer a contributing factor to aquifer recharge. Yet earlier estimates included agricultural runoff, a significant source of recharge.

Third, land in our area that previously was planted in both irrigated and dry land crops has now been paved over. During rainy years, farm fields were an important component of recharge, since rain soaked into them. Slade specifically mentions this reduction of extractable water on page 88 of his 1988 report.

Flawed calculations like these have caused water companies and other institutional users to think that they can extract more water than they can and should without adversely affecting small well users.

Primary element number two gives the appearance of an attempt to establish a commingled inter relationship between the Saugus Formation and the Santa Clara River. With a clearly defined bed and banks, the Santa Clara River has historically behaved as a river, and despite severe depletion from over pumping, still exhibits the dynamics of a river during episodes of precipitation. With our members holding rights of diversion from the State Water Resources Board, we strongly feel that any attempt to define the river in terms of percolating groundwater defies logic and the laws of physics.

Also, in the "Existing and Projected Water Supplies" section, the draft report states that "...it is currently expected that ongoing utilization of local groundwater will continue to be in amounts that have historically been pumped, 30,000 to 40,000 afy from the Alluvium..."

As stated above, Slade's 1988 report clearly and unequivocally sets the upper pumping limit of the Santa Clara flow at 32,000 afy. By relying on generous overstatements and exaggerated potentials, a plan will go forward that will have serious negative impacts for small well users in the Sand Canyon area.

In primary element three, Determination of Basin Yield and Avoidance of Overdraft, we are concerned with the second paragraph's first sentence that states "...there has not been any widespread, steady degradation of groundwater conditions that might be indicative of overdraft..."

Again in Primary Element 4, the second sentence asserts..."Both ranges of numbers are consistent with recent historical pumping that has not resulted in any indication of overdraft or other undesirable conditions." And in Primary Element 5, the third sentence further posits that ..."Groundwater pumping has remained within a range that has not caused any evidence of overdraft, or associated undesirable impacts..."

It is the direct and incontrovertible evidence of water levels in our own wells that presents us with a clear contradiction to this assertion. Based on members' records that cover a fifty-year span, the current water levels in our wells have reached an unprecedented low. We are left with inescapable evidence that large users pumping from the Santa Clara River have contributed to a cone of depression that is negatively affecting our small wells.

In addition, riparian conditions along the tributaries and main channel of the Santa Clara River reflect highly stressed, water deprived environments. In areas away from river feeder creeks, some heritage California Coastal Oaks (Quercus Agrifolia) have begun showing signs of water deprivation.

In a related matter, the proposed plan calls for identification of potential sources of contamination to assure water quality. When Robinson Ranch Golf Course was granted permission to open and operate, the city stipulated that water quality adjacent to and on the golf course be monitored and that regular reports about it be published. These reports have not been included in the draft plan, despite the fact that Robinson Ranch is a participant on the advisory committee for this draft plan. Pesticide, insecticide, fertilizer, and other volatile organic compounds are all possible runoff and plume contaminants that may be leaching from the golf course.

As members of your advisory committee, we would be glad to share with others the data from five decades of small well usage. We believe that recent developments, specifically in our area, have seriously lowered both the alluvial water levels to historic levels.

While modeling, projection, and prediction can yield abstract theories, we small well users must live with the consequences of miscalculation, however unintentional or inadvertent.

Small well holders are franchised, integral, entitled members of the water using community, and as such, must be included in the planning process associated with any groundwater management plan that is to be implemented in the Santa Clarita Valley.

Primary element nine specifies a MOU (Memorandum of Understanding) executed between the United Water Conservation District in Ventura County as an example of…"a local agency relationship that has produced the beginnings of local groundwater management, now embodied in this comprehensive (sic) plan…" While we land all attempts to widen the base of data and participation in the planning process for water resources, we are disappointed that as stakeholders in the Eastern Sub basin of the Santa Clara River Valley, our interests are not being represented on the advisory committee that has been created to direct the groundwater management plan.

We ask to be included in the planning committee that is helping to shape the future of water use in our community.

Respectfully,

**The Sand Canyon Area Well Owners Association**
Robert and Jane Fleck
Eugene and Marylou Ruddell
Richard and Leslie Christensen
Shawn Clement
Joan Walkman

# Friends of the Santa Clara River

[illegible] Santa Clara River, Newhall, California [illegible] • (661) 255-4323

August 7, 2003

Castaic Lake Water Agency
27234 Bouquet Canyon Road
Santa Clarita, CA 91350

Board of Directors

[illegible]

Affiliated Organizations

California Native Plant Society [illegible]

Santa Clarita Organization for Planning the Environment [illegible]

Sierra Club Angeles Chapter [illegible]

Surfrider Foundation

[illegible]

Ventura County Environmental Coalition

Re: Groundwater Management Plan

Dear Sirs,

Friends of the Santa Clara River submits the following comments on the June 2003 Draft Groundwater Management Plan (Plan).

We are disappointed and dismayed that the Plan sets as its primary goal the "Development of Local Groundwater for Water Supply". While providing adequate water supplies is an important objective, it would seem to us that the primary goal should be the long-term protection of local groundwater resources, including groundwater quality. Groundwater resources provide many benefits to the community, including those related to the biological and environmental health of the river corridor. Long-term protection, if implemented, should curtail the over-pumping of local aquifers which is currently occurring.

We are also concerned that water agencies, in general, have failed to weigh-in on the paving over of recharge areas in the Santa Clarita Valley. Loss of recharge could have very substantial impacts on future water availability. The Plan should emphasize that concreting of ephemeral tributary streams reduces recharge, and thus should be avoided. Adequate setbacks, or buffer zones, around major streams should be stressed - an item that is rarely adequately addressed in development projects.

The Plan advisory board is too narrowly constituted. The Regional Water Quality Control Board should be represented, as should environmental groups and county agencies working on watershed protection.

Thank you for the opportunity to comment.

Sincerely,

Ron Botturff

Ron Botturff, Chair

Attention: CLWA Directors August 8, 2003
RE: Comments on Ground Water Management Plan

FAX: (661) 297-1611

From: Henry Schultz
Phone: (661) 284-5613 or (805) 447-2863 (work) or FAX at (805) 480-1333
Email: hschultz@amgen.com henry50@pacbell.net
Three pages total

There follow 2 pages of comments on the water plan. If there are any questions I can be contacted at the above locations.

Henry Schultz
Chair, Santa Clarita Sierra Club Group

S 7 32

Castaic Lake Water Agency
27234 Bouquet Canyon Rd
Santa Clarita, CA 91350
FAX 661-257-1811

RE Ground Water Management Plan Comments

Dear Directors,

We appreciate the chance to comment on the ground water management plan. This plan has been a long time in the making. We hope that your response to concerned public input will make it a viable document. A few comments follow.

1. Based on the (too) long history of this plan, it is essential to include deadlines (with penalties for failure) for completion of the various components of the plan. Otherwise our water will just slip away.

2. There is no accounting for loss of groundwater from pollution such as perchlorates. As soon as the magnitude of the problem has been adequately determined, a realistic plan can then be implemented. As it stands right now, the numbers do not adequately represent the real water supply.

3. Loss of groundwater due to loss of percolation due to extensive development, which paves over permeable soil, is not considered. It is a continuous and cumulative impact on the water supply. More generally, the water plan must address coordination of land use with water necessities such as the preservation of water percolation basins and similar amenities.

4. Drought planning is inadequate in the plan. For example, if a water treatment plant is built, then a certain number of acre ft of water can be reclaimed. Current planning would say that this is real water, which can be counted on. In a drought, not only do you lose primary water sources, but also the corresponding amount of reclaimed water, a double hit which must be accounted for in any realistic water plan.

5. The Sierra Club strongly supports an active river-monitoring program so that potential and existing water quality issues can be addressed in a timely manner. This must be an integral part of the plan. In lieu of the water agency producing reliable data, a citizen-monitoring program will have to be undertaken to assure the quality of our water.

6. The plan does not adequately discuss maintaining river and tributary habitats such as the biological unhealthy zones created from the Rio Vista Plant's outflow into the Santa Clara River. While there are green plants growing in the area, UCLA researchers have shown that it is barren of many insects, which would normally be present in such an environment. This engenders a ripple effect in the biota.

7. Just as the City of Santa Clarita involves the public and other government and private agencies in its long range planning, CLWA should do the same with its water planning. People in the Santa Clarita Valley are just beginning to realize the importance and the fragility of their water supply. The time to start RFAC planning is now.

Thanks for your kind attention.

Henry Schultz
Chair, Santa Clarita Sierra Club Group
21827 Parvin Dr
Santa Clarita, CA 91350
Henry50@pacbell.net
661-284-5513

Ed & Joan Dunn
15414 Rhododendron Dr
Canyon Country, CA 91387
August 8, 2003

Castaic Lake Water Agency
27234 Bouquet Canyon Road
Santa Clarita, CA 91350-2173

RE: Groundwater Management Plan ; AB 3030

Dear Sirs:

We are pleased to have the opportunity to comment on your draft AB 3030 Plan. Enclosed please find copies of individual pages of this plan and associated comments for these pages.

We are disappointed that the writing of this plan appears to be following the same path of the UWMP. We are also displeased there has not been an attempt to hold more public meetings prior to this draft release. As required in AB 154, when has the agency met regularly with the advisory council to consult on this plan? What was the frequency of the meetings and how many were there?

We are quite interested in an AB 3030 Plan and would appreciated this draft be made into an honest and truthful document, allowing it to go ahead on a timely schedule without challenges and delays.

Respectfully submitted,

Ed and Joan Dunn

Enclosures: 3 Exhibits, 16 draft groundwater pages and 16 associated comment pages

Top of page:
Basin objective "manage groundwater levels and discharge to the Santa Clara River, at the west end of the basin"?
Wording should include "the entire basin".

Bottom paragraph, last sentence.
"The plan is replenishing the aquifer with WHAT sufficient water"

and effects, e.g. chronic water level decline, loss of groundwater storage, onset of land subsidence, groundwater quality degradation, a corresponding basin objective is to manage groundwater levels and associated groundwater discharge to the Santa Clara River at the west end of the basin, and thus not adversely impact surface and groundwater discharges to the downstream basin(s).

3. Preservation of groundwater quality for beneficial use in the basin, and for beneficial use of surface water and groundwater discharges from the basin. Included in this management goal will be the active characterization and solution of any groundwater contamination problems, through cooperation with responsible parties or through independent action if timely action by responsible parties is not forthcoming and the preceding management objectives are thereby impacted or constrained.

4. Preservation of interrelated surface water resources. Included in this management goal will be the maintenance of appropriate surface water flows and non-degradation of surface water quality as a result of managing groundwater conditions to meet the other management goals for the basin.

Quantitatively, the preceding goals translate into general preservation of groundwater levels and quality in the Alluvial aquifer system consistent with the last 30 years, including fluctuations through seasonal demands and local hydrologic variations (wet and dry periods). As discussed in more detail in the next chapter, the hydrogeologic setting in the area has resulted in smaller Alluvial groundwater level fluctuations toward the western half of the basin (generally west of Bouquet Canyon), and larger fluctuations to the east. However, largely due in part to the importation of supplemental surface water over the last 20 years, and the integrated or conjunctive use of that supplemental water with local groundwater, there has been no chronic decline in groundwater levels or storage. A continuation of such basin conditions, possibly complemented by management actions to decrease the historical water level fluctuations in the eastern part of the basin, will accomplish the second basin objective, continued avoidance of overdraft as has been the ongoing historical condition in the basin, while continuing to utilize local groundwater to meet part of projected water requirements, the latter being the first management objective for the basin. Corresponding management actions to sustain recharge and net overdraft groundwater storage will accomplish the third basin objective by replenishing the aquifer system with sufficient water to sustain what has been generally consistent quality of groundwater on a long-term basis.

We question Slades 1986 and 2002 Report stating the Alluvium has the capacity of 240,000 acre feet.

# III. Groundwater Basin Conditions

**Occurrence of Groundwater**

Groundwater in the Santa Clara River Valley East groundwater subbasin occurs in two aquifer systems, the Alluvium associated with the Santa Clara River and its tributaries, and the Saugus Formation. There are also some scattered outcrops of Terrace deposits in the basin that likely have the capacity to contain limited amounts of groundwater; however, since these deposits are located in limited areas that are situated at elevations above the regional water table and are also of limited thickness, they are of no practical significance as aquifers and have consequently not been developed for water supply.

The Alluvial aquifer system, of Quaternary to Holocene (Recent) geologic age, consists primarily of stream channel and flood plain deposits of the Santa Clara River and its tributaries. The Alluvium is deepest along the center of the present river channel, with a maximum thickness of about 200 feet near the area known as Saugus. It thins toward the flanks of the adjoining hills and toward the eastern and western boundaries of the basin and, in the tributaries, becomes a mere veneer in their upper reaches. The spatial extent of the Alluvium throughout the basin is illustrated in Figure 3-1.

The Alluvium is the most permeable of the local aquifer units. Based on well yields and aquifer testing, transmissivity values in the range of 50,000 to 500,000 gallons per day per foot (gpd/ft) have been reported for the Alluvium, with the higher values where the Alluvium is thickest in the center of the valley and generally west of Bouquet Canyon (Slade 1986 & 2002). The amount of groundwater in storage can vary considerably because of the effects of recharge, discharge, and pumping from the aquifer. The maximum storage capacity of the Alluvium has been estimated to be about 240,000 acre-feet (af) (Slade, 1986 & 2002).

The Saugus Formation, of Pliocene to Pleistocene geologic age, has traditionally been divided into two stratigraphic units, the lowermost, geologically older Sunshine Ranch member, which is of mixed marine to terrestrial (non-marine) origin; and the overlying, of upper, portion of the Formation which is entirely terrestrial in origin. The Sunshine Ranch Member of the Saugus Formation has a maximum thickness of about 3,000 to 2,500 feet in the central part of the valley,

Top, bottom of first paragraph
The plan states "the most significant period of Saugus pumpage was 1991 through 1994, when pumpage ranged from 10,600 afy to nearly 15,000 afy and averaged over 12,000 afy, during which time SWP water deliveries were reduced at the end of extended drought conditions".

It should be stated that the SWP water was INTERRUPTED for approximately 6 months. See Feb. 27,1991 Daily News newspaper article " Santa Clarita will turn to wells as state water supplies dry up" . As stated in the article, the SWP water processing plant was shut down. Exhibit A.

"Officials say state's water delivery system inadequate". See Exhibit B

Since 1980, total pumpage from the Saugus Formation has ranged between about 3,850 afy and nearly 15,000 afy, average pumpage over that period has been about 6,900 afy. The great majority of pumpage from the Saugus is for municipal supply (nearly 6,300 afy, or 92 percent, on average). For comparison, although historical Saugus pumping records prior to 1980 are limited, there appears to have been essentially no pumping from the Saugus prior to 1960 (on the order of about 100 af in most years, beginning in 1948), and some increased pumping for agricultural water supply beginning in about 1962 (about 900 af). The largest amount of agricultural pumping from the Saugus was during the mid-1960's, when annual Saugus pumpage was about 3,000 af. Agricultural pumping from the Saugus declined to near zero by the late 1970's, but has been generally in the 500 to 1,000 afy range since 1982. There was no Saugus pumpage for municipal supply in the early 1960's; limited data suggests that municipal pumping from the Saugus began in the 1970's, and reached nearly 5,000 afy by 1980-81. The most significant period of Saugus pumpage was 1991 through 1994, when pumpage ranged from 10,600 afy to nearly 15,000 afy and averaged over 12,000 afy, during which time SWP water deliveries were reduced at the end of extended drought conditions.

**Groundwater Monitoring Network and Program**

There is no formal groundwater monitoring network of wells for groundwater level measurements and/or groundwater quality sampling in the basin. Consequently, one component of this Plan is to formalize both a network of wells for groundwater monitoring and a program for water level measurements, water quality sampling, and other pertinent groundwater data collection (Primary Plan Element 2). Despite the lack of an existing formal groundwater monitoring network and program, however, there is a significant amount of historical groundwater data, some of which dates back into the 1940's, on which to base reasonable assessments of groundwater conditions in the basin. For example, groundwater level measurements have been made over varying periods of record in a total of 154 wells, mostly alluvial wells, throughout the basin. Similarly, groundwater quality data, consisting of varying numbers of constituents analyzed, are available from some wells, but a much smaller number than is the case for groundwater level data. These data, along with direct measurements or indirect estimates of pumpage, primarily from high capacity municipal and agricultural wells, allow for analysis of groundwater basin conditions, as discussed in this Plan, and also provide the bases on which a groundwater model can be developed (Primary Plan Element 3) and on which various management criteria such as operational yield, baseline groundwater quality, etc. can be determined (Primary Plan Elements 3 to etc.).

Middle paragraph.
"Exceedence of action level of perchlorate".
Newhall County Water District perchlorate level was 19 micro-grams per liter and Santa Clarita Water Co. was 24 or more micro-grams per liter.
The statement that nine (9) wells; exceeded 18 micro-grams per liter is false. See Exhibit C

higher quality flow TDS) water and dry periods have resulted in the notable declines in water levels described above, with a corresponding increase in TDS (and individual component constituents) in the deeper parts of the Alluvium.

Due to a much more limited number of wells and the limited spatial extent of groundwater development in the Saugus Formation, long-term Saugus groundwater quality data are not sufficiently extensive to permit any sort of basin-wide analysis or assessment of pumping-related impacts on quality. Based on the most complete historical record, over the last 35 years, however, groundwater quality in the Saugus has remained generally constant, and the Saugus Formation is, on a groundwater quality basis, a viable agricultural and municipal water supply.

The most notable groundwater quality issue in the basin centers around the detection and impact of perchlorate on several Saugus wells and one Alluvial well in the central part of the basin near the location of the former Whittaker Bermite facility, which is immediately southeast of the confluence of the main Santa Clara River and its South Fork tributary. In 1997, routine water quality sampling detected the presence of perchlorate in four municipal wells completed in the Saugus Formation (CLWA Santa Clarita Water Division Saugus Wells 1 and 2, Newhall County Water District Well 11, and Valencia Water Company Well 157). While there remains no primary or secondary drinking water standard for perchlorate, and although the detected concentrations of perchlorate in the Saugus wells did not exceed the Action Level established by the State Department of Health Services at that time (18 ug/l), all those wells were inactivated by their respective owners after detection of perchlorate; those wells remain out of municipal water supply service to date.

More recently, in late 2002, routine water quality sampling of Alluvial wells detected perchlorate in one of them (CLWA Santa Clarita Water Division Stadium Well) at a concentration which slightly exceeds the current Action Level (4 ug/l). This well has also been voluntarily inactivated, and thus remains removed from municipal water supply service.

This Plan, notably through Primary Plan Elements 1, 6 and 8, is intended to incorporate both short-term and long-term groundwater quality considerations in the management of the groundwater basin in order to formalize groundwater quality monitoring and assessment, to investigate and correct groundwater contamination problems, and to preserve or improve groundwater quality for ongoing water supply as well as for avoiding adverse water quality impacts on interconnected surface waters.

Paragraph 72.
The statement of this paragraph is misleading. The correction should show "unit of service wells significantly reduced groundwater capacity for existing groundwater supplies, so much so, that a substantial increase of state water use, has been initiated".

**Areas of Concern and Identified Problems**

A number of concerns have been expressed about groundwater conditions in the basin. While not all of the expressed concerns have been substantiated, they are listed and briefly discussed here, and they are addressed in the management objectives for the basin, intended to be achieved via implementation of the various primary and secondary elements in this Plan.

The most notable concern in the basin, at least at present, is the impact of perchlorate contamination on a number of municipal water supply wells, thus affecting the available pumping capacity from some municipal wells. While perchlorate impacts on a few wells do not preclude the ability to pump groundwater in accordance with existing water supply plans, activities to characterize the contamination, and ultimately to control it and treat it, have been initiated in order to return the impacted wells' pumping capacity to water supply service. Primary Element 8 is included in this Plan to formalize the addressing of groundwater contamination issues in the basin.

