Los Angeles County Department of Regional Planning

Final Program EIR for the County of Los Angeles' Proposed Santa Clarita Valley Area Plan

Volume III
Appendices

One Valley One Vision

2012

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County of Los Angeles' Proposed Santa Clarita Valley Area Plan

Final Program Environmental Impact Report

Volume III

Appendices

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November 2004

SANTA CLARITA SUBREGIONAL ANALYSIS

NOVEMBER 2004

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT

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EXECUTIVE SUMMARY

Background on Subregional Analysis

The overall blueprint for attainment strategy in the greater South Coast basin is the Air Quality Management Plan (AQMP). The AQMP assesses and addresses regional air quality as a macrocosm. Since 2002, as part of SCAQMD's ongoing Environmental Justice program, the SCAQMD Governing Board has also asked staff to carry out one or more "subregional analyses" each year, as "mini-AQMP" microcosms.

A subregional analysis seeks to identify disproportionate air quality impacts in a specific geographic area, and if found, to address and mitigate these impacts. Thus far, the following subregional analyses have been requested by the Board, all involving potentially disproportionate exposure to unhealthful emissions: Mira Loma (concern: diesel exhaust from large clusters of truck warehouse facilities); the Alameda Corridor (concern: diesel exhaust from port operations, the freight rail expressway, associated rail yards, and on-road trucks); and in this report, the Santa Clarita Valley (concern: transported ozone and potential increases in fugitive dust and diesel exhaust emissions stemming from proposed aggregate mining and gravel hauling operations).

In 2003, SCAQMD's Santa Clarita Valley monitoring station recorded the highest official 1-hour ozone reading in Los Angeles county (a maximum concentration of 0.194 parts per million [ppm]). Ozone concentrations in Santa Clarita exceeded the federal 1- and 8-hour standards of 0.12 and 0.08 ppm on 35 and 69 days respectively.

In the spring of 2004, the SCAQMD Governing Board directed that the District provide an expanded analysis of subregional air quality, beyond that presented in the AQMP, to examine and assess several air quality issues confronting the Santa Clarita Valley. In response to this direction, an analysis has been conducted to discuss the observed air quality, the contributing factors to recent trends and to assess the roles of local emissions and pollution transport in relationship to the observations. In addition, the analysis attempts to characterize the potential impacts of development in both the residential sector and in the industrial sector as represented by the development of the Soledad Canyon Sand and Gravel Mining Project (Cemex/Transit Mixed Concrete, Inc. [Cemex/TMC]). The results of the analysis are grouped into three categories: observed ambient air quality (ozone and PM10/PM2.5), simulated ozone and PM10 impacts from future development of available land parcels in the valley, and potential toxic risk from diesel soot emissions associated with the in-situ mining and gravel hauling operations from the Cemex/TMC project.

Ozone and PM10 Air Quality (Sections 2 and 3):

- Santa Clarita does not meet the federal and California ozone air quality standards.

- The recent increase in the number of days exceeding the federal 1-hour ozone standard has been impacted mostly by weather and the movement of the monitoring station location (the old site was unsuitably impacted by local emissions);

- The city can experience a 50 part per billion (ppb) gradient of ozone concentrations from west to east on smoggy days;

- The highest PM10 concentrations in the Santa Clarita Valley are observed in the City of Santa Clarita near the Interstate 5 (I5) and State Route 14/Antelope Valley (SR-14) freeways;

- Transport from the San Fernando Valley and Los Angeles dominates both local ozone and particulate air quality;

- Santa Clarita emissions contribute about 2 percent to local ozone impact;

- Local particulate emissions contribute about 10 percent to the annual average observed PM10 concentration;

- Weekend ozone concentrations under average wind transport conditions are approximately 23 percent higher than weekdays; and

- Santa Clarita meets federal PM10 standards but exceeds the more restrictive California standard.

Impacts from Future Development (Sections 3, 4 and 5)

- Doubling of motor vehicle emissions in the city of Santa Clarita will have a nominal impact to local PM10 and no impact to local ozone;

- When simultaneous 25-year build-out of all recorded, pending and approved land parcels in the city and county portions of the valley is assumed, simulated annual PM10 concentrations are projected to increase up to 5 micrograms per cubic meter ($\mu g/m^3$);

- The maximum regional annual average PM10 impact is projected to occur near Newhall Ranch;

- The annual average regional impact due to the development of the Cemex/TMC facility is projected to result in an increase of up to 3 $\mu g/m^3$, in the immediate area surrounding the mine;

- A focus point source analysis of the Cemex/TMC mine projected an annual PM10 impact of up to 16 $\mu g/m^3$ (at the fence line of the facility); and

- Future development would not cause violations of the federal annual average PM10 standard but could cause possible violations of the state standard.

Toxic Risk Analyses (Section 6)

- The MATES II regional toxic risk study estimated an average risk of 500 in one million for the City of Santa Clarita;

- By comparison, the average toxic risk for the South Coast Air Basin (Basin) is approximately 1,400 in one million;

- In general, simulations using a Gaussian model in the Basin are conducted using the urban meteorological assumption. Due to its unique topography, the Santa Clarita Valley was simulated using both the urban and rural meteorological assumptions to bound the analysis;

- Model-simulated maximum risk to the city of Santa Clarita from diesel emissions associated with mining and hauling operations from the Cemex/TMC project ranges from 10 to 25 in one million, dependent upon the meteorological profile: urban or rural, respectively;

- The northeast portion of the city adjacent to the SR-14 and Soledad Canyon Road split would experience the greatest impact; and

- The maximum risk to a sensitive receptor (school) ranges from 7 to 20 in one million, dependent upon the meteorological profile: urban or rural, respectively.

The City of Santa Clarita through its air quality element has instituted many air pollution mitigation measures and is considering additional options. This analysis concludes by providing selected potential mitigation measures **(Section 7)** that address fugitive dust issues and emissions from diesel mobile sources.

1.0 INTRODUCTION

At its August 2003 meeting; the Governing Board of the South Coast Air Quality Management District (District) adopted the 2003 revision to the Air Quality Management Plan (AQMP) for the South Coast Air Basin (Basin). The 2003 AQMP, which has since been forwarded to the California Air Resources Board (CARB), and approved for inclusion in the California State Implementation Plan (SIP), is the region's blueprint towards clean air. The AQMP provides regional characterization of the air quality problem and proposes the development of specific emissions control measures and rule implementation schedules to meet clean air goals. While the AQMP details the road map to regional attainment of all air quality standards, it is not directly focused on the subregional or localized air quality impacts that affect individual communities.

The City of Santa Clarita has requested that the District conduct an expanded analysis of subregional air quality, beyond that presented in the AQMP, to exam and assess several air quality issues confronting both the city and its sphere of influence, the Santa Clarita Valley. The city and valley are both rapidly developing. The community is developing a subregional plan "One Valley, One Vision," which defines the goals of growth and development for the incorporated and unincorporated cities of the valley while maintaining a high quality of life. As part of this planning effort, the city has requested that the District provide answers to key issues that are intimate to the local area. These included:

- Characterizing and evaluating the observed ozone and particulate air quality

    - trends;
    - impact of local emissions; and
    - and what is termed the "weekend effect".

- Evaluating the impact of potential development growth on air quality

    - through increased mobile source emissions; and
    - by simulating the valley build-out .

- Evaluating the impact of proposed Cemex/TMC mining operations.

- Providing potential mitigation measures.

2.0 BACKGROUND

The city of Santa Clarita (Figure 2-1) is located approximately 35 miles northwest of central Los Angeles, with its southern boundary abutting the northern portion of the San Fernando Pass. The majority of the city resides between Interstate 5 and State Routes 126 and 14. The size of the city accounts for roughly 25 percent of the 200-square mile Santa Clarita Valley.

The estimated population of Santa Clarita in 2003 was approximately 163,000 with an estimated total population in the Santa Clarita Valley of 172,000. The population of the city has grown over 35 percent since 1990 with 75 percent of the population residing in single family dwellings. The population growth rate has been complemented with substantial growth in housing, within the incorporated boundaries of the city and on adjacent developed land in both Los Angeles and Ventura counties.

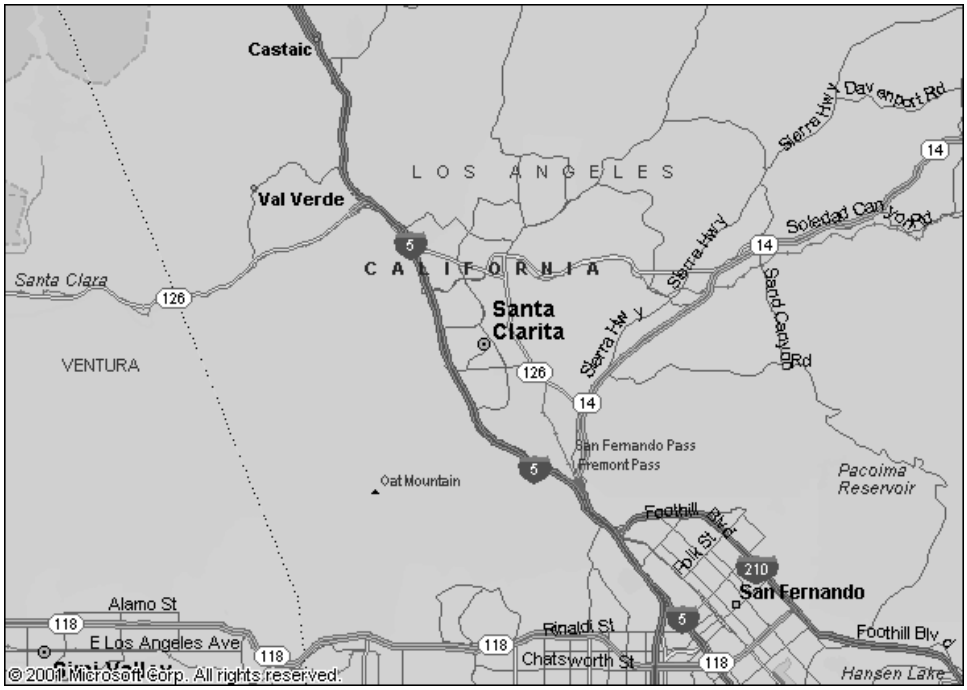


FIGURE 2-1

Santa Clarita and Neighboring Communities

While residents commuting to the San Fernando Valley and Central Los Angeles account for a large percentage of the work force, the Santa Clarita Valley retains more than 30,000 jobs. Commuting to the Santa Clarita Valley represents a growing contribution to traffic and emissions.

2.1 Meteorological Profile

During the 1997 Southern California Ozone Study (SCOS97, conducted by a partnership of air districts, CARB and U.S. EPA), extensive measurements of meteorological and air quality data were taken to help characterize the pollutant build-up and transport processes that take place in the Basin. The August 4-7, 1997 meteorological episode captured the build-up of an ozone episode and the development of a coastal eddy that resulted in transport of the polluted air mass to the Santa Clarita Valley over successive days. The episode was simulated as part of the Basin ozone attainment demonstration for the 2003 Air Quality Management Plan. In later sections of this report, these simulations are used to demonstrate the relative impact of transport to the Santa Clarita air quality problem due to emissions in the valley and in the upwind emissions source areas.

The following sections briefly describe the observed wind flow and inversion characteristics that uniquely impact the Santa Clarita Valley.

2.1.1 Wind Flow

The meteorological profile of the Santa Clarita Valley is dominated by the diurnal sea breeze wind circulation that is characteristic of Southern California. Daytime wind transport into the Santa Clarita Valley occurs along two primary routes: from the south through the Newhall pass, and from the west following the Santa Clara River (Figure 2-2). The thermally driven southwesterly wind flow exits the valley mainly through the eastern canyons on a traverse towards the Antelope Valley. A smaller percentage of the wind flow into the Santa Clarita Valley is channeled up the side canyons which are generally north-south in orientation. Average wind speeds during the afternoon range between 5 and 10 miles per hour. At night, weak drainage flow from the surrounding mountains collects along the Santa Clara River bed and is transported westward towards the coast.

Seasonally, the sea breeze is strongest during the spring and summer months. The typical flow pattern into the valley is augmented by region-wide southerly flow that accompanies the development of coastal eddies in the Southern California bight. The formation of coastal eddies occurs approximately 15 percent of the year. When the eddy is established, it promotes regional transport from the majority of the air pollution sources in the coastal plain. Less frequent, but well pronounced in the Santa Clarita Valley, are the periodic Santa Ana northerly winds which are routinely characterized by wind gusts in excess of 30 mph.

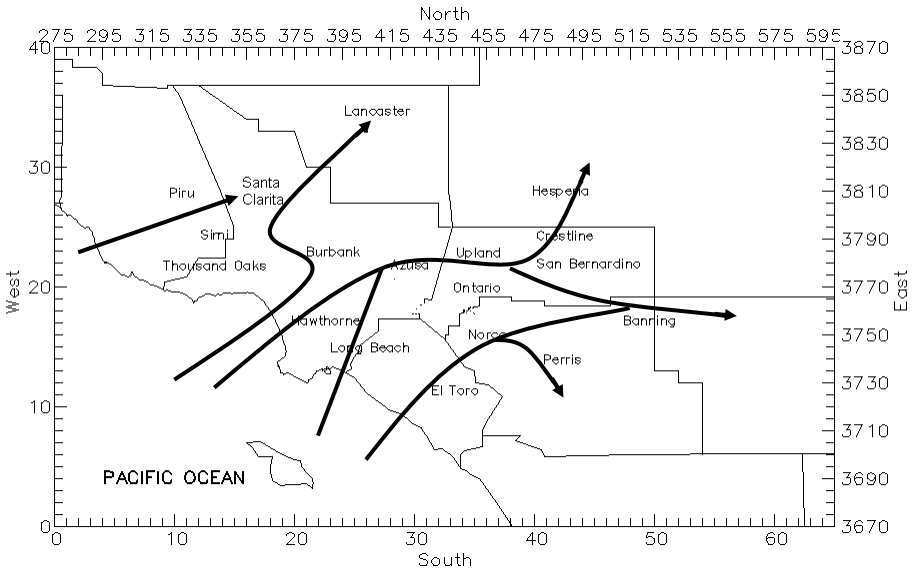


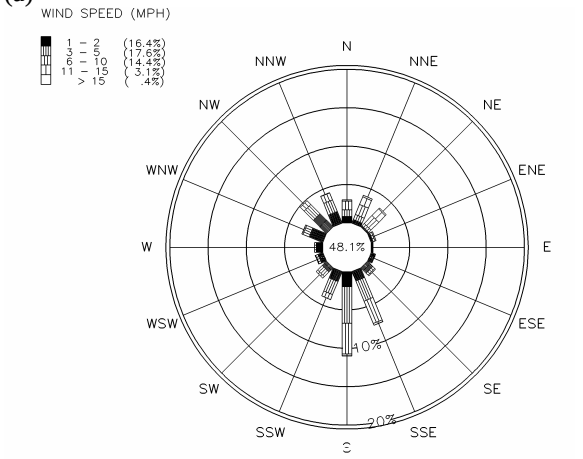
FIGURE 2-2

Prevailing Wind Transport to the Mojave Desert

The overwhelming contribution of pollution transport to the Santa Clarita Valley comes from the San Fernando Valley and metropolitan Los Angeles. Figure 2-3 depicts the seasonal-hourly wind frequency diagrams or "wind roses" for the Santa Clarita SCAQMD monitoring station for the period 1991-2000. Excluding periods of calm winds that occur as the sea breeze begins and ends (49.2 percent of all hours), the major daytime wind vectors are from the south and upwind emission source areas. This is particularly evident in the spring and summer months. In addition, several field studies have confirmed the prevalent transport route through the Newhall Pass by tracing the northward movement of inert tracer gases released in the Metropolitan Los Angeles areas.

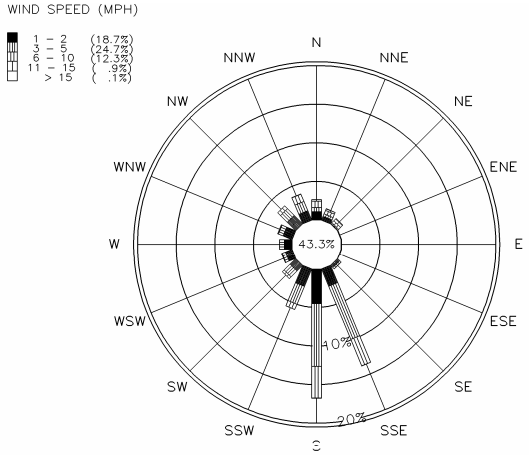
Table 2-1 summarizes the frequency of occurrence of different daytime transport regimes to Santa Clarita. In general, average transport, which is characterized by a moderate-to-strong sea breeze through the Newhall Pass, occurs two-thirds of all days. In contrast, Santa Clarita is mostly impacted from local emissions under calm winds and weak offshore flow which occurs less than ten percent of all days.

(a)



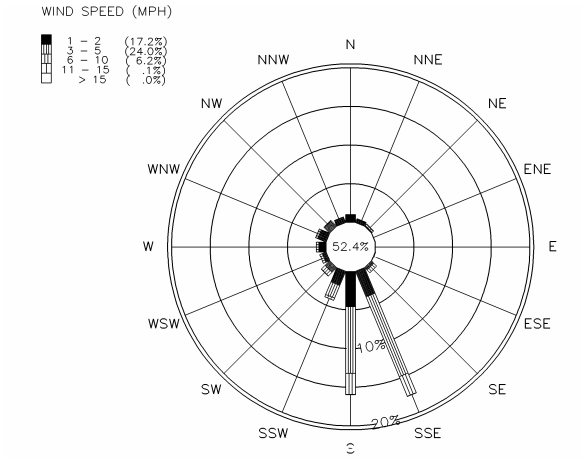
SCAQMD Santa Clarita Monitoring Station
January – March (1991–2000)

(b)



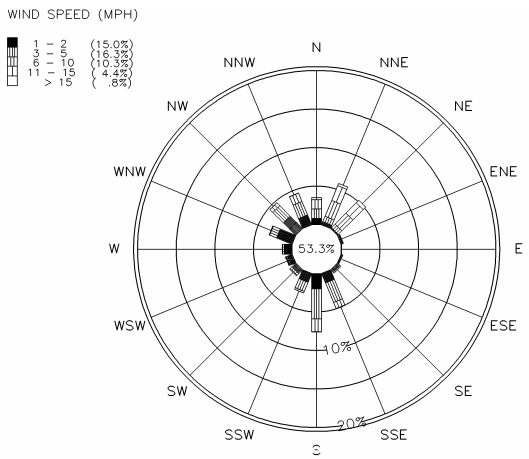
SCAQMD Santa Clarita Monitoring Station
April – June (1991–2000)

(c)



SCAQMD Santa Clarita Monitoring Station
July – September (1991–2000)

(d)



SCAQMD Santa Clarita Monitoring Station
October – December (1991–2000)

FIGURE 2-3

Hourly Wind Rose for Santa Clarita (1991-2000):
(a) Winter, (b) Spring, (c) Summer, (d) Fall

TABLE 2-1

Frequency and Strength of Daytime Wind Transport to Santa Clarita

Transport Regime	Frequency of Days	Characteristics
Local	6	Calm winds or weak offshore flow
Weak	20	Light winds onshore
Average	66	Moderate to strong sea breeze through Newhall pass and Santa Clara River Valley
Overwhelming	8	Strong Catalina eddy or an approaching storm system

2.1.2 Inversion Characteristics and Mixing

The elevation of the Santa Clarita Valley varies from just over 1000 feet to about 1700 feet above mean sea level (msl) in the eastern portion of the city. The base of the morning coastal inversion layer typically resides within a layer approximately 1000 and 3000 feet above msl with a median height of approximately 1200 feet msl. On many days, the coastal and San Fernando portions of the Basin reside in the marine layer while Santa Clarita is above the inversion base in the stable air within the inversion layer. When the inversion is lower than the elevation of the valley, Santa Clarita will take on the climatic characteristics of the high desert. These include limited cloud cover from the marine layer, low humidity and a rapid warming of daytime temperatures. Vertical mixing of the atmosphere under these conditions is limited in the pre-dawn and early morning hours due to the very stable atmosphere. Higher levels of tailpipe emissions are trapped close to the ground but the rapid heating of the atmosphere after dawn limits the amount of stagnation, acting to disperse morning pollution vertically.

On days when the height of the base of the inversion layer is approximately equal to or greater than the elevation of the valley, a modified marine air climatic profile is observed in Santa Clarita. This will often include clouds or fog, higher humidity and slower rise in daytime temperature. Vertical mixing of the atmosphere will readily disperse ground level emissions; however, the extent of mixing will be determined by the inversion base height above mean sea level relative to the terrain elevation. As a consequence, on days when the morning inversion is elevated over Santa Clarita, the mixed layer, or area of the atmosphere where pollutants readily disperse, can actually be shallower than over the San Fernando Valley and coastal plain. These conditions often accompany the development of a coastal eddy and enhanced wind transport into the valley.

As the air over Southern California heats during the day, vertical mixing in the coastal plain and San Fernando Valley will typically reach between 3000 and 5000

feet. Developing ozone and particulate air pollution caught in the mixed layer is transported with the winds towards the Santa Clarita Valley. The pollutant-laden air mass extends high enough in the atmosphere to easily move through the Newhall Pass into the valley proper. The transported pollutant air mass typically retains the marine or coastal climatic characteristics and is several degrees cooler in temperature than the air it is displacing in the Santa Clarita Valley. The cooler pollutant-laden air tends to hug the ground creating a temperature contrast between the pollutant air mass and the warmer air above in the mixed layer. As a result, the movement of the polluted air mass into Santa Clarita acts to regenerate a low-level inversion whereby the transported pollutants are concentrated in a shallow layer.

On days when Southern California experiences extreme heat, the inversion layer is broken and vertical mixing of the atmosphere becomes unlimited. Under this condition transport into the Santa Clarita Valley is limited and pollutant levels are characteristically low in the area.

2.2 Air Quality Profile

Any assessment of the Santa Clarita air quality profile must begin with an assessment of the trend of air pollution in the South Coast Air Basin. In general, the region is most greatly impacted by ground-level ozone. Particulate matter, separated into a fine mode (PM2.5 - aerodynamic diameter less than or equal to 2.5 microns) and a coarse mode (PM10 - aerodynamic diameter of 10 microns or smaller, including PM2.5), is the second major contributing pollutant to Basin air quality. To a lesser extent, and more restricted in geographical impact is carbon monoxide, a third pollutant of concern.

The federal air quality pollutant standard attainment designations characterize the Basin as a region. The Basin is classified non-attainment for ozone, PM10, and carbon monoxide. Each of these pollutants impacts the health of the Basin population through short-term acute exposure and long term chronic impacts. On a sub-regional scale, Santa Clarita exceeds only the federal standard for ozone.

Ozone is an oxidant that readily reacts with tissue in the respiratory tract; primarily the cilia in the bronchi and the alveoli in the lungs. Irritation, combined with inflammation caused by exposure leads to scarring of the alveoli cell walls and reduced pulmonary function with repeated exposure over time. Particulates, especially the fine portion, are easily inhaled and deeply penetrate the respiratory tract, causing irritation and inflammation. The particulates often serve as platforms for toxic materials and are associated with increases in mortality rates. Asthmatics, the, very young, the aged and people with pre-existing chronic respiratory ailments, are among the susceptible segments of the population who have been identified as being greatly impacted by exposure to either ozone or particulates.

Although not measured frequently in very high concentrations, carbon monoxide can cause impairment of consciousness and is especially harmful to people with emphysema or heart conditions. The Basin has met the criteria defining attainment

of the carbon monoxide since 2002. A petition to re-designate the Basin as attainment will be submitted to U.S. EPA in the near future.

2.2.1 Ozone Trend

Figure 2-4 depicts the long-term trend of days when the federal 1-hour ozone has been exceeded at one or more locations in the Basin. Also depicted in the figure is the regional peak concentration. As demonstrated by the trend, ozone air quality has significantly improved since the mid-1970's. The rate of improvement has slowed in the later 1990's and has shown a minor reversal over the past two years.

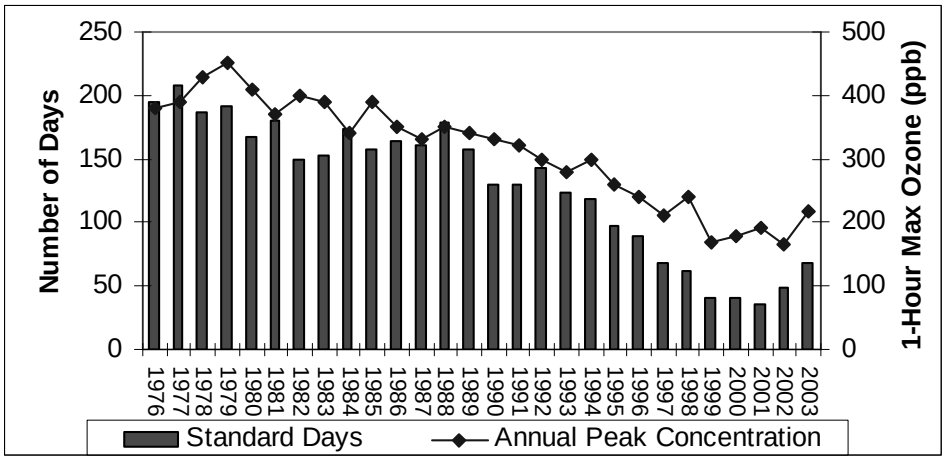


FIGURE 2-4

Trend of Days Exceeding the Federal 1-Hour Ozone Standard in the South Coast Air Basin and Annual Peak Concentration (ppb)

Figure 2-5 depicts the long-term trend of days when the federal 1-hour ozone standard was exceeded at Santa Clarita. When compared to the Basin totals, the trends are generally consistent with time. On average, Santa Clarita experiences violations of the 1-hour ozone standard on approximately fifty percent of the days each year that a basin-wide violation occurs.

Two features are very prominent in the recent ozone trend: First, no violations of the federal 1-hour average ozone standard were observed at the Santa Clarita monitoring site in 1999 and only one was observed the following year. The second characteristic of the recent trend has been the sharp increase in the number of violations observed in 2002 and 2003. A fundamental question arises when analyzing the recent trend: was the improvement in 1999-2000 real or is the 2002-2003 increase in violations a truer measure of ambient ozone in the area?

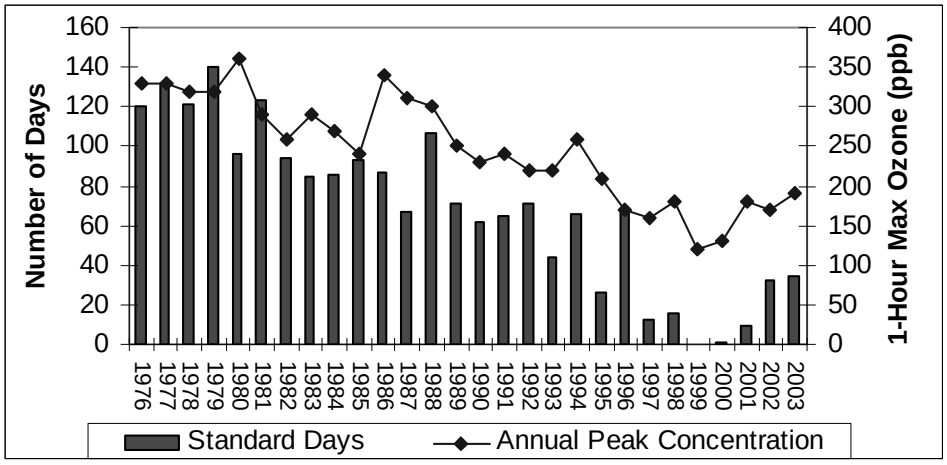


FIGURE 2-5
Trend of Days Exceeding the Federal 1-Hour Ozone Standard in Santa Clarita and Annual Peak Concentration (ppb)

2.2.1.1 Air Monitoring Station Relocation

In the spring of 2001, the Santa Clarita monitoring station was moved from its long-term location at L.A. County Fire Station #73 (24875 N. San Fernando Road, Newhall) to a site approximately one half mile to the east in a county maintenance yard. The fire station monitoring site on San Fernando Road was limited in space and had exposure interference from trees. The site was also adjacent to the fire department's diesel refueling station and was impacted from traffic emissions on San Fernando Road and from fire station activities. Diesel fire equipment, as well as routine traffic, emit high volumes of nitric oxide (NO). NO readily reacts with ambient ozone to titrate ozone concentrations nearby the NO emissions source. As a consequence, the fire station site may have been reading nominally lower ozone concentrations than the surrounding area. District staff determined that the new monitoring location receives better exposure and was less subjected to traffic influences than at the fire station.

At the time of the move, the ozone instrumentation was replaced and upgraded. The older equipment used at the fire station was found to have a problem with surface resistance on the intake manifold that scavenged ozone before reaching the analyzer. It is difficult to determine to what extent and when the equipment began to experience a loss in recorded ozone. The equipment is routinely calibrated and performance is determined to be acceptable if the results are within an acceptable range prescribed by both U.S. EPA and CARB. It is most likely that the instrument was operating at the lower bounds of acceptable performance at the fire station monitoring site during 1999 and 2000. This feature, together with favorable weather conditions, may have accounted for the unusually low number of days exceeding the

federal 1-hour average ozone standard. After the monitoring site relocation in the spring of 2001, higher ozone concentrations were observed by the new instrumentation. Concurrently, Santa Clarita experienced an upswing in the number of days exceeding the federal standard in 2001 and 2002 while leveling off in 2003. Other factors such as wildfire activity, regional changes in emissions levels and seasonal weather also may have contributed to the observed trend.