Concern has also been expressed that groundwater development in the basin will adversely impact the quantity and/or quality of surface flows leaving the basin via the Santa Clara River. Such concern extends to the potential impact on groundwater in the next downstream basin, the Piru Basin in Ventura County. While there are no established provisions regarding surface flows out of the Santa Clara River Valley East subbasin, Primary Element 2 is included in this Plan to formally address the monitoring and management of surface water flows and quality within, and flowing out of, the basin. Some work is already ongoing related to this area of concern via a Memorandum of Understanding (MOU) among CLWA, other purveyors within CLWA's service area, and United Water Conservation District, which manages surface water and groundwater in the downstream basins on the Santa Clara River in Ventura County. That cooperative effort, which is incorporated into this Plan via Primary Element 9, includes integration of databases, development of a numerical groundwater flow model, and interpretation and reporting on surface water and groundwater conditions.

A third expressed concern in the basin, although never substantiated, is that groundwater is already overdrafted. Associated with that expressed concern is a related issue that reliance on overdrafted groundwater results in an overstated water supply in the basin. As discussed earlier in this Section, long-term groundwater levels, storage, and quality all indicate a lack of overdraft. As also discussed above, the importation of supplemental surface water over the last 22 years,

References to the Urban Water Management Plan (UWMP).
The UWMP of 2000 contains incorrect information and is under legal states for correction. The UWMP does not address the total interruption of the state water supply in the event of drought, earthquake, or Delta problems. It is suggested that the UWMP not be utilized or referred to until its contents have been corrected to reflect accurate and truthful information.

32,000 afy. The history and trend of municipal groundwater use in the basin are illustrated in Figure 4-1.

As noted above, until 1980, all water supply in the basin was from local groundwater. Imported surface water was first available from the State Water Project (SWP) in 1980, when a total of 1,125 af were imported into the basin. Since then, importations of SWP water have increased in two separate steady trends, interrupted by a notable decrease at the end of, and following, the 1987-1992 drought period: a steady increase beginning in 1980, to about 21,600 afy in each of 1989 and 1990, followed by a substantial decrease, to less than 8,000 af in 1991, and then a steady increase back to about 21,000 afy in 1997 and 1998, followed by further increases to about 35,000 af in 2001. The history and trends in importation of SWP water to the basin are illustrated in Figure 4-2, which also illustrates the historical trends in groundwater pumping and total water use in the basin since the importation of SWP water.

In the context of this groundwater management plan, the historical utilization of imported SWP water to augment local groundwater represents the initiation of conjunctive use of surface water and groundwater supplies, a groundwater management principle which is intended to be continued via adoption of Primary Element 5 of this plan.

**Projected Water Requirements**

Detailed projections of municipal water requirements were most recently completed as part of the Urban Water Management Plan prepared by CLWA and the municipal water purveyors (Newhall County Water District, Santa Clarita Water Company, and Valencia Water Company) in 2005. Those projections, which are forecast for a 20 year period, also recognize an ongoing but decreasing agricultural water demand over the same period, from about 15,000 afy in 2005 to about 7,000 afy by 2020. The municipal water demand projections in the Urban Water Management Plan were derived from utilization and interpretation of multiple projection methods, including Per-Capita Water-Use applied to population projections; extrapolation of number of service connections (using two different projection techniques, an average rate and an accelerated rate projection) applied to the rate of service connection additions since 1990; and land use projections combined with unit water use factors on multiple land use categories (urban, including residential, commercial, industrial and recreational; irrigated agricultural; and vacant and open space). The water demand projections in the Urban Water Management Plan also considered weather effects (variations due to hot-dry years vs. cool-wet years) and conservation

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The UWMP of 2010 contains incorrect information and is under legal attack for correction. The UWMP does not address the total interruption of the state water supply in the event of drought, earthquake, or Delta problems. It is suggested that the UWMP not be utilized or referred to until its contents have been corrected to reflect accurate and truthful information.

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Top
"Local Groundwater" The statement is made: "That for all practical purposes the Saugus Aquifer underlies the entire CLWA service area". That statement is absolutely false! It does not!
Please correct.

Bottom paragraph:
Supplemental (SWP) Surface Water

CLWA's SWP Water Entitlement
The CLWA, indeed, has purchased water in addition to the original Table A entitlement, but cannot obtain contractual agreement to transport the additional water to the Santa Clarita Valley

water and possibly some water supply derived from water transfers and desalination outside the basin.

**Local Groundwater** - Local groundwater has historically been developed from the two aquifers that comprise the groundwater basin, the Alluvium that underlies the Santa Clara River and its tributaries, and the Saugus Formation that underlies, for all practical purposes, the entire CLWA service area. Those two aquifers, and the groundwater basin they comprise, are the focus of this groundwater management plan. Based on historical experience and observation of groundwater conditions, it is currently expected that ongoing utilization of local groundwater will continue to be in amounts that are generally comparable to what has historically been pumped, 30,000 to 40,000 afy from the Alluvium and 7,500 to 15,000 afy from the Saugus Formation. It is also expected that there is some additional development potential in the Saugus Formation, in the range of 10,000 to 20,000 af which might be intermittently extracted during one or more dry years when supplemental imported water might be reduced. Ultimately, it is expected that local groundwater will continue to be a component of water supply, at appropriate production levels in both aquifers, in the basin. The intent of this groundwater management plan is to ensure that ongoing utilization of local groundwater continues to result in acceptable aquifer conditions, i.e. avoidance of overdraft (Primary Plan Element 3), no degradation of quality (Primary Plan Element 6), no adverse impacts to surface waters (Primary Plan Element 2), all via continuation of conjunctive use operations that have been ongoing since the initial importation of supplemental surface water in 1980 (Primary Plan Element 5) and via monitoring and interpretation of surface water and groundwater conditions on an ongoing basis (Primary Plan Elements 1 and 2).

**Supplemental (SWP) Surface Water** - CLWA has a contractual Table A amount of 95,200 af of water from the SWP. CLWA's original contract, signed in 1963, was for 23,000 af, that Table A amount was later increased to 41,500 af. In 1988, CLWA purchased a Table A amount of 12,700 af from Devil's Den Water District, and it acquired another Table A amount of 41,000 af in 1995 from Kern County Water Agency and its member district, the Wheeler Ridge-Maricopa Water Storage District. There is ongoing CEQA-related litigation over the most recent acquisition of the additional SWP Table A amount, the 41,000 af acquired from Kern County Water Agency and Wheeler Ridge-Maricopa WSD. However, there has been no invalidation of the completed agreement to transfer the 41,000 af Table A amount to CLWA, and current water supply planning includes that Table A amount as CLWA corrects the CEQA technicality by preparing a new EIR to address the environmental consequences of the transfer.

Top:
Recycled Water

It should be noted CLWA's planned recycle water program is and has been for one private business only. No public agency is receiving or is planned to receive recycled water from CLWA.

**Recycled Water** - In 1993, CLWA prepared a draft Recycled Water System Master Plan that outlined a multi-phase program to integrate recycled water into the overall water supply system in the basin. Construction has begun on Phase I of that project, which will deliver approximately 1,700 afy, and deliveries are expected to begin in 2003. Overall, recycled water is expected to ultimately reclaim up to 17,000 afy of treated waste water suitable for irrigation use on golf courses, landscaping, and other non-potable uses.

Plan, page #25 Dunn, page 70

Top
Number 7 should read: Valleywide integration of recycled water.

Middle
Secondary (Potential Elements) Item #2 Change to: Involvement in land use planning per Water Code 10753.7 (f)

4. Development of Regular and Dry Year/Emergency Water Supply
5. Continuation of Conjunctive Use Operations
    - active and passive groundwater recharge
6. Long Term Salinity Management
7. Integration of Recycled Water
8. Identification and Mitigation of Soil and Groundwater Contamination
    - involvement with other local agencies in investigation, cleanup, and closure
9. Development and Continuation of Local, State and Federal Agency Relationships
10. Groundwater Management Reports

**Secondary (Potential) Elements**

1. Continuation of Public Education and Water Conservation Programs
2. Identification and Management of Recharge Areas and Wellhead Protection Areas
    - involvement in land use planning process
3. Identification of Well Construction Abandonment, and Destruction Policies
    - water quality protection
    - manage vertical distribution of pumpage
4. Provisions to Update the Groundwater Management Plan

**Primary Element 1 - Monitoring of Groundwater Levels, Quality, and Production**

Prior to 1980, all water supply in the Upper Santa Clara River Area was developed from local groundwater; since 1980, imported surface water has become an increasing component of overall water supply in the area, but groundwater continues to meet all agricultural water demand and a significant part of municipal water demand. As a result of the long term development and use of groundwater in the area, there is a fairly substantial amount of historical groundwater level data, and a useful amount of groundwater quality data, and groundwater pumping data that has been collected in the basin. All the available historical groundwater level, quality, and pumping data have been organized into a computerized data base for the Upper Santa Clara River Area. That data base, while separate, has been coordinated with an equivalent data base maintained by United Water Conservation District for the downstream basins on the Santa Clara River. The intent of database coordination has been to facilitate interpretation and reporting on groundwater and other water resource related issues by the respective agencies overlying the various basins along the River.

Bottom:
As stated earlier the UWMP is inaccurate and under legal attack and not certified by the courts.
Primary Element 4 - Development of Regular and Dry Year Emergency Water Supply

40,000 acre feet from the alluvium and 15,000 a f from the Sangas is optimistic.
We strongly suggest developing an emergency plan for an extended interruption of the state water project. How many times must we ask for such an obvious safeguard!

conditions (and associated fluctuations in recharge and pumping). Such fluctuations are typical of groundwater basin conditions in any conjunctive use setting, such as in this basin: groundwater is utilized from storage during dry years, or dry periods, and that storage is replenished during alternate wet years, or periods. The observation of these historical groundwater conditions, in combination with knowledge of pumpage from both the Alluvial and Saugus Aquifers, has led to current operational practices as well as general expectations regarding the approximate yield of the local groundwater system as discussed in this plan.

While historical operating experience, complemented by observed groundwater conditions, is an appropriate basis for generally planning for available groundwater supplies, it is possible and appropriate to more precisely analyze the basin to determine values or ranges of yield under varying hydrologic conditions, and to assess the impacts of various management actions that might be implemented in the basin. The MOU process described in Primary Element 9 of this Plan includes the development of a numerical groundwater flow model which is intended to be utilized for determination of the yield of the basin under existing land use and under existing groundwater and surface water development conditions. It is also expected to be used for implementation of this Plan Element in order to assess the yield of the basin under future land use conditions as well as future ranges of surface water importation, groundwater development, and recycled water use through varying hydrologic conditions, i.e. wet and dry periods that affect the availability of imported surface water.

The ultimate intent of this Plan Element is to develop an understanding and quantification of the yield of the basin, under varying hydrologic conditions and developing local cultural conditions, in order that groundwater development and use be managed in such a way to meet an appropriate fraction of total water demand while avoiding levels of groundwater use that would result in overdraft conditions. Thus, implementation of this Plan Element is essential to accomplishing the first and second management objectives (goals) for the basin.

**Primary Element 4 - Development of Regular and Dry Year/Emergency Water Supply**

The most recent updated Urban Water Management Plan (UWMP, December 2000) prepared by CLWA and the other purveyors in the basin (Newhall County Water District, Santa Clarita Water Company, and Valencia Water Company) includes plans to develop 30,000 to 40,000 acre-feet per year (afy) from the Alluvial aquifer and 7,500 to 15,000 afy from the Saugus Formation in average normal years. Both ranges of numbers are consistent with recent historical pumping that

The SWP water received in 1991 is erroneous. The chart indicates 8,000 a/f. It is incorrect. CUWA only received 10% of its then allocation 54,200 a/f. The 10% was received in January and the plant shut down in March. See Exhibit A. It should be noted that this is a state water project interruption for months, not a reduction.

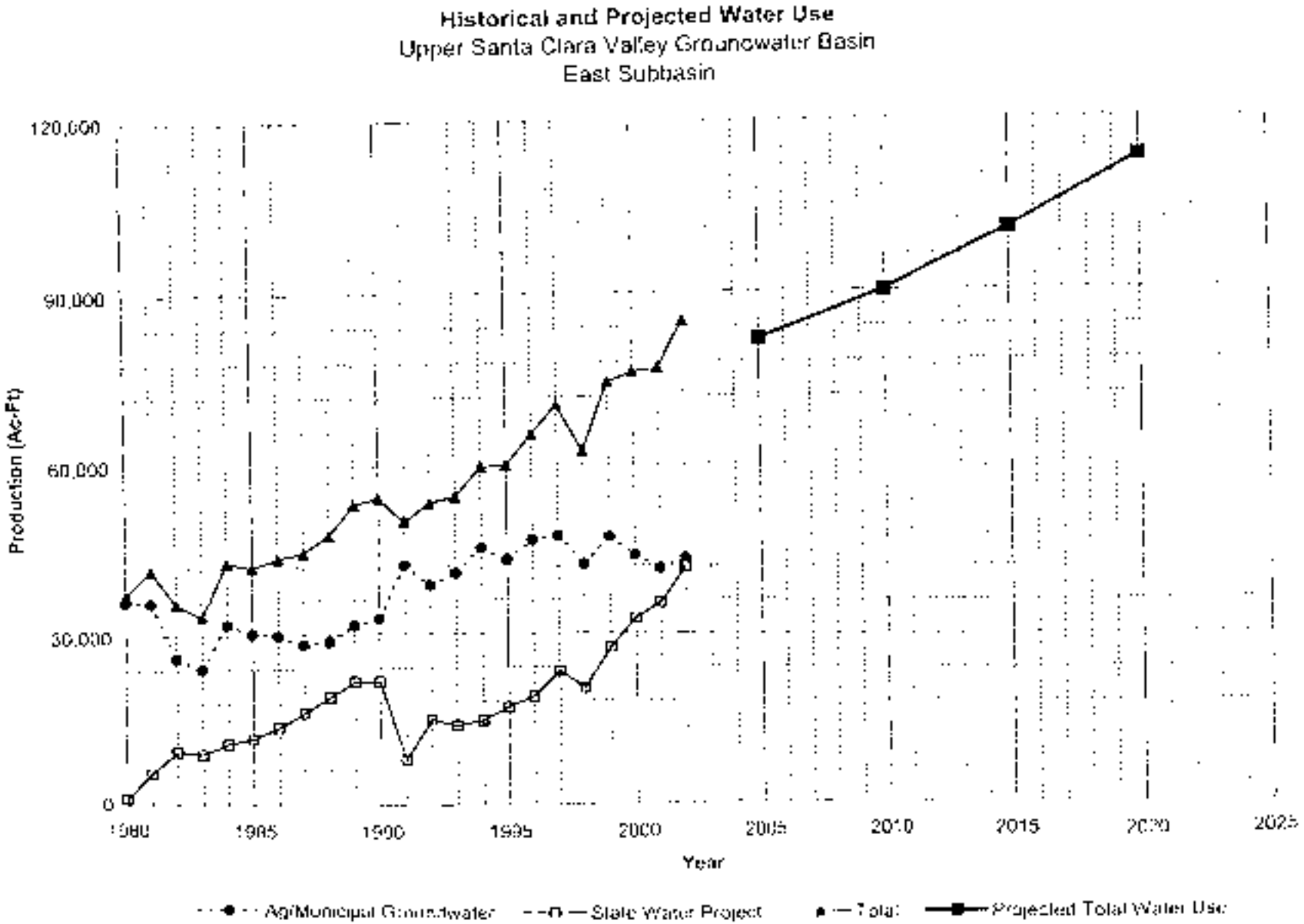

Historical and Projected Water Use
Upper Santa Clara Valley Groundwater Basin
East Subbasin
120,000
90,000
60,000
30,000
0
Production (Ac-Ft)
1980
1985
1990
1995
2000
2005
2010
2015
2020
2025
Year
Ag/Municipal Groundwater
State Water Project
Total
Projected Total Water Use

Figure 5-4

Plan, page #30 Draft, page 13

Top paragraph:

There is no mention what the folks can do if groundwater cannot meet demand and the supplemental water is not there for an extended period of time. Please develop a plan to solve this most serious occurance.

Conjunctive use of local groundwater and imported surface water will continue to be a key element in meeting all the goals for the basin, most notably utilizing groundwater for water supply without overdrafting the basin. Historical experience with groundwater pumping and aquifer response to varying hydrologic conditions has shown that the groundwater basin can support notable variations in pumping during wet and dry periods, but it cannot support continuous pumping at rates high enough to meet total local water demand. Thus, utilization of imported surface water in conjunction with local groundwater will be essential to the management of groundwater for water supply without overdrafting that resource.

As part of conjunctively using surface water and groundwater, it is recognized that, particularly when the surface water supply is imported from the State Water Project, there will be variations in the amount of available surface water supply from year to year. Similarly, there are expected to be variations in local groundwater conditions as a function of local hydrologic conditions which affect, among other things, the natural recharge to the groundwater basin from year to year. In the case of this basin, local (Southern California) hydrology which affects local groundwater conditions may not necessarily be the same as the hydrology in a distant (Northern California) location that directly affects the availability of supplemental, imported surface water in any given year. Thus, conjunctive use management is challenging, but is notably important to ensure that the groundwater basin is maintained to meet a regular component of water supply and to also be able to meet a larger component of water supply during "dry periods" that affect supplemental surface water availability. Conjunctive use management is similarly important to ensure that local groundwater can be replenished, via reduced pumping and or as a result of wetter local hydrologic conditions, during periods of wet/normal surface water availability. In light of all the preceding, implementation of this Plan Element is essential to accomplishing all the management objectives (goals) for the basin.

**Primary Element 6 - Long Term Salinity Management**

In general, groundwater quality in the basin is such that groundwater supplies meet standards for beneficial use in the basin, most of which now is for municipal (domestic) use but some of which remains for agricultural and some other irrigation (non-domestic) use. There also have been no notable historical trends of groundwater quality degradation in the basin over time. However, a number of geologic and hydrologic factors suggest that observations and interpretation of groundwater quality warrant some focus to ensure long-term preservation of groundwater quality. Notable among those geologic and hydrologic factors are: 1) the largely "closed" geologic nature

Bottom of page:

Is appears the entire paragraph is false. There is no knowledge of such meetings occurring

Newhall County Water District, Los Angeles County Waterworks District No. 36, Valencia Water Company, and its own Santa Clarita Water Division. As such, CLWA has a historical and ongoing working relationship with all those local agencies, as well as with other local groundwater pumpers, to manage water supplies in order to effectively meet water demands within the available yields of imported surface water and local groundwater. In fact, the Advisory Council convened to assist in the preparation of this Plan is comprised representatives of all the local water purveyors and significant groundwater pumpers.

A local MOU process among CLWA, other purveyors within CLWA's service area, and United Water Conservation District in neighboring Ventura County is a classic illustration of a local agency relationship that has produced the beginnings of local groundwater management, now embodied in this comprehensive plan, most notably in Primary Elements 1 through 5. In 2001, out of a willingness to seek opportunities to work together and develop programs that mutually benefit the region as well as their individual communities, those agencies prepared and executed a Memorandum of Understanding (the MOU) that initiated a collaborative and integrated approach to several of the aspects of water resource management that are now included in this Plan. United WCD manages surface water and groundwater resources in seven groundwater basins, all located in Ventura County, downstream of the East Subbasin of the Santa Clara River Valley that is the focus of this Plan. United is thus a logical partner in the cooperation of management efforts to accomplish the objectives (goals) for this basin, particularly as they relate to preservation of surface water resources that flow through the respective basins. As a result of that MOU, the cooperating agencies have integrated their database management efforts (part of Primary Elements 1 and 2 of this Plan), have initiated the development of a numerical groundwater flow model (for utilization in Primary Elements 3, 4 and 5 of this Plan), and are continuing to prepare reports on the status of basin conditions, as well as on geologic and hydrologic aspects of the overall stream-aquifer system.

A local extension of the interaction among CLWA, the retail water purveyors, and United is an ongoing working relationship with the City of Santa Clarita. CLWA and the municipal purveyors meet regularly with City staff and also present water supply conditions via study sessions with the City Council on a regular basis. It is expected that the implementation of this Plan will result in the availability of a broader range of information transfer with the City relative to the existing and future water supply to its residents. OK?

This Primary Element is included in this Plan to formalize the historical local and state agency

Plan, page #35 Dunn, page 15

Middle:

Primary Element 10-Groundwater Management Reports
These secretly created reports contain erroneous numbers to overstate supply and understate demand. The creators meet secretly, allow no public participation or oversight and meet without authority or sanction from any public agency. The meetings are held secretly and without benefit of the Brown Act. Since these reports are created with no public oversight, do not appear to have credibility, and usually are not signed by anyone, they should not be included as part of an AB3030 groundwater management plan. It is time to form an official joint powers authority between the purveyors and other participating parties

working relationships as part of comprehensively managing local groundwater, in concert with imported surface water and local recycled water, to accomplish all the management objectives (goals) for the basin.

**Primary Element 10 - Groundwater Management Reports**

As briefly described in the Introduction of this Plan, local groundwater management planning already includes, among several other activities, analysis of groundwater conditions and preparation of annual reports on groundwater and all other aspects of water resources and water supplies in the Santa Clara River Valley East ground water basin. In addition, recently formalized cooperative work with neighboring United Water Conservation District includes both regular reporting on the status of groundwater conditions and specific reporting on geologic and hydrologic aspects of the overall stream-aquifer system. For example, documentation of the numerical groundwater modeling work currently in progress is expected to be the first of the latter reports in the next year.

Beginning in 1998, CLWA and the retail water purveyors in the basin have prepared a series of annual reports, known locally as the Water Report, to describe all aspects of water supply and water resource conditions in the basin. That report provides current information to local City and County land use agencies, and to other interested parties, about current water requirements, use of groundwater and treated imported surface water to meet those water requirements, groundwater conditions (pumping, groundwater levels and quality, etc.), local surface water conditions, the status of imported surface water supplies including details of delivered SWP water in the reported year as well as an up-to-date summary of available imported SWP water for the next year, a short-term projection of water requirements in the next year, and other appropriate details about water requirements and supplies such as, for example, the status of introducing recycled water as a component of non-potable water supply.

In light of the frequency and comprehensive nature of the annual Water Reports, and also in light of the planned preparation of more detailed technical reports on various aspects of the basin as appropriate, the continued preparation of those reports will serve as regular and complete reporting on all aspects of this groundwater management plan.

Plan, page 4-16 Draft, page 16

(Not much mention on this page.) CLWA constantly preaches conservation but continually sells more and more water. CLWA should provide the public with an accounting of the water CLWA is conserving.

**Secondary Element 1 - Continuation of Public Education and Water Conservation Programs**

CLWA has provided water conservation and public education programs that will continue and expand as a complement to and an element of this groundwater management plan. The expansion of water conservation will largely stem from CLWA's having signed the "Memorandum of Understanding Regarding Water Conservation in California" (Urban MOU) in 2001, which made CLWA a wholesaler member of the California Urban Water Conservation Council. CLWA has thus committed to implementation of cost-effective water conservation measures known as Best Management Practices (BMPs) that are included in the Urban MOU and are intended to reduce California's long-term urban water demands. The BMPs have been incorporated into the water demand management measures section of the Urban Water Management Planning Act.

Water conservation and related public education measures have generally been developed in California to achieve the following goals:

- meet legal mandates
- reduce average annual potable water demands
- reduce sewer flows
- reduce water demands during peak seasons
- meet drought restrictions.

As a wholesaler of imported surface water CLWA has implemented the following BMPs for several years prior to signing the MOU:

- distribution system water audits, leak detection and repair
- public information
- school education
- wholesale agency assistance ?
- conservation pricing ?
- conservation coordinator. ?

Top:

(Not much truth here either.) Mostly deception. The UWMP doesn't exist for the reasons mentioned earlier. The UWMP must not be considered here.

As a signatory to the MOU, CLWA's water conservation and public education program will expand to include the following BMPs found to be locally cost-effective, as detailed in the 2000 Urban Water Management Plan for CLWA and the Santa Clarita Valley retail purveyors.

- water survey programs for single-family residential and multi-family residential programs
- residential plumbing retrofits
  metering with commodity rates for all new connections and retrofit of existing connections
- large landscape conservation programs and incentives
- high-efficiency washing machine rebate programs (when also provided by local energy providers or wastewater utilities)
- conservation programs for commercial, industrial, and institutional accounts
- wholesale agency programs to financially or otherwise support water conservation efforts by retailers (this measure will be expanded)
  residential ultra-low-flow toilet replacement program.

This Primary Element, while identical to independent CLWA efforts in water conservation and public education, is incorporated in this Plan to complement other Plan elements, and to move toward accomplishment of all management objectives (goals) for the groundwater basin

**Secondary Element 2 - Identification and Management of Recharge Areas and Wellhead Protection Areas**

The 1986 Amendments to the federal Safe Drinking Water Act (SDWA) established a new Wellhead Protection Program (WPP) to protect groundwater that supplies drinking water wells for public water systems. Each state was required to prepare a WPP and submit it to the USEPA by June 19, 1989. However, California did not develop an active state-wide Wellhead Protection Program at that time. Subsequently, in 1996, reauthorization of the SDWA established a related program called the Source Water Assessment Program. In 1999, the California Department of Health Services (DHS) Division of Drinking Water and Environmental Management developed its Drinking Water Source Assessment Program (DWSAP), and EPA approved it. The overall objective of the DWSAP is to ensure that the quality of drinking water sources is protected.

As discussed in Section 3 of this Plan, the potential groundwater management plan component

EXHIBIT A

# Santa Clarita will turn to wells as state water supplies dry up

2-27-91 DN.

WATER / From Page 1

and Hasley Canyon — does not have a ground-water supply.

The county agency has drilled a well about 1,000 feet northwest of the intersection of Hasley Canyon and Del Valle roads that it had planned on using in about a year after building a 250,000-gallon storage tank, Assistant Deputy Director Gary Hartley said. However, with the new cutback, the county is hurriedly seeking permission from several property owners to run a temporary pipeline from that well to customers, Hartley said.

County officials hope to have the pipeline operating in about six weeks, he said. Meanwhile, the county is working on agreements with the three other purveyors in the valley — the public Newhall County Water District and the private Valencia Water Co. and Santa Clarita Water Co., Hartley said.

If the county cannot set aside enough well water from the other purveyors, there is a chance the state would send emergency supplies through the Castaic agency, he said.

While the city considers a law that would restrict wasteful practices in the hopes of achieving a 25 percent reduction in water use, Hartley said that county water officials are drafting a conservation proposal that would require different levels of participation in different areas. Because of the severity of the water cuts in the Val Verde and Hasley Canyon areas, he said he would expect a 20 percent to 30 percent mandatory cutback in water use.

Although the plant near Castaic Lake will be closed, the agency most likely will lay off just a temporary maintenance worker, Sagehorn said. The worker was hired when one of the two permanent maintenance workers was on medical leave and was kept on.

# Suppliers driven into the ground

## *Drought forces area to rely on well water*

2-27-91

By Kimberly Heinrichs
*Daily News Staff Writer*

SANTA CLARITA — The state is expected to stop water deliveries March 15 in the Santa Clarita Valley, forcing the area to rely on ground water as California's worst drought on record continues, officials said Tuesday.

The Castaic Lake Water Agency, which treats, stores and distributes state water to local purveyors, will close its plant after the last of the imported water arrives, agency General Manager Robert Sagehorn said.

Related story:
■ Conservation law gets OK. Page 4

"For all substantial purposes we're shutting the plant down on March 15," he said, adding, "No one's going to go bone dry over this."

Local water suppliers still will pump water from the Santa Clarita Valley's extensive network of wells, he said.

The state Department of Water Resources told Sagehorn on Saturday that the expected cut of 50 percent of the agency's water supply has been increased to 90 percent as the drought continues its fifth year. The agency will have received 10 percent of this year's water allocation by the middle of March, Sagehorn said.

Of the four purveyors receiving state water from the Castaic Lake agency, only the Los Angeles County Waterworks District No. 36 — which serves Val Verde

See WATER / Pg. 2

FOR PG. 17 + FIG. 5-4

EXHIBIT [illegible]



# Officials say state's water delivery system inadequate

By Laura Myers
[illegible]

MONTEREY, Calif. — The top [illegible] for years to come because of an inadequate water delivery system, representatives of the [illegible] groups spoke for the present [illegible] of planned [illegible].

The 5-year-old drought that [illegible] California's water supplies were drastically not only magnified the problem this year, and [illegible] year's [illegible] of the urban, agriculture and wildlife interests.

"The biggest problem we have is that the infrastructure of the water supply is grossly inadequate," said Tom Quinn, conservation director for the urban Metropolitan Water District of Southern California. "The way the system works now, people can't depend on a steady water supply because the water delivery systems just doesn't work like it should."

Quinn's comments came as the annual spring conference of the California Association of Water Agencies, which attracted more than 2,000 of the state's top water officials.

Stephen Hall, representing agriculture, and Charles Hamilton, representing wildlife and the environment, agreed with Quinn that the State Water Project and the federal Central Valley Water Project can't [illegible] competing water needs.

All three were pessimistic about the future of what would happen if they weren't the first in line for water in the drought [illegible] — the goal is of urban life and [illegible], farms and [illegible] wildlife will [illegible] with some species becoming [illegible].

But beyond the growing urban competition for water supplies, they said water officials must improve the delivery and storage system that eventually hasn't developed for decades.

"We shouldn't have to continue to fight over scraps for resources," said Hall, executive director of the California Farm Water Coalition.

The Sacramento-San Joaquin Delta, the cornerstone of the delivery system, is bottlenecked even in non-drought years, Quinn and Hall said.

Part of the problem, according to Hamilton, who is an environmental consulting business, is the growing importance on protecting endangered and threatened species while making water transfers in the delta.

The water-rich choke point is already visited by state and federal wildlife officials as threatened and the delta smelt also is expected to bring the U.S. Fish and Wildlife Service to [illegible].

Unlike water [illegible] in the [illegible] where those [illegible] under [illegible], [illegible] said.

"We need to manage the [illegible] to provide adequate water throughout the year," Hamilton said.

The water-rich choke point is already visited by state and federal wildlife officials as threatened and the delta smelt also is expected to bring the U.S. Fish and Wildlife Service to [illegible].

Unlike water [illegible] in the [illegible] where those [illegible] under [illegible], [illegible] said.

"We need to manage the [illegible] to provide adequate water throughout the year," Hamilton said.

EXHIBIT C

# A boost for toxic cleanup in state

## Feds back state on perchlorate

By Heather MacDonald
Staff Writer 8-8-03 D.N.

SANTA CLARITA — The Department of Defense agreed Thursday to obey California's drinking water standards for perchlorate and not try to avoid paying for cleanup of the toxic rocket fuel byproduct.

The agreement, announced by U.S. Sen. Barbara Boxer and Pentagon officials during a visit to a contaminated site in Rialto, could help speed the cleanup of the defunct Bermite explosives factory in the center of Santa Clarita, and dozens of other polluted sites all over California, officials said.

"This is an important breakthrough," said Boxer, a California Democrat. "Defense Department activities have been a major source of perchlorate contamination in California. This kind of active cooperation will help us find and fix perchlorate problems throughout the state."

The agreement also appeared to put to rest concerns expressed by Santa Clarita leaders that legislation introduced by President George W. Bush would exempt some defense contractors from having to pay for environmental cleanups in the name of military readiness.

The Newhall County Water District Board of Directors was afraid the language of the bill could be used to let Whittaker Corp., which operated the site until 1987 and has recently begun studying the best ways to clean up the pollution, off the hook.

"The well-being of millions of Californians depends on this agreement," Boxer said.

More than 7 million Californians drink water with at least traces of perchlorate, which can damage the thyroid gland and be risky for pregnant women, whose fetuses can be affected, according to the U.S. Environmental Protection Agency.

A provisional standard set by the EPA recommends that drinking water have no more than 1 part per billion of perchlorate. The old standard considered water with 32 parts per billion of perchlorate safe.

Although the EPA is not expected to set a final standard

See WATER / Page 2

# Help on the way for toxic cleanups

8-8-03 D.N.

WATER / From Page 1

until at least 2008, Boxer has called for the agency to act next year because of the threat perchlorate poses to California residents.

Five wells in Santa Clarita have been shut down because of high levels of perchlorate, with tests showing as much as 40 parts per billion of the toxin in the water, officials said. The wells draw on the Saugus Aquifer, which serves as a backup water supply for the Santa Clarita Valley in times of drought.

State officials believe the pollution is coming from the Bermite property near the Santa Clarita Metrolink Station on Soledad Canyon Road. From World War II to the end of the Cold War, several companies manufactured and tested munitions and explosives for the U.S. military on the 996-acre site.

While the California Department of Health Services requires that wells with more than 4 parts per billion of perchlorate be shut down, the state Office of Environmental Health Hazard Assessment has found that water with as much as 6 parts per billion is safe to drink.

Heather MacDonald, (661) 257-5257
heather.macdonald@ca.gannett.com

FOR. PG. 15

-----Original Message-----
**From:** Diane Trautman [mailto:dianetrautman@comcast.net]
**Sent:** Friday, August 08, 2003 2:41 PM
**To:** Dan Masnada
**Cc:** Marsha McLean; Vince Bertani
**Subject:** Draft Groundwater Management Plan

TO: Dan Masnada

RE: Draft Groundwater Management Plan

Following are my questions and comments related to the Agency's Draft Groundwater Management Plan:

1. What percentage of the 106,000 afy (needed over the next 20 years) will be drawn from local groundwater sources? Does the Agency expect to maintain roughly the same 60% SWP/40% local groundwater mix in most years?

2. If the Saugus Formation absorbs recharge much more slowly than the Alluvial Aquifer, won't pumping of the Alluvial Aquifer at the high end of the scale over a sustained period of time reduce recharge of the Formation and reduce the amount of potable water that can be drawn from the Formation in dry periods?

3. Both this report (p. 15) and the 2002 Water Report (p. 19) state that the Agency does not have sufficient groundwater quality data on the Saugus Formation to perform an analysis of "pumping related impacts on quality." On page 25 of this report under Primary Element 1, the Agency states that it has "a useful amount of groundwater quality data." Is the latter in reference only to the Alluvial and not the Saugus? And if the Agency does not have sufficient data on quality of water from the Saugus Formation, how does the agency propose to collect that data to ensure quality in order to maintain the current pumpage level and to increase the yield as proposed on page 21?

4. Looking back at the 2002 Water Report, the Agency indicates (on page 19) that "there are limited Saugus (Formation) water level data." Does the Agency plan to collect more comprehensive data on the Saugus Formation general groundwater stability to determine reliability of projected yields and "artificial groundwater recharge" (p. 27) capacity?

5. Regarding Secondary Element 2,the Agency states: "The results of the DWSAPs can be used as a planning tool to guide land use development in the vicinity of water sources." Is the Agency currently sharing more recent, detailed information with the City regarding contamination risks in relation to the existing closed wells?

6. Where is the SCWC Stadium Well located?

7. Why is "Continuation of Public Education and Water Conservation listed as a Secondary (Potential) Element" when increased conservation savings are projected to reduce water demand by 10%? Shouldn't conservation be one of the primary elements of water management?

8. How is the Agency delivering recycled water to the TPC? Is it being run through a parallel piping system? Is so, what is the estimated cost and time frame for constructing such a system to carry the estimated 17,000afy? And how does the Agency propose to pay for this system?

9. How is the recycled water in locations, such as the golf course, reprocessed to remove pesticides and fertilizers?

10. What is the current average per capita water usage in afy?

11. The Semitropic Water Bank/Transfer is not mentioned in discussion of the Supplemental (SWP) Surface Water on page 21. Is that because it is a relatively short-term water supply? Are any of the other water transfers – Kern Water Bank, Kern Delta Water, North Las Posas Water Bank – as listed on UWMP p. 2-16, of limited duration? And if the Semitropic Water Bank Transfer is short term, how can it be included in the 105,000-106,000 afy need projected for the next 20 years? What will take its place?

12. What specific efforts will be made to manage salinity?

Thank you for giving me an opportunity to respond.

Diane Trautman

## Responses to Trautman

1. In terms of groundwater management planning, projected urban water demand (the 106,000 afy projected urban demand in 2020) does not represent total valley-wide demand; total projected demand is 113,100 afy, including both urban and agricultural. In that light, on an average basis, local ground water is expected to be utilized to meet about 40 percent of total water demand.

   In regards to maintaining "roughly the same 60% SWP 40% local groundwater mix in most years", please refer to page 20 of the draft GWMP for a more complete response to your question. For example, about 54 percent of water demand in 2001 was supplied by local groundwater, and about 46 percent was supplied by imported SWP water. Also please refer to Table II-5 in the 2002 Santa Clarita Valley Water Report, which displays the build up of SWP water use through time, and the relative percentages of groundwater and SWP water used in a given year. As noted above, it is expected that, over time, again on an average basis, the annual amount of local groundwater pumping will not appreciably change but its fraction of total water supply will decrease. Conversely, over time, and once again on an average basis, both the annual volume of imported SWP water and its fraction of total water supply will increase.

2. No. Since the Saugus Formation is recharged over a much larger area, beyond the spatial extent of the Alluvium. There is a limited relationship between Alluvial pumping and recharge to the Saugus Formation.

   The fundamental tenet of the GWMP is to utilize groundwater for water supply within its sustainable yield (see the Management Objectives, or Goals, for the Basin, GWMP Section II; see also the various GWMP Elements intended to achieve those objectives, GWMP Section V). In that light, it is expected and intended to operate in such a way that recharge to the Saugus Formation will not be "reduced" by pumping from the Alluvial Aquifer and that groundwater will be available in varying amounts, as needed depending on weather year-types, within the sustainable yields of the respective aquifers (i.e. without overdrafting them).

3. The reference to "useful amount of groundwater quality data" in the GWMP includes both Alluvial and Saugus data. However, due to the historically greater development and use of groundwater from the Alluvium (number and distribution of wells, volume of pumping), and due to the historically smaller development and use of the Saugus Formation (fewer wells, smaller geographical distribution of wells, smaller pumpage), there is a comparatively limited ability to examine relationships among pumping, recharge, and quality in the Saugus. CLWA and the other purveyors intend to expand the overall knowledge of the Saugus Formation as that resource is further explored and

developed (number of wells, additional sampling as new wells are added, etc.). All that data will be included in ongoing implementation of GWMP Primary Element 1, Monitoring of Groundwater Levels, Quality, and Production.

4. The "limited nature of Saugus water level data" is a result of the same smaller extent of historical Saugus development described in the preceding answer. Acquisition of additional data on the Saugus Formation is planned as also described in the preceding answer.

5. All publicly available information regarding the investigation of perchlorate contamination, its extent, its impact on water supply, and plans for cleanup, control of migration, etc. is available to the City. Representatives of CLWA and the purveyors meet routinely with City representatives to review the status of perchlorate cleanup and remediation activities. CLWA and the impacted water purveyors will continue to pursue control and cleanup of perchlorate contamination in order to restore impacted groundwater pumping capacity and to ensure the long-term quantity and quality of groundwater in accordance with the GWMP. As a practical matter, there are no surface contamination risks relating to perchlorate that would affect land use development adjacent to the wells.

6. The stadium well is located on the south side of the Santa Clara River, approximately two miles upstream (east) of its confluence with the South Fork tributary, or about 4,000 feet east of the Bouquet Canyon Road crossing of the Santa Clara River.

7. The assignment of "primary" or "secondary" status to any GWMP element is discretionary and certainly not absolute. Secondary status is not intended to indicate that any element of the GWMP will not be implemented; all elements are intended to be implemented. Final status of all GWMP elements will be reviewed by the Advisory Council and decided by the CLWA Board.

8. Recycled water is being delivered to the TPC via the dedicated, recycled water distribution system, which is also capable of delivering water to other non-potable water users, and which will be expanded in accordance with the Draft Recycled Water Master Plan. The costs and time frame for expanding recycled water distribution and use are included in the Draft Recycled Water Master Plan, which is complementary to, but beyond the scope of the Groundwater Management Plan. The intent is to develop the 17,000 AFY of use by 2020. The capital cost of the complete system is estimated to be $68 million, and will be funded through CLWA's connection fee program.