2.2.1.2 Wildfires

Due to drought conditions resulting from the record low rainfall measured over the past few years, much of the vegetation in the wildland interfacing the urban portion of the Basin has been stressed and has had dangerously low fuel moisture. Numerous wildfires have been ignited in Southern California. In particular the Santa Clarita area has been impacted each of the past three years (2002-2004). While the direct air quality impact caused by wildfires is due to fine particulates from the smoke, chemical reactions take place in the smoke plume that can elevate ozone concentrations. Experimental data captured from the Lodi Canyon controlled burns conducted in the Angeles National Forest during the late fall of 1986 indicated that on days having low ozone formation potential, a burn could generate concentrations of ozone exceeding 200 ppb with the smoke plume. The fires that occurred in the Santa Clarita valley during 2002 were very stubborn, lasting several days. Unlike the typical Santa Ana borne wildfires, the 2002 and 2004 fires fed upon the strong onshore sea breeze flow. Re-circulation of the smoke was observed throughout the Santa Clarita area and back into the San Fernando Valley. Several violations of the federal ozone standard occurred in both receptor areas as the fires burned and there existed a strong likelihood that the fires played a role in the enhanced ozone formation.

2.2.2 PM10 Trend

Figure 2-6 depicts the long-term trend of the peak annual average PM10 concentrations in the Basin. Also depicted in the figure is the regional peak 24- hour average concentration. The Basin exceeds the federal annual average PM10 standard (50 ug/m^3) and the 24-hour daily average standard (150 µg/m^3). The trend of annual average particulate has shown improvement since the late 1980's, however at a slower pace regionally than ozone. While the peak 24-hour average concentration continues to exceed the federal 24-hour average standard, it is important to note that since the mid 1990's the overwhelming number of days exceeding the standard were associated with high wind events (i.e. Santa Ana weather conditions and wildfires).

In the Santa Clarita Valley, annual average and 24-hour average concentrations of particulates are below the respective federal standards. Figure 2-7 shows the PM10 trends from 1989 through 2002. Over the last decade, the annual average concentration has been consistently about 70 percent of the federal annual standard. For the same period, the 24-hour maximum concentration has been on average less than 50 percent of the federal standard.

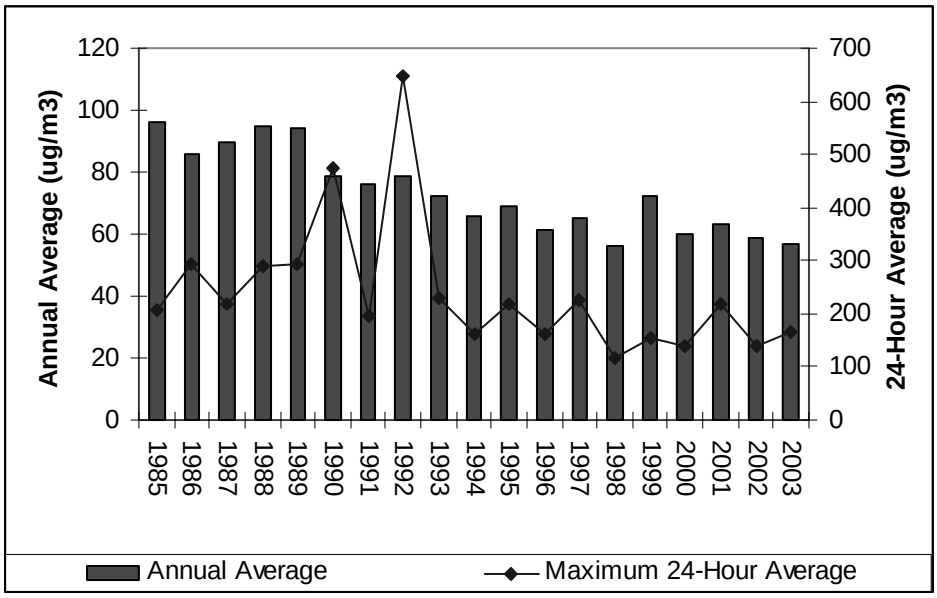


FIGURE 2-6

Basin Annual Average and Maximum 24-Hour Average PM10 Concentration

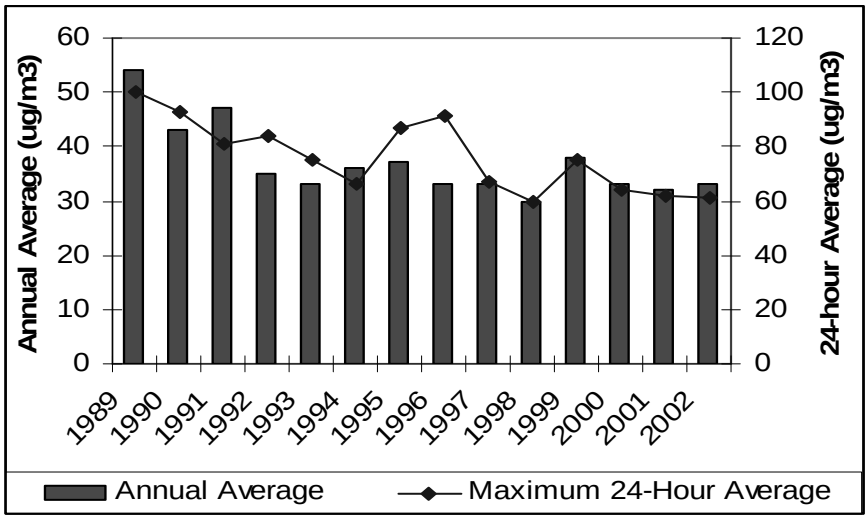


FIGURE 2-7

Santa Clarita Annual Average and Maximum 24-Hour Average PM10 Concentration

3.0 OZONE SIMULATIONS

Air quality modeling simulations were conducted to further examine the ozone impact to Santa Clarita. The modeling analyses were conducted to answer specific questions including:

- What is the subregional gradient of ozone in the Santa Clarita Valley?
- What is Santa Clarita's contribution to local smog formation?
- What is the "weekday effect" and how does it impact Santa Clarita?

3.1 Base and Future Year Simulations

The simulations were conducted for the 2003 AQMP modeling domain, using the SCOS97 meteorological episodes. The SCOS97 meteorological episode includes four days exhibiting increasing degrees of transport to the valley. August 4, 1997, the first day in the episode, was classified as a weak transport day, which occurs approximately 20 percent of the time. August 5, 1997, was classified as a local day, with little or minor transport into Santa Clarita. The local day occurs roughly 6 percent of the year. The final two days of the meteorological episode August 6, 1997, and August 7, 1997, were characteristic of the typical transport pattern which is observed on approximately 66 percent of all days.

Simulations were conducted for the full 2003 AQMP modeling domain. Figure 3-1 presents the Santa Clarita Valley subset of the full modeling domain (grids 15,25 [east-west] through 22,30 [north-south]). The hatched area includes the grids comprising the city of Santa Clarita. Interstates 5 and 210 and State Route 14 are drawn on the figure to provide reference landmarks. Each grid is 5 square kilometers in size.

3.1.3 Local vs. Regional Emissions

Ozone concentrations were simulated for three modeling inventories representing the estimated reactive emissions in the environment. The emissions inventories were developed for 2002 to reflect the conditions observed when ozone concentrations began to increase in the valley; 2007, a milestone year when the Antelope Valley must attain the federal standard; and 2010, the year the South Coast Air Basin must attain the federal 1-hour ozone standard. The emissions inventories include daily tonnages of directly emitted carbon monoxide (CO), oxides of nitrogen (NOx), volatile organic compounds (VOC) and particulate matter as PM10. VOC and NOx are the primary precursors "building blocks" of ozone. As is depicted in Table 3-1, Santa Clarita is a relatively small contributor to the total emissions of the key pollutants in both Los Angeles county and the Basin as a whole. Across the board, the emissions are typically less than three percent of the county total and two percent of the Basin total.

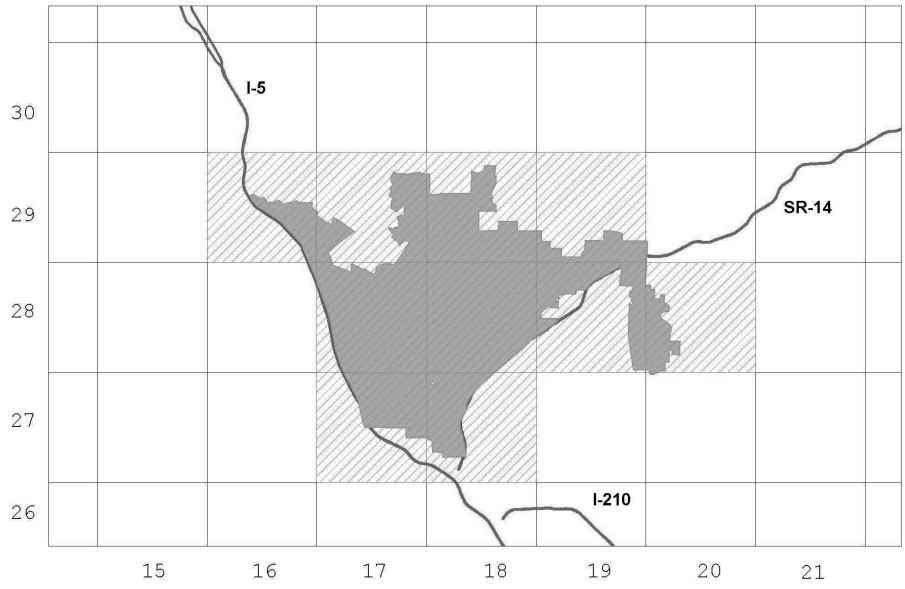


FIGURE 3-1

Santa Clarita Valley Portion of the 2003 AQMP Modeling Domain

TABLE 3-1

2002 Santa Clarita Emissions Profile

Emissions	**CO**	**NOx**	**VOC**	**PM10**
Santa Clarita (Tons Per Day)	63.9	19.3	11.2	3.4
Percentage of LA County	2.2	3.0	2.2	2.4
Percentage of Basin	1.4	1.8	1.4	1.2

3.1.2 2003 AQMP Ozone Model Simulations

The rate of progress towards achieving standard compliance is demonstrated in the 2003 AQMP ozone model simulations. Table 3-2 summarizes the results of the model simulations. In 2002, the highest observed 1-hour average ozone concentration at Santa Clarita reached 169 ppb. Model simulations for a day experiencing average transport but approximately the 95th percentile for ozone formation potential were projected to reach 146 ppb. While the weather conditions for the day simulated and the day having the observed peak are not exactly the same, the potential for ozone generation is roughly equivalent and the projection indicated that an ozone health advisory episode was likely to occur given the emissions present in the atmosphere in 2002. What is encouraging is that on weak or local transport days, Santa Clarita was simulated to attain the federal standard. Extending the analysis to 2007 predicts that Santa Clarita will marginally exceed the standard and by 2010 the city and valley will be in attainment.

TABLE 3-2

2003 AQMP Model-Predicted Santa Clarita Maximum 1-Hour Average Ozone Concentration (ppb)

Transport Regime	2002	2007	2010
Local	78	77	68
Weak	118	115	103
Average	146	135	109

3.2 Ozone Gradients

A closer grid-level examination of the model-simulated ozone concentrations for an average transport day using the 2002 emissions inventory is presented in Figure 3-2. Santa Clarita, like several communities in the Basin, experiences a gradient of ozone air pollution throughout the city. The northwestern portion of the city can be cleaner than the eastern and southeastern portions by as much as 50 ppb. While transport to Santa Clarita via the Santa Clara River valley is a factor, the bulk of the transport originates from the San Fernando Valley and the coastal plain of Los Angeles. The location of the old fire station monitoring site is in grid 17 [horizontal axis], 27 [vertical-axis]). The monitoring station relocation in 2001 shifted the analyzer location in the direction of the main pollution transport corridor and increasing ozone. Thus, on days when ozone concentrations measured at the fire station monitoring site were just below the federal standard (124 ppb) it is likely that the

projected concentration at the new location could be higher, causing the standard to be violated. Clearly, the move of the monitoring station and the equipment replacement has impacted the frequency of days reported exceeding the federal standard since 2001.

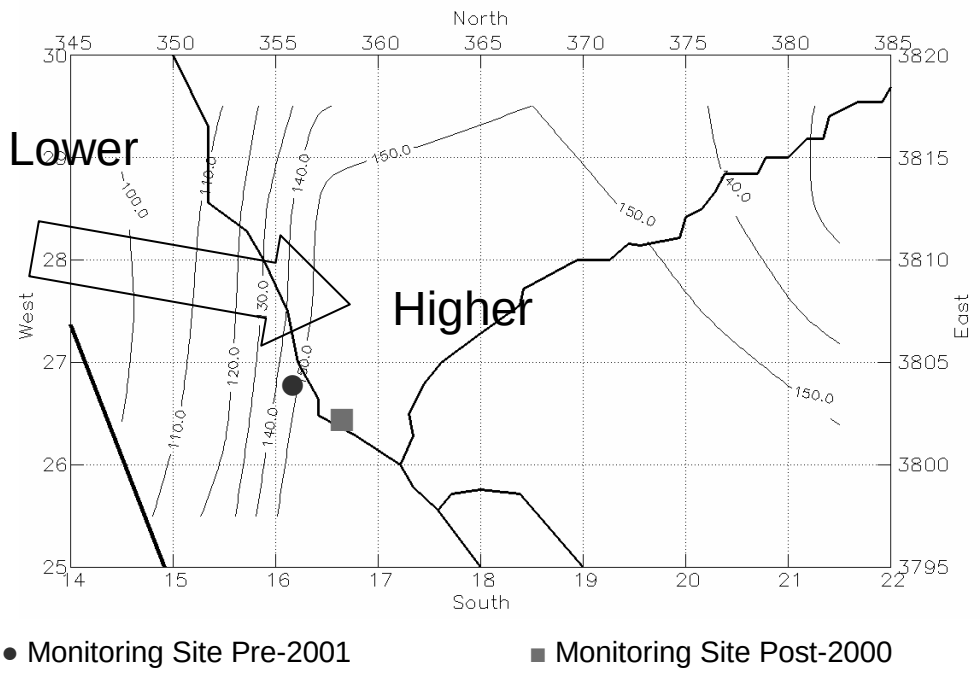


FIGURE 3-2

2002 Simulated Ozone (ppb) Gradient in Santa Clarita Valley for the Average Transport Regime

3.3 Santa Clarita's Contribution to Observed Ozone

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A principal question asked by residents and city officials of Santa Clarita was "what is our contribution to the ozone problem?" Table 3-3 summarizes a series of ozone sensitivity simulations where selected segments of the emissions were withdrawn from the analysis to assess the impact of different source regions to Santa Clarita's locally observed ozone. The first simulation withdrew all of the anthropogenic (man-made) emissions from Santa Clarita. A second simulation withdrew the emissions from upwind Santa Barbara and Ventura counties. An additional simulation doubled the Santa Clarita emissions to test the impact to the community.

In general, under average transport conditions, emissions from the Santa Clarita area do not contribute significantly to ozone formation in the city. In fact, the emissions of oxides of nitrogen act to scavenge some of the ozone that is transported to the area. (This is depicted by a negative value of the percentage contribution listed in Table 3-3). Under local and weak transport conditions, emissions from Santa Clarita

have a minor contribution to the observed ozone air quality profile. In contrast, the Ventura and Santa Barbara emissions, coupled contribute as much as 10 percent to the ozone problem under average transport conditions. Ozone transport and emissions from the San Fernando Valley and the Los Angeles coastal plain are responsible for the bulk of the observed ozone in Santa Clarita. Carryover, the process where yesterday's smog provides a platform for today's smog to develop, is also a factor.

TABLE 3-3

Percentage Emissions Contribution to Santa Clarita Ozone Air Quality

Transport Regime	Santa Clarita Emissions	Doubled Santa Clarita Emissions	Santa Barbara & Ventura Emissions	Carryover & Other Basin Emissions
Local	2.8	0.7	0.7	96.5
Weak	1.2	-0.2	6.0	92.8
Average	-2.9	-2.9	9.9	93.0

3.4 Weekend Effect

A final issue that was addressed through the ozone simulations was the "weekend effect" and its impact on Santa Clarita air quality. Ozone concentrations observed on weekend days are higher than that observed on weekdays. Figure 3-3 illustrates the day-of-week smog season average ozone concentrations for 1-hour and 8-hour averaging periods measured in Santa Clarita. Over the period 2001-2003, a disproportionate percentage of the days exceeding the standard occurred on weekend days (43 percent as opposed to the expected two days out of seven or 28 percent). In general, the weekend effect reflects the change in emissions levels and emissions sources that occur from weekdays (Monday-Thursday) and Friday, Saturday and Sunday. The primary cause of the weekend effect has been postulated in several analyses as the change in motor vehicle emissions patterns both in space and time as the weekend progresses. In general the postulation is as follows: Extended commuting on Friday night coupled with a later start to the morning commute on both Saturday and Sunday gives rise to a more reactive pollution cloud; the reactive pollutant cloud generates ozone concentrations earlier in the day, reaching peak concentrations at a faster pace. In addition, the weekend effect is most notable nearby the emissions source areas.

Three scenarios were simulated to test the impact of the weekend effect on transport of ozone to Santa Clarita. First, the August SCOS97 ozone meteorological episode was simulated assuming the August 4 through 7, 1997, episode took place on a Friday through Monday rather than a Monday through Thursday as it was observed. For this simulation, August 5 was assigned the Saturday emissions profile and August 6 the Sunday emissions profile. The analysis was repeated moving the start date (August 4) to a Thursday, placing August 6 as the Saturday and August 7 as Sunday. A third simulation was conducted placing August 4 on a Wednesday so that the August 7 was treated as a Saturday.

The reasoning for this rotation was to test the weekend effect when the Friday emissions were placed in different meteorological scenarios. In the first simulation, the Friday meteorology was classified as a weak transport day. The second simulation placed Friday as a local transport day. For the third simulation the Friday was classified as an average transport scenario.

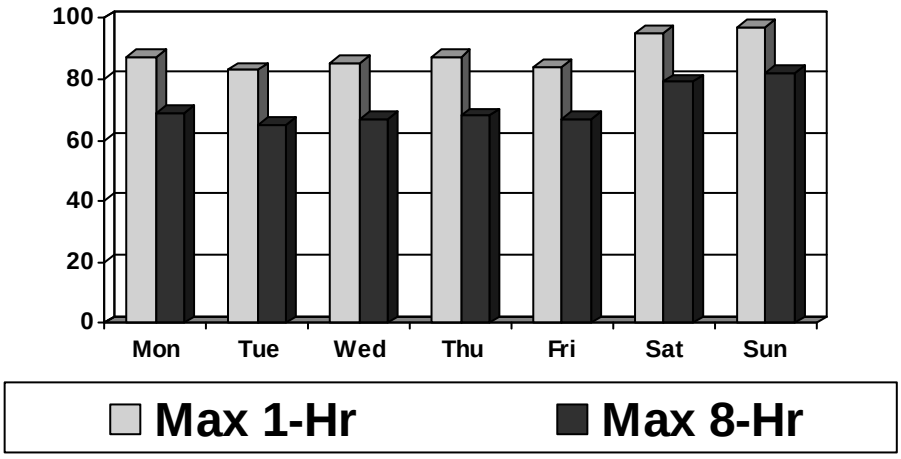

FIGURE 3-3

2001-2003 Average Santa Clarita Daily Maximum 1-Hour Average Ozone Concentration (ppb)

The results of the weekend simulations for the Santa Clarita modeling area are presented in Table 3-4. The analysis indicated that on weekend days experiencing average transport, ozone concentrations could increase by as much as 23 percent over weekdays. Under weak or local transport conditions, the weekend effect would be negated.

TABLE 3-4

Simulated Weekend Change in Ozone Concentration from Weekdays at Santa Clarita

Transport Regime	**Percentage Change in Ozone Concentrations**
Local	-6.5
Weak	-3.3
Average	+ 22.9

4.0 PARTICULATE SIMULATIONS: CURRENT IMPACTS

PM10 and PM2.5 are comprised of several components which are associated with a variety of sources. Sulfate, nitrate and organic particulate are mostly associated with urban smog that is transported to Santa Clarita and comprise the bulk of the fine particulate PM2.5 mass. Elemental carbon (including diesel soot) together with roadway and construction dust have local emissions source contributions as well as the urban signature. This is clearly observed in Santa Clarita where traffic generates re-entrained road dust and diesel soot and construction projects are widespread.

Air quality modeling simulations were conducted to examine the relative contributions of smog transport and local source emissions to the PM10 impact on Santa Clarita. The modeling analyses were conducted to answer specific questions including:

- What is Santa Clarita's contribution to local PM10 and PM2.5 levels?
- What will be the impact of valley growth on PM10 air quality?
- What will be the impact of the Cemex/TMC mining operations on PM10 air quality

4.1 PM10 Gradient

Figure 4-1 depicts the 2002 simulated annual average PM10 concentration for the Santa Clarita Valley. The peak particulate concentrations are well represented by the air monitoring site (grid 17,29) where the southern and central portions of the city experience the highest concentrations. The concentration drops significantly in the northern third and eastern portion of the city. The easternmost edge of the city is roughly 18 $\mu g/m^3$ cleaner than the central portion of the city. The highest PM10 concentrations occur nearby the traffic arteries where road dust is a major contributing factor. Localized hot-spots for particulate emissions are also observed and correspond to construction activities and mining in the valley. The valley, overall, is in compliance with the federal annual average PM10 standard.

4.2 Santa Clarita's Contribution to Observed PM10 and PM2.5

A series of annual air quality simulations was conducted to assess the local Santa Clarita emissions contribution to its observed PM10 air quality profile. The UAMAERO-LT regional particulate simulation model used in the 2003 AQMP annual PM10 modeling analyses was simulated for the 2002 modeling inventory (see Table 3-1) and the AQMP modeling domain. The Santa Clarita Valley subset of the 5 square kilometer modeling domain is evaluated for this portion of the analysis.

The UAMAERO-LT simulation model provides predictions of both PM10 and the PM2.5 fraction. While PM2.5 is not routinely measured in the Santa Clarita Valley, the model predictions are driven by the regional emissions and they afford a

perspective of the expected local impact. A first simulation removed all area source emissions from the city of Santa Clarita (but included the mobile source contribution). A second simulation doubled the mobile source emissions over the current level while leaving the area source emissions unchanged.

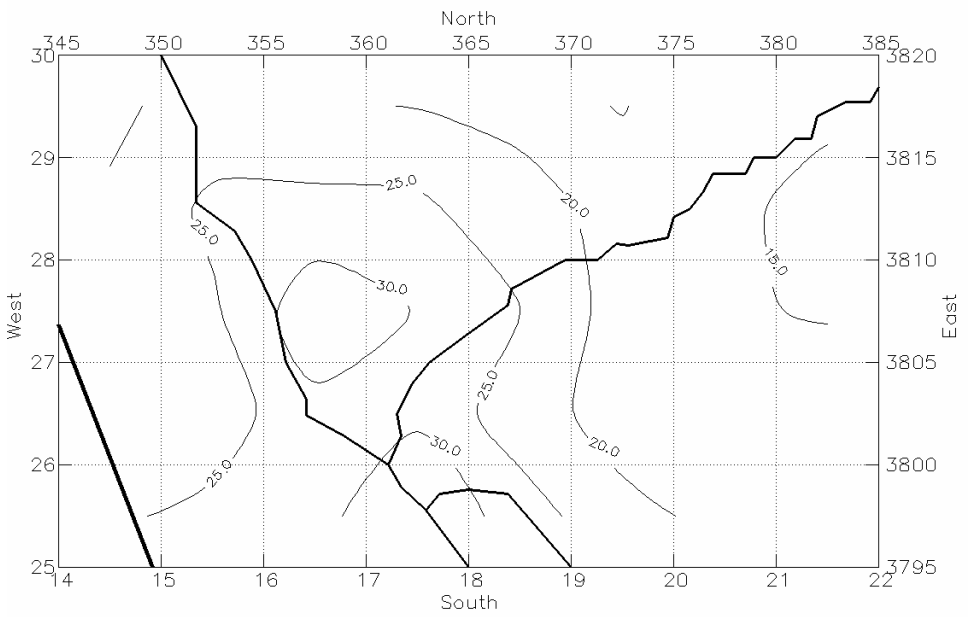

FIGURE 4-1

2002 Simulated Annual Average Santa Clarita PM10 (µg/m3)

While construction contributes to a portion of the mobile source emissions, its direct impact is in the area source category. By taking the area source emissions out of Santa Clarita, an estimate can be made of the impact of current (2002) construction to dust levels in the area. Doubling the mobile source emissions provides an estimate of the impact of growth on the community after the construction activities have stabilized. The impact of future construction emissions on Santa Clarita particulate air quality is addressed separately, and discussed in a later section of this document.

Table 4-1 summarizes the results of these sensitivity analyses. From the 2003 AQMP air quality simulations, PM2.5 accounts for roughly 57 percent of the PM10 total mass concentration in the city of Santa Clarita. When area source emissions were removed from the city of Santa Clarita, the PM10 concentrations were projected to decrease by an average of 10 percent. For the same emissions scenario, PM2.5 concentrations were predicted to decrease by approximately 7 percent. When mobile source emissions were doubled, only a nominal increase in PM10 and PM2.5 concentrations was predicted. What can be inferred from these analyses is that current construction activities are an identifiable contributor to particulate levels in the community; however, the overwhelming contribution is from upwind transport.

In addition, growth within the valley (excluding direct construction emissions or mining activities) will have a nominal impact on air quality.

TABLE 4-1

Annual Particulate Air Quality Simulation Sensitivity Analyses Summary:
Percentage Change in Concentration from 2002 Base Emissions

	No Area Sources	**Doubled Mobile Source Emissions**
PM10	-10 %	+1%
PM2.5	-7%	+2%

5.0 PARTICULATE SIMULATIONS: CONSTRUCTION AND DEVELOPMENT

A significant portion of the analysis was directed towards determining the impact of future construction on PM10 air quality in the Santa Clarita Valley. The AQMP 2006 and 2010 future year projections of air quality in the Santa Clarita Valley reflect the growth estimates provided by the Southern California Association of Governments (SCAG). Regardless, the Santa Clarita Valley is not expected to complete its build-out by 2010. City growth estimates expect place construction activities continuing over the next 25 to 30 years. Included in this estimate is the development of Newhall Ranch which will produce more than 21,000 homes before the project is completed. In the short term, mining activities from the Soledad Sand and Gravel Mining Project (Cemex/TMC) located to the east of the city are expected to commence mid-decade and expand operations at an accelerated rate thereafter. This will result in increased local particulate emissions.

Two sensitivity analyses were conducted to estimate the potential impacts of construction and mining to the air quality profile. These included simulating (1) the simultaneous build-out of all recorded, pending and approved land parcels in the valley over a 25-year period and (2) the phased development of the Cemex/TMC mining operations. The 25-year build-out of the valley was simulated to determine the additional annual impact on PM10 air quality that would be added to the current profile. It is noted that the simultaneous build-out of all parcels over the 25-year period is unlikely; however, this estimate places and upper bound on the estimated PM10 impact.

5.1 Emissions for the Twenty-five Year Build-Out

Residential construction growth and associated PM10 emissions were determined for each available land parcel by scaling development on an acreage basis to the profile of development determined for the Newhall Ranch project. PM10 emissions from multi-dwelling, commercial and industrial development were scaled on an acreage basis and then allocated based on required time estimated for building construction (e.g. a commercial dwelling requires 1 year to complete construction). Figure 5-1 depicts the distribution of parcel tracts in the study area with the modeling grid overlaid. CARB construction emissions factors were used to translate development into PM10 emissions. The phased and maximum allowable PM10 emissions for the Cemex/TMC mining operations were extracted from the project's Final Environmental Impact Statement (EIS) and the Consent Decree settlement document in the lawsuit Cemex v. County of Los Angeles (Case Number CV-02-747 DT).

Figure 5-2 depicts the daily PM10 emissions expected to result from the projected 25-year build-out of the Santa Clarita Valley overlaid on the modeling grid. The daily PM10 emissions total just over 3 tons per day in the Valley. As an example of the diversity of the development, Table 5-1 lists the tracts that contribute to the construction estimation and their status for development for grid 19,29. Fifteen tracts covering 1,567 acres of land in the 5 square kilometer grid are projected to contribute 337 lbs of PM10 emissions on a daily basis.

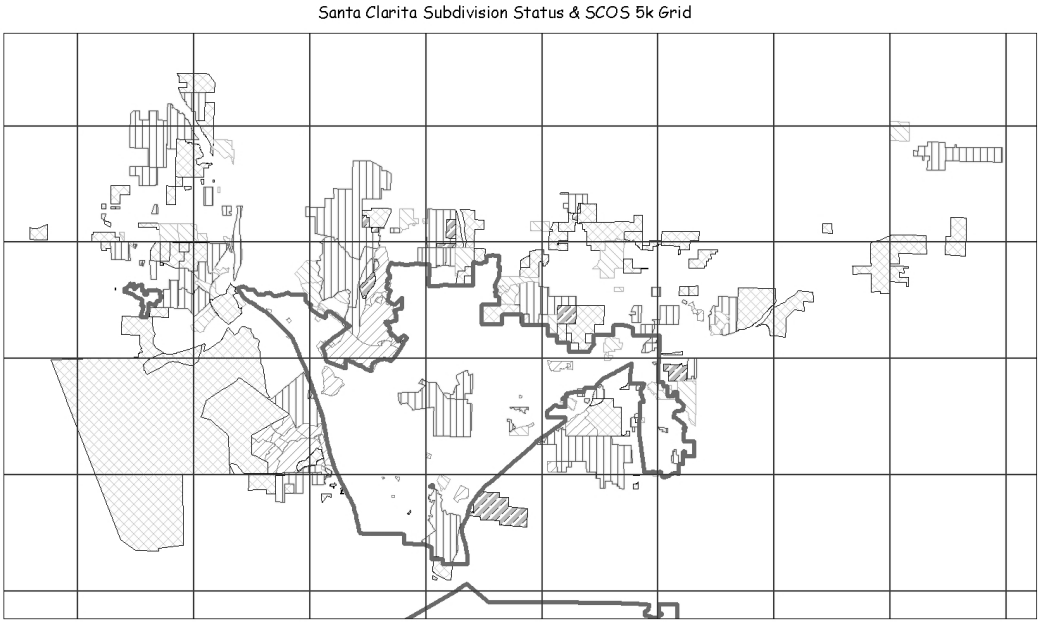

FIGURE 5-1

Santa Clarita Land Parcel Subdivisions

j \ i	*15*	*16*	*17*	*18*	*19*	*20*	*21*	*22*
30	**387**	**130**	**182**	**62**	**101**	**18**	**7**	**99**
29	**365**	**411**	**378**	**288**	**337**	**143**	**81**	**42**
28	**552**	**383**	**90**	**101**	**273**	**46**	**0**	**0**
27	**227**	**44**	**15**	**266**	**13**	**0**	**0**	**0**
26	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

FIGURE 5-2

25-Year Build-Out Grid Level PM10 Emissions (lbs/day)
(Grid coordinates are listed as italics)

TABLE 5-1

Parcel Tracts Contributing PM10 Emissions in Grid 19,29 (Shaded in Figure 5-2)

TRACT	STATUS	ACRES
44967	RECORDED	338
45416	RECORDED	115
46353	APPROVED	65
46626	RECORDED	79
46716	APPROVED	30
49024	PENDING	37
49621	APPROVED	9
50467	PENDING	58
50846	PENDING	477
52194	PENDING	63
52355	APPROVED	33
52777	PENDING	79
52790	APPROVED	53
52990	PENDING	79
53074	APPROVED	52

5.2 PM10 Emissions from the Cemex/TMC Mining Site

As previously stated, PM10 emissions from the Cemex/TMC mining site reflect the projected routine operation and maximum allowable levels of production for two scheduled, phase-in periods. The emissions for the mining site (located in grid 21,29) were extracted from the Final EIS for the project. For all scenarios, the mining site was assumed to operate on a Monday through Friday schedule for 16 hours a day. Figure 5-3 depicts the topography of the Cemex/TMC mining site in reference to the surrounding area.