9. Recycled water is not "reprocessed" at points of use such as the TPC golf course. In general, recycled water is highly treated (tertiary treated) waste water. In the case of the Santa Clarita Valley, treatment already occurs at the Valencia Reclamation Plant operated by the Sanitation Districts of Los Angeles County. The treated water, ready for non-potable use, is distributed from the plant site in a dedicated transmission pipeline system to end users such as the TPC. Pesticide and fertilizer uses, as part of cultural practices at end-user locations such as golf courses, are discretionary actions of the respective end users of recycled water.

10. Most water agencies no longer use "per capita" water use as a standard because it is not an accurate representation of actual per person water use, mainly due to the effects of landscape and commercial/industrial water use. (It is also expressed in "gallons per day," rather than "acre-feet per year, since it refers to individual water usage.") In general for the South Coast hydrologic region of California, water use is approximately 200 gallons per person per day (DWR Bulletin 160-98). Per capita use for the Santa Clarita Valley is slightly higher than this due to landscape irrigation demands caused by local climate conditions.

11. The SWP is referred to as "supplemental" water because that is the original purpose of the SWP: to serve as a supply that would "supplement" local supplies (whether groundwater or local surface water or both). The specific amounts referred to in the GWMP are from the contractual terms between CLWA and the California Department of Water Resources.

    The water banked in the Semitropic Water Storage Program during 2002 is a short-term, dry period supply. The program has a term of ten years (i.e., the water must be returned to CLWA for use in its service area within that time period). Thus it is not included as a supply for long-term needs. However, the other programs listed in the UWMP (most of which, by the way, are not water "transfers," but are instead groundwater banking programs) are long-term sources of supply. As of this writing, the Agency is in the process of designing and implementing a Long-Term Reliability Plan to begin bringing such long-term programs on line as a means to store water available in wet years, for use in later dry years. CEQA analysis, with its accompanying public comment opportunities, will be part of the long-term reliability program approval process.

12. Primary Element 6 – Long Term Salinity Management is included in the GWMP for the reasons presented in the text discussion of that element. The element recognizes the need to plan for salinity management but also recognizes that, to the present, there has been no extraordinary trend of salinity increase. Hence, there are no specific efforts currently in place to "manage" salinity. It is envisioned that specific efforts will be developed over

time in response to implementation of the GWMP and, in particular, its Primary Element 6

CLWA is participating in efforts by the Sanitation Districts of Los Angeles County to address the Los Angeles Regional Water Quality Control Board's proposed TMDL standard for chloride in the Santa Clara River. This effort is separate from and beyond the scope of the Groundwater Management Plan.

# Additional Comments

Ed and Joan Dunn
15414 Rhododendron Dr.
Canyon Country, CA 91387
November 25, 2003

Castaic Lake Water Agency
President Peter Kavounas and Board of Directors
27234 Bouquet Canyon Road
Santa Clarita, CA 91350-2173

Re: Groundwater Management Plan (AB 3030) Nov. 2003 Draft

Dear President Kavounas and Directors:

We would like to comment on some statements of your new draft plan. On page 38 there is a bullet - Conservation pricing. Since we have never seen any conservation pricing locally, this should be explained or removed. We seriously question this being presently implemented.

On page 41, we ask why you are stating that only the eastern portion of the alluvium has experienced historical fluctuations in groundwater levels. How can there be constant groundwater levels in the western portion of the basin, when the western basin is supposed to receive its re-charge primarily from the eastern portion of the river? You imply that tributaries in the Bouquet Canyon area are the source of water in that area. We believe you are avoiding the real source of water to the area. That source appears to be the large amount of effluent from Sanitation District #26, and is maintaining the water level. Why is this not explained?

As usual, there is no explanation for a total extended interrupt of the state wholesale water system or the CLWA facilities!

We are disappointed that of the numerous comments of August 8, 2003 that we supplied, only a few were considered. We spent our time and efforts to supply comments and suggestions to make the water plan a good plan. So much for that!

Sincerely,

Ed and Joan Dunn

November 25, 2003

Mary Lou Cotton
Water Resources Manager
CLWA
via fax only

Subject: November 25, 2003 Groundwater Management Plan Protest Hearing

I will not be attending the protest hearing this evening, but I do have three comments on the information you provided to me.

First, I commented previously on the proposed network of monitoring wells and the public availability of data. The monitoring wells in figures 5-1 and 5-2 appear to cover a wide range of the valley. However, the text on p. 27 states the network will be mostly as illustrated in figures 5-1 and 5-2, but possibly expanded. I hope the final network is extensive and covers all areas of the valley. Further expansion of the network would add valuable data points and should be encouraged.

I did not see any indication of whether the collected monitoring data would be publicly available. I have heard comments from others that some well data is not being released to the public even upon request. I think that concerned citizens and groups should be allowed access to the monitoring database.

Second, I have one new comment on the wording on page 34 regarding perchlorate cleanup. The last paragraph states "The proposed pumping would be combined with approved wellhead treatment to render the treated water suitable for municipal supply." This may be a wording issue, but my understanding is that wellhead treatment is not always approved or allowed by the permitting agencies. This wording implies that wellhead treatment is already an approved scenario. While it may be determined that treatment followed by re-injection or non-potable usage makes more sense, I think it would be more accurate to not specify the final treatment scenario until the plume characterization is complete and the pilot studies are finished and accepted.

Finally, the plan is clearly an overview that will have to be expanded upon with supporting policies and target dates. Some commenters requested more information on goals in the groundwater plan. If the agency does not add implementation strategies and target dates to the plan, they should be prepared separately, updated annually, and made available to the public upon request.

I understand the time for commenting may have past, but if you are able to address these concerns in the final draft, I would be appreciated.

Sincerely,

Maria Gutzel
24483 Shadeland Dr
Newhall, CA 91321

**Memorandum of Understanding Between the Santa Clara River Valley Upper Basin Water Purveyors and United Water Conservation District, August 2001**

# MEMORANDUM OF UNDERSTANDING
# BETWEEN THE
# SANTA CLARA RIVER VALLEY
# UPPER BASIN WATER PURVEYORS
# AND
# UNITED WATER CONSERVATION DISTRICT

**AUGUST 2001**

COPY

# Memorandum of Understanding
# Between the
# Santa Clara River Valley
# Upper Basin Water Purveyors and
# United Water Conservation District

August 2001

# MEMORANDUM OF UNDERSTANDING

This Memorandum of Understanding ("MOU") is entered into effective August 20, 2001, by and among Castaic Lake Water Agency ("CLWA"), CLWA's Santa Clarita Water Division ("SCWC"), Newhall County Water District ("NCWD"), Valencia Water Company ("VWC") and Los Angeles County Waterworks District No. 36 ("LACWD"), which are collectively referred to as the "Upper Basin Water Purveyors" and United Water Conservation District "UWCD", hereinafter referred together as the "parties."

## RECITALS

**WHEREAS,** UWCD is a public agency that encompasses approximately 214,000 acres of land located in central Ventura County. UWCD's service area covers the downstream portion of the Santa Clara River Valley in Ventura County, as well as the Oxnard Plain (sometimes referred to as the "Lower Santa Clara River Area"). UWCD manages surface and groundwater resources within seven groundwater basins in the Lower Santa Clara River Valley Area. UWCD's Boundary is shown on Figure 1-1; and,

**WHEREAS,** the Upper Basin Water Purveyors meet regularly as a technical group to coordinate conjunctive use of imported, recycled and groundwater resources of the water basins east of the Los Angeles/ Ventura County line (sometimes referred to as the "Upper Santa Clara River Area"), which is located almost entirely within northwestern Los Angeles County. The respective services areas of the Upper Basin Water Purveyors members (CLWA, SCWC, NCWD, VWC and LACWD) are shown on Figure 1-2; and,

**WHEREAS,** UWCD has been involved in the review of water resources in both the Lower Santa Clara River Area and also the Upper Santa Clara River Area as part of UWCD's review of the Newhall Ranch Specific Plan and EIR (NRSP); and,

**WHEREAS,** litigation of the Newhall Ranch Specific Plan and EIR resulted in preparation of an additional analysis to the previously certified EIR for the NRSP, including the section addressing water resource issues; and,

**WHEREAS,** the Additional Analysis includes a water flow model and impact analyses of the future water usage projections for the Upper Santa Clara River Area; and,

**WHEREAS,** UWCD, Newhall Land and Farming Company (NLF) and others have had several technical meetings to further study the Additional Analysis as it relates to the water issues, and, based on this information, and further discussions between UWCD and the Upper Basin Water Purveyors, UWCD believes that it is in the best interests of the parties and the future beneficial water resources management in the upper and lower basins to enter into a cooperative working relationship among the parties; and,

**WHEREAS,** the parties have determined that this MOU is the best format for establishing a program that would be implemented over time for purposes of agreeing upon overall water resources management techniques and an information database that would benefit the upper and lower basins; and,

**WHEREAS,** this MOU is prepared by UWCD and the Upper Basin Water Purveyors because the parties believe that a cooperative water resource monitoring program in the Upper and Lower Santa Clara River Areas is desirable to protect and enhance the conjunctive use of imported water, groundwater and surface water resources within the region; and,

**WHEREAS,** the parties support regional water planning efforts that rely on the provision of accurate and timely information about available water resources; and,

**WHEREAS,** the parties to this MOU desire to create and maintain a cooperative relationship for purposes of gathering information for UWCD and the Upper Basin Water Purveyors to be used in further assessing imported water, surface water and groundwater conditions in both the Upper and Lower Santa Clara River Areas; and,

**WHEREAS,** the parties to this MOU intend to form a reciprocal relationship. In order to do this, UWCD will designate an individual or individuals with technical knowledge and experience appointed by the General Manager of UWCD who will be included in discussions and efforts that take place with the Upper Basin Water Purveyors and others regarding the Upper Santa Clara River Area. Likewise, the Upper Basin Water Purveyors will designate an individual or individuals with technical knowledge and experience appointed by the General Managers of the Upper Basin Purveyors who will be included in discussions and efforts with UWCD and others regarding the Lower Santa Clara River Area, and,

**WHEREAS,** the goal of the MOU is to establish a joint monitoring program, which includes: (a) data collection (monitoring and testing); (b) database management; (c) groundwater flow modeling; (d) assessment of groundwater basin conditions (operational yield); and (e) report preparation and presentation.

**NOW, THEREFORE,** in consideration of the mutual promises and covenants herein contained, the parties to this MOU agree as follows:

1.1 **Program Monitoring.** The parties will participate in a joint monitoring program.

1.2 **Program Content.** The technical aspects of this joint monitoring program are set forth in a technical memorandum entitled, "Water Resource Monitoring Program Upper Santa Clara River Area," (Program) which is attached as Exhibit 1 and incorporated by this reference.

1.3 **Program Meetings.** The General Manager or President of each party to this MOU (or their designee) shall meet as the "Program Committee" within 30 days of the execution of this MOU. The "Program Committee" will establish appropriate subcommittees to initiate the Program and determine the meeting times and locations for the committees. The Program Committee and subcommittees will discuss and coordinate technical aspects of the Program, including the gathering, interpretation and reporting of information as outlined in the technical memorandum (Exhibit 1). Other attendees may be permitted by agreement of the parties to this MOU.

1.4 **Monitoring Costs.** The costs incurred in administrating the Monitoring Program will be determined as implementation of the Program takes place. However, it is understood that, unless the parties to this MOU agree otherwise, the Upper River monitoring costs of the program will be borne by the Upper Basin Water Purveyors because such monitoring will take place within their service areas and the Lower River monitoring costs of the program will be borne by UWCD because such monitoring will take place within its service area.

1.5 **Program Implementation**. The parties to this MOU have prepared a schedule, attached as Exhibit 2, that describes the tasks and estimated time to implement the Program. The Parties acknowledge that Program Implementation will be an on-going and evolving process and may change due to future amendments to the Program, challenging technical issues or other unforeseen circumstances.

1.6 **Water Rights**. Notwithstanding the provisions of this MOU, nothing in either this MOU or the technical memorandum (Exhibit 1) shall be construed as affecting the water rights or operations of any party, person or entity.

1.7 **Term.** This MOU shall remain in effect for an initial period of seven (7) years and shall be automatically renewed for additional one year increments unless otherwise unanimously terminated by the members of the Program Committee as that committee exists at the time action is taken to terminate this MOU.

1.8 **Counterparts.** This MOU may be executed in any number of counterparts, each of which, when so executed, will be deemed to be an original and all of which taken together will constitute one and the same agreement.

IN WITNESS WHEREOF, the parties have executed this MOU as of the date first set forth above.

United Water Conservation District

By _____
General Manager

Castaic Lake Water Agency

By _____
General Manager

Newhall County Water District

By _____
General Manager

Valencia Water Company

By _____
President

Santa Clarita Water Company

By _____
President

Los Angeles County Waterworks District No. 36

By _____
County of Los Angeles

# United Water Conservation District Boundary

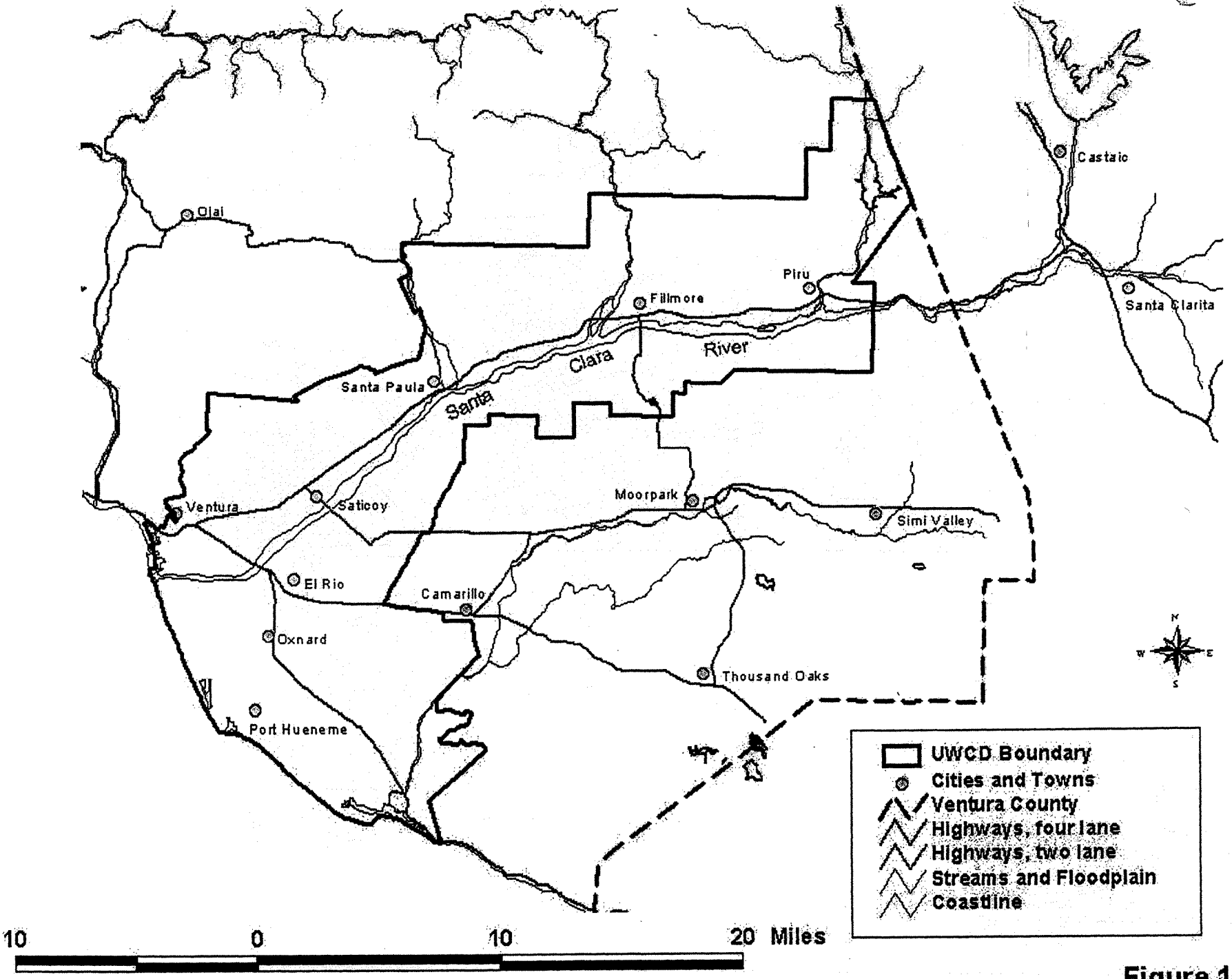
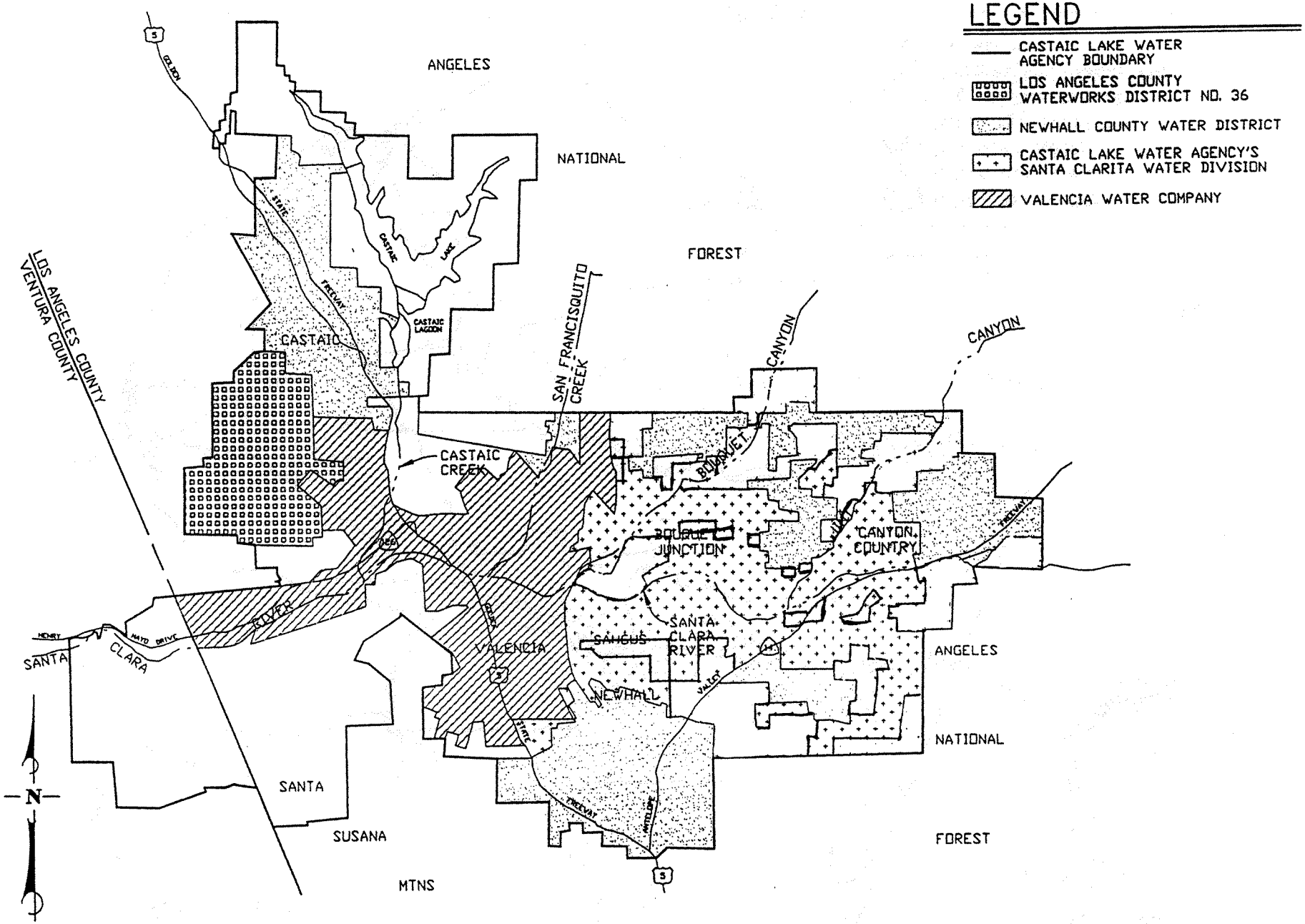



Figure 1-1




FIGUI 1-2

CLWA AND WATER PURVEYOR SERVICE AREAS

# Exhibit 1
# WATER RESOURCE MONITORING PROGRAM
# UPPER SANTA CLARA RIVER AREA

## INTRODUCTION

As part of its ongoing monitoring, interpretation, and reporting on imported water supplies and groundwater conditions in the aquifer systems underlying the Upper Santa Clara River Area, generally east of the Los Angeles County - Ventura County line and extending east to about the vicinity of Lang Station, the principal water purveyors in the area (primarily the municipal water purveyors - Castaic Lake Water Agency, Los Angeles County Waterworks District No. 36, Newhall County Water District, and Valencia Water Company) have committed to formalizing the data base on which water supply conditions are analyzed, and expanding the analysis of groundwater conditions such that the adequacy of water supply is well understood, and that both local and regional questions or issues about surface and groundwater can be addressed.

This water monitoring program outline has been prepared as a cooperative effort by the Upper Basin Water Purveyors operating in the Santa Clarita Valley and by the United Water Conservation District in Ventura County, the latter as the primary groundwater resource management entity in the Lower Santa Clara River Area (west of the Los Angeles - Ventura County line). The intent of the program outline is to delineate a series of elements that will be undertaken primarily by the Upper River Area entities, but in cooperation with United such that there is ultimately an integrated and coordinated data base, as well as agreed-upon technical tools such as a numerical groundwater flow model, to allow a continued regional understanding of water resources along the Santa Clara River. In that light, the following program includes elements which address data collection (monitoring and testing), database management, groundwater modeling, operational yield analyses, and report preparation and presentation.

**DATA COLLECTION (MONITORING AND TESTING)**

Historically, data on groundwater and related hydrologic conditions have been collected on varying frequencies and in varying formats throughout the Upper River Area. Fortunately, more than sufficient data have historically been collected on groundwater levels, quality, and production (pumpage) to permit general assessment of groundwater conditions, in some detail in the widely developed Alluvial aquifer and to a lesser extent the Saugus Formation aquifer. In order to expand on the general assessment of groundwater conditions, historical data collection efforts will be updated and formalized in the following areas.

*Groundwater Levels and Quality* - Wells in which historical and current water level data are available will be "qualified" (to confirm locations, depths, well completion details, annular seals, etc.) to confirm their utility for ongoing monitoring of water level and/or water quality in a particular aquifer. Based on a combination of qualified well details and available historical and current data, a network of existing and future wells will be developed for ongoing monitoring of groundwater levels (initially on a semi-annual frequency) and groundwater quality (initially on an annual to triennial frequency, depending on the use of the well) in both the Alluvium and the Saugus Formation aquifers. The water level and water quality monitoring networks may not be identical (as with most basins, the number of water level monitoring points will likely be greater than the number of water quality monitoring points). Also, in light of the relative differences in development of the two aquifer systems, there will be more monitoring points in the Alluvium than in the Saugus. However, as future development of the Saugus increases, particularly as the spatial extent of the Saugus "well field" expands, the Saugus monitoring network will evolve and expand accordingly. Water quality details are expected to begin with what historical analyses have been made; monitored details are expected to increase as the use of local Groundwater continues to change from irrigation supply to municipal supply, with the addition of organic and other hazardous chemical analyses of drinking water supplies in recent years. Finally, such as any dedicated monitoring wells are installed in the

area, for specific site investigation or other purposes, they will be added to the qualified well network as appropriate.

*Groundwater Pumpage* - Essentially all pumpage in the Upper Area (except small capacity individual domestic and similar wells) is metered or directly estimated from electrical power records, and the results are maintained in a decentralized data base. Metered measurement of all substantial capacity wells (all municipal and agricultural, as well as other private wells, e.g. golf course irrigation wells) will be continued on at least an annual basis, with progression to monthly data collection as appropriate for particular analyses that may be undertaken.

*Surface Water Flows and Quality* - Historical stream gage sites will be preserved as possible to allow ongoing surface water gaging of stream inflows to the Upper River area, stream outflows from the Upper River area into Ventura County, and return flows to the River system from in-area wastewater treatment plant discharges. Surface water quality at the same points will also be sampled on some frequency to continue historical records as appropriate or to document episodic or other (e.g. treated wastewater discharges) surface water flows into or out of the Upper River area.

*Well and Aquifer Characteristics* - Recently constructed wells, in both the Alluvium and Saugus Formation, have been tested, in some cases with the benefit of nearby monitoring wells, to determine well yields and aquifer hydraulic properties (e.g. transmissivity and storage coefficient). In limited cases, production logging and depth-specific water quality sampling has been undertaken to examine variations in aquifer productivity and quality with depth. Such as there is a need for additional spatial or vertical distribution of well yield or aquifer characteristic data, selected qualified wells will be tested in the Alluvium and Saugus aquifers. In general, all new production wells will be tested to determine the yields of the wells and the hydraulic characteristics of the aquifer materials in which they are completed at various locations in the Upper River area.

*Precipitation* - The locations of historical precipitation gaging will be verified and the quality of the

gaging stations will be assessed. Continuation of historical gaging will be a primary goal, with additions as appropriate to assess inflow of water within the Upper River area as well as distribution of precipitation throughout the area.

**DATABASE MANAGEMENT**

*Geographic Information System - There* is a good start on a regional GIS from the US Geological Survey's Regional Aquifer Study. For instance, roads, streams and other basic geographic features are in the USGS GIS that has been maintained and expanded by United Water Conservation District. United has commercial digital air photo coverage of Ventura County that includes a small portion of western Los Angeles County; additional digital imagery will be sought from agencies in Los Angeles County.

Most of the wells in the Valencia/Santa Clarita area are also in a USGS GIS coverage that includes well construction information. The wells are identified by owners designations as well as state well number. By using the state well number in identifying all monitoring data, information from the databases can be linked directly to the GIS well coverage.

*Water Level Database* - Monitoring data will be collected together in common databases, using an easily accessible program such as Microsoft Access. Groundwater level information is presently in a variety of forms, including paper copy, spreadsheet files, and agency databases. The digital information will be incorporated into a master database, but the data on paper copies will have to be entered into a computer. This will be accomplished by prioritizing the order in which this information is entered. Historic groundwater level data will be obtained from as many wells as possible, public and private, to ensure meaningful area coverage.

*Water Quality Database* - Water quality information may be a larger chore to organize in a database than water levels because each water sample collected is commonly analyzed for a large number of constituents. For water quality data collected in the future, analytical labs can provide results in digital form for ease of integration into a database. Historical water quality information is available digitally from the California Department of Health Services for public water supply wells (data is available for about the past ten years). For the rest of the historical water quality data, prioritizing the order of manual data entry would be necessary. Constituents of concern are obviously the first to be entered. Whether to enter all historical data will need to be addressed; this information is valuable in identifying long-term trends, but data entry takes time. United Water now has all historic water quality data for seven basins in Ventura County in a database, but it took several years to do this.

Water quality data from surface sources such as streams will also be included in the main water quality database. A location identifier can be used to tie the sample to the monitoring location in a GIS coverage. The approximate flow of the surface water source at the time of measurement should accompany each water quality data entry.

*Pumpage Database* - Pumpage data from individual wells is key to assessing both water level and water quality trends. This information is also required to construct a groundwater model. Some of this information has already been entered in computer files and can be readily imported into a database. Other information will likely have to be obtained on a cooperative basis. If pumpers do not have their own metered pumping records, pumpage will be estimated from other sources such as utility bills. For wells where no records have been kept, probable pumping quantities can be estimated through land use records and, in the case of irrigated agriculture, from irrigation methods and practices. This calculated information should not be entered directly in the pumpage database.

*Streamflow Database* - There should be a database of streamflow measured at various monitoring points. For USGS gauges, much of this information is already in digital form. Other agencies, such as County Flood Control, may also have digital data.

## GROUNDWATER FLOW MODELING

As part of the technical analysis of water supply alternatives to meet projected water demands of the proposed Newhall Ranch project in the Upper River area, a numerical groundwater flow model was prepared for that project's proponent. That model was developed to focus on the feasibility and impacts of a potential storage and recovery project in the Saugus Formation, including the impacts of injection and recovery pumping in the Saugus on the overlying Alluvium, and the resultant impacts on Santa Clara River flows out of the Upper River area. The current model is calibrated for a steady state condition, including the addition of some focused injection and pumping. As a result, it represents a useful initial modeling effort of the overall aquifer system in the Upper River area. Depending on its availability for other uses in the Upper River area, that initial model will be subjected to transient calibration efforts and additional calibration of the Alluvial aquifer. The model will then become an evolving tool for analysis of ongoing groundwater development and recharge, in conjunction with imported surface water, and the resultant impacts on groundwater conditions in the Upper River area, as well as on surface outflows to the downstream basins on the Santa Clara River.

## OPERATIONAL YIELD OF THE BASIN

A primary objective of the monitoring efforts, database management efforts, and modeling efforts described above is to assess groundwater basin conditions in the Upper River area in the context of the long term sustainability of the Alluvium aquifer and the generally underlying Saugus Formation, and to operate the basin such that the operating yield is not exceeded over a multi-year wet/dry cycle. This operational yield includes flexibility of groundwater use by allowing increased groundwater use during dry periods and increased recharge (direct or in-lieu) with supplemental water when it is

available. The operational yield protects the aquifer by assuring that groundwater supplies are adequately replenished from one wet/dry cycle to the next. Historical groundwater data demonstrates that the Alluvium has been, and continues to be developed within its long-term sustainability (i.e. no chronic lowering of water levels, no notable trend toward degradation of groundwater quality, etc.). Limited historical data in the Saugus Formation shows no lowering of water levels or degradation of water quality where it has been developed.

While current planning places future pumping of the Alluvium in the same range as has historically occurred for several decades, with anticipated similar results in terms of Alluvial water levels, storage, and quality, the model described above will be a useful tool to quantify the impacts in water budget terms and to analyze a range of scenarios as appropriate to optimize the use of the high-yielding Alluvium. The Saugus Formation is alternately being considered for short-term dry-period water supply at capacities higher than have historically been pumped from that formation, and for injection, storage and recovery of water as part of the overall water supply of the Upper Santa Clara River area. The model will also be used to determine the operational yield of the Saugus under a wide-ranging set of low to high pumping capacities (during wet to dry years, respectively), and with varying aquifer storage (recharge), to avoid undesirable impacts and assure that the operating yield is not exceeded over a multi-year wet/dry cycle.

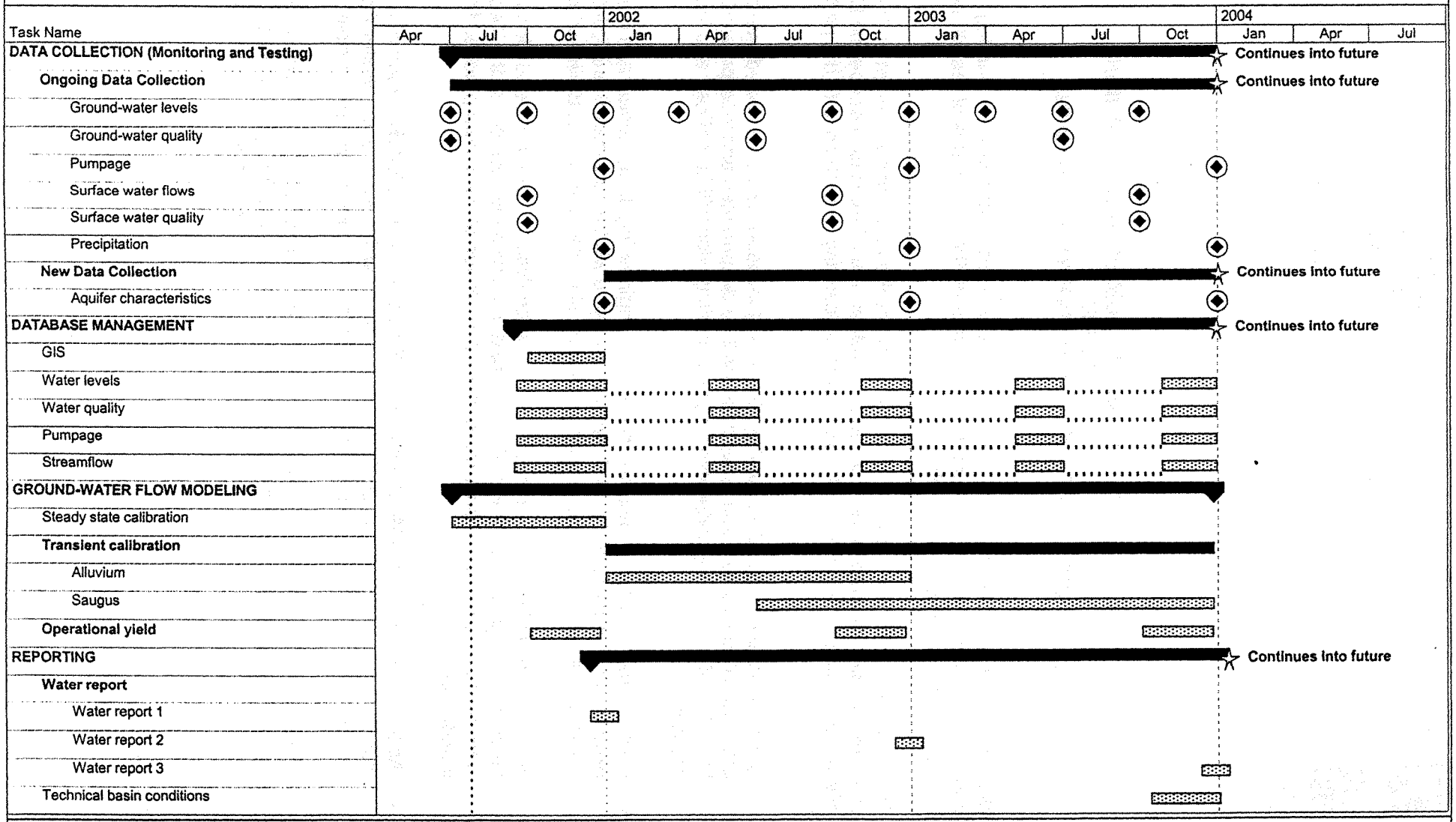
**REPORTING**

Beginning in 1998, an annual report on water supply conditions in the Upper Santa Clara River area has been prepared by the water purveyors in the Upper River area. Those reports have focused on a planning-level discussion of current and immediate future water demands, and the availability of local Groundwater and imported surface water to meet those demands. The overall primary objectives of the reports have been to provide some documentation, to local and County planners as

well as County Supervisors, on the water supply conditions in the Santa Clarita Valley and to present a general assessment of the status of groundwater conditions in both the Alluvial and Saugus aquifer systems, with a focus of that assessment on historical and recent groundwater development within operating yield parameters.

As the water resource monitoring program described above is implemented and evolves, it is planned that reporting on groundwater basin conditions will evolve in two generally parallel ways: 1) a continuation of the annual reporting on current water supply conditions, as a basis for current planning and consideration of development proposals; and 2) the addition of less frequent, more technically oriented reports on the geologic and hydrologic aspects of the groundwater resources of the Upper River area, including documentation of: a) groundwater basin conditions, b) development and application of modeling efforts to assess operational yield and the impacts of long-term planned utilization of local groundwater as part of the overall water supply, and c) assessment of actual versus predicted impacts on groundwater and surface water, including basin outflows, combined with ongoing updated assessments of the adequacy of local groundwater management actions and identification of any needed changes which are identified over time. As needed, the resource monitoring program and technical reports will be coordinated with interested regulatory agencies such as the Regional Water Quality Control Board, the California Department of Health Services and the California Department of Toxics and Substance Control.

# Exhibit 2
# WATER RESOURCE MONITORING PROGRAM
# UPPER SANTA CLARA RIVER AREA

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NCWD

**NEWHALL COUNTY WATER DISTRICT**
23780 North Pine Street • P.O. Box 220970 • Santa Clarita, CA 91322-0970
(661) 259-3610 Phone • (661) 259-9673 Fax • email: mail@ncwd.org

**Directors:** RANDALL D. PFIESTER, *President* VALERIE THOMAS, *Vice President* BARBARA DORE LYNNE A. PLAMBECK DICK A. UNGER

**ATTACHMENT TO MEMORANDUM OF UNDERSTANDING**
**BETWEEN**
**UPPER BASIN WATER PURVEYORS AND UWCD**

NEWHALL COUNTY WATER DISTRICT strongly supports a cooperative working relationship and establishment of a joint monitoring program among the signatories of the attached Memorandum of Understanding (MOU).

This attachment shall not be construed to alter either the terms of agreement or the proposed activities that are the substance of the MOU. Rather, the intent is to describe the District's interpretation of the document and to convey their resulting expectations to the parties to the MOU.

- Subcommittee membership, meeting times, and locations will be finalized within six months. Subcommittee structure and organization will be documented and incorporated into the MOU by reference. Opportunities for public participation will be defined and included in the process.

- Cost estimates, activity plans and schedules, engineering data, models and modeling results, actual expenditures, and reports generated will be considered public information and made available under the terms and conditions of current law and established policies.

- Neutral technical expertise to ensure objective analyses and recommendations will be provided through inclusion of a USGS "expert" as a working member of the Technical Committee. Conclusions, proposals, and extrapolation of data must proceed from a credible foundation.

- As the provisions of the MOU are fulfilled, the parties will undertake regional water planning efforts to protect and enhance the water resources within the region. Water Code Sections 10750 through 10795 describe activities that may be included, where feasible.

- The Upper Basin Water Purveyors recognize the importance of the alluvial aquifer as a source of water supply for the residents of the Santa Clarita Valley, and will cooperatively encourage replenishment projects, particularly in the eastern reaches of the Santa Clara River.

August 16, 2001

ENDORSED JUL 31 2000

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FILED
KERN COUNTY
AUG - 3 2000
TERRY McNALLY, CLERK
BY_____DEPUTY

SUPERIOR COURT OF CALIFORNIA, COUNTY OF KERN

| | |
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| UNITED WATER CONSERVATION DISTRICT,<br>Petitioner,<br>vs.<br>COUNTY OF LOS ANGELES, et al.,<br>Respondents,<br>THE NEWHALL LAND AND FARMING COMPANY, et al.,<br>Real Parties in Interest,<br>AND RELATED CASES. | Kern Case No. 239324-RDR<br>(Consolidated w/ 239325, 239326 and 239327-RDR)<br><br>**[~~PETITIONERS' PROPOSED~~]**<br>**STATEMENT OF DECISION**<br><br>Date: March 2 and 3, 2000<br>Time: 8:30 a.m.<br>Dept.: 6<br>Judge: Roger D. Randall |

The above-entitled consolidated actions were heard on March 2 and 3, 2000, by the Honorable Roger D. Randall in Department 6 of the Kern County Superior Court. Petitioners County of Ventura, Ventura County Flood Control District, Ventura County Air Pollution Control District, the City of Oxnard, City of San Buenaventura, City of Santa Paula, Fox Canyon Groundwater Management Agency and United Water Conservation District ("the Ventura County petitioners") appeared by and through their counsel, Dennis L. Slivinski and Antonette Benita Cordero, Assistant County Counsel for the County of Ventura. Petitioners and plaintiffs Sierra Club, Friends of the Santa Clara River and Santa Clarita Organization for Planning the Environment ("the Sierra Club

petitioners") appeared by and through their counsel John T. Buse of the Environmental Defense Center, and Jan Chatten-Brown and Douglas P. Carstens of Chatten-Brown and Associates. Petitioners and plaintiffs Maria Vega, LaVerne Drew, Luis Serrano and Silvestre Silva ("the Vega petitioners") appeared by and through their counsel, David Pallack of the San Fernando Valley Neighborhood Legal Services, and Michael Rawson of the California Affordable Housing Law Project. Respondents and defendants, County of Los Angeles and the Board of Supervisors of the County of Los Angeles ("Respondents"), appeared by and through their counsel, Peter J. Gutierrez, Senior Deputy County Counsel for the County of Los Angeles, and Charles J. Moore of Cox, Castle & Nicholson. Real parties in interest, The Newhall Land and Farming Company, Valencia Corporation, The Newhall Ranch Company, and Newhall Management Limited Partnership (collectively, "Newhall") appeared by and through their counsel, Mark J. Dillon and Thomas Deak of Gatzke, Dillon & Ballance. Amicus Curiae the People of the State of California appeared by and through their counsel, Brian Hembacher and Sarah E. Morrison, Deputy Attorneys General for the State of California, in support of petitioners and plaintiffs. Amicus Curiae the Castaic Lake Water Agency ("CLWA") submitted a brief in support of the Respondents, but did not appear at the hearing.