Mining operations were projected to occur in two phases: Phase I, years 1-10; and Phase II, years 11-20. The PM10 emissions for Phase I were estimated at 445 lbs/day. Phase II emissions were estimated at 641 lbs/day. As part of the Concent Decree settlement document, a maximum allowable PM10 emissions rate of 761 lbs/day was included in the finer scaled PM10 analysis. This rate reflected a maximum allowable production rate of five million tons of excavation per year. All mining emissions were allocated to grid 21,29 for the analysis.

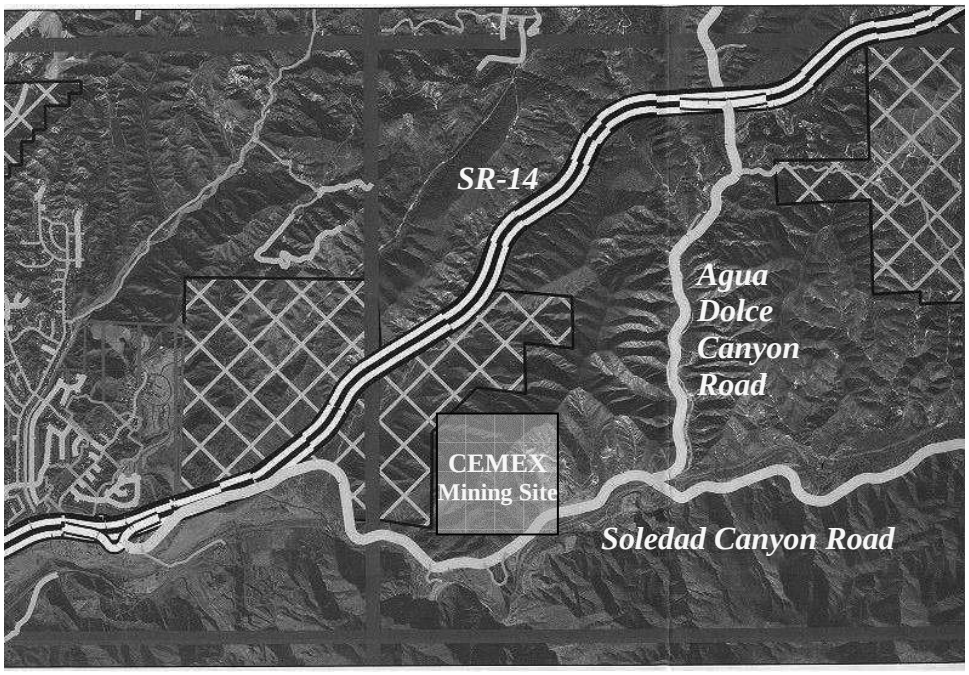

FIGURE 5-3

Cemex/TMC Mining Site in Soledad Canyon

5.3 Projected Future Year Impacts from Sensitivity Analyses

The projected PM10 impacts from the 25-year build-out and the two phases of mining operations were simulated to determine the upper bounds of additional PM10 that would be expected to impact the Santa Clarita Valley in the near term (1-10 years) and long term (10-20 years). The additional PM10 impacts from the 25-year build-out and the Phase I mining operation are presented in Figure 5-4. A maximum increase in annual PM10 concentration of 5 $\mu g/m^3$ is projected from the 25-year build-out. The predicted impact of the Cemex/TMC mining operation is approximately 2 $\mu g/m^3$, focused on the immediate area surrounding the mine. When the mining operation shift to Phase II, the impact will increase to 3 $\mu g/m^3$; however, there will be no net change in the impact caused by the 25-year build-out.

Figure 5-5 combines the projected 25-year annual build-out and Phase I mining operations PM10 impacts with the observed 2002 concentrations. Figure 5-6 repeats this process for the annual 25-year build-out impact and Phase II mining operations and the 2006 AQMP projected PM10 air quality. (While 2006 is within the Phase I time frame, future year modeling beyond 2006 shows little change in the spatial distribution and concentration levels in the Santa Clarita portion of the modeling domain; as a consequence 2006 is representative of the Phase-II projected PM10 baseline). As depicted, the federal PM10 standard would not be exceeded with the proposed build-out or development of the mining site in either the near-term or long-term analysis. PM10 air quality would exceed the more protective California standard in both scenarios.

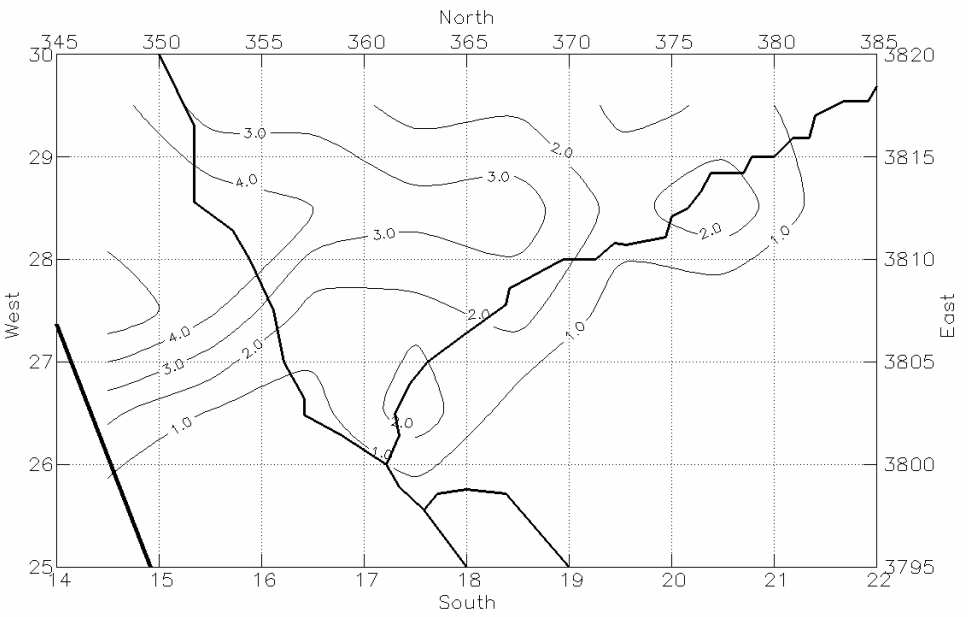

FIGURE 5-4

Simulated Annual PM10 Impact (µg/m^3): 25-Year Build-Out & Phase I Mining

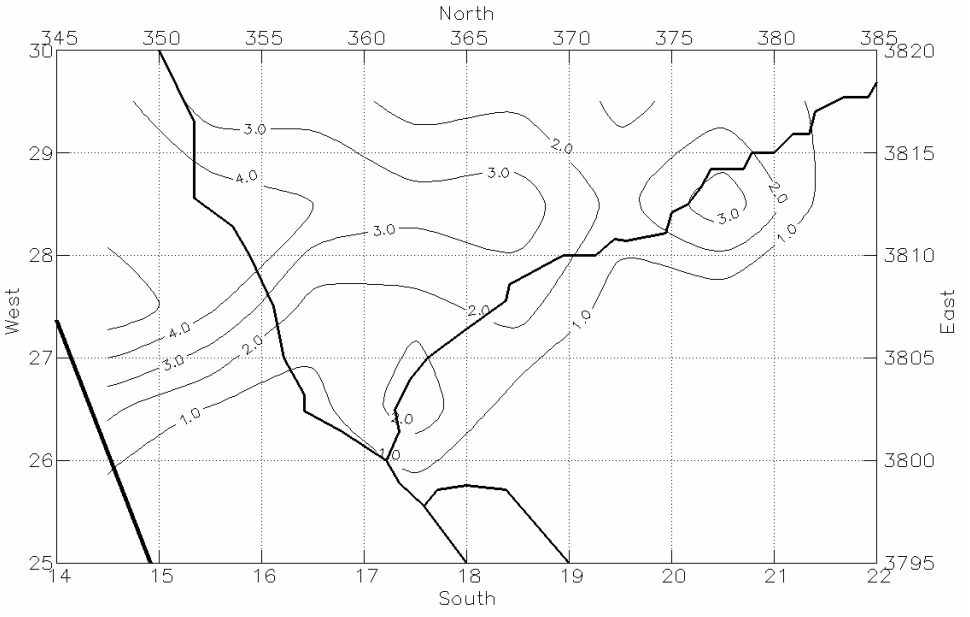

FIGURE 5-5

Simulated Annual PM10 Impact (µg/m^3): 25-Year Build-Out & Phase II Mining

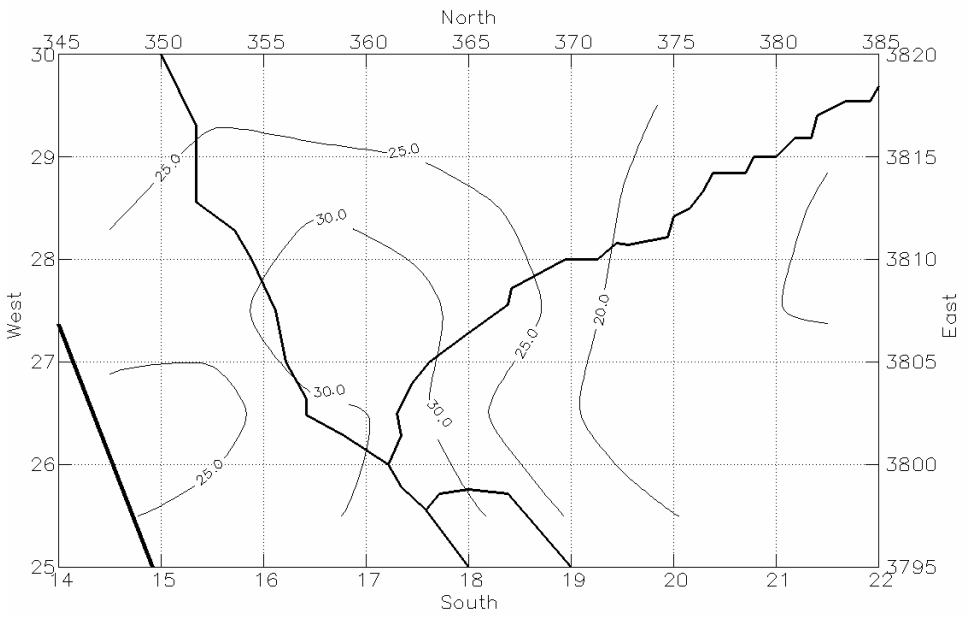

FIGURE 5-6

Simulated 2002 Annual PM10 (µg/m^3) With Build-Out and Phase I Cemex/TMC Mining

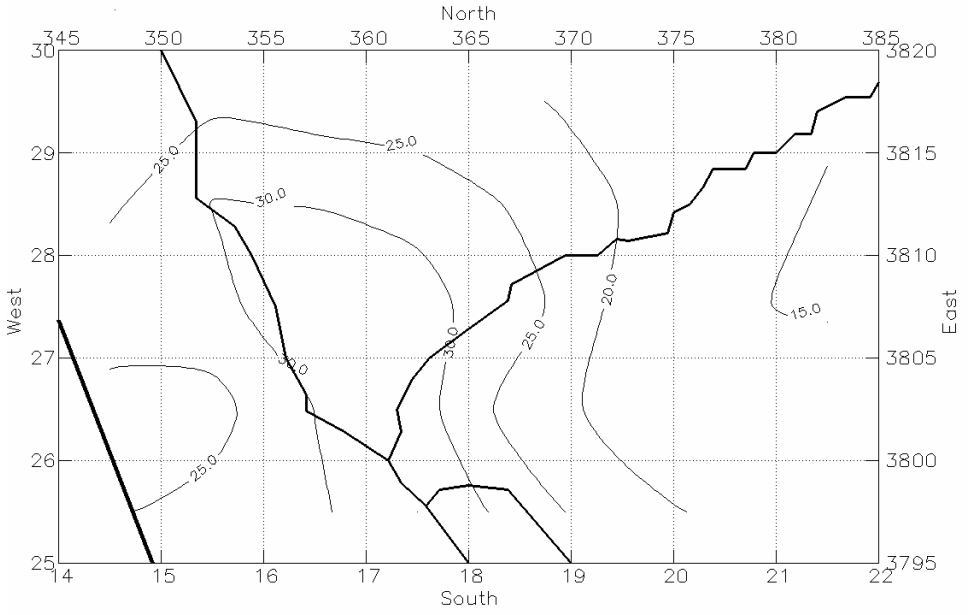

FIGURE 5-7

Simulated 2006 Annual PM10 (µg/m^3) With Build-Out and Phase II Cemex/TMC Mining

5.4 Simulating Cemex/TMC Emissions at a Finer Scale of Resolution

The preceding PM10 simulations provided the regional impacts due to growth and development of the Cemex/TMC mining site. However, the 5 square kilometer grid resolution does not lend itself to determining the local impacts from the mine operations to nearby sensitive receptors of PM10. A second sensitivity modeling simulation analysis was conducted to determine the finer scale gradient of projected PM10 impact. This analysis used the U.S. EPA ISCST3 point source model to simulate mining operations and determine the offsite impacts at a grid resolution of 500 meters. Annual average PM10 concentrations were calculated for each grid intersection or "flag pole" emanating from the mine boundary at 500 m intervals out to 5 km.

Figure 5-8 depicts the mining site with the 500 m and 5 km grid overlaid. The closest residential dwelling is located approximately 500 m to the south of the mining site and the nearest sensitive receptor (school) is located approximately 4,500 m to the west of the mining site.

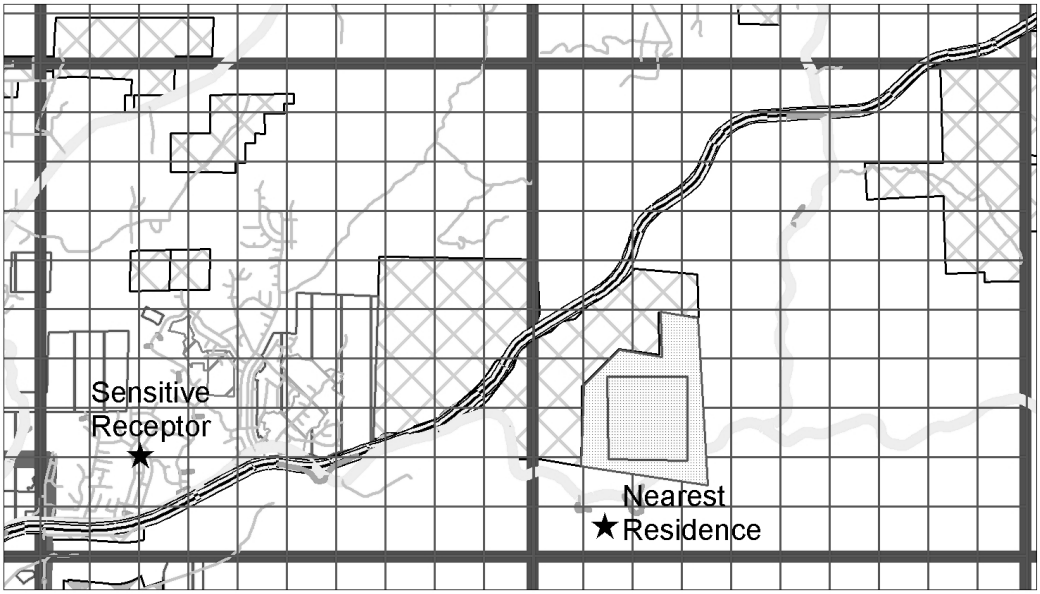

FIGURE 5-8

Cemex/TMC Mining Site With Flag Pole Grid

The simulation was conducted for a one-year period using both urban and rural meteorology developed for the mining site from the 1998-99 MATES-II meteorological modeling data. In general, simulations using a Gaussian model in the Basin are conducted using the urban meteorological assumption. Due to its unique

topography, the Santa Clarita Valley was simulated using both the urban and rural meteorological assumptions to bound the analysis.

Table 5-2 summarizes the results of the simulations. As expected, the modeling analysis using the rural meteorological option produced the highest impacts to the community with concentrations projected to reach approximately 18 $\mu g/m^3$ at the fence line. The maximum impacts to the nearest residence and nearest sensitive receptor (Phase II using the rural option) were calculated at 12.5 and 0.2 $\mu g/m^3$ respectively. When the flag pole concentrations were averaged over the 5 square km grid (21,29), the average impact was consistent with that simulated using the AQMP modeling platform. In all of the scenarios, including the rural maximum allowable case, the projected impact added tot he baseline PM10 would not result in a violation of the federal annual average standard.

TABLE 5-2

ISCST3 Simulated PM10 Impacts ($\mu g/m^3$) from Cemex/TMC Mining Site

Impacted Receptor	**Phase I**		**Phase II**		**Maximum Allowable**	
	Urban	Rural	Urban	Rural	Urban	Rural
5-Km^2 Grid Average	1.4	3.1	2.0	4.5	2.6	5.7
Fence Line	4.2	12.2	6.0	17.6	7.7	22.3
Nearest Residential	2.9	8.7	4.2	12.5	5.3	15.9
City Line - Canyon Country	0.3	0.7	0.4	1.0	0.5	1.3
Northeast Modeling Region	0.2	0.4	0.3	0.6	0.4	0.7
Nearest Sensitive Receptor	0.1	0.2	0.1	0.2	0.2	0.3

6.0 RISK FROM DIESEL PARTICULATES

The final phase of the analysis focused on the potential toxic impact or "risk" that could arise from the development of the Cemex/TMC mining site due to emissions of diesel particulate, both from in-situ operations and from gravel hauling offsite.

Risk is expressed as a probability of the development of excess cancer cases to the community based upon a lifetime (70 years) of exposure. The 1999 Multiple Air Toxics Exposure Study II (MATES II) analysis conducted for the South Coast Air Basin estimated that the Santa Clarita average community risk from all sources of toxic emissions was approximately 500 in million. (The basin-wide average estimated by MATES II exceeded 1,400 in one million). Exposure to diesel particulates was the major driver of risk to the community.

Diesel particulates have been shown to have a unit risk factor of 300 in one million for every 1.0 $\mu g/m^3$ of exposure. As a consequence, even comparatively small emissions can have a significant increased risk to the community. For comparison purposes, AB2588-Air Toxics "Hot Spots" Program notification and risk reduction levels are 10 and 25 in one million. Risk is presented in this analysis for both the urban and rural meteorological assumptions. In general, the SCAQMD uses the urban meteorological mode for hazardous risk assessments. Since the Santa Clarita Valley has a rural component, the simulations were conducted for the rural mode as well as the urban model. The assessment of risk using the two meteorological assumptions places an upper bound on the expected risk to the community.

6.1 In-Situ Mining Operations

Table 6-1 provides the Final EIS estimated annual diesel emissions rates for the various operations option and load considerations for the Cemex/TMC mine. Note: emissions for Phase II operations decrease compared with Phase I. This reflects the implementation of federal and California diesel control measures later in this decade. The diesel emissions were used to scale the ISCST3 predicted point source impacts to determine risk to the community neighboring the mining site. The results of the analysis are presented in Table 6-2.

TABLE 6-1

Diesel Particulate Emissions From Cemex/TMC Mine

Operation Option	**Annual Emissions Rate**
Phase I	1,528 lb/yr
Phase I Maximum Allowable	3,043 lb/yr
Phase II	1,431 lb/yr
Phase II Maximum Allowable	1,817 lb/yr

TABLE 6-2

ISCST3 Simulated Risk from Diesel Particulate from Cemex/TMC Mining
(Increased Probability of Excess Cancers Per Million People Exposed)

Impacted Receptor	Phase I				Phase II			
	Average Operations		Maximum Allowable		Average Operations		Maximum Allowable	
	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural
Fence Line	16	47	32	93	15	44	18	52
Nearest Residential	11	33	22	66	10	31	12	37
City Line - Canyon Country	1	3	2	6	1	2	1	3
Northeast Modeling Region	1	2	2	4	1	1	1	2
Nearest Sensitive Receptor	0	1	1	2	0	1	0	1

The maximum risk predicted by the model simulation occurs at the fence line of the mining site for the Phase I maximum allowable emissions scenario and the rural meteorology option. The maximum predicted risk to the nearest residence exceeds the 25 in one million criteria required for implementing risk reduction measures for the rural meteorology scenarios. However, when the impacts are estimated for the Santa Clarita city line and the nearest sensitive receptor (i.e. school), regardless of the emissions rate or meteorology, the risk falls below 10 in one million. Figure 6-1

depicts this tight gradient of impact for the rural meteorological mode, this time drawn over the two square kilometer grid used for the MATES II analysis. Impacts offsite quickly dissipate with distance from the Cemex/TMC Soledad Canyon facility.

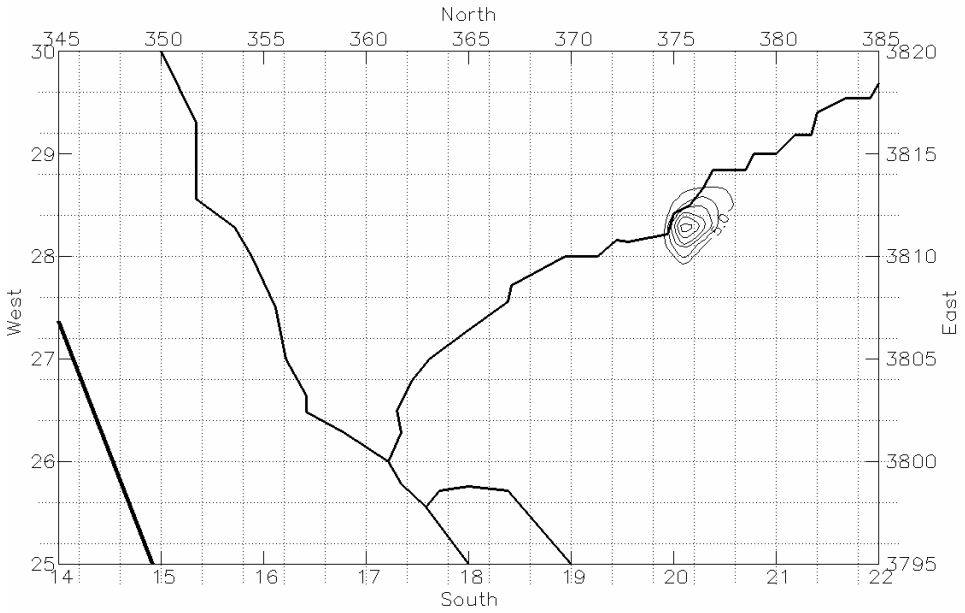

FIGURE 6-1

ISCST3 Phase I Simulated Diesel Risk From Cemex/TMC Mine Operations: Rural Mode
(Increased Probability of Excess Cancers Per Million People Exposed)

6.2 Gravel Hauling Operations

The simulation of risk due to diesel emissions was not limited to in-situ operations but extended beyond the mine due to gravel hauling through the Santa Clarita Valley to local end users and recipients in adjacent valleys. Based upon assumptions provided in the Final EIS, Phase I gravel hauling from the mine will result in 347 round trips by heavy-duty diesel trucks. Phase II will see an increase to 582 round trips. The truck hauling operations are expected to continue 24 hours a day with truck traveling at an average speed of 45 mph. Emission rates for heavy-duty diesels operating under these two travel scenarios (Phase I, 0.312 grams/mile; Phase II, 0.185) were extracted from the CARB EMFAC2002 emissions factor model.

Note again, the emissions rate for Phase II operations is lower than for Phase I reflecting the required introduction of cleaner vehicles and fuels. As a consequence, the daily emissions rate (truck trips multiplied by the appropriate diesel emissions factor) for Phase I and Phase II gravel hauling operations are essentially equal. Since

the difference between the estimated daily emissions rates is nominal, (Phase I being slightly higher), the projected Phase I risk from diesel truck hauling operations stands as a baseline for this analysis and is the only assessment presented.

If the option is exercised to expand gravel production to the maximum allowable rate provided in the Consent Decree, then hauling and the number of truck trips is expected to increase accordingly. Phase I projected risk due to diesel truck emissions under the maximum allowable production rate is estimated to increase by approximately 70 percent over the baseline while Phase II projected risk is estimated to increase by approximately 19 percent over the baseline.

The EIS provided some direct guidance on the direction of truck hauling with 95 percent of the transit moving west towards Santa Clarita and San Fernando Valleys and 5 percent routed east towards the Antelope Valley. However the truck routing through the Santa Clarita Valley was not explicitly provided. Based on estimates of population growth rates and estimates of future aggregate consumption (EIS Table 1.1-3), it was assumed that 54 percent of the westward-bound hauling would be earmarked for the San Fernando Valley traveling exclusively along SR 14. The remaining 46 percent of the westward-bound hauling would fill the needs of the Santa Clarita Valley and would be split between routes including SR 14 and Soledad Canyon Road. Gravel hauling was assumed to extend as far west as the Newhall Ranch development.

Meteorological data sets for four representative locations in the Santa Clarita Valley and the ISCST3 dispersion model were used to calculate diesel impacts to the Santa Clarita Valley for both urban and rural modes. The impacts were calculated for a one kilometer grid for each meteorological data set and the results were merged to provide a mapping of probable diesel impacts and risk to the Valley.

Figure 6-2 depicts the estimated baseline risk from truck hauling for the urban meteorological assumption. In isolated areas, risk exceeds 10 in one million with the maximum impact occurring along the SR 14 freeway. When the less dispersive rural meteorological assumption is used, the impacts increase along the SR 14 corridor and expand along Soledad Canyon Road. (See Figure 6-3). The highest estimated risk for both model simulations occurs near the SR 14 - Soledad Canyon Road separation with a maximum of 25 in one million for the rural meteorological option. In addition the maximum risk to a sensitive receptor occurs within one kilometer of the SR 14 freeway with values of 7 in one million for the urban meteorological mode and 20 in one million for the rural mode.

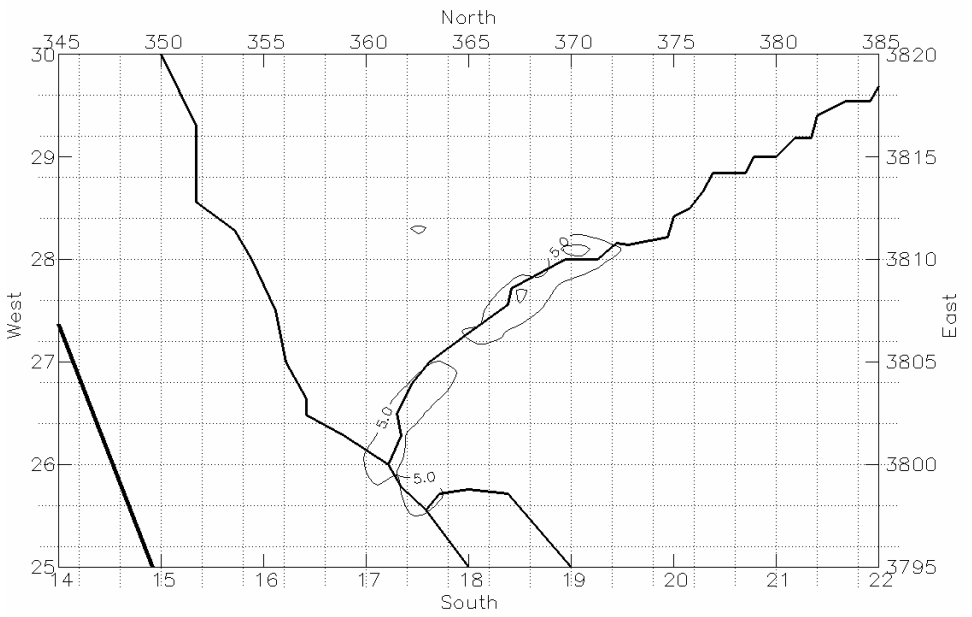

FIGURE 6-2

Simulated Baseline Diesel Risk from Cemex/TMC Gravel Hauling Operations: Urban Mode
(Increased Probability of Excess Cancers Per Million People Exposed)

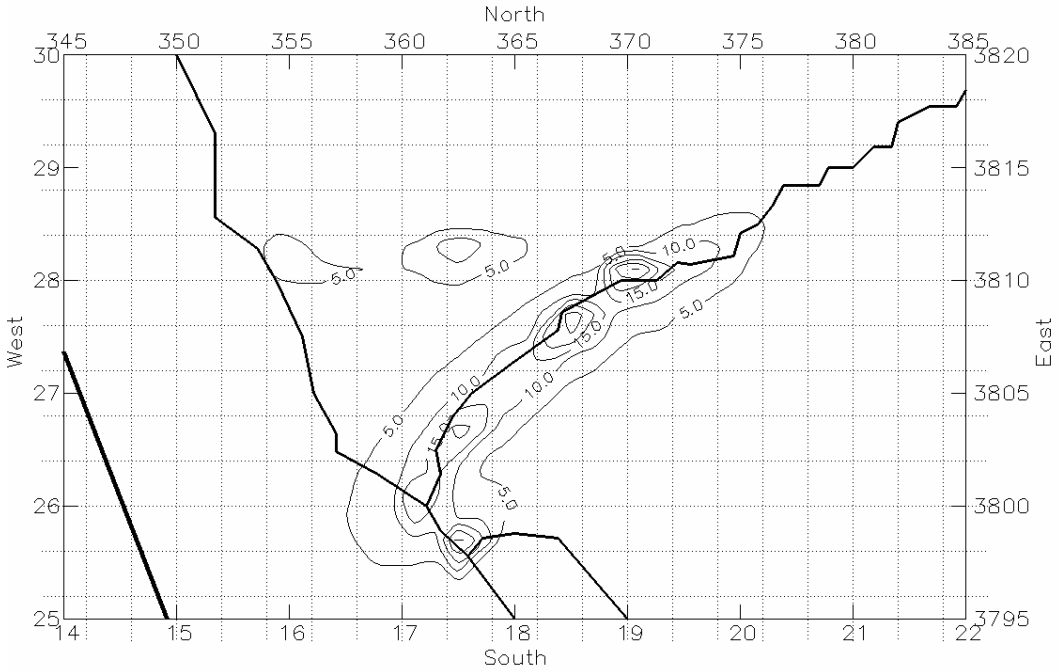

FIGURE 6-3

Simulated Baseline Diesel Risk From Cemex/TMC Gravel Hauling Operations: Rural Mode
(Increased Probability of Excess Cancers Per Million People Exposed)

6.3 Merged Diesel Risk: Mining and Gravel Hauling Operations

Figure 6-4 shows the simulated baseline risk when the mining and gravel hauling operations are merged (for the rural meteorological assumption). Because of the localized impact caused by the in-situ mining operations, there is very little overlapping risk caused by the hauling operations. As a consequence, the results of the risk assessment reported through the table and graphics in the two previous sections do not change significantly when the analyses are merged.