The Court has accepted into evidence the Newhall Ranch Administrative Record, consisting of Volumes 1 through 67 (Bates pages 000001 through 063177), a separate Index Volume, a graphics binder (Volume 68) as well as oversized graphics (Bates pages 200003 through 200131), and Supplemental Administrative Record Volumes 1 through 4 (Bates pages 001 through 2503).

In these consolidated actions, the petitioners and plaintiffs challenge Respondents' approval of the Newhall Ranch Project, which would include up to 22,038 dwelling units and a 6.9 million gallons per day water reclamation plant. Specifically, the Project includes General Plan Amendment 94-087-(5), Santa Clarita Areawide Plan Amendment 94-087-(5), the Newhall Ranch Specific Plan, Zone Change 94-087-(5), Conditional Use Permit 94-087-(5), and Vesting Tentative Parcel Map No. 24500-(5).

Petitioners' challenges are brought under the California Environmental Quality Act ("CEQA")[1/], the Subdivision Map Act[2/] and the Planning and Zoning Law.[3/]

The Court has received, read, and considered the memoranda of points and authorities submitted by the various parties to the above-entitled consolidated actions and the two amicus briefs, as well as the oral arguments of all counsel. It has also received and, to the extent appropriate, reviewed the Administrative Record in this case. Being thus informed concerning the issues, the Court has arrived at the conclusions set forth in this Statement of Decision.[4/] We begin with a discussion of the Subdivision Map Act which concerns a non-CEQA issue.

## THE SUBDIVISION MAP ACT ISSUE

In 1851 the State Legislature created the County of Los Angeles and established its boundaries. At that time the three lots that are impacted by the subdivision in question in the instant case already existed, and were bisected by the western-most county line of Los Angeles County. Thereafter, in 1872, Ventura County was created, and from that point forward has shared the bisecting county line with Los Angeles County. Consequently, the westerly portions of the three lots impacted by the subdivision are located in the eastern portion of Ventura County.

It is the view of Ventura County that the effect of the approval by the Los Angeles County Board of Supervisors of the Vesting Tentative Parcel Map was to cause the three original lots to be subdivided into 33 smaller lots, 30 of which are in Los Angeles County (those on which the Project is scheduled to take place) and three of which are in Ventura County. Ventura County argues that the Los Angeles Board of Supervisors' action ". . . severed the portions of the lots in Ventura County from the portions in Los Angeles

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[1/] Public Resources Code sections 21000 et seq.

[2/] Government Code sections 66410 et seq.

[3/] Government Code sections 65000 et seq.

[4/] Where in the course of the ruling several parties have argued the same point, the ruling does not always acknowledge all the arguments advanced on that point. However, the ruling is informed by all of the arguments which were advanced concerning a given issue being urged by counsel.

County, creating three new lots entirely within Ventura County." Since the purpose of the subdivision was the sale, lease or financing of the lots, then it is Ventura County's view that the lots they style as the three new lots within Ventura County are part and parcel of the subdivision and, consequently, should have triggered a joint application to the Boards of Supervisors of both Ventura and Los Angeles Counties for subdivision approval.

Both Los Angeles County and Ventura County agree that neither county may approve a subdivision beyond its borders; however, Respondents contend that there was no subdivision in Ventura County because the three original lots were divided more than 100 years ago when the border between Los Angeles County and Ventura County was established; and also, should that not be so, the portions of the three original lots that are in Ventura County are either remainders or excluded portions of the property, not subject to the Subdivision Map Act.

A. **The Standard of Review**

Having agreed to disagree, Los Angeles and Ventura cannot agree on the standard of review to be utilized by this Court in examining the issue before it. Ventura contends that, since this Court is dealing with an issue of statutory interpretation, the Court must use its independent judgment in this case of first impression in determining whether Respondents violated the law by approving the tentative map without requiring a joint application by Newhall Ranch to the County of Ventura. Ventura County relies on *City of Lafayette v. East Bay Mun. Utility Dist.* (1993) 16 Cal.App.4th 1005, 1013, for this proposition.

Respondents contend that the standard to be utilized is the substantial evidence test in determining whether Los Angeles County's approval of VTPM 24500 complies fully with the Subdivision Map Act. They rely on the case of *Pescosolido v. Smith* (1983) 142 Cal.App.3d 964, 967. We shall conclude that Ventura is correct and that the standard of review with regard to the Subdivision Map Act question is that of an independent review and the exercise of the independent judgment of the trial judge.

In the *Pescosolido* case, the trial judge concluded:

> (3) Petitioners' right to dispose of their property is a fundamental right protected by state and federal constitutional provisions; accordingly, this Court must apply the independent judgment test in reviewing the record of the proceedings before the administrative bodies involved.

(*Pescosolido v. Smith, supra,* 142 Cal.App.3d at p. 967.)

The court had before it a case in which the senior Pescosolidos wished to divide their property between several children and to retain a single parcel for themselves. The parents owned a 37.60-acre lot and wanted to give the parcels to the children, not with the intent that the parcels be sold, but to allow the children to use the land they received to help finance their college educations. The Tulare County Planning Department denied the Pescosolidos' application for certificates of compliance as to the six portions of land they had deeded to their children and ultimately their applications for certificates of compliance were denied with the finding that the lots created by the six deeds to the children were in violation of Tulare County Ordinances governing the subdivision of land.

On the record before it, the Court of Appeal concluded:

> [W]e are not dealing with an absolute prohibition against the right to alienate property or the right to make *inter vivos* or testamentary gifts to one's children which very well could involve a fundamental and vested right. It is more accurate to ask whether a county's refusal to permit owners of land to divide it into discrete parcels without seeking local governmental approval substantially affects or involves the right to make gifts of that land.

(*Pescosolido v. Smith, supra,* 142 Cal.App.3d at p. 969.)

The court thus concluded:

> The elder Pescosolidos' desire to provide their children with a gift of maximum monetary value was certainly an understandable and admirable expression of familial devotion, but the specific objective of maximization of market worth does not outweigh the interest of the public in land development regulation and is not important enough to require full and independent review by the courts. It was therefore error for the trial court to apply its independent judgment and reweigh and evaluate the evidence before the Board.

(*Pescosolido v. Smith, supra,* 142 Cal.App.3d at p. 970.)

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The appellate court did not cite to authority for its conclusion that the independent judgment test should not apply in a case where the issue before the court did not raise a fundamental question of statutory or constitutional right. However, utilizing that analysis, we now turn to the question before this Court.

Both Ventura and Los Angeles cite to numerous authorities emphasizing the significance of the Subdivision Map Act and the importance of complying with its terms. We do not here deal with a question of the manner in which a private property owner undertakes to convey portions of their real estate, but rather we deal with a fundamental question of the power of one political subdivision to impact the operation of another co-equal political subdivision. Under these circumstances, the utilization of the independent judgment test constitutes the appropriate standard.

**B. <u>Analysis of the Problem</u>**

The Los Angeles County Board of Supervisors adopted a finding that:

> [B]ased on a review of the vesting tentative parcel map, as well as substantial evidence in both the Final EIR and the administrative record, the applicant's vesting tentative parcel map does not include any land situated within Ventura County and, on that basis, Ventura County has no jurisdiction over the parcel map under the Subdivision Map Act because no "subdivision" of land is proposed in Ventura County. . . . In addition, the Board finds that, based on substantial evidence in the record, the vesting tentative parcel map is consistent with the State Subdivision Map Act . . . .

(A.R. 6435-6436, ¶ 25.)

In support of the finding of the Los Angeles County Board of Supervisors, Respondents argue:

> In forming the two counties and describing each as a "legal subdivision of the state," the Legislature divided the so-called "transcounty" lots along the counties' common boundary line as a matter of law.

They cite no authority for this proposition. On the other hand, petitioner relies upon an opinion of the Attorney General (61 Ops.Cal.Atty.Gen. 299, 301, (1978)) addressing an analogous situation to that which we find currently, and the Court finds the reasoning of that opinion persuasive.

In the referenced opinion the Attorney General concluded that commonly owned units of land could be developed as a single subdivision project even though separated by a fee simple strip of land owned by another (in that case a federal governmental unit) and concluded, therefore, that the units could be considered contiguous under Government Code section 66424. That code section provides, inter alia, that property shall be considered as contiguous units, even if it is separated by roads, streets, utility easements or railroad rights of way. Consequently, we conclude that the portions of the three lots in question that are situated in Ventura County have not been severed by law from the portions of the lots situated in Los Angeles County.

The question then remains whether the portions of the three lots that are in Ventura County must be included within the subdivision. If so, Ventura County must be included in the process of adopting the map.

Respondents argue that even if VTPM 24500 divides property situated partially in Ventura County, nevertheless the Map Act authorizes Newhall to entirely omit that portion of the property that lies in that County because Government Code section 66424.6, subdivision (a), provides that:

> When a subdivision, as defined in Section 66424, is of a portion of any unit or units of improved or unimproved land, the subdivider . . . may omit entirely that portion of any unit of improved or unimproved land which is not divided for the purpose of sale, lease, or financing.

Petitioner points out that the Vesting Tentative Parcel Map did not designate any remainders. Consequently, no remainder could have been created pursuant to the provisions of Government Code section 66424.6, subdivision (a). However, a reading of the statute appears to indicate that, while certain activity must be undertaken to designate a remainder, it is possible to omit a portion of a parcel of land that is not scheduled for development while creating a subdivision on another portion of the land, and this, Respondents argue, is what has been done here. Nevertheless, petitioner asserts that parties cannot subdivide a portion of their property, then omit or treat as a remainder the rest of that property if their intent is to sell, lease, or finance the so-called remainder.

Ventura County relies on an Attorney General's opinion found at 77 Ops.Cal.Atty.Gen. 185 (1994), which concluded that under the provisions of the Subdivision Map Act a remainder cannot be designated when a developer subdivides portions of the parcel for the first phase of a housing development while intending later to subdivide the undeveloped portions for subsequent phases of development.

Respondents contend that the record demonstrates Newhall Ranch has no intention to shift from agricultural pursuits on the Ventura property and to develop the land in Ventura County. Ventura County, however, is able to demonstrate that Newhall Ranch has clearly shown its intent to develop all of its land, including the land in Ventura County, in the future. For example, the Ventura County land has been allowed to lapse from Williamson Act protection (Gov. Code, § 51200 et seq.); and the Administrative Record is replete with statements by Newhall Ranch that it is now in the business of real estate development. Given that this is so, argues Ventura County, there can be no omitted portion of the property in question when it is intended that all of the property will ultimately be developed. In this regard, Ventura County is wrong.

In *Pescosolido v. Smith, supra,* 142 Cal.App.3d, the appellate court concluded:

> [T]he grants to the children of specific parcels were not invalid so long as they used the property for agricultural purposes. The restriction imposed was a prohibition against division in distinct parcels for the purpose of present or future sale or development. The prohibition is against transfer in discrete units for subdivision development without complying with the Subdivision Map Act.

(*Id.* at p. 969.)

While it is no doubt accurate to say that Newhall Ranch is presently in the primary business of creating "value from land by meeting the needs of a growing population" (A.R. 13631), the record does not demonstrate that the portion of the three lots situated in Ventura County is being severed from the 30 subdivided lots in Los Angeles County for the purpose of sale, lease, or financing. The record demonstrates that the property in Ventura County is still being used for agricultural purposes and is devoid of any indication that that property is being omitted for the purpose of allowing a second, third, or

fourth phase of development of the Project now in planning in the future. Consequently, there was no need for Newhall Ranch to apply to Ventura County for subdivision map approval.

**IS THE SPECIFIC PLAN CONSISTENT WITH THE FUNDAMENTAL POLICIES OF THE LOS ANGELES COUNTY GENERAL PLAN (HOUSING)?**

The Vega petitioners contend the Newhall Ranch Project is void because the Specific Plan is inconsistent with the fundamental policies of the Los Angeles County General Plan. They assert that the Specific Plan is inconsistent with certain of the county's housing element goals and also with general policies found in the background report of the General Plan.

Petitioners point out that of the various elements of a General Plan required by the Government Code, the housing element is of "preeminent importance." (*Committee for Responsible Planning v. City of Indian Wells* (1989) 209 Cal.App.3d 1005, 1013). They also point out that the Southern California Association of Governments ("SCAG") has determined Los Angeles County's share of future regional needs for housing. That determination was incorporated in the County's assessment of housing needs in its housing element, reflecting a total need for 34,039 units comprising very low income, low income, moderate income, and high income (to say nothing of a need for 54,613 very low income and low income households to achieve affordable housing because they are currently overpaying for housing). To meet those needs, the housing element established as its first goal:

> [A] sufficient quantity of dwelling units to meet the housing needs of the population, particularly those lower-income households and other special needs groups such as elderly and the homeless.

Petitioners contend that the Specific Plan will create a greater need for low-cost housing than the plan will accommodate and that the Specific Plan's consistency analysis regarding Goal One ignores that shortfall.

Respondents argue that the Los Angeles County General Plan is not intended to mandate a precise quid pro quo of housing units to jobs or housing units to population in a given development. The introduction to the General Plan contains the following language:

> The *General Plan* provides general policy direction for the future of the County; it is not a detailed blueprint for action. . . The Plan is the tool to guide decision-making related to overall land use direction and development in the County . . . At the time specific decisions are made . . . the appropriate decision-making authority must interpret and weigh various Plan policies based on the best information available at the time. Thus, the *General Plan* neither promises nor guarantees the achievement of a particular goal nor strict adherence to any single policy statement.

(A.R. 7121.)

Petitioners also allege that Goal Three of the housing element has not been met: "A housing supply that ranges broadly enough in price and rent to enable <u>all</u> households, regardless of income, to secure adequate, affordable housing." They argue that the plan is inconsistent with the goal because, while it creates affordable housing, the need based upon jobs and the like created in the area is greater than the need accommodated. Respondents reply that their plan supplies 2,200 dwelling units qualifying as very low, low, or moderate income housing, and reiterate that they are not required by any policy or plan to supply 100 percent of the affordable housing needs existing in an approved project area.

The Vega petitioners also raise the question whether Goal Four has been adequately met:

> Adequate housing, accessible to employment and community services for all persons, regardless of race, ethnic background, sex, age, marital status, <u>income</u>, or disability.

Petitioners contend that the plan is inconsistent with that goal:

> [B]ecause the plan fails to provide sufficient housing to meet the additional need for housing affordable to very low and low income households generated by the low wage employment opportunities that will be created.

///

/ / /

The Court is satisfied that substantial evidence supports the finding of the Respondent Board of Supervisors that the Specific Plan was consistent with the housing elements of the General Plan:

> Once a general plan is in place, it is the province of elected city officials to examine the specifics of a proposed project to determine whether it would be "in harmony" with the policies stated in the plan. [Citation.] It is, emphatically, *not* the role of the courts to micromanage these development decisions. Our function is simply to decide whether the city officials considered the applicable policies and the extent to which the proposed project conforms with those policies, whether the city officials made appropriate findings on this issue, and whether those findings are supported by substantial evidence. [Citations.]

(*Sequoyah Hills Homeowners Assn. v. City of Oakland* (1993) 23 Cal.App.4th 704, 719.)

The Vega petitioners further allege that the Newhall Ranch approvals should be enjoined because the Respondents failed to update the housing element of the General Plan to address the substantial additional need for affordable housing the Project would create. They pointed out that the law requires revision of the General Plan as frequently "as appropriate, but not less than every five years . . . ." (Gov. Code, § 65588, subd. (b).) While conceding that the statute does not define "as appropriate," petitioners argue that the Project in question is of such a magnitude that its implementation must necessarily trigger such a review. In the instant case, the Court does not find a basis for concluding that it was an abuse of discretion for the Board of Supervisors of Los Angeles County to conclude no revision was required by the implementation of this Project.

Petitioners contend that the EIR improperly concludes that the Specific Plan will have no significant impact on regional or local population, housing and employment. They argue that the EIR reaches its conclusion by relying on the consistency of the increases in population, housing and employment projected by the Project with the SCAG Planning Forecast. In this regard the EIR has four flaws, the first being that there is no evidence in the record to support the conclusion that consistency with planning forecasts means that the Project will have no significant impact on the environment. They base this argument on the theory that if an EIR was prepared at the time of the development of the SCAG forecast, and if that EIR is being relied upon, it must be set forth and analyzed in

the development of the current EIR. Respondents, however, argue correctly that they are relying upon the SCAG projections themselves and not upon the underlying EIR. Both sides cite to CEQA Guidelines section 15150, and related Guidelines. It is apparent that the manner in which the SCAG forecast was utilized in the current EIR is consistent with those Guidelines.

The Vega petitioners next argue that the EIR used the wrong legal standard to evaluate Project impacts. In the EIR, Respondents state that:

> According to Appendix G of the State CEQA Guidelines, as amended, a project is considered to have a significant effect on the environment if it will induce substantial growth or concentration of population, and cumulatively exceed official regional or local population forecasts.

(A.R. 5036.) Petitioners correctly point out that Respondents have mischaracterized Appendix G in that the appendix lists a number of items that will normally have a significant effect on the environment, one of which is "conflict with adopted environmental plans and goals of the community where it is located . . . ." That listing is not conjunctive, but rather is disjunctive with other items on the list. Consequently, petitioners conclude that Respondents have simply relied upon their misreading of Appendix G to allow them to conclude there are no significant or environmental effects based upon the increased population, housing and employment to be generated by the Project in question.

Respondents conceded the error in their reply to Ventura County's comment during the comment period but now argue that CEQA does not require the precise application of the Appendix G significant thresholds but rather allows agencies to format their own versions. They point out that in the case of the County of Los Angeles, the County has adopted an environmental checklist tailored to the needs of Los Angeles County, which tailoring is authorized by CEQA Guidelines section 15063, subdivision (f). Respondents also argue that their analysis of the utilization of various adopted environmental plans and goals demonstrates proper compliance with CEQA. The Court concurs.

Petitioners argue that the EIR fails to analyze the impact of its excessive employment projections, pointing out that Respondents admit their employment projections exceed SCAG's estimate but argue that the increase will not be significant because upon completion of the Project the jobs/housing ratio in the Santa Clarita Valley will be the same as SCAG's target ratio. Petitioners assert that statement, however, does not take into account the fact that there will be many years when the jobs and housing ratio in the interim is not balanced and also does not consider the cost of housing in relation to available jobs. They cite to no authority for the proposition that the EIR must analyze a jobs/-housing imbalance in order to comply with CEQA. Absent such a requirement in the form of a statute or guideline, this Court cannot impose such a requirement upon the proponent of an EIR.

The Vega petitioners contend that Respondents were presented with a fair argument that a lack of affordable housing would impact the environment by causing undue commuting and traffic congestion as low-income employees attempted to reach jobs in the Project. The Respondent Board of Supervisors concluded there were affordable housing opportunities within the suburbs for low-wage jobs being created there:

> Los Angeles County believes that the Newhall Ranch Specific Plan provides both the wage and housing mix necessary to discourage low-wage workers from commuting. As discussed in **Topical Response 10** - Provision of Affordable Housing on the Specific Plan Site, lower-wage earners in the average or higher wage categories would be able to afford estimated rents within Newhall Ranch without sharing a unit. Persons earning the lowest wage reported would also be able to afford a Newhall Ranch rental unit if they shared the unit with another person. Some people with the lowest, or no wages, could be accommodated in Second Units, or granny flats.
>
> In addition, higher density multi-family units are located close to commercial and employment centers and transportation routes. This design reduces the potential for a "commuting class of low-wage earners."