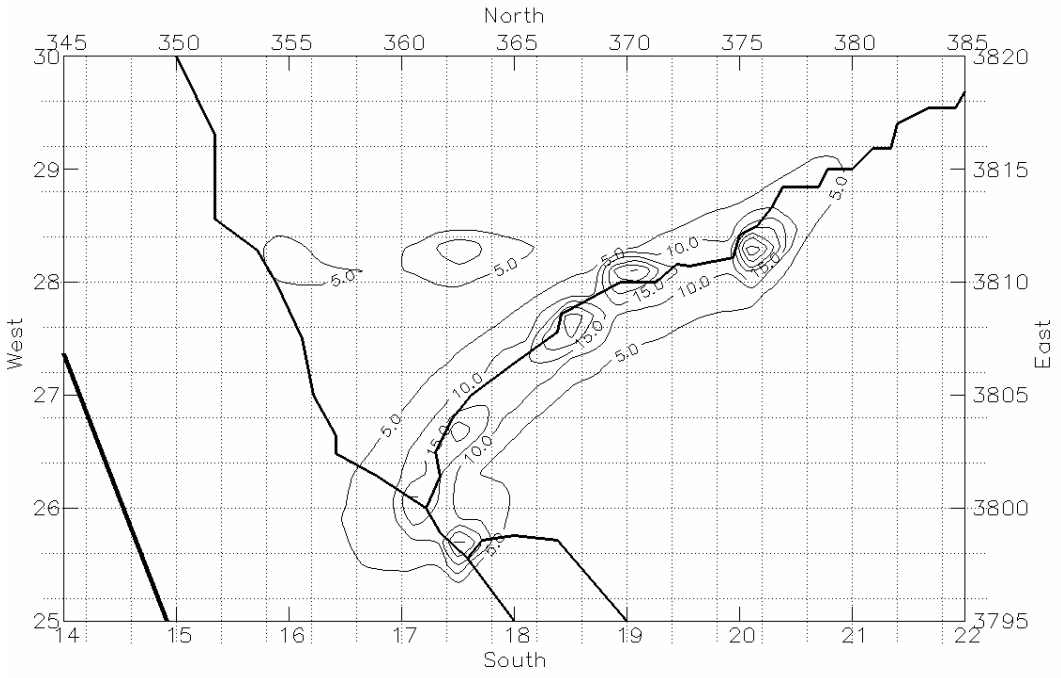

FIGURE 6-4

Merged Baseline Diesel Risk From Cemex/TMC Mining and
Gravel Hauling Operations: Rural Mode
(Increased Probability of Excess Cancers Per Million People Exposed)

7.0 POTENTIAL MITIGATION ACTIONS

The City of Santa Clarita is drafting an aggressive air quality element to its General Plan that will contain many potential mitigation measures to offset the air quality impacts associated with growth and regional transport of smog. The draft element includes measures that address traffic flow through the Valley, the use of alternatively fueled city vehicles and refueling stations, and rideshare programs, among others that address the city's commitment to reducing regional smog. Two bullet lists follow which provide potential additional mitigation measures that specifically address impacts from the issues of PM10 fugitive dust associated with growth and diesel mobile source emissions from the development of the Soledad Canyon mining site.

7.1 Potential Mitigation Measures for PM10 Fugitive Dust

Rule 403-Fugitive Dust provides a comprehensive list of dust control measures. Required control measures and recommended guidance measures that go beyond the requirements of Rule 403 can be implemented to mitigate fugitive dust emissions during construction and operation of aggregate handling facilities. For example, where Rule 403 identifies an option for implementing several control measures, mitigation measures can include several or all of the control measures and recommended guidance. In addition, mitigation measures can also include increasing the frequency of measures, such as watering, to go beyond the recommended guidance under Rule 403.

- Installation of monitoring devices around perimeter of site to collect samples during the construction and operation of the project to ensure that the PM10 levels do not exceed 50 $\mu g/m^3$ pursuant to requirements under Rule 403.

- Signs posted with a phone number for the public to report dust problems.

- Apply water three times daily, or non-toxic soil stabilizers according to manufacturers' specifications, to all unpaved parking or staging areas or unpaved road surfaces (compared to watering twice daily as the minimum required by Rule 403).

- Pave construction roads that have a traffic volume of more than 50 daily trips by construction equipment, 150 total daily trips for all vehicles (compared to watering twice daily as the minimum required by Rule 403).

- Pave all construction access roads at least 100 feet onto the site from the main road (for sites $\leq$ 5 acres or $\leq$ 100 cubic yards daily import/export of bulk material).

- Pave construction roads that have a daily traffic volume of more than 50 vehicular trips (compared to watering twice daily as the minimum required by Rule 403).

7.2 Potential Mitigation from Diesel Mobile Sources

- Use of aftertreatment control technologies such as diesel oxidation catalysts.
- Use of alternative diesel fuels such as emulsified diesel fuel.
- Provide a minimum buffer zone of 300 meters between truck traffic and/or and sensitive receptors.
- Re-route truck traffic by adding direct off-ramps for the truck traffic or by restricting truck traffic on certain sensitive routes.
- Improve traffic flow by signal synchronization.
- Enforce truck parking restrictions.
- Develop park-and-ride programs.
- Restrict truck engine idling.
- Restrict operation to “clean” trucks.
- Provide electrical hook-ups for trucks that need to cool their load.
- Electrify auxiliary power units.
- Provide onsite services to minimize truck traffic in or near residential areas, including, but not limited to, the following services: meal or cafeteria service, automated teller machines, etc.
- Require or provide incentives to use low-sulfur diesel fuel with particulate traps.
- Conduct air quality monitoring at sensitive receptors.

APPENDIX F3.13

Water Service Information

The Santa Clarita Valley 2010 Water Quality Report

Castaic Lake Water Agency (CLWA) and the local water retailers continuously work to provide new ways to ensure you and your neighbors have a reliable water supply at a reasonable price. We are committed to maintaining high quality water for you, our customers. The California Department of Public Health requires water agencies to publish a report that provides background on the quality of your water and shows you how it meets or exceeds federal and state drinking water standards.

This 2010 Annual Water Quality Report describes in detail the quality of local water supplies in Santa Clarita Valley. In 2009, CLWA and the local retailers met all of the drinking water quality standards. Further explanations of the requirements are in the accompanying pages.

Water conservation is a collaborative effort between CLWA, the local water retailers and their customers. Santa Clarita Valley's water supply remains sufficient to meet resident's needs in 2010, largely due to the community's ongoing conservation efforts and rainfall experienced earlier this year.

Despite this year's normal rainfall total, California has not yet recovered from three consecutive years of drought and residents need to continue to conserve water inside and outside. Remember to water at night or the early morning hours and regularly check your toilets and faucets for leaks.

Last year, we launched a series of programs to encourage residents and businesses to continue their conservation efforts. These programs include free on-site water survey for businesses, institutions and homeowners' associations as well as residential programs for free weather-based irrigation controllers. We urge businesses and institutional customers to take action and reduce water use by signing up for free water use surveys. We will evaluate your business' water use patterns and offer ways you can reduce water use and save money.

In addition, our new plant book "Colorful Landscapes for Water Conservation" makes it easy for both novice and experienced gardeners to incorporate California-friendly plants into their gardens. Take a trip to the CLWA Conservatory Garden to pick up your free copy or sign up for one of the free monthly Landscape Education workshops. Visit us on the web at www.clwa.org for more easy water conservation tips. Also, check with your local water retailer for its conservation programs.

If you have any questions about this report or water quality, please contact us at 661-297-1600. Additional information is available from the local water retailers, whose contact information is supplied at the end of this report.

Sincerely,

Dan Masnada
General Manager
CLWA

Steve Cole
General Manager
NCWD

Mauricio Guardado
Retail Manager
SCWD

Robert DiPrimio
President
VWC

Adam Ariki
District Engineer
Los Angeles County
Waterworks District #36

NOTE: All of the test results in this report were run in 2009 unless noted otherwise. If you do not find a chemical listed in this report, it was not found in any test performed on local water. Your local water supplier is therefore in compliance with all drinking water regulations unless a specific violation is noted.

CASTAIC LAKE WATER AGENCY

CLWA SANTA CLARITA WATER DIVISION

NEWHALL COUNTY-WATER DISTRICT

VALENCIA WATER COMPANY

LA COUNTY DEPARTMENT OF PUBLIC WORKS

REMEMBER:

Use Water Wisely It's a Way of Life

The Castaic Lake Water Agency wants all customers to rethink household and outdoor water habits and reduce water use even more during the hot, dry summer months.

You can easily reduce water use with simple adjustments to your outdoor watering:

- Replace a section of your water guzzling grass with California friendly plants
- Reduce evaporation by watering at night or early morning
- Avoid runoff by setting your sprinklers to run for two short cycles

By conserving water, you help your water providers help you.
To find out how, visit **clwa.org or scvh2o.org.**

FOR MORE INFORMATION

CASTAIC LAKE WATER AGENCY
David Kimbrough | 661-297-1600 x223
E-mail: dkimbrough@clwa.org | Website: www.clwa.org
The Castaic Lake Water Agency is governed by a Board of Directors that meets at 6:30 pm on the second and fourth Wednesdays of each month at the Rio Vista Administration Building, 27234 Bouquet Canyon Road.

CLWA SANTA CLARITA WATER DIVISION
Cathy Hollomon | 661-259 -2737
E-mail: chollomon@scwater.org | Website: www.scwater.org
The Santa Clarita Water Division is a division of the CLW . The CLWA Retail Operations Committee meets at 6:30 pm on the first Monday of each month at the SCWD office, 22722 Soledad Canyon Road.

NEWHALL COUNTY WATER DISTRICT
Ryan Bye | 661-259-3610
E-mail: rbye@ncwd.org | Website: www.ncwd.org
The Newhall County Water District is governed by a Board of Directors that meets at 6:30 pm on the second Thursday of each month at the District Board Room, 23655 Newhall Avenue, Suite "C."

VALENCIA WATER COMPANY
James Saenz | 661-294-0828
E-mail: jsaenz@valenciawater.com | W .valenciawater.com
The Valencia Water Company is a public water utility regulated by the California Public Utilities Commission. The office is located at 24631 Avenue Rockefeller.

LOS ANGELES COUNTY WATERWORKS DISTRICT NO. 36
Timothy Chen | (626) 300-3342
E-mail: tchen@dpw.lacounty.gov | W .lacwaterworks.org
Waterworks District No. 36 is governed by the Los Angeles County Board of Supervisors that meets every Tuesday at 9:30 am at the Kenneth Hahn Hall of Administration, 500 West Temple Street Room 381B, Los Angeles.
On Tuesdays following a Monday holiday, the meetings begin at 1:00 pm.

Este informe contiene información muy importante sobre su agua potable. Si usted quisiera el texto en español para este reporte, comuníquese con David Kimbrough al número de teléfono 661-297-1600 x223.

CASTAIC LAKE WATER AGENCY

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CLWA PROVIDES WATER TO LOCAL PURVEYORS

CLWA receives and treats surface water from the SWP and other imported sources. The SWP consists of facilities operated by the California Department of Water Resources to conserve and convey water to SWP contractors for use as agricultural or urban supply. CLWA operates two water treatment plants, the Earl Schmidt Filtration Plant (ESFP) in Castaic and the Rio Vista Water Treatment Plant (RVWTP) in Saugus. The SCV's four water purveyors distribute the treated imported water along with groundwater from the shallow Alluvial aquifer and the deeper Saugus formation. Water quality information for your area is presented in the table contained in this report.

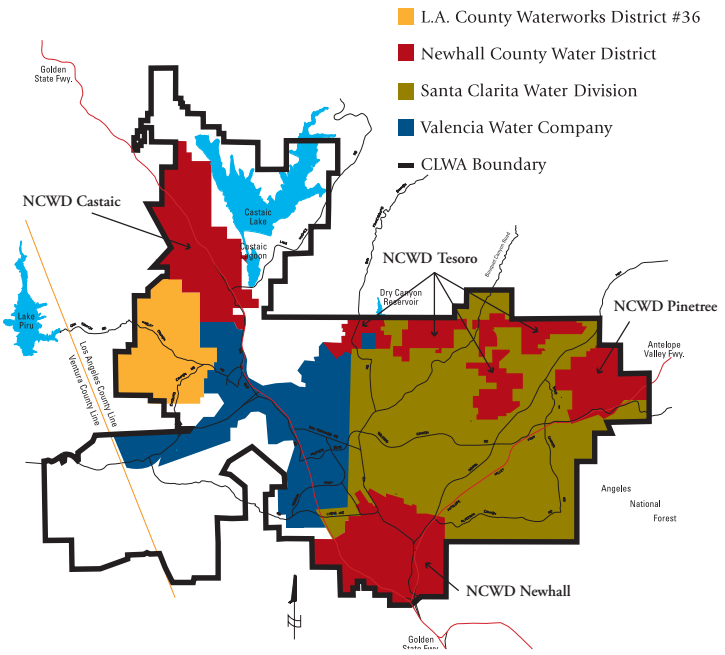
CLWA Santa Clarita Water Division (SCWD) provides water to a portion of the City of Santa Clarita and unincorporated portions of Los Angeles County in the communities of Saugus, Canyon Country and Newhall. Customers received approximately 64% imported water and 36% local groundwater in 2009.

Los Angeles County Waterworks District #36 (LACWD #36) serves customers located in Hasley Canyon and the community of Val Verde. Customers received 100% imported water in 2009.

Newhall County Water District (NCWD) serves customers located in the Castaic, Newhall, Pinetree and Tesoro del Valle areas. In 2009, Castaic customers received 43% imported water and 57% local groundwater, Newhall customers received 20% imported water and 80% local groundwater, and Pinetree customers received 77% imported water and 23% local groundwater. Tesoro del Valle customers received 100% imported water.

Valencia Water Company (VWC) supplies water to customers in Valencia, Stevenson Ranch, and portions of Castaic, Saugus, and Newhall. In 2009, VWC customers received 48% imported water and 51% local groundwater and 1% recycled water was delivered to large landscape customers.

Castaic Lake Water Agency Service Area



CHEMICALS IN THE NEWS – NITROSAMINES (NDMA)

In complying with USEPA sampling requirements under the Unregulated Contaminant Monitoring Regulation – Cycle 2 (UCMR2), Valencia Water Company detected N-Nitrosodimethylamine (NDMA) above the detection limit for reporting of 2.0 parts per trillion in a few samples. These detections are at extremely low concentrations.

NDMA is formed from nitrites and amines. Recent research and results of UCMR2 data suggest this contaminant is created as a disinfection by-product during water treatment processes. In addition, NDMA has been found in groundwater near sites that used or manufacture rocket fuel or other combustible compounds.

Public health authorities are expected to regulate NDMA over the next few years. Recent laboratory studies have indicated NDMA caused various health risks in laboratory animals, including liver, kidney, lung and stomach cancer. NDMA has been detected in nearly 25% of public water supplies during the first 24 months of UCMR2 monitoring, at concentrations as high as 600 parts per trillion. For details you can visit the UCMR section on the EPA's website at http://www.epa.gov/safewater/ucmr/data.html.

WATER QUALITY DEFINITIONS

In order to ensure that tap water is safe to drink, the United States Environmental Protection Agency (USEPA) and the California Department of Public Health (DPH) prescribe regulations that limit the amount of certain contaminants in water provided by public water systems. USEPA, DPH and the California Environmental Protection Agency (CalEPA) set goals and legal standards for the quality of drinking water. These standards are intended to protect consumers from contaminants in drinking water. Most of the standards are based on the concentration of contaminants, but a few are based on a Treatment Technique (TT) to remove the contaminant. Drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some contaminants. The presence of contaminants does not necessarily indicate that water poses a health risk. More information about contaminants and potential health effects can be obtained by calling the EPA's Safe Drinking Water Hotline 1-800-426-4791.

Some people may be more vulnerable to contaminants in drinking water than the general population. Immuno-compromised persons such as persons with cancer undergoing chemotherapy, persons who have undergone organ transplants, people with HIV/AIDS or other immune system disorders, some elderly, and infants can be particularly at risk from infections. These people should seek advice about drinking water from their health care providers. USEPA/Centers for Disease Control (CDC) guidelines on appropriate means to lessen the risk of infection by Cryptosporidium and other microbial contaminants are available from the Safe Drinking Water Hotline.

When a contaminant is regulated based on concentration, there are three levels that are listed: 1) **Detection Limit for Report (DLR)**, 2) the **Public Health Goal (PHG)** or **Maximum Contaminant Level Goal (MCLG)**, and 3) the **Maximum Contaminant Level (MCL), Action Level (AL) or Notification Level (NL).**

The DLR is the smallest concentration of a contaminant that can be measured and reported. DLRs are set by DPH (same as MRL, Minimum Reporting Level, set by USEPA).

PHG and MCLG are the level of a contaminant in drinking water below which there is no known or expected risk to health. PHGs are set by Cal EPA. MCLGs are set by the USEPA.

A Primary MCL is the highest level of a contaminant that is allowed in drinking water. Primary MCLs are set as close to the PHGs (or MCLGs) as is economically and technologically feasible.

Secondary MCLs are set to protect the odor, taste and appearance of drinking water.

ALs are federal standards developed by USEPA that address the concentration of a contaminant which, if exceeded, triggers treatment or other requirements that a water system must follow.

NLs are state guidelines developed by DPH that address the concentration of a contaminant which, if exceeded, triggers public notification.

TTs are a required process intended to reduce the level of a contaminant in drinking water.

Maximum Residual Disinfectant Level (MRDL): The highest level of a disinfectant allowed in drinking water. There is convincing evidence that addition of a disinfectant is necessary for control of microbial contaminants.

Maximum Residual Disinfectant Level Goal (MRDLG): The level of a drinking water disinfectant below which there is no known or expected risk to health. MRDLGs do not reflect the benefits of the use of disinfectants to control microbial contaminants.

METALS AND SALTS

Metals and salts are tested in groundwater from wells once every three years and in Castaic Lake water every month. Small quantities of naturally occurring arsenic are found in Castaic Lake and in groundwater from a few wells. These are present due to the natural erosion of the rocks that water travels over or through. Inorganic compounds such as salts and metals can be naturally occurring or result from urban storm water runoff, industrial or domestic wastewater discharges, oil and gas production, mining, or farming.

A number of naturally occurring salts are found in both surface and well water. These include chloride, fluoride, nitrate, nitrite, calcium, magnesium, potassium, and sodium. Taken together they are called Total Dissolved Solids (TDS). Calcium and magnesium together are called "hardness" and can deposit as scale.

Nitrate in drinking water at levels above 45 mg/L is a health risk for infants less than six months of age. High nitrate levels in drinking water can interfere with the capacity of the infant's blood to carry oxygen, resulting in a serious illness; symptoms include shortness of breath and blueness of the skin. High nitrate levels may also affect the ability of the blood to carry oxygen in other individuals, such as pregnant women and those with certain specific enzyme deficiencies. Nitrate levels may rise quickly for short periods of time because of rainfall or agricultural activity. If you are pregnant or caring for an infant, y ld ask for advice from your health care provider. Nitrates are tested at least annually.

While your drinking water meets the federal and state standard for arsenic, it does contain low levels of arsenic. The arsenic standard balances the current understanding of arsenic's possible health effects against the costs of removing arsenic from drinking water. The USEPA continues to research the health effects of low levels of arsenic, which is a mineral known to cause cancer in humans at high concentrations and is linked to other health effects such as skin damage and circulatory problems.

DISINFECTION BY-PRODUCTS

The CLWA uses ozone and chloramines to disinfect its water. Disinfection By-Products (DBPs), which include Trihalomethanes (THMs) and Haloacetic Acids (HAA5) are generated by the interaction between naturally occurring organic matter and disinfectants such as chlorine and ozone. THMs and HAA5 a l average.

Ozone is a very powerful disinfectant that not only kills organisms that no other disinfectant can but also destroys organic chemicals that cause unpleasant tastes and odors.

MICROBIOLOGICAL

Microbial contaminants, such as viruses and bacteria, can be naturally occurring or result from urban storm water runoff, sewage treatment plants, septic systems, agricultural livestock operations, and wildlife.

The most important microbiological drinking water tests are for bacteria. Water is tested throughout the systems weekly for Total Coliform bacteria and for Escherichia coli (E. coli). The presence of E. coli indicates fecal contamination of waters. No E.coli was detected in any drinking waters in the SCV last year. Total coliforms are a group of bacteria that indicate water quality may have deteriorated. The MCL for total coliforms is 5% of all monthly tests showing positives for larger systems.

Additional microbiological tests for the water-borne parasites cryptosporidium parvum and giardia lamblia were performed on Castaic Lake water, and none were detected.

RADIOLOGICAL TESTS

Radioactive compounds can be found in both ground and surface waters, and can be naturally occurring or be the result of oil and gas production and mining activities. Testing is conducted for two types of radioactivity: alpha and beta. If none is detected at concentrations above five picoCuries per liter no further testing is required. If it is detected, the water must be checked for uranium and radium.

CLWA is required to monitor its source water for specific contaminants on a regular basis. R . CLWA failed to monitor as required for drinking water standards during the past two year and, therefore, was in violation of the regulations. In 2008 and 2009 one sample should have been collected for both tritium and strontium-90. Therefore, the quality of our drinking water during those two years is uncertain in regard to those two analytes. Even though this failure was not an emergency, as our customers, you have a right to know what you should do, what happened, and what we did to correct this situation. There is nothing you need to do at this time. CLWA has collected the appropriate samples and no standards were exceeded, as results from sampling in years preceding 2008 also indicated.

LEAD AND COPPER

The local water retailers are required to sample for lead and copper at specific consumer taps every three years. The results for lead and copper are reported as the 90th percentile. The 90th percentile is the result that is greater than 90% of all t ly for pregnant women and young children. Lead in drinking water is primarily from materials and components associated with service lines and home plumbing. CLWA and the retailers are responsible for providing high quality drinking water, but cannot control the variety of materials used in plumbing components. When your water has been sitting for several hours, you can minimize the potential for lead exposure by flushing your tap for 30 seconds to 2 minutes before using water for drinking or cooking. If you are concerned about lead in your water, you may wish to have your water tested. Information on lead in drinking water, testing methods, a lable from the Safe Drinking Water Hotline 1-800-42604791 or at http://www.epa.gov/safewater/lead

ORGANIC COMPOUNDS

Organic chemical contaminants, including synthetic and volatile organic chemicals, are by products of industrial processes and petroleum production, and can also come from gas stations, urban storm water runoff, and septic systems. Organic compounds also include pesticides and herbicides, which may come from a variety of sources such as agriculture, urban storm water runoff, and residential uses. Water is tested for two types of organic compounds: volatile organic compounds (VOCs) and non-volatile synthetic organic compounds (SOCs). These organic compounds are synthetic chemicals produced from industrial and agricultural uses. Castaic Lake is checked annually for VOCs and SOCs. Local w lls are tested at least annually for VOCs and periodically for SOCs. Tetrachloroethylene (PCE) was found in trace levels (below the MCL in groundwater in the SCV. Some people who use water containing tetrachloroethylene in excess of the MCL over many years may experience liver problems, and may have an increased risk of getting cancer.

DRINKING WATER SOURCE ASSESSMENT AND PROTECTION

The sources of drinking water (both tap water and bottled water) include rivers, lakes, streams, ponds, reservoirs, springs, and wells. As water travels over the surface of the land or through the ground, it dissolves naturally-occurring minerals and, in some cases, radioactive material, and can pick up substances resulting from the presence of animals or from human activity.

Contaminants that may be present in source water include:

- Microbial contaminants, such as viruses and bacteria, that may come from sewage treatment plants, septic systems, agricultural livestock operations, and wildlife.
- Inorganic contaminants, such as salts and metals, that can be naturally-occurring or result from urban stormwater runoff, industrial or domestic wastewater discharges, oil and gas production, mining, or farming.
- Pesticides and herbicides, that may come from a variety of sources such as agriculture, urban stormwater runoff, and residential uses.
- Organic chemical contaminants, including synthetic and volatile organic chemicals, that are by products of industrial processes and petroleum production, a .
- Radioactive contaminants, that can be naturally-occurring or be the result of oil and gas production and mining activities.

In order to ensure that tap water is safe to drink, the USEPA and the DPH prescribe regulations that limit the amount of certain contaminants in water provided by public water systems. Department regulations also establish limits for contaminants in bottled water that provide the same protection for public health.

As part of DPH requirements, the retailers of the SCV conducted a Drinking Water Source Assessment and Protection (DWSAP) study for all of their groundwater sources. This study enables DPH and water utilities to collect information about each drinking water source and surrounding residential, commercial, and industrial activities. It was completed and provided to DPH in 2002.

As part of the program, "surrounding activities" which include schools, medical offices, gas stations and various other facilities around each water source are categorized and ranked as "possible contaminating activities" (PCA). Below is a list of PCAs that may have contributed to trace levels of contaminants in local wells. Trace levels of PCE (below the MCL) have been detected in one well.

- Automobile/gas stations, auto shops - tetrachloroethylene (PCE)
- Dry cleaners - PCE
- Known contaminant plumes - perchlorate

In addition, a known perchlorate contaminant plume has been identified and several wells have tested positive for perchlorate. In October 2007, DPH adopted an MCL of 6 ug/L for this contaminant. Prior to October, a PHG of 6 ug/L and a notification level (NL) of 6 ug/L were established by the Office of Health Hazard Assessment and the DPH respectively.

In 2008, all of the surface water supplied to the SCV was provided by or delivered through the SWP via Castaic Lake. The Department of Water Resources produces a watershed sanitary survey (WSS) of the SWP watersheds every five years. The last survey was published in 2001. Based on that WSS, a DWSAP study for Castaic Lake was completed in 2003. The study found that Castaic Lake supplies are considered to be most vulnerable to septic and sewage lift stations, recreational activities, boating, traffic accidents and spills, grazing livestock, algal blooms and fires.

Assessments for SCWD's two new drinking water sources, the Santa Clara and Valley Center wells, were completed in January 2009 and February 2009 respectively. The Santa Clara well is considered principally vulnerable to septic systems although this assessment was not made as a result of any detected contaminant.

The Valley Center well is considered principally vulnerable to the following activities also not made as a result of any detected contaminants: automobile body and repair shops, fleet/truck/bus terminals, furniture repair/manufacturing, machine shops, photo processing/printing, and sewer collection systems. Copies of the complete assessments are available at the SCWD office located at 22722 Soledad Canyon Road in Santa Clarita. You may request summaries of the assessments be sent to you by contacting Cathy Z. Hollomon at (661) 259-2737.

Additional DWSAP information is available upon request from your local water retailers. Contact names and numbers are supplied at the end of this report.