(A.R. 16927.)

After examining the record created with regard to analysis of the availability of affordable housing within the Project, this Court (while it might question the

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practicality of the granny flat solution) cannot conclude that there is no substantial evidence supporting the finding just quoted.

The Vega petitioners also argue that the EIR fails to identify all significant effects of the increase in population, employment and housing. Respondents point to the analysis found at Administrative Record pages 5025 through 5058 which deals with the increases in population, housing and employment anticipated as a result of approval of the Specific Plan. Substantial evidence contained within the Administrative Record justified the conclusion of the Board of Supervisors that the Specific Plan adequately analyzed transportation, population and employment impacts. While petitioners point to the alleged paucity of Respondents' solutions for the affordable housing/employment/population increase aspect of the plan, they ignore the fact that the plan does introduce a substantial number of low-income housing units into the mix. As Respondents repeatedly assert, the EIR need not purport to solve all of the housing problems facing Los Angeles County, but rather must analyze the effect of the Project itself on the portion of the County which will be directly impacted by the planned Project.

**DOES THE EIR ADEQUATELY ANALYZE AND MITIGATE THE SPECIFIC PLAN'S BIOLOGICAL IMPACTS?**

Sierra Club petitioners allege that the EIR improperly defers the analysis and mitigation of the Project's biological impacts. They point out that the EIR concludes the Specific Plan would "substantially diminish habitat for wildlife and plants" and "significantly impact sensitive wildlife species, significantly impact the ability of animals to move across portions of the site, and significantly impact several sensitive upland habitat types." That being the case, they argue that the EIR lacks specificity in its treatment of biological resources and, in essence, defers evaluation of the impact of the Project on fish

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and wildlife until the approval process for Specific Tract Maps, or for section 404[5] permits and section 1603[6] agreements. This deferral:

> [C]onfounds any good faith effort to understand the Project's impacts on wildlife and plants. In general, the Project's potential impacts on number of rare and endangered species are discussed without any connection to where these impacts will occur, when during the Project's 30-year buildup they will occur, and how the anticipated destruction of habitat actually affects the species. Where potentially significant impacts are identified, the reader is directed to a set of boiler plate mitigation measures that bear no clear relation to the particular impacts that they are supposed to address.

As an example of this treatment, petitioners review the EIR's approach to Project impacts on the least Bell's vireo, a state and federally listed endangered songbird. The EIR references mitigation measures 4.6-1 through 4.6-26, 4.6-53, 4.6-56, and 4.6-59, which are designed to reduce the Project's impacts to the vireo to a less than significant level. The Sierra Club petitioners allege that analysis of those measures "describe an extremely general habitat restoration, enhancement, and management program," and otherwise does not demonstrate that the mitigation measures will address the impact on the vireo. A similar analysis can be utilized for most of the additional endangered or threatened biological species identified in the EIR and, therefore, the EIR does not pass muster with regard to its discussion of the impacts on the biological resources in the Project area. "In general, an agency may not defer the formulation of mitigation measures to some future date pending the additional assessment of environmental impacts. Sundstrom v. County of Mendocino (1988) 202 Cal.App.3d 296, 306-307 . . . . The mitigation framework defers not only the small details of 'environmental problem-solving', but also the establishment of the standards and criteria needed to evaluate the adequacy of mitigation."

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[5] Section 404 of the Federal Clean Water Act (33 U.S.C., § 1344 et seq.).

[6] Section 1603 of the California Fish and Game Code.

Respondents contend that:

> [C]ontrary to the impression painted by petitioners, the EIR contains a 155 page analysis of the biological setting of the Specific Plan site, the Project-Specific and cumulative impact of the Specific Plan and the biological mitigation program adopted by the County. . . . As part of the environmental review process, the County prepared 11 technical studies and documents devoted solely to the biological impacts of the Specific Plan, including a detailed biological impact report . . . . In addition, the Specific Plan itself contains a 'Resource Management Plan,' which provides regulations and standards by which biological resources within the Specific Plan area will be managed. . . . In approving this Specific Plan, the County also adopted a Mitigation Monitoring Plan, which includes no less than 98 enforceable measures for the mitigation of the Specific Plan's biological impacts . . . .

The Court has reviewed the Resource Management Plan and the Mitigation Monitoring Plan referenced by Respondents. It agrees with amicus counsel from the Attorney General's Office that mitigation measures that require compliance with environmental regulations are proper only where the public agency had "meaningful information" that justified an expectation of compliance, and also that the CEQA Guidelines in essence allow such mitigation measures so long as they "may specify performance standards which would mitigate the significant effect of the project and which may be accomplished in more than one specified way." (14 Cal. Code Regs., tit. 14, § 15126.4, subd. (a)(1)(B).) It does not agree, however, with the argument of the Sierra Club or amicus counsel that the mitigation measures being challenged herein do not include performance standards which would mitigate impacts on sensitive species and sensitive habitat. The mitigation requirements discussed in the Administrative Record at pages 4453-4471 do include performance standards that can be utilized to hold the Respondents to compliance with the EIR, and that adequately inform the public of the nature of the proposed mitigation designed to reduce the significant impacts on biological resources in the area during the development of the Project.

Sierra Club petitioners have analogized the situation regarding biological impacts analysis in this case to the Project addressed by the Court of Appeal in *Stanislaus Natur Heritage Project v. County of Stanislaus* (1996) 48 Cal.App.4th 182. There a project of

substantial magnitude was contemplated and the County of Stanislaus certified an EIR for a proposed specific plan submitted by the developer involving the creation of an approximately 30,000-acre destination resort and residential community. The project was to be developed in phases over 25 years, and water had only been secured for a portion of the first phase (five years out of the fifteen years contemplated for that phase).

> The County knew neither the source of the water the project would use beyond the first five years, nor what significant environmental effects might be expected when the as yet unknown water source (or sources) is ultimately used.

(*Id.* at p. 195.) The respondent developer and county in the *Stanislaus* case contended that they planned to undertake a site-specific environmental review for each of the four phases of development and that they could properly defer analysis of the environmental impacts of supplying water to the project until they had selected the source of supply in the future. The court said:

> "[T]iering" is not a device for deferring the identification of significant environmental impacts that the adoption of a specific plan can be expected to cause. The County in this case could not make an informed decision on whether to adopt the Diablo Grande Specific Plan without being informed, to some reasonable degree, of the environmental consequences of supplying water to a 5,000-residential-unit development which has no on-site water source.

(*Id.* at p. 199.)

It was this total lack of information that caused the *Stanislaus* court to reject the EIR there being proffered. In contrast, the environmental consequences of the Project to biological resources on site have been explored in the instant case and mitigation measures adopted with performance standards specific enough to demonstrate the feasibility of the mitigation that is proposed.

The Sierra Club petitioners allege that the EIR does not include an adequate discussion of the Project's impacts on tributary streams, pointing out that of approximately 92,500 linear feet of blue line drainage courses affected by Project activity, approximately 52 percent of the stream area in question would be converted to closed drainages. The Sierra Club petitioners allege that, in essence, there was an inadequate

response to remarks of the U.S. Fish and Wildlife Service ("USFWS") comment that the EIR "grossly undervalued" the Specific Plan areas existing on ephemeral drainages.

Respondents disagree as to the significance of that comment, arguing that the USFWS's comment had to do with criticism of the EIR's analysis of the use of the ephemeral drainages as wildlife corridors, rather than a criticism of the analysis of the drainages as such. Respondents allege that they did respond to the USFWS's comment when the comment is put in proper context. They also argue that the petitioners' argument on this ground must fail:

> [B]ecause it presents no tangible issue (i.e., it never contends that the Specific Plan will cause an adverse significant impact on minor streams). Petitioners summarize the Specific Plan's method of altering on-site drainage courses, but never explain how this methodology will cause a significant environmental impact.

In the absence of any indication on the record that the Specific Plan will cause an adverse significant impact on minor streams, the Court finds no basis for granting the relief sought by petitioners based upon this ground.

The Sierra Club next contends that the EIR does not adequately address impacts of biological resources related to flood plan modifications. They point out that, although several individuals and agencies have commented upon the effect of modifications to the river and channels insofar as biological resources were concerned, the only effort to address these concerns was with reference to the County Public Works Department's Sedimentation Manual, and then argument from inference that the minimal change in velocity caused by channelization would not affect aquatic resources.

Respondents argue that if there is no anticipated significant sedimentation or scouring impacts on the Santa Clara River from channelization or hardening of its banks for insertion of the fill in the flood plain "implementation of the Specific Plan is not expected to affect fish movement anywhere along the river." Unfortunately, this reliance upon the quoted language in the EIR does not address the issue posed. The California Department of Fish and Game commented on impacts to the unarmored three-spine

stickleback based upon narrowing of the river channel and increased flow velocities, and there was further comment regarding impact of channelization and restriction of the river bottom on river habitat and dependent species (A.R. 14826). Conversely, there is no substantial evidence to justify the conclusions reached by Respondents that there would be no adverse biological impacts on the river corridor based upon channelization and hardening of the banks. The fact that a lack of significant sedimentation or scouring would equate to an environment which did not affect fish movement along the river begs the question. Consequently, petitioners are entitled to relief with regard to this issue.[7]

**IS THE EIR'S ANALYSIS OF THE WATER RECLAMATION PLANT'S IMPACT ON BIOLOGICAL RESOURCES INADEQUATE?**

In his amicus brief the Attorney General argues that the Water Reclamation Plant ("WRP") as cited in the plan will have significant biological impacts that are not addressed other than in a cursory fashion in the EIR. He also argues that there was an inadequate analysis of alternatives to the WRP.

An analysis of the minimal discussion of the siting of the Water Reclamation Plant in the Specific Plan at the river location demonstrates that there was substantial evidence to justify rejection of the "no WRP" alternative and the alternatives involving siting of the plant upstream of the Project or downstream of the Project, or expansion of the existing WRP in the area. However, the Court concurs with the Attorney General that there is no substantial evidence to justify the finding that siting of the WRP at a non-river location will not mitigate the biological impacts concededly caused by the siting of the plant as proposed immediately adjacent to SEA 23 (Significant Ecological Area), and impacting some acreage, although small, of sensitive habitat (about 10 acres) (A.R. 51011).

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[7] The Sierra Club has argued that the EIR does not adequately address impacts to biological resources that are related to Project-induced changes in groundwater levels. Because that argument deals with the effect of storage of the Castaic Creek flood waters via the ASR alternative, and because of the conclusions the Court reaches in its findings on the water issues, there is no discussion of this issue in this portion of the ruling.

Given the fact that no substantial evidence justifies rejection of the mitigation of the alternative of a non-river site, and the minimal discussion of the biological impacts of siting the WRP on the river, the EIR is deficient in its analysis of the Specific Plan location of the WRP.

**DOES THE EIR ADEQUATELY ANALYZE THE ALTERNATIVES AVAILABLE TO THE PROJECT?**

Sierra Club petitioners allege that there is no substantial evidence supporting the Respondents' rejection of feasible alternatives to the Specific Plan. It then discusses the six alternatives that were presented in the planning documents and, using Alternative Five as an example, argues the inadequacy of the analysis provided. Specifically, it argues that the conclusion that Alternative Five would impede the ability of the developer to earn a reasonable return on his investment "requires specific evidence that cost or profit considerations make an environmentally superior alternative truly impractical." Respondents argue that there was substantial consideration of the alternatives documented in the record with adequate information contained therein to allow an intelligent analysis of the alternatives. The Court has reviewed the Administrative Record with regard to the discussion of the six alternatives and has concluded that the argument that no substantial evidence supports Respondents' rejection of feasible alternatives must be rejected, notwithstanding the failure of the Respondent to adequately document the economic aspect of the implementation of Alternative Five. CEQA Guidelines section 15126.6, subdivision (d), provides:

> The EIR shall include sufficient information about each alternative to allow meaningful evaluation, analysis, and comparison with the proposed project. A matrix displaying the major characteristics and significant environmental effects of each alternative may be used to summarize the comparison. If an alternative would cause one or more significant effects in addition to those that would be caused by the project as proposed, the significant effects of the alternative shall be discussed, but in less detail than the significant effects of the project as proposed.

Whereas in *Citizens of Goleta Valley v. Board of Supervisors* (1988) 197 Cal.App.3d 1167, 1181, the proponent of the project had given an inadequate economic

analysis as to the feasibility of the scaled down project, and had made no other meaningful analysis of negative aspects of the alternative other than those economic reasons, in the instant case a variety of matters were considered and adequately documented to justify the finding that the six alternatives propounded were infeasible.

**IS THE SPECIFIC PLAN CONSISTENT WITH THE FUNDAMENTAL POLICIES OF THE LOS ANGELES COUNTY GENERAL PLAN (NATURAL RESOURCES)?**

Sierra Club petitioners argue that the Newhall Ranch Project is inconsistent with General Plan policies requiring protection of natural resources, especially Significant Ecological Areas ("SEAs"). They point out that:

> In the Land Use Element of its General Plan, Los Angeles County has designated certain areas as special management areas . . . due to the presence of natural and scenic resources or hazards. Significant Ecological Areas, which are ecologically important or fragile land and water areas that are valuable as plant and animal communities, are one type of SMA.

It then argues that, given the intent of the General Plan policy which was designed to preserve the County significant ecological resources in natural condition, the Project in question would adversely affect SEA 23 by authorizing extensive commercial and residential development, as well as three bridges within the confines of that area.

Petitioners contend that, although the Board amended the General Plan to change the boundaries of SEA 23, the action of amending the plan in this regard was contrary to several General Plan policies designed to conserve natural habitats. It points out that more than 103 acres of the most sensitive habitat types are being eliminated from SEA 23 and argues that, although the General Plan Amendment states that the modification of the boundaries of SEA 23 are done to "in part, better reflect the sensitive biological resources present on the site," it is clear that the real rationale for the amendment of the boundary was "made to accommodate the siting of commercial and residential uses rather than merely to reflect the presence of biological resources."

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Respondents contend that sufficient findings were made by the Board to justify the modification of SEA 23, and point out that the addition of acreage with a Special Management Area ("SMA") designation immediately adjacent to the SEA 23 area will result in an increase of approximately 155 acres of protected habitat. Petitioners, however, point out that:

> Here, the Board improperly reduced the size of SEA 23, then created the River Corridor SMA to include portions of SEA 23, and then made findings about the SMA which were not based upon substantial evidence. By doing so, the Board failed to make findings about SEA 23, as it is required to do.

Respondents argue that on a percentage analysis "only 22% of the impacted area of SEA 23 consists of sensitive habitat," and argue that, in essence, better habitat is being substituted in the SMA for poorer quality habitat being deleted in SEA 23 (other than the 103 acres previously referenced). Respondents also argue that any impacts to SEA 23's sensitive habitat are mitigated according to the Specific Plan:

> All of the riparian vegetation and all *oak resources* will be restored in the most suitable areas of the *SMA* as identified and required under the Resource Management Plan or under regulations of the ACOE [Army Corps of Engineers] and State Department of Fish and Game.

This argument, however, begs the question because the fact that all riparian vegetation and all oak resources will be restored somewhere in the SMA does not address the fact that 103 acres of highly sensitive habitat are being deleted from the SMA. Because the Board chose to address its findings within the context of the River Corridor SMA, this Court cannot conclude on the record that substantial evidence supported the findings made by the Board with regard to deletion of highly sensitive habitat from SEA 23.

The Court cannot discern from the record that there is substantial evidence to justify the finding of the Board which was designed to satisfy General Plan Policy 2.22 and the County Zoning Ordinance requirement that in granting a CUP the roads and utilities serving the development be located and designed "so as not to conflict with critical resources, habitat areas, or migratory paths," given the fact that in other portions of the CEQA findings we have the following language:

> Wildlife movement along the Santa Clara River through the Specific Plan area will also be affected by adjacent development and several bridges across the River.

(A.R. 6631.) Consequently, the Court agrees with the Sierra Club's argument that the Newhall Ranch Project is inconsistent with General Plan policies requiring protection of natural resources insofar as SEA 23 is concerned.

Insofar as the Sierra Club petitioners have advanced other arguments concerning the treatment of SEA 23 the Court has reviewed the record and concluded that its arguments are without merit.

With regard to SEA 20, the Court has reviewed the record and the arguments of the parties and concluded that substantial evidence exists to justify the findings that were made by the Board in approving modifications to that SEA.

**DID THE EIR ADEQUATELY ANALYZE THE SPECIFIC PLAN'S EFFECT ON THE SALT CREEK CORRIDOR?**

Petitioners, Ventura County, et al., and United Water Conservation District (hereafter collectively "Ventura County") argue that the EIR did not adequately analyze and identify the Project's impact on the Salt Creek biological corridor in Ventura County. They argue that the Project will create an urban barrier drastically narrowing the movement of wildlife from the Los Padres National Forest north of the Project across the Santa Clara River and into the Santa Susana Mountains south of the Project. They conclude, therefore, that all of the wildlife movement, which now occurs over a 2.1 to 5.1 mile front, will be channeled to the Salt Creek Corridor, which the Los Angeles County Board of Supervisors has characterized as a "critical component of the Open Area system within the Newhall Ranch property . . . ." Petitioners point out that despite this characterization the Board "deferred analysis of the extension of the Salt Creek corridor in Ventura County to 'future action' that may be taken by Ventura County." Petitioners argue that since the Los Angeles County Board found that "the impact of the revised Specific Plan on biological resources would remain individually and cumulatively significant" even

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after mitigation measures, the Board was required to "adopt all feasible measures that would mitigate those impacts." (Relying on CEQA Guidelines, § 15092.)

Respondents point out that in the Final Plan the Los Angeles portion of the Salt Creek corridor was widened considerably. They point to the Administrative Record:

> To understand the role that the Salt Creek corridor plays in animal movement, one must understand that this corridor is but one small part of a larger regional wildlife movement interface that exists between the Los Padres/Angeles National Forest and the Santa Susana Mountains that spans a distance of approximately 35 miles . . . . [T]he Newhall Ranch Specific Plan site is only an approximately 2 to 5 mile-wide portion . . . of this 35-mile wide interface. Clearly, the Salt Creek corridor is just one of many such corridors which exist in this very broad interface area.

(A.R. 488.) They then point to the conclusion in the EIR that:

> [B]ecause the Newhall Ranch Specific Plan does not propose development in the Ventura County portion of the corridor and no other development activity has been proposed there, and because the Specific Plan now incorporates a ½ -mile wide setback from the County line which will allow for animal movement between the River and High Country in Los Angeles County, and because many more connections similar to Salt Creek occur along the 35-mile wide interface area, no significant impact would occur due to the Newhall Ranch Specific Plan which would require mitigation in Ventura County.

(A.R. 493-494.)

The problem is that, since Respondents undertook no study of the portion of the Salt Creek corridor lying in Ventura County to ascertain the effect of the restriction of movement of wildlife for 2.1 to 5.1 miles east of that corridor, there is no substantial evidence to justify the finding reached in the EIR in this regard. Since the EIR concludes that the wildlife movement will be focused toward the west side of the Project down Salt Creek, it is clear that the lack of a study of the Ventura County portion of the Salt Creek corridor leaves a vacuum in the record concerning the impact of that westward shift of wildlife into the Salt Creek corridor.

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**IS THE EIR LEGALLY DEFICIENT BECAUSE IT EMPLOYS A DIFFERENT AND LESS RIGOROUS TRAFFIC IMPACT ANALYSIS IN VENTURA COUNTY THAN IN LOS ANGELES COUNTY?**

Ventura County argues that the FEIR adopted:

> [A]s the standard for a measurable traffic impact a specific plan contribution of more than 1 percent to arterial highways. (4596.) Hence, in Los Angeles County vehicle counts for those locations where the specific plan was found to contribute more than 1 percent to the total traffic volume were examined and feasible mitigation measures proposed. However, the traffic analysis in Ventura County was stopped at Highway 126 . . . and Highway 23 . . . even though the Project traffic still greatly exceeded 1 percent of the total traffic. No Project traffic analysis was done for Ventura County arterial highways exiting SR-126 and SR-23.