The Results of Thousands of Tests on Your Water

PARAMETERS/ CONSTITUENTS	Units	MCL (AL)	MCLG (PHG)	DLR	Castaic Lake Water Agency Wholesale Division			Castaic Lake Water Agency Santa Clarita Division			Valencia Water Company			Newhall County Water District Castaic			Newhall County Water District Newhall			Newhall County Water District Pinetree			Newhall County Water District Tesoro[1]			Los Angeles County Water Works District #36[1]		
INORGANICS					Minimum	Maximum	Typical	Minimum	Maximum	Typical	Minimum	Maximum	Typical	Minimum	Maximum	Typical	Minimum	Maximum	Typical	Minimum	Maximum	Typical	Minimum	Maximum	Typical	Minimum	Maximum	Typical
Aluminum	ug/L	1000	(60)	50	<DLR	<DLR	<DLR	<DLR	<DLR	<DLR	<DLR	90	<DLR	<DLR	<DLR	<DLR	<DLR	<DLR	<DLR	<DLR	<DLR	<DLR						
Arsenic	ug/L	10	None	2	2.2	5.6	4.2	<DLR	2.3	<DLR	<DLR	4.6	<DLR	<DLR	<DLR	<DLR	<DLR	<DLR	<DLR	<DLR	4.3	2.2						
Barium	ug/L	1000	(2000)	100				<DLR	140	<DLR	<DLR	103	<DLR	<DLR	<DLR	<DLR	<DLR	<DLR	<DLR	<DLR	150	<DLR						
Boron	ug/L	None	None	100				490	1800	1000																		
Fluoride[2]	mg/L	2	(1)	0.1	<DLR	<DLR	<DLR	0.30	0.52	0.4	0.10	0.80	0.40	0.5	0.5	0.5	0.30	0.40	0.35	0.34	0.45	0.40						
Nitrate (as NO3)	mg/L	45	(45)	2	<DLR	4.4	2.3	11	32	23	6.7	28.2	16.8	<DLR	<DLR	<DLR	15.0	36.0	28.4	8.8	20	12.9						
ORGANICS																												
Tetrachloroethylene[3]	ug/L	5	(0.06)	0.5	<DLR	<DLR	<DLR	<DLR	<DLR	<DLR	<DLR	<DLR	<DLR	<DLR	<DLR	<DLR	<DLR	<DLR	<DLR	<DLR	0.60	<DLR						
DISINFECTION BY-PRODUCTS																												
Bromate RVWTP	ug/L	10	0	5	<DLR	6.0	<DLR																					
Bromate ESFP	ug/L	10	0	5	<DLR	11	<DLR																					
Haloacetic Acids (HAA5)	ug/L	60	0	1.0	2.0	8.1	4.4	0	17	4.3	0	5.8	2.8	1.9	4.1	3.1	<DLR	3.4	0.1	2.6	5.3	3.9	3.2	8.6	4.9	<DLR	23.1	8.6
Trihalomethanes, Total (TTHMs)	ug/L	80	0	0.5	8.0	23.0	16.0	0.95	72	18.7	1.7	36	16.5	9.3	19	13.4	<DLR	19.0	1.6	12	21	16.9	18	39	26.4	12.3	33	24.5
MICROBIOLOGICAL																												
Coliform % Positive Samples	%	5	0		0	1	0	0	1	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CLARITY / TURBIDITY																												
Surface Water Only RVWTP	NTU	TT = 1 NTU	None		0.07	0.12	0.09																					
		TT = 95% of Samples ≤ 0.2 NTU			100	100	100																					
Surface Water Only ESFP	NTU	TT = 1 NTU	None		0.07	0.15	0.10																					
		TT = 95% of Samples ≤ 0.2 NTU			100	100	100																					
RADIOLOGICAL																												
Alpha Activity, Gross	pCi/L	15	0	3	<DLR	5.8	3.3	<DLR	4.7	2.4	<DLR	5.96	<DLR	<DLR	7.6	<DLR	4.6	5.8	5.2	<DLR	17	8.4						
Beta Activity, Gross	pCi/L	50	0	4	<DLR	<DLR	<DLR	<DLR	<DLR	<DLR				<DLR	<DLR	<DLR	<DLR	<DLR	<DLR	<DLR	27	10.4						
Radium 228	pCi/L	5	0	1				<DLR	<DLR	<DLR	<DLR	<DLR	<DLR	<DLR	<DLR	<DLR	<DLR	<DLR	<DLR	<DLR	<DLR	<DLR						
Uranium	pCi/L	20	(0.2)	2	3.1	4.9	4.1	1.7	4.6	2.6	<DLR	2.5	<DLR	<DLR	<DLR	<DLR	1.4	2.8	2.1	<DLR	20	11.35						
Year of Analysis					2009	2009	2009	2009	2009	2009	2009	2009	2009	2008	2008	2008	2009	2009	2009	2005/ 2009	2005/ 2009	2005/ 2009						
LEAD AND COPPER (Retailers Only)								90th Percentile	No. of sites Tested	No. of Sites Above the AL	90th Percentile	No. of Sites Tested	No. of Sites Above the AL	90th Percentile	No. of Sites Tested	No. of Sites Above the AL	90th Percentile	No. of Sites Tested	No. of Sites Above the AL	90th Percentile	No. of Sites Tested	No. of Sites Above the AL	90th Percentile	No. of Sites Tested	No. of Sites Above the AL	90th Percentile	No. of Sites Tested	No. of Sites Above the AL
Copper	ug/L	(1300)	(170)	50			NA	480	54	1	690	32	1	400	20	0	1100	30	3	1100	20	1	180	20	0	538	23	0
Lead	ug/L	(15)	(2)	5			NA	7.4	54	2	6	32	1	2.5	20	0	9.5	30	3	3.3	20	0	12	20	1	6	23	0
Year of Analysis								2009	2009	2009	2007	2007	2007	2009	2009	2009	2009	2009	2009	2009	2009	2009	2008	2008	2008	2008	2008	2008
SECONDARY STANDARDS					Minimum	Maximum	Typical	Minimum	Maximum	Typical	Minimum	Maximum	Typical	Minimum	Maximum	Typical	Minimum	Maximum	Typical	Minimum	Maximum	Typical	Minimum	Maximum	Typical	Minimum	Maximum	Typical
Chlorides[4]	mg/L	250/500/600			74	78	76	67	110	92	24	128	71	75	76	76	35	40	37.5	78	140	109						
Color	Units	15			5	10	5	<DLR	<DLR	<DLR	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5						
Odor-Threshold	Units	3			1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1						
Sulfates[4]	mg/L	250/500/600		1	50	63	56	110	200	159	127	406	226	100	110	107	150	210	180	99	120	110						
Turbidity	NTU	5			0.44	1.87	1.02	0.05	0.71	0.13	0.05	0.33	0.11	0.07	0.34	0.17	0.15	0.19	0.17	0.06	0.21	0.14						
Total Dissolved Solids[4]	mg/L	500/1000/1500			285	387	333	650	888	777	542	983	732	466	478	474	592	716	654	610	764	687						
Conductivity[4]	uS / cm	900/1600/2200			540	585	562	1000	1310	1162	872	1572	1175	777	789	782	803	973	888	984	1290	1137						
ADDITIONAL TESTS																												
Calcium	mg/L				27	35	31	94	140	111	87	147	107	54	61	58	83	120	102	94	110	102						
Magnesium	mg/L				11	13	12	24	48	33	23.3	45	33.8	23	23	23	18	28	23	21	24	22.5						
Sodium	mg/L				56	69	61	71	110	95	55	117	86.1	68	69	205	51	61	56	81	140	110.5						
Potassium	mg/L				2.3	3.2	2.8	2.3	4.7	3.8	1.3	5	3.3	3.3	3.7	3.5	2.2	2.2	2.2	3.2	3.4	3.3						
Hardness as CaCO[3]	mg/L				114	137	127	334	502	412	317	535	407	235	238	237	274	415	345	334	361	348						
pH	Units				7.60	8.40	7.92	7.6	7.9	7.8	7.22	7.57	7.47	7.61	7.70	7.64	7.25	7.35	7.30	7.17	7.28	7.23						
Alkalinity as CaCO[3]	mg/L				81	99	90	130	330	285	166	304	240	167	176	172	183	221	202	289	359	324						

Key for the Charts used in this Report

1 All values for NCWD Tesoro Water and Los Angeles County Waterworks District #36 are the same as CLWA, except in the specific rows shown.

2 Depending on annual temperatures.

3 Some people who use water containing tetrachloroethylene in excess of the MCL over many years may experience liver problems, and may have an increased risk of getting cancer.

4 There are three MCLs for these parameters: The first is the recommended, long term. The second is the upper, long term. The third is short term.

AL Action Level
DLR Detection Limit for Reporting
ESFP Earl Schmidt Filtration Plant
MCL Maximum Contaminant Level

MCLG Maximum Contaminant Level Goal
ug/L Microgram / Liter
mg/L Milligram / Liter
mS Millisiemens / Centimeter

NTU Nephlometric Turbidity Units
NA Not Analyzed/Not Applicable
pCi/L Picocurie / Liter
PHG Public Health Goal

RVWTP Rio Vista Water Treatment Plant
ESFP Earl Schmidt Filtration Plant

RECEIVED
SEP 16 2009
By

September 15, 2009

Project 9967.000.0

Mr. Jose Diaz
Department of Toxic Substances Control
Site Mitigation Branch
9211 Oakdale Avenue
Chatsworth, CA 91311

Re: Former Whittaker-Bermite Facility, Santa Clarita, CA
Summary Report for Month of August 2009

Dear Mr. Diaz:

This letter constitutes a progress report for the month of August 2009, prepared pursuant to Task 4 and Section 6.3 of the "Imminent and Substantial Endangerment Determination and Order and Remedial Action Order" (the Order) that the Department of Toxic Substances Control (DTSC) issued on November 22, 2002, for the former Whittaker-Bermite facility (site) in Santa Clarita, California.

SECTION I – SOIL ISSUES

Specific actions taken on behalf of the respondent, actions expected to be undertaken, and planned activities for soil issues are summarized in the following sections:

OU1 REMEDIATION

Activities for This Report Period (1)

All excavation, bio-treatment, backfilling, and slope restoration activities for the OU1 remediation program were completed during previous reporting periods. During this reporting period, CDM worked on the preparation of the closure report documenting the soil remediation operations for OU1.

Anticipated Activities for This Month

Work on the closure report documenting the soil remediation operations for OU1.

Long-Term Actions

Complete the closure report documenting the soil remediation operations for OU1 and submit to DTSC for review.

Activities for This Report Period (2)

Operated the primary soil vapor extraction (SVE) system at Area 43 and the secondary (hi-vacuum) SVE system at Building 329.

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Anticipated Activities for This Month

Continue operation and optimization of SVE systems at Building 329 and Area 43.

Long-Term Actions

Continue the SVE operations until volatile organic compound levels are eliminated or reduced to appropriate levels or until asymptotic levels are reached.

REMEDIAL ACTION PLAN

Activities for This Report Period

CDM completed the third draft of the Remedial Action Plan (RAP) for OU2 through OU6 soils (Site-Wide Soils RAP), which was submitted to DTSC on August 14, 2009. The DTSC issued preliminary review comments via email on August 24, 2009. DTSC's preliminary review comments were incorporated and the third draft of the RAP was resubmitted to DTSC on August 31, 2009.

Anticipated Activities for This Month

Allow DTSC review of the Site-Wide Soils RAP. Address DTSC's comments, if any received.

Long-Term Actions

Work with DTSC to finalize the Site-Wide Soils RAP and present for public review.

PILOT STUDIES (SVE)

Activities for This Report Period

CDM had previously prepared a pilot study work plan for SVE. DTSC approved the revised SVE work plan in a letter dated October 22, 2008.

The field pilot programs for Areas 2, 4, 27, 31/45, 53/54/72, Area 14-South, and Hula Bowl Canyon I were completed during prior reporting periods. During this reporting period the field pilot program for Area 14-Central was completed. However, due to the large amount of VOC mass removal achieved for both Area 14-South and 14-Central using the G.E.O. cryogenic/condenser system, the operations in Area 14 were extended for an additional two months while evaluations are completed to determine if further operation of the G.E.O. system with the existing well configuration is warranted prior to scale up of the pilot study operations.

Anticipated Activities for This Month

Prepare the report documenting the results of the pilot studies, and extended SVE pilot operations in Area 14.

Long-Term Actions

Complete planned pilot study activities and prepare documentation reports for submittal to DTSC. Incorporate the results of the SVE Pilot Study to the Site-Wide RAP and the Remedial Design document.

PILOT STUDIES (GEDIT)

Activities for This Report Period

CDM had previously prepared pilot study work plan for in-situ bioremediation of perchlorate impact to deep soils via Gaseous Electron Donor Injection Technology (GEDIT). DTSC provided conditional approval of the GEDIT work plan on November 14, 2008.

The laboratory bench-scale treatability study for the GEDIT pilot study was initiated at CDM's laboratory in Bellevue, Washington, during a previous reporting period. The bench-scale study was continued during this reporting period.

Anticipated Activities for This Month

Continue tracking and monitoring of bench-scale study.

Long-Term Actions

Complete planned pilot study activities and prepare documentation reports for submittal to DTSC. Incorporate the results of the GEDIT Pilot Study to the Site-Wide RAP and the Remedial Design document.

SOILS INTERIM REMEDIAL MEASURES (IRMS) AND REMOVAL ACTIONS

Depleted Uranium (DU) Investigation and Clearance Activities

Activities for this Report Period

Continued to maintain close contact with California Department of Public Health-Radiological Health Branch (CDPH-RHB) regarding the review of the Work Plan and have provided preliminary information to address requests made by CDPH-RHB. Site visit by CDPH-RHB has not been scheduled at this time and is being coordinated by Mr. Jerry Hensley at RHB along with Mr. Jose Diaz at DTSC. Meeting with California Department of Fish and Game representative was completed on August 24th resulting in approval of permit for brush removal as described in our notification. Development of the project Health and Safety Plan (HASP) as well as the Final Status Survey Plan (FSSP) have also been started during this period. Finalization of both plans will be pending information received from CDPH-RHB review of Work Plan.

Anticipated Activities for this Month

It is anticipated that a site visit will be scheduled by CDPH-RHB and DTSC as part of the Work Plan review process. This visit will provide supporting information pertinent to the review of the submitted Work Plan. Pending comments from CDPH-RBH, changes may be necessary to the Work Plan. Work on both the HASP and FSSP will be continued during this period. We are awaiting approval from ACOE and RWQCB prior to moving forward with the brush removal. We expect to initiate coordination for brush removal during this period.

Long Term Actions

Once approval is confirmed with ACOE and RWQCB the brush removal and UXO clearance survey can be coordinated. Pending necessary changes to the Work Plan, submittal of the FSSP to CDPH-RHB will be required. A specific schedule will be developed for brush removal, UXO clearance, DU removal and Final Status Surveys.

UXO/OE Investigation and Clearance Activities

Activities for This Report Period

EODT completed the following activities during this reporting period.

Work Plan Addendum (WPA) Further Investigation and No Further Action Areas
The EODT Work Plan Addendum (WPA) and associated Conceptual Site Model were submitted for DTSC and stakeholders review on July 23, 2009. The WPA field work will characterize the Further Investigations Areas and confirm the No Further Action status of the areas not affected by Munitions and Explosives of Concerns (MEC) as originally referenced in the 2006 Historical Site Assessment (HSA) Report.

Munitions and Explosives of Concern Clearance Activities at Hula Bowl II and III Associated Drainage Area, and the Depleted Uranium (DU) Impacted Area
The Hula Bowl II and III and DU Work Plan Addenda were approved with comments by DTSC in June 2008. EODT continues to coordinate with the DU-Impacted Area contractor Energy Solutions and AMEC Geomatrix to refine a phased removal plan consisting of an initial surface clearance to be followed by a removal to depth in the footprint of the DU excavation. After the MEC surface clearance is complete and actual site conditions are known, along with DTSC, the subsurface removal action alternatives will be planned and completed. Fish and Game permit application has been submitted and approved for brush clearance in the DU clearance area.

Hula Bowl II and III Drainage
EODT is tracking the landfill drainage so the clearance is completed after the drainage 'dam' is in place (so new items do not enter the drainage).

Anticipated Activities for This Month

Work Plan Addendum Further Investigation and No Further Action Areas
Anticipate planning for the field work execution and staffing in coordination with DTSC and the stakeholders.

Munitions and Explosives of Concern Clearance Activities at Hula Bowl II and III Associated Drainage Area, and the Depleted Uranium Impacted Area
Track the progress on the Hula Bowl II and III drainage 'dam' to determine the appropriate time for surface removal.

DU area MEC clearance
EODT will continue to track the progress of the review and approval process and refine the schedule for the surface clearance.

SECTION III – GROUNDWATER AND SURFACE WATER ISSUES

Specific actions taken on behalf of the respondent, action expected to be undertaken and planned activities for groundwater and surface water issues are summarized in the following sections:

GROUNDWATER (OU7) FEASIBILITY STUDY (FS)

Activities for This Report Period (1)

The Draft OU-7 FS report has been prepared and is under internal review. To support the OU-7 FS evaluations, step drawdown testing was conducted in selected OU2/OU6 perched zone wells to assess hydraulic properties.

Anticipated Activities for This Month

Continue the OU-7 FS evaluations. The Draft OU-7 FS report is under review and will be submitted to DTSC in October 2009.

Review the step drawdown testing results for selected OU2/OU6 perched zone wells. This information will be used in the OU-7 FS evaluation of groundwater extraction and dewatering options for the perched groundwater zone.

Long-Term Actions

Prepare the Remedial Action Plan for OU-7.

INTERIM REMEDIAL MEASURES (IRMS) AND PILOT PROGRAMS FOR GROUNDWATER

SAUGUS AQUIFER EXTRACTION PILOT PROGRAM

Activities for This Report Period

The Work Plan, Saugus Aquifer Pilot Remediation Well Network, Operable Unit 7 was submitted to DTSC on September 22, 2008. DTSC provided comments on November 18, 2008 and subsequently provided conditional approval of the Work Plan on December 31, 2008. A request for qualifications and proposals (RFQ/RFP) for implementation of the Saugus Extraction Pilot program was issued during March and a site tour was given to the bidders on March 25th. Responses to RFQ/RFP were received from five firms on the proposal deadline of April 23. Following review of the proposals, presentations and interviews were conducted with the five companies on May 27, 2009. Whittaker team has entered into contract negotiations with the front runner firm for implementation of the Saugus Extraction Pilot program.

Anticipated Activities for This Month

Whittaker team will continue negotiations with the front runner firm and execute a mutually agreeable contract so that the scope of work outlined in the Work Plan, Saugus Aquifer Pilot Remediation Well Network is implemented. DTSC comments on the Pilot Saugus Groundwater Remediation Work Plan will be incorporated as the Work Plan is implemented.

Long-Term Actions

Implement the Saugus Aquifer Extraction Pilot Program. Incorporate the results of the pilot work to the groundwater (OU7) RAP and design document.

NORTHERN ALLUVIUM GROUNDWATER TREATMENT SYSTEM OPERATION

Activities for This Report Period (1)

A Pilot Remediation Pumping Program was started in Northern Alluvium Areas 11, 67, and 75, in 2006. An alternate extraction well 75-MW-35 for higher groundwater extraction and six hot spot wells were connected to the new higher capacity groundwater treatment system in 2007. Sustained pumping of the extraction well 75-MW-35 that began in mid-October 2007 continues to date, with the exception of a brief period of shut down for treatment system maintenance. As of August 31, 2009, approximately 23,017,700 gallons of impacted water have been treated and discharged.

The August monthly compliance sample was collected on August 3, 2009. The sampling results indicated that the system was in compliance during May. Media were replaced in the treatment vessels as follows:

- August 6, 2009 – Removed/replaced perchlorate media in lead vessel.

- August 31, 2009 – Removed/replaced nitrate medial in lead vessel.

After replacement, the nitrate and perchlorate treatment vessels were reconfigured to have the old lag vessel as the lead and the new vessel with fresh media as the lag vessel. Because of a cracked valve on the GAC manifold, only the lead GAC vessel is in operation. Siemens is working on a solution to repair the leaky manifold.

The system was operated routinely throughout the month. The low flow wells were shut down during the routine quarterly sampling event (August 5 to August 12, 2009), however, the high flow well remained on during this time. As of August 31, 2009, approximately 23,017,700 gallons of impacted water have been treated and discharged. Approximately 91 percent of the treated volume was from the extraction wells of the Northern Alluvium pumping system; the remaining 9 percent is from IDW water collected during the quarterly sampling events, storm water collected from various areas of the site, and Saugus well development water.

Anticipated Activities for This Month

Continue the pumping, treatment, and discharge system operation and routine weekly and monthly NPDES compliance sampling and media change outs as needed.

Monitoring of the aquifer response to pumping from the alternate extraction well 75-MW-35 and the downgradient site boundary low flow extraction wells will continue.

Repair GAC manifold and put the second GAC treatment vessel back into service.

Long-Term Actions

Continue operating the extraction and treatment system and conduct additional performance monitoring.

Activities for This Report Period (2)

Potential application of remedial technologies for Northern Alluvium groundwater hot spots, including evaluation of the Area 75 boundary containment established by sustained operation of the low flow pumping wells is being addressed in the OU7 FS.

Anticipated Activities for This Month

Evaluation of potential pilot studies for the Northern Alluvium area of the site will continue. The results presented in the Shaw Technology Demonstration Summary Report for Area 11 will be reviewed for potential applicability to other areas in the Northern Alluvium.

Long-Term Actions

Additional source control measures in Northern Alluvium will be considered and recommended where determined to be necessary.

GROUNDWATER AND MONITORING

Activities for This Report Period (1)

Data review and preparation of the report is in progress for the Second Quarter 2009 quarterly groundwater monitoring. Sampling for the Third Quarter 2009 monitoring event was conducted during August.

Anticipated Activities for This Month

Data review and preparation of the report is in progress for the Second Quarter 2009 quarterly groundwater monitoring.

Long-Term Actions

Continue monitoring and reporting of the proposed network of monitoring wells on the updated schedule presented in Technical Memorandum No. 8.

Activities for This Report Period (2)

RCRA groundwater monitoring of the Area 1 (former Building 317) continues on schedule. Data from the Second Quarter 2009 groundwater monitoring event conducted in May 2009 is being reviewed. Sampling for the Third Quarter 2009 monitoring event was conducted during August.

Anticipated Activities for This Month

Data from the Second Quarter 2009 groundwater monitoring event conducted in May 2009 is being reviewed and report preparation is in progress.

Long-Term Actions

The current RCRA groundwater monitoring program will be modified to include the proposed wells and frequency and DTSC input to the monitoring plan.

STORM WATER MONITORING

Activities for This Report Period

Pursuant to the site Storm Water Pollution Prevention Plan, Environ continued coordinating the implementation of short-term surface water run-off mitigation measures. Implementation of the short-term mitigation measures is being coordinated with CDM, particularly in the areas of the site where soil remediation activities have occurred.

Anticipated Activities for This Month

Upgrades to the short-term mitigation measures will continue as necessary. CDM is working on a plan for upgrading the short-term mitigation measures. Surface water run-off sampling will be conducted following significant rainfall events in accordance with the site-wide surface water runoff sampling plan.

Long-Term Actions

Long-term mitigation of the drainages and excavations will be conducted in conjunction with the soil remediation.

SECTION IV – REQUIREMENTS UNDER THE ORDER THAT WERE NOT COMPLETED

All requirements of the Order were completed. Whittaker has met or exceeded all the substantive requirements of the Order.

SECTION V – PROBLEMS OR ANTICIPATED PROBLEMS IN COMPLYING WITH THE ORDER

Following DTSC's agreement with Whittaker's proposed modifications to implementation plans in compliance with the Order reflected in the letter dated September 28, 2004, DTSC's letter dated July 11, 2005, included a schedule for submitting a number of documents. All deadlines have been met and documents have been submitted per requested schedule.

SECTION VI – RESULTS OF SAMPLE ANALYSIS, TESTS, AND OTHER DATA

Whittaker has instructed its contractors to continue to provide DTSC staff with raw data sets for ongoing quarterly groundwater monitoring events and RI/FS work upon receipt from the lab.

Sincerely yours,
AMEC Geomatrix, Inc.

Hassan Amini, PhD, CHG
Project Coordinator

cc: Eric Lardiere, Esq., Whittaker Corp; Joseph Armao, Winston & Strawn, LLP; William Weaver, CDM; Jessica Donovan, ENVIRON; Paul Bergstrom, Knight Piésold; Larry Sievers, EODT; Tim Bricker, Santa Clarita L.L.C.; Megan Trend, Chubb Financial Solutions; Cindy Hunter, MariKay Fish, Julie Diebenow, AIG Insurance; Vitthal Hosangadi, NOREAS; John Carty, Zurich North America; Hal Dash, Cerrell Associates; Jeff Hogan, City of Santa Clarita; Yueh

Chuang, CH2M Hill; Kathy Stryker Anderson, US Army Corps of Engineers; Robert DiPrimio, Valencia Water Company; Lynn Takaichi, and Meredith Durant, Kennedy Jenks; David Bacharowski, RWQCB; James Leserman, Castaic Lake Water Agency; Steve Cole, Newhall County Water District; Mauricio Guardado, Santa Clarita Water; Neil Elsey, Avion Holdings LLC; Alisa Lacey, Stinson Morrison Hecker LLP; Jeff O'Keefe, Department of Public Health.

AMEC Letter Request for Deadline Extension for OU2-6 RAP Former Whittaker Bermite Facility, Santa Clarita, CA (June 8, 2009)

June 8, 2009

Project 9967

Mr. Jose Diaz
Department of Toxic Substances Control
Site Mitigation Branch
9211 Oakdale Avenue
Chatsworth, California 91311

Re: Request for Deadline Extension for OU2-6 RAP
Former Whittaker Bermite Facility, Santa Clarita, CA

Dear Mr. Diaz:

Confirming our discussions of May 22 and June 2, this letter presents Whittaker's formal request to extend the deadline for submitting the Remedial Action Plan (RAP) for Operable Units 2 through 6 of the former Whittaker Bermite site (the site) from May 29, 2009, to August 14, 2009.

As you are aware, the Whittaker team prepared and submitted the second draft of the RAP to the Department of Toxic Substance Control (DTSC) on January 30, 2009. DTSC provided comments on April 10, 2009, and referenced the February 18, 2009, letter from the City of Santa Clarita (City) and raised concern that modifications to the terms and conditions of the Porta Bella Development Plan that was referenced in the City letter would significantly delay cleanup of the site. Based on that concern DTSC requested that the RAP should be revised to remove any reference to the Porta Bella Plan. As requested, the Whittaker team is currently revising the RAP and removing specific references to the Porta Bella Plan. Nonetheless, we wish to maintain the references to the integration of site remediation with potential future development on a conceptual level to allow flexibility for any potential future development.

As we discussed during our telephone conversations on May 22nd and June 2nd, 2009, a technical meeting between the DTSC and Whittaker teams will be highly beneficial to discuss application of the selected remedial measures to specific areas referenced in the RAP. To that end, I will contact you to coordinate that meeting. Following our technical meeting and discussions with DTSC, we will make appropriate changes to the text, figures, tables, and appendixes as necessary.

The April 10, 2009, DTSC letter also provided comments related to the Resource Conservation and Recovery Act (RCRA) unit (OU6). DTSC requested a revised "Closure Plan" for the RCRA unit to incorporate pilot and field studies proposed for that area. DTSC anticipates that the revisions to the Closure Plan will trigger Class 2 or 3 modifications to the RCRA Interim Status Hazardous Waste Facility Permit. As I briefed you during our telephone conversations, we are currently reviewing the available closure options for the RCRA unit (i.e., clean closure vs. closure with waste in place). Based on the review of the DTSC comments and our telephone conversations, we understand that modifications to the Closure Plan can be proposed at this time while the pilot and field studies are underway. However, the determination of "clean" vs. "waste in place" closure will need to be made based on the results of the studies as well as an

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assessment of the risks to human health and environment that may be posed by any residual chemicals beneath the RCRA unit. Although we have already started review of this matter, development of modifications to the Closure Plan will require additional time. Therefore, I respectfully request a revised deadline of September 15 for the proposed modifications.

As you are aware, we are making good progress in implementing the work plan for the soil vapor extraction pilot study that has been approved by the DTSC. We have also started the laboratory scale testing portion of our pilot study work plan for Gaseous Electron Donor Injection Technology potentially applicable to deep soil treatment at the site. Meanwhile, we will continue our focus on expediting on-site groundwater containment through implementation of the pilot scale extraction and treatment operation that was approved by DTSC. To that end, we have finished review of the contractors' proposals and have conducted interviews to select a qualified firm. We will make that selection in the next two weeks. In addition, Energy Solutions results of characterization of the depleted uranium (DU) impact in the Areas 57 and 14 and their work plan for DU removal has been finalized and will be submitted to DTSC and the Radiological Health Branch of the California Department of Public Health shortly. In summary, we are making good progress in all areas of compliance with the DTSC order, as I regularly summarize in my monthly project progress summary reports.

Please call me at (949) 642-0245 if you need any additional information. Thank you for your continuous attention and support.

Sincerely,
AMEC Geomatrix, Inc.

Hassan Amini, Ph.D. C.HG.
Project Coordinator

cc: Eric Lardiere, Whittaker Corp; William Weaver, CDM; Jessica Donovan, ENVIRON; Paul Bergstrom, Knight Piésold; Larry Sievers, EODT; Tim Bricker, Santa Clarita L.L.C.; Megan Trend, Chubb Financial Solutions; Cindy Hunter, MariKay Fish, Julie Diebenow, AIG Insurance; Vitthal Hosangadi, NOREAS; John Carty, Zurich North America; Hal Dash, Cerrell Associates; Jeff Hogan, City of Santa Clarita; Yueh Chuang, CH2M Hill; Kathy Stryker Anderson, US Army Corps of Engineers; Robert DiPrimio, Valencia Water Company; Lynn Takaichi, and Meredith Durant, Kennedy Jenks; David Bacharowski, RWQCB; James Leserman, Castaic Lake Water Agency; Steve Cole, Newhall County Water District; Mauricio Guardado, Santa Clarita Water; Neil Elsey, Avion Holdings LLC; Alisa Lacey, Stinson Morrison Hecker LLP; Jeff O'Keefe, Department of Public Health

Castaic Lake Water Agency
Memorandum

ITEM NO. 4.1

October 1, 2009

To: CLWA Board of Directors

From: Brian J. Folsom BJF
Engineering and Operations Manager

Subject: Engineering and Operations Department Report

TREATMENT PLANT OPERATIONS AND MAINTENANCE

Completed Work:

Deliveries to the purveyors in September totaled 4,663 acre-feet (AF), for an average daily flow rate of 51 million gallons per day (MGD). September 2009 deliveries were 8.7% above September 2008 deliveries. The fiscal-year-to-date (FYTD) deliveries for FY 2009/2010 are 15,036 AF, which is 2.2% above FYTD 2008/2009. Monthly flows for 2006, 2007, 2008 and 2009 are presented in the attached table. *(FY 09/10 Action A1.1. Meet all purveyor water demands and Action B3.9: Meet all applicable water quality regulations.)*

FYTD electrical use for FY 2009/10 at the Agency's major facilities is shown in the attached "Energy Usage at Major Facilities" table and equals 2,990,433 kWh at a total cost of $343,452.77.