Consequently, Ventura County contends that there is not substantial evidence for a finding as to Ventura County's arterial highways that significant traffic impacts identified in that County based on the 1 percent standard were mitigated, as was done in the Los Angeles County area based upon that same standard.

Respondents contend that they did not use a different standard in analyzing traffic impacts in Ventura County but rather used that same standard. However, they fail to demonstrate that is the case. As Ventura County points out, when the FEIR traffic analysis in Ventura County stopped on State Route 126, the Project represented 12.2 percent of the traffic and when it stopped on State Route 23, it represented 35 percent of the traffic.

The plan traffic analysis states:

> In all cases, a Specific Plan contribution of more than 1 percent is considered to be a measurable impact and is used as the impact criterion [for traffic analysis]. Hence, V/Cs [volume/capacity] for those locations where the Specific Plan contributes more that 1 percent to the total volume are examined and, if any of the above impact types are found, then the location is identified as being significantly impacted by the Specific Plan.

There being no evidence available in the Administrative Record to demonstrate that the local roadways exiting on State Routes 126 and 23 in Ventura County would not be

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impacted above 1 percent, there was no basis for the finding that traffic impacts would not be significant on those roads in Ventura County.

Given the Court's finding with regard to the inadequacy of the traffic study contained in the EIR, the argument concerning the traffic impact fee is moot.

**WERE THE AIR POLLUTION MITIGATION MEASURES PROPOSED BY VENTURA COUNTY REJECTED WITHOUT SUBSTANTIAL EVIDENCE?**

Ventura County points out that the Los Angeles County Board of Supervisors found that there would be unavoidable impacts on the air as a result of the Project. Petitioners argue that the Project will thus make it more difficult for Ventura County to attempt to meet State and Federal standards for clean air. Respondents, however, contend that the EIR demonstrates that:

> [O]n most days of the year, the Specific Plan's impact on Ventura County's air quality will be relatively slight. Under prevailing winds, 'Ventura County would receive a minimal impact (on the order of 1%) of the Newhall Ranch Specific Plan's emissions compared with the Santa Clarita Valley and Los Angeles County.' (A.R. 410.)

The Court finds on the totality of the record with regard to the issue of air pollution that substantial evidence supports the finding of the Board in its rejection of the mitigation measures proposed by Ventura County.

**IS THE EIR LEGALLY DEFICIENT BECAUSE IT DOES NOT EVALUATE OR MITIGATE THE REASONABLY PERCEIVABLE IMPACTS OF CONTAMINATED STORM WATER RUNOFF ON WATER QUALITY?**

Petitioner Ventura County argues that the FEIR is legally deficient for failure to evaluate or mitigate the reasonably foreseeable impacts of contaminated storm water runoff on water quality in the Santa Clara River watershed. Pointing to the NPDES's permit which calls for coordination among the City of Santa Clarita, the County of Los Angeles and Ventura County in developing and implementing a future storm water management

plan for the watershed, Ventura County argues that all that has been developed by way of mitigation of potential storm water pollution has been a piecemeal approach to the problem and:

> [A]s a result, the FEIR mitigation measures regarding potentially contaminated storm water runoff are inadequate to mitigate to a level below significance the potential Project storm water impact on the watershed as a whole.

Respondents reply that they have neither piecemealed nor deferred (as the amicus brief of the Attorney General suggests) arguing, inter alia:

> As described in the EIR, the County found these deferral arguments inappropriate given that the Specific Plan contemplates future subdivision maps where, appropriately, on-site drainage systems would be designed and engineered. Specifically, the EIR states that:
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> > 'Because NPDES is a federal law, future subdivisions within the Specific Plan would be subject to all applicable future rules and requirements of the program, which occur over time. It is premature to apply specific BMPS to the Specific Plan at this time because the on-site drainage systems, which dictate the placement, sizes and types of BMPs have not yet been designed and engineered. Also, as development occurs in Newhall Ranch, new and improved BMP technologies are likely to be available as more experience is gained in the NPDES program nationally.'

Substantial evidence appears in the Administrative Record to justify the findings of the Board with regard to the issue of storm water pollution. In this case, given the need to tailor drainage systems to the specific subdivision in development, discussion of the drainage system and its impacts Project-wide were sufficient to allow proper input during the process of developing the EIR.

## DOES THE EIR ADEQUATELY DEAL WITH ISSUES CONCERNING WATER SUPPLY FOR THE PROJECT?

### A. <u>Does the Ruling in the *Stanislaus* Case Mandate Rejection of the Water Supply Approach Utilized in the EIR</u>?

All petitioners, save the Vega petitioners and the Attorney General in his amicus brief, raise similar concerns about the adequacy of the EIR's treatment of water issues.

Each petitioner addressing the water issues, as well as the Attorney General, place substantial reliance on the holding in *Stanislaus Natural Heritage Project v. County of Stanislaus*, *supra*, 48 Cal.App.4th 182. As we have previously discussed, in that case the proponents of the project took the position that, inasmuch as they were dealing with a project to be developed in tiers, it was sufficient to have the county deem the environmental effects of the specific plan to be significant, approve the specific plan, and then at a later time determine what the significant environmental effects of the specific plan were to be as construction approached on each phase of the project. Thus, the proponents set forth the various sources from which they hoped to acquire water for their project, analyzed the water needs for the built-out project, conceded that they had a firm water supply in hand only for the first five years of development, and successfully proposed to the board of supervisors (but not so successfully argued to the Court of Appeal) that adequate mitigation could be achieved by adopting a mitigation measure declaring that development requiring over a certain number of acre-feet per year of water would not be permitted beyond the five year build-out:

> [U]nless the applicant can show to the County's satisfaction that adequate water supplies have been made available, and that environmental impacts of those sources have been studied and mitigated per CEQA requirements.

(*Id.* at p. 195.)

In the instant case Respondents correctly argue that, unlike the proponents in the *Stanislaus* case, they have specifically identified their water sources, have detailed their water needs through build-out, and, they contend, have attempted to address the significant impacts of the utilization of the various water sources upon the environment. Consequently, although the *Stanislaus* analysis must be applied to certain aspects of the mitigation measures adopted in this case, the *Stanislaus* holding does not require the conclusion that the water needs analysis contained in the instant EIR simply constitutes an inappropriate deferral of an analysis of environmental impacts.

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**B. Given That Respondents Have Adequately Identified the Source of the Water Supply Required upon Build-out, Have They Demonstrated That Sufficient Water Will Be Available from Those Sources?**

The revised Specific Plan calls for 17,680 acre-feet a year ("afy") of water (A.R. 767), from which the water needs are to be met by: (1) reclaimed water from the WRP; (2) water from Castaic Creek flood flows; and (3) water from the Valencia Water Company ("VWC"). Valencia Water Company, a subsidiary of real party Newhall, derives its water from groundwater pumping in the area, and from CLWA, which in turn receives its water from the State Water Project ("SWP"). The Project forecasts use of 5,344 afy from the WRP, leaving 12,336 afy to be obtained from flood flows and from Valencia Water Company. In dry years flood flows would not be available, unless they had been stored by injection into either the Alluvial or the Saugus aquifer. We will deal with that issue later. Consequently, in dry years the Project would need 12,336 afy from VWC. At the time of the adoption of the EIR, the CLWA had an entitlement to 54,200 afy of water from SWP each year. The various petitioners and amicus argue, however, that the SWP has never been in a position to deliver more than 50 percent of entitlement to its users, including CLWA. While Respondents contend that is not so, and that the reason that CLWA has never taken more than 50 percent of its entitlement has to do with its lack of need for that entitlement rather than its availability, Ventura County in its reply brief points out that:

> [T]here is nothing in the record regarding CLWA's *requested* deliveries compared to its *actual* deliveries of State water and certainly no evidence to support the suggestion that it can obtain as much of its entitlement as it requests.

Respondents have argued, extra the record, that subsequent to the approval of the EIR that which was projected in the EIR has happened, and CLWA has acquired an additional 41,000 afy. As several petitioners point out, we view the record as it exists at the time the document is adopted and not later. Moreover, as several petitioners have also argued, even assuming acquisition of 41,000 afy by CLWA, only 20,500 afy can be

projected from that source based upon historical records. Thus, of a theoretical entitlement of 95,200 afy available to CLWA, only half that sum would be available in fact based upon the record before us, and of that sum only 35.9 percent would be available to VWC, which means, given the existence of currently pending, approved and recorded projects, and their demands upon VWC, the Project can only meet its water demands if it also utilizes flood flow from Castaic Creek.

In effect, Respondents argue that, assuming all of the above to be correct, they will be able to utilize flood flow from Castaic Creek to augment the SWP water supply because they will obtain their allotted share of the flood flow in wet years from CLWA and will inject the same into the Saugus aquifer. Since the approved Project requires that no additional groundwater be drawn to support the Project, there must be substantial evidence in the record to demonstrate that: (a) the flood flow in wet years will be available to Respondents for use on the Project, and (b) the Respondents' share of that flow can be safely stored by injection into the aquifer and then retrieved without undue environmental damage. Lacking such evidence, the only source available to meet SWP shortfalls will be pumping of groundwater in violation of the terms of the EIR.

Looking first to the resolution of the question whether the Castaic Creek flood waters will be reasonably available to Respondents, the Court agrees with Respondents that an EIR can project modification to agreements in the future. However, the status of the record in this case is such that there is no substantial evidence that modification of the agreement to allow withdrawal of the flood water and storage of Newhall's share of the flood waters is achievable. Assuming, however, that the modification can be done and storage can be achieved and that neither is a sufficient impediment to utilization of flood waters, the more complex problem involves the ability to store the flood waters in the aquifer.

At Administrative Record page 4786 the DEIR recognizes that "the ability of the Saugus Aquifer to receive the treated flows is also a constraint" but states that "Findings indicate that the Saugus Aquifer would be able to accept the treated flows . . . ." There is

nothing in the record that supports a finding that a given volume of water can be stored in the Saugus aquifer. Respondents contend that since this is a "confined" aquifer, its capacity to store additional water is, in essence, unlimited. Indeed, in response to a comment that the Aquifer Storage and Recovery ("ASR") alternative will cause groundwater levels to "drop because of a decrease in the recharge rate," Respondents' response was:

> [T]he proposed use of ASR for Newhall Ranch would involve injecting water into the Saugus Formation, in which groundwater is confined under pressure. As a result of confinement and pressure, the Saugus aquifer is fully saturated and the water-level surface occurs at an elevation that is above the top of the aquifer. Even in dry years, therefore, the Saugus aquifer is "full" of water, but its capacity to store additional water is unaffected. An analogy for a confined aquifer in this situation is a pressurized gas cylinder that accepts increases in pressure by the addition of gas without changing shape or leaking.

(A.R. 789.) As the Court pointed out to Respondents' counsel at oral argument, that statement belies the laws of physics which hold that, while gases can be substantially compressed (indeed, until they achieve liquid form), liquid cannot be compressed, and thus the science of hydraulics is born.

Storage of water in the Saugus aquifer is also affected by the operation of the Alluvial aquifer, which Respondents assume is linked to it. Petitioner Ventura County questions how much water the aquifers can actually hold, and points out that the EIR does not demonstrate the ability of the Alluvial and Saugus aquifers to actually store such water.

Respondents' revised draft EIR states:

> The general lack of specific data on the potential interconnection [between the two aquifers], however, precludes a precise determination of potential effects on the Alluvial Aquifer. In the absence of these data, the hydraulic interconnection between the two aquifers is approximated in this analysis by simplifying assumptions for the properties of both aquifers. These assumptions are based on the professional judgment of CH2M HILL, the Specific Plan hydrogeologists, and result in an over exaggeration of the potential water-level decline in the alluvial Aquifer as a result of the ASR pumping in the Saugus Aquifer. The over exaggeration is deliberate to compensate for the lack of complete understanding of the potential flow between aquifers . . . .

(A.R. 4808.) Respondents take the position that their approach to ASR storage in the aquifers has been extremely conservative with only conservative assumptions being made.

It is not the job of the courts in reviewing an EIR to interpose their judgment in place of the approving authority, nor to rule on the adequacy of the evidence presented to that authority, save to conclude that there is substantial evidence in support of the authority's determination. However, since in this case there is an admitted lack of understanding as to the properties of the aquifers in question, any assumptions based upon professional judgments are merely guesses on the capacity of the aquifers which, if wrong, could substantially impact water availability to the Project and also the use of the aquifers by downstream users in Ventura County.[8/]

This, then, leaves the proponents of the Project with water mitigation measure 4.11-6:

> Prior to recordation of any final subdivision map that allows construction, and in accordance with the requirements of the Los Angeles County Development Monitoring System (DMS), as amended, Los Angeles County shall require the applicant of the subdivision to obtain written confirmation from the retail water agency that a water source is available to supply the subdivision concurrent with need. If the applicant of the subdivision cannot obtain confirmation that a water source is available for buildout of the subdivision, the subdivision shall be phased with the timing of an available water source.

This mitigation measure, standing alone, does not pass the scrutiny of a *Stanislaus* analysis. Consequently, the EIR is inadequate in its approach to the availability of water resources to supply its Project.

Because adequate water supplies have not been ensured, Los Angeles County has failed to comply with the requirements of the Development Monitoring System section of the General Plan as they relate to water supplies.

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[8/] See Public Resources Code section 21080, subdivision (e)(1), "For the purpose of this section and this division, substantial evidence includes . . . expert opinion supported by fact." See also *Gentry v. City of Murrieta* (1995) 36 Cal.App.4th 1359, 1422-1423.

## CONCLUSION

Based upon the foregoing analysis, the parties to the various actions are entitled to relief as follows:

## VENTURA COUNTY PETITIONERS

Petitioners are entitled to a Writ of Mandate stating:

1) Certification of the Final Environmental Impact Report ("EIR") for the Project is voided, but only with respect to the specific areas found deficient, as set forth in this Statement of Decision; and

2) Respondents and each named real party in interest and their respective agents, officers, employees, and all persons acting on their behalf or in concert with them, are directed and ordered to suspend any or all specific Project activity or activities that could result in an adverse change or alteration to the physical environment, until they have complied with the requirements of the California Environmental Quality Act ("CEQA") in the following respects:

   a. Determine the effect on that portion of the Salt Creek Corridor situated in Ventura County to be caused by the shifting of wildlife into the Salt Creek Corridor.

   b. Extend the traffic impact analysis employed in analyzing the Project in Los Angeles County to analysis of the impact of the Project on arterial roadways in Ventura County until the 1 percent impact standard is reached.

## THE SIERRA CLUB

Petitioners are entitled to a Writ of Mandate stating:

1) Certification of the Environmental Impact Report for the Project is voided, but only with respect to the specific areas found deficient, as set forth in this Statement of Decision; and

2) Respondents and each named real party in interest and their respective agents, officers, employees, and all persons acting on their behalf or in concert with

them, are directed and ordered to suspend any or all specific Project activity or activities that could result in an adverse change or alteration to the physical environment until they have complied with the requirements of CEQA in the following respects:

a. Address the issue of adverse biological impacts on the river corridor based upon channelization and hardening of the banks.

b. Determine the effect on that portion of the Salt Creek Corridor situated in Ventura County to be caused by the shifting of wildlife into the Salt Creek Corridor.

3) Pursuant to the State Planning and Zoning Laws:

a. With regard to SEA 23, petitioners are entitled to a Writ of Mandate compelling Respondents and each named real party in interest and their respective agents, officers, employees, and all persons acting on their behalf or in concert with them to set aside their approval of the Newhall Ranch Specific Plan, General Plan Amendment 94-087-(5), Santa Clarita Areawide Plan Amendment 94-087-(5), Zone Change 94-087-(5) and Conditional Use Permit 94-087-(5), but only as those Project approvals relate to SEA 23 and the Los Angeles County's Development Monitoring System ("DMS") as it applies to water supplies. Respondents shall take action to ensure that the Newhall Ranch Specific Plan, General Plan Amendment 94-087-(5), Santa Clarita Areawide Amendment 94-087-(5), Zone Change 94-087-(5), and Conditional Use Permit 94-087-(5) are consistent with the General Plan policies of Los Angeles County requiring protection of natural resources in SEAs as they relate to SEA 23, and the General Plan policies relating to water supplies.

b. Petitioners are entitled to a Writ of Mandate compelling Respondents and each named real party in interest and their respective agents, officers, employees, and all persons acting on their behalf or in concert with them

to suspend any or all specific Project activity or activities that could result in an adverse change or alteration to the physical environment unless and until they comply with the provisions of the Los Angeles County General Plan related to the Development Monitoring System as it relates to water supplies, and the General Plan policies of Los Angeles County requiring protection of natural resources in SEAs as they relate to SEA 23.

**PETITIONERS VENTURA COUNTY, UNITED WATER, AND SIERRA CLUB**

Petitioners are entitled to a Writ of Mandate stating:

1) Certification of the Environmental Impact Report for the Project is voided, but only with respect to the specific areas found deficient, as set forth in this Statement of Decision; and

2) Respondents and each named real party in interest and their respective agents, officers, employees, and all persons acting on their behalf or in concert with them, are directed and ordered to suspend any or all specific Project activity or activities that could result in an adverse change or alteration to the physical environment until they have complied with the requirements of CEQA and the State Planning and Zoning Laws in the following respects:

   Demonstrating that adequate water sources will be available for build-out of the Project, which may be achieved by securing other water sources consistent with CEQA, and/or by developing a factual basis providing substantial evidence from which the Board of Supervisors can adequately assess the environmental impacts of the employment of the ASR alternative and its ability to meet water needs.

**ATTORNEY GENERAL AND THE SIERRA CLUB**

The Writ of Mandate shall include an order stating:

1) Certification of the Environmental Impact Report for the Project is voided, but only with respect to the specific issues set forth in this Statement of Decision; and

2) Respondents and each named real party in interest and their respective agents officers, employees, and all persons acting on their behalf or in concert with them, are directed and ordered to suspend any or all specific Project activity or activities that could result in an adverse change or alteration to the physical environment until they have complied with the requirements of CEQA in the following respects:

Address the alternative of siting the WRP off-river, including analyzing the biological impact of that siting, given that there is no substantial evidence to justify rejection of the off-river siting of the WRP.

**RESPONDENTS**

Respondents are entitled to the following relief:

1. That the Petition of the Vega petitioners be denied.

2. To a finding that the Subdivision Map Act does not require inclusion of Ventura County in the map approval process.

**PREPARATION OF JUDGMENT AND WRITS**

The petitioners shall prepare and submit a Judgement and a Peremptory Writ of Mandate consistent with this Statement of Decision.

Dated: 8-1-00

ROGER D. RANDALL

ROGER D. RANDALL, Judge

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## PROOF OF SERVICE

**STATE OF CALIFORNIA, COUNTY OF VENTURA**

The undersigned declares: I am a citizen of the United States and I am employed in the County of Ventura, State of California. I am over the age of 18 and not a party to the within action; my business address is County Counsel's Office, 800 South Victoria Avenue, Ventura, California 93009-1830.

On July 28, 2000, I served the within **[PETITIONERS' PROPOSED] STATEMENT OF DECISION** on:

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[ ] **by an express service carrier,** (a guaranteed next day delivery service), a true copy of the above-stated document in an envelope or package designated by said carrier and addressed to the above person(s) on whom it is to be served.

[] **by facsimile transmission** of said document(s) from fax telephone number (805) 654-2185 to the above-named persons as indicated above. This transmission was reported as complete and without error.

[X] **by addressing an envelope** to the above-named person(s) as indicated above, and placed in the envelope a true copy of each of said documents, and by then sealing and depositing said envelope, with postage thereon fully prepaid, in the United States mail at Ventura, California, where is located the office of the person by and for whom said service was made.

[X] **(STATE)** I declare under penalty of perjury under the laws of the State of California that the foregoing is true and correct. Executed on July 28, 2000, at Ventura, California.

[ ] **(FEDERAL)** I declare under penalty of perjury that I am employed in the office of a member of the bar of this court at whose direction the service was made. Executed on
_____, 19___, at Ventura, California.

SHEILA L. DELEO