Inspection and maintenance activities during September included cleaning wash water return basins, chemical feed pump monthly maintenance, on-line analyzer maintenance and fabrication of clarifier screens at RVWTP.

Distribution system maintenance activities during September included preventive maintenance on air release and vacuum valves and pump outs, and exercising of valves. Grading at Sand Canyon Reservoir was completed.

Inspector Activities

Pressure recorders/data loggers readings and GPS coordinates were gathered at various points throughout the system.

Magic Mountain Pipeline/Recycled Water Pipeline Modification: Performed inspections of Security Paving's construction of the Magic Mountain Pipeline Vault Replacement.

Rio Vista Water Treatment Plant Expansion: Inspected soil borings, located underground facilities and collected GPS coordinates of existing utilities throughout jobsite.

Completed 50 dig alerts.

Work in Progress:

Maintenance of air release and vacuum valves and pump-outs throughout the distribution system continues. Ozone injector preventive maintenance is ongoing. At RVWTP, a leak was discovered near the plant water line and the area was excavated to determine the source of the leak. Repair of the leak is nearly complete. Electrical switch gear preventive maintenance and testing at all facilities continues.

Planned Actions:

Install ozone generator cooling water closed loop system. Perform repairs on plant water tank at Rio Vista Water Treatment Plant.

PERCHLORATE CONTAMINATION PROGRAM MANAGEMENT

(FY 2009/10 Action A4.1: Complete construction of the Groundwater Production Restoration Project; Action A4.2: Complete construction and startup of the Perchlorate Treatment Project; Action A4.8: Develop replacement wells for capacity lost due to perchlorate contamination.)

SUMMARY

Work continues on multiple tasks to address the groundwater contamination stemming from past manufacturing activities on the Whittaker-Bermite site. The Agency and purveyors are proceeding to restore the production capacity of the groundwater supply wells contaminated by perchlorate, while working on the objectives of containing the downgradient migration of perchlorate and recovering costs incurred in responding to the perchlorate contamination.

PERCHLORATE CONTAMINATION PROGRAM MANAGEMENT

The following table provides a status report on the activities and tasks:

Task Group	Tasks	Consultant	Status
Settlement Activities	Project Description	K/J	Complete.
	Final Settlement	K/J, Nossaman	Settlement agreement took effect on 7/13/07 with U.S. District Court approval.
DTSC Approval Activities	Remedial Investigation (RI)	K/J	DTSC approved 8/16/05.
	Feasibility Study (FS)	K/J	DTSC approved 8/16/05.
	Final Remedial Action Plan	K/J	Public hearing held 9/7/05. DTSC approved 1/20/06.
U.S. Army Corps of Engineers Feasibility Phase Study	Conceptual Hydrogeology Technical Memorandum	CH2MHill	Final distributed 1/19/05. Progress report with model construction calibration distributed 10/11/05.
DPH Approval Activities (97-005)	Source Water Assessment	B&V, CE	Received comments on revised document from DPH 4/27/06.
	Effective Monitoring and Treatment	B&V, CE, CH2MHill	Received comments on revised document from DPH 4/27/06.
	Water Quality Investigation	B&V, CE	Received comments on revised document from DPH 4/27/06.
	Human Health Risk	B&V	Received comments on revised document from DPH 4/27/06.
	Source Protection Plan	B&V	Received comments on revised document from DPH 4/27/06.

Task Group	Tasks	Consultant	Status
	Alternatives Evaluation	B&V, CE	Received comments on revised document from DPH 5/10/06. Revised document will be returned to DPH with Engineer's Report.
	Engineers Report	B&V	Final submitted to DPH 1/29/09.
	CEQA	B&V	Mitigated Negative Declaration certified 9/14/05.
	Operations and Maintenance Report	K/J	Staff is reviewing K/J draft report submitted on 8/19/09.
	Permit Application	B&V	Will be submitted with documents.
	Public Hearing	B&V	Will take place upon approval of all documents.
	DPH Evaluation and Permit	B&V	Awaiting response from DPH.
Implementation Activities	Easements and Right of Way	K/J	Easement and right-of-way acquisition completed 1/08.
	Treatment Project	K/J	Project is 96% complete.
	Pipeline Project	K/J	Project is 98% complete.
	Well Rehabilitation	SCP/GPC	General Pump completed the rehabilitation work on 2/3/09 and installed the new pumps.
	Start-up and Monitoring	K/J	Scheduled fall 2009.
	Sentinel Wells	Environ	Wells have been installed. Disposal of investigation derived wastes awaits results of laboratory analyses.

The monthly Technical Committee Meeting was held on September 9, 2009. The next Technical Committee Meeting is scheduled for October 13, 2009. The next Whittaker-Bermite Multi-Jurisdictional Task Force meeting is scheduled for December 9, 2009. A ribbon cutting event was held at the new Perchlorate Treatment Facility on September 22, 2009.

FINANCIAL STATUS

The Settlement Agreement among CLWA, the purveyors, Whittaker-Bermite and insurance carriers is in effect. Reimbursement requests have been submitted and payments have been made for expenses through July 31, 2009.

CAPITAL IMPROVEMENT PROJECTS

Sand Canyon Pipeline and Reservoir

Completed Work:

Nye and Nelson, Inc. completed construction work on July 31, 2009. The Agency approved the Certificate of Acceptance for the project on August 26, 2009 and recorded the Notice of Completion on September 2, 2009.

Work In Progress:

Construction contract is in close-out phase.

Planned Actions:

Close out project and process final payment to contractor.

Rio Vista Water Treatment Plant Expansion

(FY 2009/10 Action B1.26: Complete construction of the RVWTP Expansion Project.)

Completed Work:

The contractor has installed the foundation rebar for the new washwater return basin and the formwork for a portion of the chlorine building walls. The contractor has also constructed a portion of the ozone injection sample stations and prepared the subgrade for the new clarifier structure.

Work In Progress:

The contactor is working on the remaining submittals and Kennedy/Jenks Consultants (K/J) is reviewing the submitted submittals. The contractor is installing the formwork for the chlorine building walls and preparing the clarifier structure area for rebar installation. The contractor is also installing electrical duct banks.

Planned Actions:

The contractor will continue to prepare and submit his construction submittals and K/J will continue to review them. Construction activities will continue.

Modification to MWDSC Foothill Feeder Connection

(FY 2009/10 Action B1.25: Complete construction of the permanent raw water connection to MWDSC's Foothill Feeder pipeline.)

Completed Work:

The connection agreement has been executed. The 60% design submittal has been completed.

Work in Progress:

MWDSC and staff are reviewing the 60% submittal.

Planned Actions:

MWDSC and staff will be submitting comments to K/J for action.

Honby Parallel Phase II

(FY 2009/10 Action B1.3: Complete design of the Honby Parallel Pipeline Phase 2; Action B1.24: Complete construction of the Honby Parallel Pipeline Phase 2.)

Completed Work:

The City has approved the pipeline alignment and geotechnical data.

Work in Progress:

Permits, license agreements and easements are in the process of being acquired. K/J is revising the plans and specifications to address LADWP comments.

Planned Actions:

Complete and submit the traffic control plans to the City for approval. Mail notification letters to businesses along the project route to inform them of the project. Acquire permits, license agreement and easements. Submit the revised plans and specifications to LADWP.

RVWTP Relocate Entrance Gate and Security Kiosk

(FY 2009/10 Action B6.2: Complete design of RVWTP entrance gate and security kiosk relocation.)

Completed Work:

Lee & Ro completed the PDR.

Work In Progress:

Staff is in the process of requesting Board approval of the final design services.

Planned Actions:

Start final design.

RVWTP Warehouse and Storage Facilities

(FY 2009/10 Action B1.16: Complete design of the RVWTP Maintenance Facility Expansion Project.)

Completed Work:

Lee & Ro completed the preliminary plans.

Work in Progress:

Staff is reviewing the preliminary plans.

Planned Actions:

Staff will meet with Lee & Ro to discuss staff's comments to the preliminary plans.

ESFP Chemical Storage and Delivery

Completed Work:

SoCal Pacific Construction completed 99% of the construction contract. Remaining work was evaluated and credits and liquidated damages were issued as deductive contract change orders. Notice of Completion for the project was recorded in the Los Angeles County Recorder's Office on August 20, 2009 and the final payment was released on September 30, 2009.

ESFP Chemical Storage and Delivery

(Continued from previous page...)

Work in Progress:

Construction contract is in closeout phase.

Planned Actions:

Agency staff will complete the remaining construction items.

ESFP Drainage and Paving Improvements

(FY 2009/10 Action B1.23: Complete construction of the ESFP Drainage and Paving Improvements Project.)

a) Planning and Preliminary Design for ESFP Drainage and Paving Improvements.

b) ESFP Ozone Injection Station Canopy, Lighting and Pavement Improvements.

Completed Work:

a) Notice to Proceed was issued to Civiltec Engineering, Inc. on November 13, 2008. Civiltec completed topographic survey, subsurface investigations, initial Base Map and submitted the Geotechnical Investigation Report and a draft of a Preliminary Design Report. On September 30, 2009, Civiltec submitted recommended alternatives for discussion.

b) Design drawings have been completed.

Work in Progress:

a) Civiltec Engineering, Inc. is finalizing the recommendations for a Preliminary Design Report draft.

b) The specifications are being finalized.

Planned Actions:

a) Staff will review the proposed design alternatives.

b) Advertise the project for construction bids.

ESFP Railing and Platform Modifications

(FY 2009/10 Action B2.16: Complete modifications of the ESFP railings and platforms.)

Completed Work:

The topographic survey has been completed. Construction drawings for the railing and platform improvements at washwater basin are being finalized. The design of railing and platform improvements at filter gallery was added to the project scope in April 2009. Hilts Consulting Group, Inc. collected and reviewed record drawings information and conducted field investigations and provided 90% submittals plans and specifications for staff review and comments.

Work in Progress:

Hilts Consulting Group is reviewing the comments and modifying the plans and specifications.

ESFP Railing and Platform Modifications

(Continued from previous page...)

Planned Actions:

On October 5, 2009, meet with the consultant to field verify proposed design details. Consultant anticipates submitting final plans and specifications for staff review and approval in October 2009.

Recycled Water Program Phase II

(FY 2009/10 Action B1.27: Complete design and construct Recycled Water Program Phase II.)

Completed Work:

The draft initial study for Phase 2A has been completed. The draft evaluation for the old Honby Pump Station has been completed. The draft design has been completed for the installation of inspection access structures for the old Honby Pipeline.

Work in Progress:

Staff is reviewing the draft initial study for Phase 2A and the draft evaluation of the old Honby Pump Station for Phase 2B. K/J is analyzing potential recycled water facilities near Lost Canyon for Phase 2B. Staff is reviewing the draft design of the inspection access structures for the old Honby Pipeline.

Planned Actions:

Complete the draft environmental documentation for Phase 2A. Finalize the evaluation of the old Honby Pump Station.

Kennedy/Jenks Consultants' General Engineering Services Work Authorization

During September, K/J assisted the Agency staff with various engineering tasks including coordinating with the Los Angeles County Sanitation District regarding the treatment and availability of recycled water at the Saugus Water Reclamation Plant and coordinating with Civiltec Engineering, Inc. on the development of the water system hydraulic model and the system emergency storage study.

FACILITY CAPACITY FEES

(Goal C1.: Fairness Doctrine - Apply all costs using the Fairness Doctrine by applying costs to those who benefit from an expenditure and ensuring that existing and future users will pay their fair share.)

Completed Work:

During September, 20 new certificates were issued and $145,894 was collected in facility capacity fees, representing approximately 11.7 acre-feet of water demand. For the fiscal year, 54 new certificates have been issued and $1,129,853 has been collected in developer impact fees representing 100.26 acre-feet of water demand.

Attachments

CASTAIC LAKE WATER AGENCY

SWP Water Deliveries to Purveyors (Acre-Feet)

2006	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
SCWC	807	775	428	545	1,603	2,051	2,648	2,410	2,183	1,495	1,267	936	17,146
VWC	821	875	622	887	1,736	2,050	2,360	1,412	1,614	1,574	1,327	1,035	16,313
NCWD	490	347	158	245	589	454	828	625	647	464	597	455	5,898
LACo	68	75	52	55	113	146	178	161	143	112	105	81	1,289
Total	2,186	2,072	1,260	1,732	4,041	4,701	6,013	4,608	4,586	3,644	3,295	2,508	**40,646**
Cum. YTD	2,186	4,258	5,518	7,250	11,291	15,992	22,005	26,613	31,199	34,843	38,138	40,646	
Cum. FYTD	26,700	28,772	30,032	31,763	35,804	**40,505**	6,013	10,622	15,207	18,852	22,146	24,654	
2007	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Total**
SCWC	984	684	1,217	1,423	2,023	2,370	2,732	2,773	2,229	1,906	1,403	926	20,669
VWC	983	640	1,212	908	1,871	2,003	2,046	1,857	1,767	1,428	1,270	922	16,906
NCWD	436	185	397	578	712	586	765	910	630	443	420	418	6,478
LACo	83	63	92	102	137	151	174	168	138	122	107	69	1,406
Total	2,485	1,572	2,918	3,012	4,742	5,110	5,717	5,707	4,764	3,899	3,200	2,334	**45,459**
Cum. YTD	2,485	4,056	6,974	9,986	14,729	19,838	25,555	31,262	36,026	39,925	43,125	45,459	
Cum. FYTD	27,139	28,711	31,629	34,641	39,383	**44,493**	5,717	11,424	16,188	20,087	23,286	25,621	
2008	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Total**
SCWC	764	707	1,203	1,273	1,795	2,333	2,446	2,283	2,064	2,044	1,162	638	18,712
VWC	815	583	1,631	1,443	1,640	1,845	2,159	1,761	1,577	1,419	1,000	547	16,419
NCWD	414	300	270	344	505	640	767	671	505	493	302	217	5,427
LACo	56	53	92	116	134	158	167	163	144	127	82	62	1,353
Total	2,049	1,642	3,196	3,175	4,074	4,975	5,539	4,879	4,290	4,083	2,546	1,465	**41,912**
Cum. YTD	2,049	3,692	6,887	10,062	14,136	19,111	24,650	29,529	33,819	37,901	40,447	41,912	
Cum. FYTD	27,670	29,312	32,508	35,683	39,757	**44,732**	5,539	10,418	14,708	18,790	21,336	22,801	
2009	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Total**
SCWC	910	367	1,106	1,448	2,135	1,896	2,073	2,300	2,032	0	0	0	14,267
VWC	518	364	923	1,242	1,135	996	2,102	2,063	2,011	0	0	0	11,353
NCWD	242	132	210	415	467	427	937	599	477	0	0	0	3,904
LACo	75	38	73	102	134	121	152	149	143	0	0	0	986
Total	1,744	901	2,312	3,207	3,870	3,440	5,263	5,110	4,663	0	0	0	**30,510**
Cum. YTD	1,744	2,645	4,957	8,164	12,034	15,474	20,737	25,847	30,510	30,510	30,510	30,510	
Cum. FYTD	24,545	25,446	27,758	30,965	34,835	**38,275**	5,263	10,373	15,036	15,036	15,036	15,036	

10/1/2009

CASTAIC LAKE WATER AGENCY

Recycled Water Deliveries to Purveyors (Acre-Feet)

2006	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
SCWC													0
VWC	14	16	6	12	42	66	75	63	67	33	20	12	427
NCWD													0
LACo													0
Total*	14	16	6	12	42	66	75	63	67	33	20	12	**426**
Cum. YTD	14	30	36	48	90	156	231	294	361	394	414	426	
Cum. FYTD	284	300	306	318	360	**426**	75	142	209	242	262	274	
2007	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Total**
SCWC													0
VWC	17	14	43	38	58	63	78	67	55	37	25	7	501
NCWD													0
LACo													0
Total*	17	14	43	38	58	63	78	67	55	37	25	7	**501**
Cum. YTD	17	32	74	112	170	233	311	378	433	469	494	501	
Cum. FYTD	291	306	348	386	444	**507**	78	133	187	224	249	256	
2008	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Total**
SCWC													0
VWC	4	11	39	37	56	34	26	63	44	38	4	1	358
NCWD													0
LACo													0
Total*	4	11	39	37	56	34	26	63	44	38	4	1	**358**
Cum. YTD	4	16	54	92	147	182	208	271	315	353	357	358	
Cum. FYTD	260	271	310	348	403	**438**	26	89	133	171	175	176	
2009	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Total**
SCWC													0
VWC	8	3	24	39	30	46	71	59	17	0	0	0	298
NCWD													0
LACo													0
Total*	8	3	24	39	30	46	71	59	17	0	0	0	**298**
Cum. YTD	8	11	35	74	104	150	221	280	298	298	298	298	
Cum. FYTD	184	187	211	250	280	**326**	71	88	105	105	105	105	

10/1/2009

FY 2009/10
Energy Usage at Major Facilities

Service Date From	Service Date To	Usage kWh Total	Usage kVarh Total	Total $ Amount
Earl Schmidt Intake Pump Station				
07/01/09	07/29/09	4,008	4,302	$489.20
07/29/09	08/27/09	7,226	10,163	$6,311.53
		Total		**$6,800.73**
Earl Schmidt Filtration Plant				
07/01/09	07/28/09	118,668	89,844	$12,575.44
07/28/09	08/26/09	124,925	97,018	$13,573.19
		Total		**$26,148.63**
Honby Pump Station				
07/01/09	07/22/09	0		$67.28
07/22/09	08/20/09	0		$94.80
		Total		**$162.08**
Recycled Water Meter				
07/01/09	07/10/09	10,987	4,197	$1,617.58
07/10/09	08/10/09	37,110	14,067	$5,325.10
		Total		**$6,942.68**
Rio Vista Intake Pump Station				
07/01/09	07/29/09	578,750	206	$73,917.27
06/29/09	07/29/09			$10.00
07/29/09	08/27/09	632,506	142,890	$80,482.94
		Total		**$154,410.21**
Rio Vista Water Treatment Plant				
07/01/09	07/29/09	183,775		$15,847.44
07/29/09	08/27/09	190,833		$16,335.09
		Total		**$32,182.53**
Sand Canyon Pump Station				
07/01/09	07/29/09	467,599	168,661	$53,803.10
07/29/09	08/27/09	574,056	202,627	$63,002.81
				$116,805.91
	TOTAL	**2,930,443**		**$343,452.77**

Castaic Lake Water Agency News Release
September 14, 2009

NEWS RELEASE
DATE: September 14, 2009
FOR IMMEDIATE RELEASE

CONTACT: Dan Masnada (661) 297-1600 ext. 239
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CASTAIC LAKE WATER AGENCY

CLWA TO CELEBRATE COMPLETION OF PROJECT TO RESTORE GROUNDWATER PRODUCTION CAPACITY IMPACTED BY PERCHLORATE CONTAMINATION

The Castaic Lake Water Agency (CLWA), in partnership with the CLWA Santa Clarita Water Division, Newhall County Water District, Valencia Water Company and the City of Santa Clarita, will be holding an event celebrating completion of a project to restore groundwater production capacity impacted by perchlorate contamination and stop migration of a contaminant plume emanating from the former Whittaker-Bermite site in the center of the Santa Clarita Valley. The event is scheduled for Tuesday, September 22, 2009 at 9:30 a.m. at CLWA Rio Vista Intake Pump Station (RVIPS) located at 26401 Bouquet Canyon Road. The RVIPS is the stucco building to the left of In-N-Out Burger near Lowe's Home Improvement Warehouse.

After years of negotiations and studies, regulatory agencies, property owners and water suppliers agreed on the process to clean up ammonium perchlorate contaminating a portion of the local groundwater basin. The contamination is a result of manufacturing and storing explosives, fireworks and munitions over 50 years at the approximate 996 site.

The project to restore the well production capacity and mitigate the migration of the perchlorate plume began in 2007. Pumping and treatment operations will occur on a continuous basis over a number of decades. The affected groundwater will be pumped from two existing wells through a dedicated underground pipeline to the new perchlorate treatment plant located at CLWA's RVIPS. The project will remove the perchlorate from the pumped groundwater using ion exchange technology. The treated groundwater will then be disinfected and pumped into the CLWA distribution system.

Other activities on the project include continual monitoring of the wells and further characterization of the groundwater contamination to ensure migration of the contaminate plume is fully contained. The entire process will be overseen by State regulatory agencies to ensure public health and safety. The successful completion of the project would not be possible without the mutual cooperation of many parties in addition to the four water agencies and the City, including the U.S. Army Corps of Engineers, California Department of Public Health, California Department of Toxic Substances Control, Los Angeles County Department of Public Works, community groups, Whittaker Corporation, and numerous consultants, contractors, and suppliers.

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Development of Flow Criteria for the Sacramento-San Joaquin Delta Ecosystem
August 3, 2010

State Water Resources Control Board
California Environmental Protection Agency

Development of Flow Criteria for the Sacramento-San Joaquin Delta Ecosystem

Prepared Pursuant to the Sacramento-San Joaquin Delta Reform Act of 2009

August 3, 2010

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Governor Arnold Schwarzenegger

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State Water Resources Control Board
California Environmental Protection Agency

Development of Flow Criteria for the Sacramento-San Joaquin Delta Ecosystem

Prepared Pursuant to the Sacramento-San Joaquin Delta Reform Act of 2009

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Acknowledgements

The State Water Resources Control Board (State Water Board or Board) acknowledges the following for their contributions and participation in the Board's Delta Flow Criteria proceding:

- The professors, researchers, and staff from various resource agencies that comprise the Delta Environmental Flows Group (DEFG) for providing valuable information and insights that informed the Delta flow criteria informational proceeding, and whose work was cited liberally throughout this report
- The UC Davis Delta Solutions Group, a subset of the DEFG for providing additional insights in their reports on habitat variability, flow presecriptions, and ecosystem investments
- The California Department of Fish and Game for working collaboratively with the State Water Board on development of species life history requirements and for reviewing portions of the draft report
- The United States Fish and Wildflie Service and National Marine Fisheries Service for reviewing portions of the draft report
- All the participants of the proceeding for providing information and serving on panels to answer questions during the proceeding

The State Water Board, however, is responsible for any errors and for all interpretations of the information in this report.

STATE WATER RESOURCES CONTROL BOARD
RESOLUTION NO. 2010-0039

DETERMINING DELTA FLOW CRITERIA PURSUANT TO THE DELTA REFORM ACT

WHEREAS:

1. Water Code section 85086, contained in the Sacramento-San Joaquin Delta Reform Act of 2009 (Stats. 2009 (7th Ex. Sess.) ch. 5) (commencing with Wat. Code, 85000), requires the State Water Resources Control Board (State Water Board) to develop, within nine months of enactment of the statute, new flow criteria for the Sacramento-San Joaquin Delta (Delta) ecosystem that are necessary to protect public trust resources. The purpose of the flow criteria is to inform planning decisions for the Delta Plan and the Bay Delta Conservation Plan. The statute specifies that the flow criteria shall not predetermine any issue that may arise in the State Water Board s subsequent consideration of a permit.

2. In accordance with Water Code section 85086, subdivision (c)(1), the State Water Board conducted a public process in the form of an informational proceeding to collect information used to develop the flow criteria. The State Water Board conducted the informational proceeding on March 22-24, 2010, and considered the information submitted in connection with that proceeding in developing the flow criteria.

3. The State Water Board has prepared a report determining flow criteria for the Delta ecosystem necessary to protect public trust resources. In developing the flow criteria, the State Water Board reviewed existing water quality objectives and used the best available scientific information. The flow criteria include the volume, timing, and quality of flow necessary under different hydrologic conditions.

THEREFORE BE IT RESOLVED THAT:

1. In accordance with the Delta Reform Act, the State Water Board approves the report determining new flow criteria for the Delta ecosystem that are necessary to protect public trust resources.

2. The Executive Director is directed to submit the Delta flow criteria report to the Delta Stewardship Council for its information within 30 days of the adoption of this resolution.

CERTIFICATION

The undersigned Clerk to the Board does hereby certify that the foregoing is a full, true, and correct copy of a resolution duly and regularly adopted at a meeting of the State Water Board held on August 3, 2010.

AYE: Chairman Charles R. Hoppin
Vice Chair Frances Spivy-Weber
Board Member Arthur G. Baggett, Jr.
Board Member Tam M. Doduc
Board Member Walter G. Pettit

NAY: None

ABSENT: None

ABSTAIN: None

Jeanine Townsend
Clerk to the Board

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Acronyms and Abbreviations

AFRP	Anadromous Fish Restoration Program
AR	American Rivers
Bay-Delta	San Francisco Bay/Sacramento-San Joaquin Delta Estuary including Suisun Marsh
Bay-Delta Plan	Water Quality Control Plan for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary
BDCP	Bay Delta Conservation Program
CCWD	Contra Costa Water District
Central Valley Regional Board	Central Valley Regional Water Quality Control Board
CEQA	California Environmental Quality Act
CESA	California Endangered Species Act
cfs	cubic feet per second
Council	Delta Stewardship Council
CSPA	California Sportfishing Protection Alliance
CVP	Central Valley Project
CWIN	California Water Impact Network
DEFG	Delta Environmental Flows Group
Delta	Confluence of the Sacramento River and San Joaquin River (as defined in Water Code section 12220)
Delta Plan	Delta Stewardship Council comprehensive, long-term management plan for the Delta
Delta Reform Act	Sacramento-San Joaquin Delta Reform Act of 2009
DFG	California Department of Fish and Game
DO	dissolved oxygen
DOI	United States Department of the Interior
DSM2	Delta Simulation Model
DWR	California Department of Water Resources
DWSC	Stockton Deep Water Ship Channel
E/I	Export/Inflow ratio
EC	Electrical Conductivity
EDF	Environmental Defense Fund
ESA	Endangered Species Act
FERC	Federal Energy Regulatory Commission
FMWG	Fisheries Management Work Group
FMWT	Fall mid-water trawl
IEP	Interagency Ecological Program
LSZ	Low Salinity Zone
MAF	million acre-feet
mg/L	milligrams per liter
mmhos/cm	millimhos per centimeter
NAS	National Academy of Sciences
NCCPA	State Natural Community Conservation Planning Act
NDOI	Net Delta Outflow Index
NEPA	National Environmental Policy Act
NHI	Natural Heritage Institute

NMFS	National Marine Fisheries Service
NRDC	Natural Resources Defense Council
OCAP	Long-Term Operations Criteria and Plan for Coordination of the Central Valley Project and the State Water Project
OMR	Old and Middle River
Opinion	Biological Opinion
PCFFA	Pacific Coast Federation of Fishermen's Associations
POD	Pelagic Organism Decline
ppt	parts per thousand
psu	practical salinity unit
PTM	Particle Tracking Model
RMP	Regional Monitoring Program
RPA	Reasonable and Prudent Alternatives
San Francisco Regional Board	San Francisco Bay Regional Water Quality Control Board
SB 1	Senate Bill No. 1 of the 2009-2010 Seventh Extraordinary Session (Stats. 2009 (7th Ex. Sess.) ch. 5, □39)
SFWC	State and Federal Water Contractors
SJRA	San Joaquin River Agreement
SJRGA	San Joaquin River Group Authority
SJRRP	San Joaquin River Restoration Program
SRWTP	Sacramento Regional Wastewater Treatment Plant
State Water Board	State Water Resources Control Board
SWG	Smelt Working Group
SWP	State Water Project
TBI	The Bay Institute
TNC	The Nature Conservancy
USACE	U.S. Army Corps of Engineers
USBR	United States Bureau of Reclamation
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
VAMP	Vernalis Adaptive Management Plan
WOMT	Water Operations Management Team

1. Executive Summary

The Sacramento-San Joaquin Delta (Delta) is a critically important natural resource for California and the nation. It is both the hub of California's water supply system and the most valuable estuary and wetlands on the western coast of the Americas. The Delta is in ecological crisis, resulting in high levels of conflict that affect the sustainability of existing water policy in California. Several species of fish have been listed as protected species under the California Endangered Species Act (CESA) and under the federal Endangered Species Act (ESA). These two laws and other regulatory constraints have restricted water diversions from the Delta in an effort to prevent further harm to the protected species.

In November 2009, California enacted a comprehensive package of four policy bills and a bond measure intended to meet California's growing water challenges by adopting a policy of sustainable water supply management to ensure a reliable water supply for the State and to restore the Delta and other ecologically sensitive areas. One of these bills, Senate Bill No. 1 (SB 1) (Stats. 2009 (7th Ex. Sess.) ch 5, § 39) contains the Sacramento-San Joaquin Delta Reform Act of 2009 (Delta Reform Act), Water Code section 85000 et seq. The Delta Reform Act establishes a Delta Stewardship Council (Council), tasked with developing a comprehensive, long-term management plan for the Delta, known as the Delta Plan, and providing direction to multiple state and local agencies that take actions related to the Delta. The comprehensive bill package also sets water conservation policy, requires increased groundwater monitoring, and provides for increased enforcement against illegal water diversions.

The Delta Reform Act requires the State Water Board to use a public process to develop new flow criteria for the Delta ecosystem. During this process, participants cautioned the the State Water Board on the limitations of any flow criteria (Fleenor *et al*., 2010):

> "How much water do fish need?" has been a common refrain in Delta water management for many years – it is highly unlikely that any fixed or predetermined prescription will be a "silver bullet". The performance of native and desirable fish populations in the Delta requires much more than fresh water flows. Fish need enough water of appropriate quality over the temporal and spatial extent of habitats to which they adapted their life history strategies. Typically, this requires habitat having a particular range of physical characteristics, appropriate variability, adequate food supply and a diminished set of invasive species. While folks ask "How much water do fish need?" they might well also ask, "How much habitat of different types and locations, suitable water quality, improved food supply and fewer invasive species that is maintained by better governance institutions, competent implementation and directed research do fish need?" The answers to these questions are interdependent. We cannot know all of this now, perhaps ever, but we do know things that should help us move in a better direction, especially the urgency for being proactive. We do know that current policies have been disastrous for desirable fish. It took over a century to change the Delta's ecosystem to a less desirable state; it will take many decades to put it back together again with a different physical, biological, economic, and institutional environment."

The State Water Board concurs with this cautionary note. The State Water Board further cautions that flow and physical habitat interact in many ways, but they are not interchangeable.

The best available science suggests that current flows are insufficient to protect public trust resources.

1.1 Legislative Directive and State Water Board Approach

Legislative Directive

Water Code section 85086 (See Appendix B), contained in the Delta Reform Act, was enacted as part of the comprehensive package of water legislation adopted in November 2009. Water Code section 85086 requires the State Water Resources Control Board (State Water Board) to use the best available scientific information gathered as part of a public process conducted as an informational proceeding to develop new flow criteria for the Delta ecosystem to protect public trust resources. The purpose of the flow criteria is to inform planning decisions for the Delta Plan and the BDCP. The Legislature intended to establish an accelerated process to determine the instream flow needs of the Delta in order to facilitate the planning decisions required to meet the objectives of the Delta Plan. Accordingly, Water Code section 85086 requires the State Water Board to develop the flow criteria within nine months of enactment of the statute and to submit its flow criteria determinations to the Council within 30 days of their development.

State Water Board Approach

In determining the extent of protection to be afforded public trust resources through the development of the flow criteria, the State Water Board considered the broad goals of the planning efforts the criteria are intended to inform, including restoring and promoting viable, self-sustaining populations of aquatic species. Given the accelerated time frame in which to develop the criteria, the State Water Board's approach to developing criteria was limited to review of instream needs in the Delta ecosystem, specifically fish species and Delta outflows, while also receiving information on hydrodynamics and major tributary inflows. The State Water Board's flow criteria determinations are accordingly limited to protection of aquatic resources in the Delta.

Limitations of State Water Board Approach

When setting flow objectives with regulatory effect, the State Water Board reviews and considers all the effects of the flow objectives through a broad inquiry into all public trust and public interest concerns. For example, the State Water Board would consider other public trust resources potentially affected by Delta outflow requirements and impose measures for the protection of those resources, such as requiring sufficient water for cold water pool in reservoirs to maintain temperatures in Delta tributaries. The State Water Board would also consider a broad range of public interest matters, including economics, power production, human health and welfare requirements, and the effects of flow measures on non-aquatic resources (such as habitat for terrestrial species). The limited process adopted for this proceeding does not include this comprehensive review.

The State Water Board's Public Trust Responsibilities in this Proceeding

Under the public trust doctrine, the State Water Board must take the public trust into account in the planning and allocation of water resources, and to protect public trust uses whenever feasible. (*National Audubon Society v. Superior Court* (1983) 33 Cal.3d 419, 446.) Public trust values include navigation, commerce, fisheries, recreation, scenic, and ecological values. "[I]n determining whether it is 'feasible' to protect public trust values like fish and wildlife in a particular instance, the [State Water] Board must determine whether protection of those values, or what level of protection, is 'consistent with the public interest.'" (*State Water Resources*

Control Bd. Cases (2006) 136 Cal.App.4th 674, 778.) The State Water Board does not make any determination regarding the feasibility of the public trust criteria and consistency with the public interest in this report.

In this forum, the State Water Board has not considered the allocation of water resources, the application of the public trust to a particular water diversion or use, water supply impacts, or any balancing between potentially competing public trust resources (such as potential adverse effects of increased Delta outflow on the maintenance of coldwater resources for salmonids in upstream areas). Any such application of the State Water Board's public trust responsibilities, including any balancing of public trust values and water rights, would be conducted through an adjudicative or regulatory proceeding. Instead, the State Water Board's focus here is solely on identifying public trust resources in the Delta ecosystem and determining the flow criteria, as directed by Water Code section 85086.

Future Use of This Report

None of the determinations in this report have regulatory or adjudicatory effect. Any process with regulatory or adjudicative effect must take place through the State Water Board's water quality control planning, water rights processes, or public trust proceedings in conformance with applicable law. In the State Water Board's development of Delta flow objectives with regulatory effect, it must ensure the reasonable protection of beneficial uses, which may entail balancing of competing beneficial uses of water, including municipal and industrial uses, agricultural uses, and other environmental uses. The State Water Board's evaluation will include an analysis of the effect of any changed flow objectives on the environment in the watersheds in which Delta flows originate, the Delta, and the areas in which Delta water is used. It will also include an analysis of the economic impacts that result from changed flow objectives.

Nothing in either the Delta Reform Act or in this report amends or otherwise affects the water rights of any person. In carrying out its water right responsibilities, the State Water Board may impose any conditions that in its judgment will best develop, conserve, and utilize in the public interest the water to be appropriated. In making this determination, the State Water Board considers the relative benefit to be derived from all beneficial uses of the water concerned and balances competing interests.

The State Water Board has continuing authority over water right permits and licenses it issues. In the exercise of that authority and duty, the State Water Board may, if appropriate, amend terms and conditions of water right permits and licenses to impose further limitations on the diversion and use of water by the water right holder to protect public trust uses or to meet water quality and flow objectives in Water Quality Control Plans it has adopted. The State Water Board must provide notice to the water permit or license holder and an opportunity for hearing before it may amend a water right permit or license.

If the DWR and/or the USBR in the future request the State Water Board to amend the water right permits for the State Water Project (SWP) and/or the Central Valley Project (CVP) to move the authorized points of diversion for the projects from the southern Delta to the Sacramento River, Water Code section 85086 directs the State Water Board to include in any order approving a change in the point of the diversion of the projects appropriate Delta flow criteria. At that time, the State Water Board will determine appropriate permit terms and conditions. That decision will be informed by the analysis in this report, but will also take many other factors into consideration, including any newly developed scientific information, habitat conditions at the time, and other policies of the State, including the relative benefit to be derived from all

beneficial uses of water. The flow criteria in this report are not pre-decisional in regard to any State Water Board action. (See e.g., Wat. Code, 85086, subd. (c)(1).)

The information in this report illustrates to the State Water Board the need for an integrated approach to management of the Delta. Best available science supports that it is important to directly address the negative effects of other stressors, including habitat, water quality, and invasive species, that contribute to higher demands for water to protect public trust resources. The flow criteria highlight the continued need for the BDCP to develop an integrated set of solutions and to implement non flow measures to protect public trust resources.

1.2 Summary Determinations

This report contains the State Water Board s determinations as to the flows that protect public trust resources in the Delta, under the narrow circumstances analyzed in this report. As required, the report includes the volume, timing, and quality of flow for protection of public trust resources under different hydrologic conditions. The flow criteria represent a technical assessment only of flow and operational requirements that provide fishery protection under existing conditions. The flow criteria contained in this report do not represent flows that might be protective under other conditions. The State Water Board recognizes that changes in existing conditions may alter the need for flow. Changes in existing conditions that may affect flow needs include, but are not limited to, reduced reverse flows in Delta channels, increased tidal habitat, improved water quality, reduced competition from invasive species, changes in the point of diversion of the SWP and CVP, and climate change.

Flow Criteria and Conclusions

The numeric criteria determinations in this report must be considered in the following context:

- The flow criteria in this report do not consider any balancing of public trust resource protection with public interest needs for water.
- The State Water Board does not intend that the criteria should supersede requirements for health and safety such as the need to manage water for flood control.
- There is sufficient scientific information to support the need for increased flows to protect public trust resources; while there is uncertainty regarding specific numeric criteria, scientific certainty is not the standard for agency decision making.

The State Water Board has considered the testimony presented during the Board s informational proceeding to develop flow criteria and to support the following summary conclusions. Several of these summary conclusions rely in whole or in part on conclusions and recommendations made to the State Water Board by the Delta Environmental Flows Group (DEFG)[1] and the University of California at Davis Delta Solutions Group[2].

1. The effects of non-flow changes in the Delta ecosystem, such as nutrient composition, channelization, habitat, invasive species, and water quality, need to be addressed and integrated with flow measures.

[1] The Delta Environmental Flows Group of experts consists of William Bennett, Jon Burau, Cliff Dahm, Chris Enright, Fred Feyrer, William Fleenor, Bruce Herbold, Wim Kimmerer, Jay Lund, Peter Moyle, and Matthew Nobriga.

[2] The Delta Solutions Group consists of William Bennett, William Fleenor, Jay Lund, and Peter Moyle.

2. Recent Delta flows are insufficient to support native Delta fishes for today's habitats.[3] Flow modification is one of the immediate actions available although the links between flows and fish response are often indirect and are not fully resolved. Flow and physical habitat interact in many ways, but they are not interchangeable.

3. In order to preserve the attributes of a natural variable system to which native fish species are adapted, many of the criteria developed by the State Water Board are crafted as percentages of natural or unimpaired flows. These criteria include:

    - 75% of unimpaired Delta outflow from January through June;
    - 75% of unimpaired Sacramento River inflow from November through June; and
    - 60% of unimpaired San Joaquin River inflow from February through June.

    It is not the State Water Board's intent that these criteria be interpreted as precise flow requirements for fish under current conditions, but rather they reflect the general timing and magnitude of flows under the narrow circumstances analyzed in this report. In comparison, historic flows over the last 18 to 22 years have been:

    - approximately 30% in drier years to almost 100% of unimpaired flows in wetter years for Delta outflows;
    - about 50% on average from April through June for Sacramento River inflows; and
    - approximately 20% in drier years to almost 50% in wetter years for San Joaquin River inflows.

4. Other criteria include: increased fall Delta outflow in wet and above normal years; fall pulse flows on the Sacramento and San Joaquin Rivers; and flow criteria in the Delta to help protect fish from mortality in the central and southern Delta resulting from operations of the State and federal water export facilities.

5. The report also includes determinations regarding variability and the natural hydrograph, floodplain activation and other habitat improvements, water quality and contaminants, cold water pool management, and adaptive management:
    - Criteria should reflect the frequency, duration, timing, and rate of change of flows, and not just volumes or magnitudes. Accordingly, whenever possible, the criteria specified above are expressed as a percentage of the unimpaired hydrograph.

[3] This statement should not be construed as a critique of the basis for existing regulatory requirements included in the 2006 Bay-Delta Plan and biological opinions. Those requirements were developed pursuant to specific statutory requirements and considerations that differ from this proceeding. Particularly when developing water quality objectives, the State Water Board must consider many different factors including what constitutes reasonable protection of the beneficial use and economic considerations. In addition, the biological opinions for the SWP and CVP Operations Criteria and Plan were developed to prevent jeopardy to specific fish species listed pursuant to the federal Endangered Species Act; in contrast, the flow criteria developed in this proceeding are intended to halt population decline and increase populations of certain species.

- Inflows should generally be provided from tributaries to the Delta watershed in proportion to their contribution to unimpaired flow unless otherwise indicated.
- Studies and demonstration projects for, and implementation of, floodplain restoration, improved connectivity and passage, and other habitat improvements should proceed to provide additional protection of public trust uses and potentially allow for the reduction of flows otherwise needed to protect public trust resources in the Delta.
- The Central Valley and San Francisco Regional Water Quality Control Boards should continue developing Total Maximum Daily Loads (TMDLs) for all listed pollutants and adopting programs to implement control actions.
- The Central Valley Regional Water Quality Control Board should require additional studies and incorporate discharge limits and other controls into permits, as appropriate, for the control of nutrients and ammonia.
- Temperature and water supply modeling and analyses should be conducted to identify conflicting requirements to achieve both flow and cold water temperature goals.
- A strong science program and a flexible management regime are critical to improving flow criteria. The State Water Board should work with the Council, the Delta Science Program, BDCP, the Interagency Ecological Program (IEP), and others to develop the framework for adaptive management that could be relied upon for the management and regulation of Delta flows.
- The numeric criteria included in this report are all criteria that are only appropriate for the current physical system and climate; as other factors change the flow needs advanced in this report will also change. As physical changes occur to the environment and our understanding of species needs improves, the long-term flow needs will also change. Actual flows should be informed by adaptive management.
- Only the underlying principles for the numeric criteria and other measures are advanced as long term criteria.

6. Past changes in the Delta may influence migratory cues for some fishes. These cues are further scrambled by a reverse salinity gradient in the south Delta. It is important to establish seaward gradients and create more slough networks with natural channel geometry. Achieving a variable more complex estuary requires establishing seasonal gradients in salinity and other water quality variables and diverse habitats throughout the estuary. These goals in turn encourage policies which establish internal Delta flows that create a tidally-mixed upstream- downstream gradient (without cross-Delta flows) in water quality. Continued through-Delta conveyance is likely to continue the need for in-Delta flow requirements and restrictions to protect fish within the Delta.

7. Restoring environmental variability in the Delta is fundamentally inconsistent with continuing to move large volumes of water through the Delta for export. The drinking and agricultural water quality requirements of through-Delta exports, and perhaps even some current in-Delta uses, are at odds with the water quality and variability needs of desirable Delta species.

8. The Delta ecosystem is likely to dramatically shift within 50 years due to large scale levee collapse. Overall, these changes are likely to promote a more variable, heterogeneous estuary. This changed environment is likely to be better for desirable estuarine species; at least it is unlikely to be worse.

9. Positive changes in the Delta ecosystem resulting from improved flow or flow patterns will benefit humans as well as fish and wildlife.

10. In order to prevent further channelization of riparian corridors and infill of wetland habitats, the Delta Stewardship Council should consider developing a plan to coordinate land use policy within the Delta between the city, county, State, and federal governments.

Ecosystems are complex; there are many factors that affect the quality of the habitat that they provide. These factors combine in ways that can amplify the effect of the factors on aquatic resources. The habitat value of the Delta ecosystem for favorable species can be improved by habitat restoration, contaminant and nutrient reduction, changes in diversions, control of invasive species, and island flooding. Each of these non-flow factors has the potential to interact with flow to affect available aquatic habitat in Delta channels.

The State Water Board supports the most efficient use of water that can reasonably be made. The flow improvements that the State Water Board identifies in this report as being necessary to protect public trust resources illustrate the importance of addressing the negative effects of these other stressors that contribute to higher than necessary demands for water to provide resource protection. Future habitat improvements or changes in nutrients and contaminants, for example, may change the response of fishes to flow. Addressing other stressors directly will be necessary to assure protection of public trust resources and could change the demands for water to provide resource protection in the future. Uncertainty regarding the effects of habitat improvement and other stressors on flow demands for resource protection highlights the need for continued study and adaptive management to respond to changing conditions.

The flow criteria identified in this report highlight the need for the BDCP to develop an integrated set of solutions, to address ecosystem flow needs, including flow and non-flow measures. Although flow modification is an action that can be implemented in a relatively short time in order to improve the survival of desirable species and protect public trust resources, public trust resource protection cannot be achieved solely through flows habitat restoration also is needed. One cannot substitute for the other; both flow improvements and habitat restoration are essential to protecting public trust resources.

1.3 Background and Next Steps

Informational Proceeding

The State Water Board held an informational proceeding on March 22, 23, and 24, 2010, to receive scientific information from technical experts on the Delta outflows needed to protect public trust resources. The State Water Board also received information at the proceeding on flow criteria for inflow to the Delta from the Sacramento and San Joaquin rivers and Delta hydrodynamics. The State Water Board did not solicit information on the need for water for other beneficial uses, including the amount of water needed for human health and safety, during the informational proceeding. Nor did the State Water Board consider other policy considerations, such as the state goal of providing a decent home and suitable living environment for every Californian.

Analytical Methods

The State Water Board received a wide range of recommendations for the volume, quantity and timing of flow necessary to protect public trust resources. Recommendations were also

received on non-flow related measures. State Water Board determinations of flow criteria rely upon four types of information:

- Unimpaired flows
- Historical impaired inflows that supported more desirable ecological conditions
- Statistical relationships between flow and native species abundance
- Ecological functions-based analysis for desirable species and ecosystem attributes

The State Water Board emphasizes, however, information based on ecological functions, followed by information on statistical relationships between flow and native species abundance.

In all cases, the flow criteria contained in this report are those supported by the best available scientific information submitted into the record for this proceeding. The conceptual bases for all of the criteria in this report are supported by scientific information on function-based species or ecosystem needs. In other words, there is sufficiently strong scientific evidence to support the need for flows necessary to support particular functions. This does not necessarily mean that there is scientific evidence to support *specific* numeric criteria. Criteria are therefore divided into two categories: Category A criteria have more and better scientific information, with less uncertainty, to support specific numeric criteria than do Category B criteria. The State Water Board followed the following steps to develop flow criteria and other measures:

1. Establish general goals and objectives for protection of public trust resources in the Delta
2. Identify species to include based on ecological, recreational, or commercial importance.
3. Review and summarize species life history requirements
4. Summarize numeric and other criteria for each of: Delta outflow, Sacramento River inflow, San Joaquin River inflow, and Hydrodynamics, including Old and Middle River flows
5. Review other flow-related and non-flow measures that should be considered
6. Provide summary determinations for flow criteria and other measures

In developing its flow criteria, the State Water Board reviewed the life history requirements of the following pelagic and anadromous species:

- Chinook Salmon (various runs)
- American Shad.
- Longfin Smelt
- Delta Smelt
- Sacramento Splittail
- Starry Flounder
- Bay Shrimp
- Zooplankton

The flow criteria needed to protect public trust resources are more than just the sum of each species-specific flow need. The State Water Board also considered the following issues to make its flow criteria determinations:

- Variability, flow paths, and the natural hydrograph
- Floodplain activation and other habitat improvements

- Water quality and contaminants
- Cold water pool management
- Adaptive management

The Board also made other specific determinations for other measures based on review of these issues.

Regulatory Authority of the State Water Board

The State Water Board was established in 1967 as the State agency with jurisdiction to administer California's water resources. The State Water Board is responsible for water allocation as well as for water quality planning and water pollution control. In carrying out its water quality planning functions under both State and federal law, the State Water Board formulates and adopts state policy for water quality control, which includes water quality principles and guidelines for long-range resource planning, water quality objectives, and other principles and guidelines deemed essential by the State Water Board for water quality control. The State Water Board has adopted a Water Quality Control Plan for the Delta (Bay-Delta Plan). The plan is implemented in part through conditions imposed in both water quality and water right permits.

The State Water Board administers the water rights program for the State, including issuing water right permits. More than two-thirds of the residents of California and more than two million acres of highly productive farmlands receive water exported from the Delta, primarily, although not exclusively, through the SWP and CVP. In addition to the SWP and CVP, there are many other diversions from the Delta and from tributaries to the Delta including the East Bay Municipal Utilities District, the San Francisco Public Utilities Commission, and Contra Costa Water District, to name a few.

Regulatory Actions by Other Agencies

In addition to the State Water Board, other state and federal agencies have authority to take regulatory action that can affect Delta inflows, outflows, and hydrodynamics. As indicated below, the United States Fish and Wildlife Service (USFWS), the National Marine Fisheries Service (NMFS), and the California Department of Fish and Game (DFG) have authority to impose regulatory conditions that affect water diversions from the Delta. The Federal Energy Regulatory Commission (FERC) also has authority over non-federal hydropower projects that can change the timing and quantity of inflows to the Delta. Over the next six years, there are 16 hydropower projects on tributaries to the Sacramento and San Joaquin rivers with potential to affect Delta tributary flows that have ongoing or pending proceedings before the FERC.

Next Steps

The State Water Board will submit its flow criteria determinations to the Council for its information within 30 days of completing its determinations as required by Water Code section 85086.

The flow criteria contained in this report will be submitted to the Council to inform the Delta Plan. The Council is required to develop the Delta Plan to implement the State's co-equal goals of providing a more reliable water supply for California and protecting, restoring, and enhancing the Delta ecosystem. The Council is to develop the Delta Plan by January 2012.

The flow criteria will also inform the BDCP. The BDCP is a multispecies conservation plan being developed pursuant to the ESA and the State Natural Community Conservation Planning Act (NCCPA), administered by the USFWS and the NMFS and the DFG, respectively. The

CESA and the federal ESA generally prohibit the "take" of species protected pursuant to the acts. Both acts contain provisions that allow entities to seek approvals from the resources agencies, which approvals allow limited take of protected species under some circumstances. The BDCP is intended to meet all regulatory requirements necessary for USFWS and NMFS to issue Incidental Take Permits to allow incidental take of all proposed covered species as a result of covered activities undertaken by DWR, certain SWP contractors, and Mirant Corporation, and to issue biological opinions under the ESA to authorize incidental take for covered actions undertaken by USBR and CVP contractors. The BDCP is also intended to address all of the requirements of the NCCPA for aquatic, wetland, and terrestrial covered species of fish, wildlife, and plants and Delta natural communities affected by BDCP actions and is intended to provide sufficient information for DFG to issue permits under the CESA for the taking of the species proposed for coverage under the BDCP.

Finally, the flow criteria in this report will also inform the State Water Board's on-going and subsequent proceedings, including the review and development of flow objectives in the San Joaquin River, a comprehensive update to the 2006 Bay-Delta Plan, and the associated water rights proceedings to implement these Bay-Delta Plan updates.

2. Introduction

The purpose of this report is to identify new flow criteria for the Sacramento-San Joaquin Delta (Delta) ecosystem to protect public trust resources in accordance with the Delta Reform Act of 2009, Water Code § 85000 et seq. The flow criteria, which do not have any regulatory or adjudicative effect, may be used to inform planning decisions for the new Delta Plan being prepared by the newly created Delta Stewardship Council (Council) and the Bay Delta Conservation Plan (BDCP). The public trust resources that are the subject of this proceeding include those resources affected by flow, namely, native and valued resident and migratory aquatic species, habitats, and ecosystem processes. The State Water Resources Control Board (State Water Board or Board) has developed flow criteria to protect these resources that incorporate measures regarding Delta outflows and Delta inflows and has recommended other measures relevant to the protection of public trust resources. After approval by the State Water Board, this report will be submitted to the Council.

3. Purpose and Background

3.1 Background and Scope of Report

Pursuant to Water Code section 85086, subdivision (c), enacted on November 12, 2009, in Senate Bill No. 1 of the 2009-2010 Seventh Extraordinary Session (Stats. 2009 (7th Ex. Sess.) ch. 5, § 39) (SB 1), the State Water Board is required to "develop new flow criteria for the Delta ecosystem necessary to protect public trust resources." The purpose of this report is to comply with the Legislature's mandate to the State Water Board.

Given the limited amount of time the State Water Board had to develop the criteria, the Board initially focused on Delta outflow conditions as a primary driver of ecosystem functions in the Delta. In determining the extent of protection to be afforded public trust resources through the development of the flow criteria, the State Water Board considered the broad goals of the planning efforts the criteria are intended to inform, including restoring and promoting viable, self-sustaining populations of aquatic species. The specific goals for protection are discussed in more detail below.

The notice for this proceeding focused the proceeding on Delta outflows. During the proceeding, however, the State Water Board received useful information from participants regarding Sacramento River inflows, San Joaquin River inflows, and Delta hydrodynamics (including Old and Middle River flows, San Joaquin River at Jersey Point flows, and San Joaquin River inflow to export ratios) that is relevant to protection of public trust resources in the Delta ecosystem. The hydrodynamic criteria included in this reportare largely dependent on exports and on San Joaquin River inflows, and do not directly affect the outflows considered in this proceeding. The State Water Board believes, however, that this information should be transmitted to the Council for its use in informing the Delta Plan and BDCP. Because the notice for the proceeding focused on Delta outflows, and some of the participants did not submit scientific information on inflows and hydrodynamics for the State Water Board's consideration, the record for inflows and hydrodynamics may not be as complete, and the analyses for these flow parameters accordingly may be limited. As a result, these criteria do not constitute formal criteria within the scope of the informational proceeding as noticed, but instead are submitted to the Council with the acknowledgement that they are based on the limited information received by the State Water Board.

3.1.1 The Legislative Requirements

In November 2009, legislation was enacted comprising a comprehensive water package for California. In general, the legislation is designed to achieve a reliable water supply for future generations and to restore the Delta and other ecologically sensitive areas. The package includes a bond bill and four policy bills, one of which is SB 1.

In the Delta Reform Act, the Legislature found and declared, among other matters, that:

> "The Sacramento-San Joaquin Delta watershed and California's water infrastructure are in crisis and existing Delta policies are not sustainable. Resolving the crisis requires fundamental reorganization of the state's management of Delta watershed resources. (Wat. Code, § 85001, subd. (a).)
>
> By enacting this division, it is the intent of the Legislature to provide for the sustainable management of the Sacramento-San Joaquin Delta ecosystem, to provide for a more reliable water supply for the state, to protect and enhance the quality of water supply from the Delta, and to establish a governance structure that will direct efforts across state agencies to develop a legally enforceable Delta Plan." (Wat. Code, § 85001, subd. (c).)

Among other provisions, SB 1 establishes the Delta Stewardship Council, which is charged with responsibility to develop, adopt, and commence implementation of a Delta Plan, a comprehensive, long-term management plan for the Delta, by January 1, 2012. The legislation also establishes requirements for inclusion of the BDCP, a multispecies conservation plan, into the Delta Plan. For purposes of informing the planning efforts for the Delta Plan and BDCP, SB 1 requires the State Water Board, pursuant to its public trust obligations, to develop new flow criteria for the Delta ecosystem necessary to protect public trust resources. (Wat. Code, § 85086, subd. (c).) Regarding the flow criteria, the Legislature provided that the flow criteria shall:

- include the volume, quality, and timing of water necessary for the Delta ecosystem;
- be developed within nine months of enactment of SB 1;

- be submitted to the Council within 30 days of completion;
- inform planning decisions for the Delta Plan and the BDCP;
- be based on a review of existing water quality objectives and the use of the best available scientific information;
- be developed in a public process by the State Water Board as a result of an informational proceeding conducted under the board's regulations set forth at California Code of Regulations, title 23, sections 649-649.5, in which all interested persons have an opportunity to participate.
- not be considered predecisional with regard to any subsequent State Water Board consideration of a permit, including any permit in connection with a final BDCP;
- inform any State Water Board order approving a change in the point of diversion of the State Water Project or the federal Central Valley Project from the southern Delta to a point on the Sacramento River;

3.1.2 The State Water Board's Public Trust Obligations

As stated above, SB 1 requires the State Water Board to develop new flow criteria to protect public trust resources in the Delta ecosystem pursuant to the Board's public trust obligations. The purpose of the public trust is to protect commerce, navigation, fisheries, recreation, ecological values, and fish and wildlife habitat. Under the public trust doctrine, the State of California has sovereign authority to exercise continuous supervision and control over the navigable waters of the state and the lands underlying those waters. (*National Audubon Society v. Superior Court* (*Audubon*) (1983) 33 Cal.3d 419.) A variant of the public trust doctrine also applies to activities that harm a fishery in non-navigable waters. (*People v. Truckee Lumber Co.* (1897) 116 Cal. 397, see *California Trout, Inc. v. State Water Resources Control Board* (1989) 207 Cal.App.3d 585, 630.)

In *Audubon*, the California Supreme Court held that California water law is an integration of the public trust doctrine and the appropriative water right system. (*Audubon*, *supra*, 33 Cal.3d at p. 426.) The state has an affirmative duty to take the public trust into account in the planning and allocation of water resources. The public trust doctrine requires the State Water Board to consider the effect of a diversion or use of water on streams, lakes, or other bodies of water, and "preserve, so far as consistent with the public interest, the uses protected by the trust." (*Audubon*, *supra*, 33 Cal.3d at p. 447.) Thus, before the State Water Board approves a water diversion, it must consider the effect of the diversion on public trust resources and avoid or minimize any harm to those resources where feasible. (*Id.* at p. 426.) Even after an appropriation has been approved, the public trust imposes a duty of continuing supervision. (*Id.* at p. 447.)

The purpose of this proceeding is to receive scientific information and develop flow criteria pursuant to the State Water Board's public trust obligations. In this forum, the State Water Board will not consider the allocation of water resources, the application of the public trust to a particular water diversion or use, or any balancing between potentially competing public trust resources. The State Water Board has also not considered minimum or maximum flows needed to protect public health and safety. Any such application of the State Water Board's public trust responsibilities, including any balancing of public trust values and water rights, would be conducted through an adjudicative or regulatory proceeding. Instead, the State Water Board's focus here is solely on identifying public trust resources in the Delta ecosystem within the scope of SB 1 and determining the flows necessary to protect those resources.

3.1.3 Public Process

The Water Code directs the State Water Board to develop the flow criteria in a public process in the form of an informational proceeding conducted pursuant to the Board's regulations. (Wat. Code, § 85086, subd. (c)(1); Cal. Code Regs., tit. 23, §§ 649-649.5.) The State Water Board conducted this informational proceeding to receive the best available scientific information to use in carrying out its mandate to develop new flow criteria for the Delta ecosystem necessary to protect public trust resources. (Wat. Code, § 85086, subd. (c)(1).) On December 16, 2009, the State Water Board issued the notice for the public informational proceeding to develop the flow criteria. For the informational proceeding, the State Water Board required the participants to submit a Notice of Intent to Appear by January 5, 2010. The State Water Board received 55 Notices of Intent to Appear for the informational proceeding.

On January 7, 2010, the State Water Board conducted a pre-proceeding conference to discuss the procedures for the informational proceeding mandated by Water Code section 85086, subdivision (c). Topics for the pre-proceeding conference included coordination of joint presentations, use of presentation panels, time limits on presentations, and electronic submittal of written information. The conference was used only to discuss procedural matters and did not address any substantive issues.

On January 29, 2010, the State Water Board issued a revised notice amending certain procedural requirements and posted a preliminary list of reference documents. Written testimony, exhibits, and written summaries, along with lists of witnesses and lists of exhibits, were due on February 16, 2010. The State Water Board gave participants and interested parties an opportunity to submit written questions regarding the written testimony, exhibits, and written summaries by March 9, 2010. All submittals were posted on the State Water Board's website.

On March 22 through 24, the State Water Board held the public informational proceeding to develop flow criteria for the Delta ecosystem. The State Water Board received a technical introduction by the Delta Environmental Flows Group (DEFG)[4] at the beginning of the proceeding. The group prepared two documents and an associated list of references that were submitted as State Water Board exhibits:

- Key Points on Delta Environmental Flows for the State Water Resources Control Board, February 2010
- Changing Ecosystems: a Brief Ecological History of the Delta, February 2010

A subset of the group, the UC Davis Delta Solutions Group, prepared three additional papers (which were also submitted as State Water Board exhibits):

- Habitat Variability and Complexity in the Upper San Francisco Estuary
- On Developing Prescriptions for Freshwater Flows to Sustain Desirable Fishes in the Sacramento-San Joaquin Delta

[4] The Delta Environmental Flows Group consists of William Bennett, Jon Burau, Cliff Dahm, Chris Enright, Fred Feyrer, William Fleenor, Bruce Herbold, Wim Kimmerer, Jay Lund, Peter Moyle, and Matthew Nobriga. This group of professors, researchers, and staff from various resource agencies was assembled by State Water Board staff with the intent of informing the Delta flow criteria informational proceeding.

- Ecosystem Investments for the Sacramento-San Joaquin Delta: Development of a Portfolio Framework

Over the course of the hearing, the State Water Board received information from expert witnesses in response to questions posed by Board members. The expert witnesses, representing various participants, as well as experts from the DEFG, were grouped into five panels in order to focus the discussions on specific aspects of the Delta flow criteria. These panels addressed the following topics: hydrology, pelagic fish, anadromous fish, other stressors, and hydrodynamics.

At the conclusion of the informational proceeding, participants were given approximately 20 days to submit closing comments. On July 21, 2010, the draft report was released for public review and comment.

3.1.4 Scope of This Report

Due to the limited nine-month time period in which the State Water Board must develop new flow criteria, the notice for the informational proceeding requested information on what volume, quality, and timing of Delta outflows are necessary under different hydrological conditions to protect public trust resources pursuant to the State Water Board s public trust obligations and the requirements of SB 1. Delta outflows are of critical importance to various ecosystem functions, water supply, habitat restoration, and other planning issues. The effect of Delta outflows in protecting public trust resources necessarily involves complex interactions with other flows in the Delta and with non-flow parameters including water quality and the physical configuration of the Delta. This report recognizes the role of source inflows used to meet Delta outflows, Delta hydrodynamics, tidal action, hydrology, water diversions, water project operations, and cold water pool storage in upstream reservoirs, and relies upon information submitted on these related topics to inform its determinations.

The State Water Board intends that the flow criteria developed in this proceeding should meet the following general goal regarding the protection of public trust resources:

- Halt the population decline and increase populations of native species as well as species of commercial and recreational importance by providing sufficient flow and water quality at appropriate times to promote viable life stages of these species.

To meet this goal, the State Water Board also sought to develop criteria that are comprehensive and that can be implemented without undue complexity. This report is limited to consideration of flow criteria needed under the existing physical conditions, so therefore does not consider or anticipate changes in habitat or modification of water conveyance facilities. The State Water Board does, however, identify other measures that should be considered in conjunction with, and to complement, the flow criteria.

A number of factors outside the scope of the legislative mandate to develop new flow criteria could affect public trust resources and some other factors could affect the interaction of flows with the environment. These factors include contaminants, water quality parameters, future habitat restoration measures, water conveyance facilities modification, and the presence of non-native species.

3.1.5 Concurrent State Water Board Processes

The State Water Board has a number of ongoing proceedings that may be informed by the development of flow criteria. Some of these proceedings will result in regulatory requirements

that affect flow, or otherwise affect the volume, quality, or timing of flows into, within, or out of the Delta. In July 2008, the State Water Board adopted a strategic work plan for actions to protect beneficial uses of the San Francisco Bay/Delta (Bay-Delta). In accordance with the work plan, the State Water Board recently completed a periodic review of the 2006 Water Quality Control Plan for the Bay-DeltaEstuary (Bay-Delta Plan) that recommended the Delta Outflow objectives, as well as other flow objectives, for further review in the water quality control planning process. Currently, the State Water Board is in the process of reviewing the southern Delta salinity and the San Joaquin River flow objectives contained in the Bay-Delta Plan.

Clean Water Act Water Quality Certifications

Several non-federal hydropower projects with potential to affect Delta tributary flows have ongoing or pending proceedings before the Federal Energy Regulatory Commission (FERC) that will result in the issuance of new licenses that will govern operations for the 30-50 year term. The relicensing process allows state and federal agencies to prescribe conditions to achieve certain objectives such as state water quality standards and the protection of listed species. New license conditions may include instreams flows requirements or other conditions to protect aquatic species. For example, the new license for the Oroville Dam will require changes in minimum flow requirements and changes in facilities and operations to meet certain water temperature requirements to protect Chinook salmon, steelhead, and green sturgeon. By 2016, more than 25 Delta tributary dams will go through the relicensing process.

The State Water Board will rely upon the FERC license application and the National Environmental Policy Act (NEPA) and California Environmental Quality Act (CEQA) documents prepared for the projects, and may require submittal of additional data or studies, to inform its Clean Water Act Section 401 Water Quality Certifications for the projects. The Board s water quality certification will be issued as soon as possible after the environmental documents and any other needed studies are complete, after which FERC will issue a new license. The conditions in the water quality certification are mandatory and must be included in the FERC license.

Information developed as part of the relicensing of these projects will be used to inform on-going Bay Delta proceedings, and any information developed in the State Water Board s Bay Delta proceedings will be used to inform the two water quality certifications.

Table 1 summarizes the dams, tributaries, and license expiration dates for FERC projects in the Delta watershed. Several of these projects are upstream of major dams and reservoirs in the Sacramento and San Joaquin river watershed so operational changes would have little or no direct effect upon Delta flows.

Table 1. Delta Watershed FERC Projects

River	Dam(s)	Storage Capacity (acre-feet)	Owner	Status of Proceeding	FERC License Expiration
Feather	Oroville	3.5 million	Department of Water Resources (DWR)	Near completion	January 2007
West Branch Feather	Philbrook, Round Valley	6,200	Pacific Gas and Electric Company (PG&E)	Near Completion	October 2009
South Feather	Little Grass Valley	90,000	South Feather Water and Power Agency	Near completion	March 2009
Upper North Fork Feather	Lake Almanor	1.1 million	PG&E	Near Completion	October 2004
Pit River	McCloud, Iron Canyon,Pit 6, 7	110,000	PG&E	Ongoing	July 2011
North Yuba	New Bullards Bar	970,000	Yuba County Water Agency	Pre-Licensing meetings started	March 2016
Middle and South Yuba, Bear	Yuba-Bear Project, 10 dams	210,000	Nevada Irrigation District	Ongoing	April 2013
Middle & South Yuba, Bear	Drum-Spaulding Project, 10 dams	150,000	PG&E	Ongoing	April 2013
Middle Fork American River	French Meadows, Hell Hole	340,000	Placer County Water Agency	Ongoing	February 2013
South Fork American River	Loon Lake, Slab Creek	400,000	Sacramento Municipal Utility District	Near completion	July 2007
South Fork American River	Chili Bar	1,300	PG&E	Near completion	July 2007
Tuolumne	New Don Pedro	2 million	Turlock Irrigation District	To commence late 2010	April 2016
Merced	New Exchequer/ McSwain	1 million	Merced Irrigation District	Ongoing	February 2014
Merced	Merced Falls	650	PG&E	Ongoing	February 2014
San Joaquin	Mammoth Pool	120,000	Southern California Edison	Near Completion	November 2007
San Joaquin	Huntington, Shaver, Florence	320,000	Southern California Edison	Near Completion	February 2009

3.1.6 Delta Stewardship Council and Use of This Report

In accordance with the legislative requirements described above, the State Water Board will submit this report, containing its Delta flow criteria determinations, to the Council within 30 days after this report has been completed. This report will be deemed complete on the date the State Water Board adopts a resolution approving transmittal of the report to the Council.

Additionally, SB 1 requires any order approving a change in the point of diversion of the State Water Project (SWP) or the Central Valley Project (CVP) from the southern Delta to a point on the Sacramento River to include appropriate flow criteria and to be informed by the analysis in this report. (Wat. Code, § 85086, subd. (c)(2).) The statute also specifies, however, that the criteria shall not be considered predecisional with respect to the State Water Board's subsequent consideration of a permit. (*Id*., § 85086, subd. (c)(1).) Thus, any process with regulatory or adjudicative effect must take place through the State Water Board's water quality control planning or water rights processes in conformance with applicable law. Any person who wishes to introduce information produced during this informational proceeding, or the State Water Board's ultimate determinations in this report, into a later rulemaking or adjudicative proceeding must comply with the rules for submission of information or evidence applicable to that proceeding.

3.2 Regulatory Setting

3.2.1 History of Delta Flow Requirements

The State Water Rights Board (a predecessor to the State Water Board) first had an opportunity to consider flow requirements in the Delta when it approved water rights for much of the U.S. Bureau of Reclamation's (USBR) CVP in Water Right Decision 990 (D-990) (adopted in 1961), but it did not impose any fish protection conditions in D-990. In 1967, the State Water Rights Board included fish protections in D-1275 approving the water right permits for the SWP. Effective December 1, 1967, the State Water Rights Board and the State Water Quality Control Board were merged in a new agency, the State Water Board, which exercises both the water quality and water rights adjudicatory and regulatory functions of the state. The State Water Board adopted a new water quality control policy for the Delta and Suisun Marsh in October 1968, in Resolution 68-17. The resolution specified that the objectives would be implemented through conditions on the water rights of the CVP and SWP.

To implement the water quality objectives, the State Water Board adopted Water Right Decision 1379 (D-1379) in 1971[5]. D-1379 established new water quality requirements in both the SWP and CVP permits, including fish flows, and rescinded the previous SWP requirements from D-1275 and D-1291. D-1379 was stayed by the courts and eventually was superseded by Water Right Decision 1485 (D-1485).

In April 1973, in Resolution 73-16, the State Water Board adopted a water quality control plan to supplement the State water quality control policies for the Delta.

[5] In 1971, the State Water Board approved interim regional water quality control plans for the entire State, including the Delta and Suisun Marsh. Subsequently, the State Water Board approved long-term objectives for the Delta and Suisun Marsh in the regional plans for the Sacramento-San Joaquin Delta Basin and the San Francisco Bay Basin.

In August 1978, the State Water Board adopted both D-1485 and the 1978 Delta Plan. Together the 1978 Delta Plan and D-1485 revised existing objectives for flow and salinity in the Delta's channels and ordered USBR and DWR to meet the objectives. In 1987, the State Water Board commenced proceedings to review the 1978 Delta Plan and D-1485. The Board held a hearing at numerous venues in California and released a draft water quality control planin 1988, but subsequently withdrew it and resumed further proceedings.

In 1991, the State Water Board adopted the 1991 water quality control plan. This is the first Bay-Delta plan to adopt objectives for dissolved oxygen (DO) and temperature. The 1991 Bay-Delta plan did not amend either the flow or water project operations objectives adopted in the 1978 Delta Plan.[6] The United States Environmental Protection Agency (USEPA) approved the objectives in the plan for salinity for municipal, industrial, and agricultural uses, and approved the new DO objectives for fish and wildlife, but disapproved the Delta outflow objectives for the protection of fish and wildlife carried over from the 1978 Delta Plan. The USEPA adopted its own Delta outflow standards in 1994 to supersede the State's objectives.

In the summer of 1994, after the USEPA had initiated its process to develop standards for the Delta, the State and federal agencies with responsibility for management of Bay-Delta resources signed a Framework Agreement, agreeing that: (1) the State Water Board would update and revise its 1991 Bay-Delta Plan to meet federal requirements and would initiate a water right proceeding to implement the plan, after which the USEPA would withdraw its fish and wildlife objectives; (2) a group would be formed to coordinate operations of the SWP and CVP with all regulatory requirements in the Delta; and (3) the State and federal governments would undertake a joint long-term solution finding process to resolve issues in the Bay-Delta. In December 1994, representatives of the State and federal governments, water users, and environmental interests agreed to the implementation of a Bay-Delta protection plan. The plan and institutional documents to implement it are contained in a document titled "Principles for Agreement on Bay-Delta Standards between the State of California and the Federal Government." This is commonly referred to as the "Bay-Delta Accord" or "Principles Agreement."

In 1995 the State Water Board adopted the 1995 Bay-Delta Plan, which is consistent with the Principles Agreement.[7] In response to a water right change petition filed by DWR and USBR, the State Water Board then adopted Water Right orders that temporarily allowed DWR and USBR to operate the SWP and CVP in accordance with the 1995 Plan while the State Water Board conducted water right proceedings for a water right decision that would implement the 1995 Bay-Delta Plan. The hearing commenced in 1998 and concluded in 1999. During the 1998-99 water right hearing, DWR and USBR and their water supply contractors negotiated with a number of parties. In 1999, the State Water Board adopted Decision 1641 (D-1641) and subsequently revised D-1641 in 2000.

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[6] After adopting the 1991 Plan, the State Water Board conducted a proceeding to establish interim water right requirements for the protection of public trust uses in the Delta. The State Water Board released a draft water right decision known as "Decision 1630" (D-1630), but did not adopt it.

[7] USEPA approved the 1995 Bay-Delta Plan. By approving the 1995 Bay-Delta Plan, the USEPA supplanted its own water quality standards with the standards in the 1995 Bay-Delta Plan. (*State Water Resources Control Board Cases* (2006) 136 Cal.App.4th 674,774-775 [39 Cal.Rptr.3d 189]; 33 U.S.C. § 1313(c)(2)(A),(c)(3).)

3.2.2 Current State Water Board Flow Requirements

The current Bay-Delta flow requirements are contained in the 2006 Bay-Delta Plan and in D-1641. D-1641 implements portions of the 1995 Bay-Delta Plan. D-1641 accepts the contribution that certain entities, through their agreements, will make to meet the flow-dependent water quality objectives in the 1995 Plan, and continues the responsibility of DWR and USBR for the remaining measures to meet the flow-dependent objectives and other responsibilities. In addition, D-1641 recognizes the San Joaquin River Agreement (SJRA) and approves, for a period of twelve years, the conduct of the Vernalis Adaptive Management Plan (VAMP) under the SJRA instead of meeting the San Joaquin River pulse flow objectives in the 1995 Plan. The 2006 Bay-Delta Plan is consistent with D-1641 and makes only minor changes to the 1995 Bay-Delta Plan, allowing the staged implementation of the San Joaquin River spring pulse flow objectives and other minor changes. The 2006 Bay-Delta Plan also identifies a number of issues requiring additional review and planning including: the pelagic organism decline (POD), climate change, Delta and Central Valley salinity, and San Joaquin River flows.

Current Delta outflow requirements, set forth in Tables 3 and 4 in both the 2006 Bay-Delta Plan and D-1641, take two basic forms based on water year type and season: 1) specific numeric Delta outflow requirements; and 2) position of X2, the horizontal distance in kilometers up the axis of the estuary from the Golden Gate Bridge to where the tidally averaged near-bottom salinity is 2 practical salinity units (psu). The Delta outflow requirements are expressed in Table 3 as a Net Delta Outflow Index (NDOI). The NDOI is a calculated flow expressed as Delta Inflow, minus net Delta consumptive use, minus Delta exports. Each component is calculated as described in the 2006 Bay-Delta Plan and D-1641. An electrical conductivity (EC) measurement of 2.64 mmhos/cm at Collinsville station C2 can be substituted for the NDOI during February through June. The most downstream location of either the maximum daily average or the 14-day running average of this EC level is commonly referred to as the position of "X2" in the Delta. Table 4 specifies EC measurements at two specific locations and alternatively allows an NDOI calculation at these locations.

3.2.3 Special Status Species

The California Endangered Species Act (CESA) states that all native species of fishes, amphibians, reptiles, birds, mammals, invertebrates, and plants, and their habitats, threatened with extinction and those experiencing a significant decline which, if not halted, would lead to a threatened or endangered designation, will be protected or preserved. The federal Endangered Species Act of 1973 (ESA) provides for the conservation of species that are endangered or threatened throughout all or a significant portion of their range, and the conservation of the ecosystems on which they depend. A number of species discussed in this report are afforded protections under CESA and ESA. These species and the protections are discussed below.

The longfin smelt (*Spirinchus thaleichthys*) is currently a candidate for threatened species status under the CESA. (DFG 1, p. 9.) In March 2009, the California Fish and Game Commission (Commission) made a final determination that the listing of longfin smelt as a threatened species was warranted and the rulemaking process to officially add the species to the CESA list of threatened species found in the California Code of Regulations was initiated. Upon completion of this rulemaking process, the longfin smelt's status will officially change from candidate to threatened. (DFG 1, p. 9.) Its status remains unresolved at the federal level. (USFWS 2009.) The delta smelt (*Hypomesus transpacificus*) is listed as endangered and threatened pursuant to the CESA and ESA, respectively. (DFG 1, p. 14; USFWS 1993.) In April 2010, the United States Fish and Wildlife Service (USFWS) considered a petition to reclassify the delta smelt from threatened to endangered. After review of all available scientific and

commercial information, the USFWS found that reclassifying the delta smelt from a threatened to an endangered species is warranted, but precluded by other higher priority listing actions. (USFWS 2010.)

Sacramento winter-run Chinook salmon *(Oncorhynchus tshawytscha)* is listed as endangered pursuant to the CESA and ESA. (NMFS 1994; NMFS 2005; DFG 2010.) Central Valley spring-run Chinook salmon (*O. tshawytscha*) is listed as threatened pursuant to both the CESA and ESA. (NMFS 1999; NMFS 2005; DFG 2010.) Central Valley fall/late fall-run Chinook salmon (*O. tshawytscha*) are classified as species of special concern by the National Marine Fisheries Service (NMFS). (NMFS 2004.) Central Valley steelhead (*O. mykiss*) is listed as threatened under the ESA (NMFS 1998; NMFS 2006a.) Southern Distinct Population Segment of North American green sturgeon (*Acipenser medirostris*) is listed as threatened under the ESA. (NMFS 2006b.)

3.2.4 State Incidental Take Permit for Longfin Smelt

The CESA prohibits the take[8] of any species of wildlife designated as an endangered, threatened, or candidate species[9] by the Commission. The Department of Fish and Game (DFG), however, may authorize the take of such species by permit if certain conditions are met (Cal. Code Regs., tit 14, § 783.4). In 2009, DFG issued an Incidental Take Permit for Longfin Smelt to the DWR for the on-going and long-term operation of the SWP. The permit specifies a number of conditions, including two flow measures (Conditions 5.1 and 5.2) intended to minimize take of the longfin smelt and provide partial mitigation for the remaining take by: 1) minimizing entrainment; 2) improving estuarine processes and flow; 3) improving downstream transport of longfin smelt larvae; and 4) providing more water that is used as habitat (increasing habitat quality and quantity) by longfin smelt than would otherwise be provided by the SWP.

Longfin Smelt Incidental Take Permit (2009), p. 9-10, Condition 5.1.
This Condition is not likely to occur in many years. To protect adult longfin smelt migration and spawning during December through February period, the Smelt Working Group (SWG) or DFG SWG personnel staff shall provide Old and Middle River (OMR) flow advice to the Water Operations Management Team (WOMT) and to Director of DFG weekly. The SWG will provide the advice when either: 1) the cumulative salvage index (defined as the total longfin smelt salvage at the CVP and SWP in the December through February period divided by the immediately previous FMWT longfin smelt annual abundance index) exceeds five (5); or 2) when a review of all abundance and distribution survey data and other pertinent biological factors that influence the entrainment risk of adult longfin smelt indicate OMR flow advise is warranted. Permittee shall ensure the OMR flow requirement is met by maintaining the OMR flow 14-day running average is no more negative than -5,000 cfs and the initial 5-day running average is not more negative than -6,250 cfs. During any time OMR flow restrictions for the USFWS's 2008 Biological Opinion for delta smelt are being implemented, this condition (5.1) shall not result in additional OMR flow requirements for protection of adult longfin smelt. Once spawning has been detected in the system, this Condition terminates and 5.2 begins. Condition 5.1 is not required or would cease if previously required when river flows are 1) ≥ 55,000 cfs in

[8] Pursuant to Fish and Game Code section 86, "Take" means hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture or kill."

[9] "Candidate species" are species of wildlife that have not yet been placed on the list of endangered species or the list of threatened species, but which are under formal consideration for listing pursuant to Fish and Game Code section 2074.2

the Sacramento River at Rio Vista; or 2) □ 8,000 cfs in the San Joaquin River at Vernalis. If flows go below 40,000 cfs in the Sacramento River at Rio Vista or 5,000 cfs in the San Joaquin River at Vernalis, the OMR flow in Condition 5.1 shall resume if triggered previously. Review of survey data and other pertinent biological factors that influence the entrainment risk of adult longfin smelt may result in a recommendation to relax or cease an OMR flow requirement.

Longfin Smelt Incidental Take Permit (2009), p. 10-11, Condition 5.2.
To protect larval and juvenile longfin smelt during January -June period, the SWG or DFG SWG personnel shall provide OMR flow advice to the WOMT and the DFG Director weekly. The OMR flow advice shall be an OMR flow between -1,250 and -5,000 cfs and be based on review of survey data, including all of the distributional and abundance data, and other pertinent biological factors that influence the entrainment risk of larval and juvenile longfin smelt. When a single Smelt Larval Survey (SLS) or 20 mm Survey sampling period results in: 1) longfin smelt larvae or juveniles found in 8 or more of the 12 SLS or 20mm stations in the central and south Delta (Stations 809, 812, 901, 910, 912, 918, 919) or, 2) catch per tow exceeds 15 longfin smelt larvae or juveniles in 4 or more of the 12 survey stations listed above, OMR flow advice shall be warranted. Permittee shall ensure the OMR flow requirement is met by maintaining the OMR flow 14-day running average no more negative than the required OMR flow and the 5-day running average is within 25□ of the required OMR. This Conditions OMR flow requirement is likely to vary throughout Jan through June. Based on prior analysis, DFG has identified three likely scenarios that illustrate the typical entrainment risk level and protective measures for larval smelt over the period: High Entrainment Risk Period - Jan through Mar OMR range from -1,250 to -5,000 cfs; Medium Entrainment Risk Period - April and May OMR range from -2000 to -5,000 cfs, and Low Entrainment Risk Period - June OMR -5,000 cfs. When river flows are: 1) greater than 55,000 cfs in the Sacramento River at Rio Vista; or 2) greater than 8,000 cfs in the San Joaquin River at Vernalis, the Condition would not trigger or would be relaxed if triggered previously. Should flows go below 40,000 cfs in Sacramento River at Rio Vista or 5,000 cfs in the San Joaquin River at Vernalis, the Condition shall resume if triggered previously. In addition to river flows, the SWG or DFG SWG personnel review of all abundance and distribution survey data and other pertinent biological factors that influence the entrainment risk of longfin smelt may result in a recommendation by DFG to WOMT to relax or cease an OMR flow requirement.

3.2.5 Biological Opinions

In 2008 and 2009, the USBR and the DWR concluded consultations regarding the effects of continued long-term operations of the Central CVP and SWP with the USFWS and the NMFS, respectively. Those consultations led to the issuance of biological opinions that require implementation of reasonable and prudent alternatives (RPAs) to avoid jeopardizing the continued existence and potential for recovery of delta smelt (*Hypomesus transpacificus*), Sacramento River winter-run Chinook salmon *(Oncorhynchus tshawytscha)*, Central Valley spring-run Chinook salmon (*O. tshawytscha*), Central Valley steelhead (*O. mykiss*), Southern Distinct Population Segment of North American green sturgeon (*Acipenser medirostris*), and Southern Resident killer whales *(Orcinus orca)*.

Pursuant to Section 7 of the ESA, federal agencies must insure that their actions do not jeopardize the continued existence of threatened or endangered species or adversely modify their designated critical habitat. The regulations (50 CFR 402.02) implementing Section 7 of the ESA define RPAs as alternative actions, identified during formal consultation, that: 1) can be implemented in a manner consistent with the intended purpose of the action; 2) can be implemented consistent with the scope of the action agency□s legal authority and jurisdiction; 3) are economically and technologically feasible; and, 4) would, the USFWS or NMFS believes,

avoid the likelihood of jeopardizing the continued existence of listed species or resulting in the destruction or adverse modification of critical habitat. (USFWS 2008, p.279.)

Numerous anthropogenic and other factors (e.g., pollutants and non-native species) that may adversely affect listed fish species in the region are not under the direct control of the CVP or the SWP and as such are not addressed in the biological opinions.

USFWS Biological Opinion

On December 15, 2008, the USFWS issued a biological opinion on the Long-Term Operational Criteria and Plan (OCAP) for coordination of the CVP and SWP (UFWS Opinion). The RPA in the USFWS Opinion, divided into six actions, applies to delta smelt and focuses primarily on managing flow regimes to reduce entrainment of delta smelt and on the extent of suitable water conditions in the Delta, as well as on construction or restoration of habitat. (USFWS 2008, pp.329-381.) Flow related components of the RPA include:

- A fixed duration action to protect pre-spawning adult delta smelt from entrainment during the first flush, and to provide advantageous hydrodynamic conditions early in the migration period. This action limits exports so that the average daily net OMR flow is no more negative than -2,000 cubic-feet per second (cfs) for a total duration of 14 days, with a 5-day running average no more negative than -2,500 cfs (within 25 percent) (Action 1, p.329).

- An adaptive process to continue to protect pre-spawning adults from entrainment and, to the extent possible, from adverse hydrodynamic conditions after the action identified above. The range of net daily OMR flows will be more no more negative than -1,250 to -5,000 cfs. From the onset of this action through its termination, the Delta Smelt Working Group would provide weekly recommendations for specific net OMR flows based upon review of the sampling data, from real-time salvage data at the CVP and SWP, and utilizing the most up-to-date technological expertise and knowledge relating population status and predicted distribution to monitored variables of flow and turbidity. The USFWS will make the final determination (Action 2, p.352).

- Upon completion of Actions 1 and 2 or when Delta water temperatures reach 12□C (based on a 3-station average of daily average water temperature at Mossdale, Antioch, and Rio Vista) or when a spent female delta smelt is detected in the trawls or at the salvage facilities, the projects shall operate to maintain net OMR flows no more negative than -1,250 to -5000 cfs based on a 14-day running average with a simultaneous 5-day running average within 25□ of the applicable 14-day OMR flow requirement. Action continues until June 30th or when Delta water temperatures reach 25□C, whichever comes first (Action 3, p.357).

- Improve fall habitat, both quality and quantity, for delta smelt through increasing Delta outflow during fall (fall X2). Subject to adaptive management, provide sufficient Delta outflow to maintain average X2 for September and October no greater (more eastward) than 74 km in the fall following wet years and 81km in the fall following above normal years. The monthly average X2 must be maintained at or seaward of these values for each individual month and not averaged over the two month period. In November, the inflow to CVP/SWP reservoirs in the Sacramento Basin will be added to reservoir releases to provide an added increment of Delta inflow and to augment Delta outflow up

- To minimize entrainment of larval and juvenile delta smelt at the State and federal south Delta export facilities or from being transported into the south and central Delta, where they could later become entrained, do not install the Head of Old River Barrier (HORB) if delta smelt entrainment is a concern. If installation of the HORB is not allowed, the agricultural barriers would be installed as described in the Project Description of the biological opinion. If installation of the HORB is allowed, the Temporary Barrier Project flap gates would be tied in the open position until May 15 (Action 5, p. 377).

- Implement habitat restoration activities designed to improve habitat conditions for delta smelt by enhancing food production and availability to supplement the benefits resulting from the flow actions described above. DWR shall implement a program to create or restore a minimum of 8,000 acres of intertidal and associated subtidal habitat in the Delta and Suisun Marsh. The restoration efforts shall begin within 12 months of signature of this biological opinion and be completed within a 10 year period (Action 6, p. 379).

NMFS Biological Opinion

On June 4, 2009, NMFS issued its Biological and Conference Opinion on the OCAP (NMFS Opinion), which provides RPA actions to protect winter-run and spring-run Chinook salmon, Central Valley steelhead, green sturgeon, and killer whales from project effects in the Delta and upstream areas. (NMFS 3.) The RPA consists of five actions with a total of 72 subsidiary actions. Included within the RPA are actions related to: formation of technical teams, research and adaptive management, monitoring and reporting, flow management, temperature management, gravel augmentation, fish passage and reintroduction, gate operations and installation (Red Bluff Diversion Dam, Delta Cross Channel Gate, South Delta Improvement Program), funding for fish screening, floodplain and other habitat restoration, hatchery management, export restrictions, CVP and SWP fish collection facility modifications, and fish collection and handling. The flow related components of the opinion include:

- In the Sacramento River Basin flow requirements for Clear Creek; release requirements from Whiskeytown Dam for temperature management; cold water pool management of Shasta Reservoir; development of flow requirements for Wilkins Slough; and restoration of floodplain habitat in the lower Sacramento River basin to better protect Chinook salmon, steelhead, and green sturgeon. (*Id at* pp.587-611.)

- In the American River - flow requirements and cold water pool management requirements to provide protection for steelhead. (*Id at* pp. 611-619.)

- In the San Joaquin River Basin cold water pool management, floodplain inundation flows, and flow requirements for the Stanislaus River (NMFS 3, pp. 619-628, Appendix 2-E) and an interim minimum flow schedule for the San Joaquin River at Vernalis during April and May effective through 2011 for the protection of steelhead. (*Id at* pp. 641-645.)

- In the Delta Delta Cross-Channel Gate operational requirements; net negative flow requirements toward the export pumps in Old and Middle rivers; and export limitations based on a ratio of San Joaquin River flows to combined SWP and CVP export during April and May for the protection of Chinook salmon and steelhead. (*Id. at* pp. 628-660.)

It is important to note that the flow protections described in the project description and RPA are the minimum flows necessary to avoid jeopardy. (NMFS written summary, p.3.) In addition, NMFS considered provision of water to senior water rights holders to be non-discretionary for purposes of the ESA as it applies to Section 7 consultation with the USBR, which constrained development of RPA Shasta storage actions and flow schedules. San Joaquin River flows at Vernalis were constrained by the NMFS Opinion s scope extending only to CVP New Melones operations. Operations on other San Joaquin tributaries were not within the scope of the consultation. (*Id.*)

Recent Litigation

Both the USFWS Opinion and the NMFS Opinion are the subject of ongoing litigation in the United States District Court for the Eastern District of California. Plaintiffs challenged the validity of the opinions under various legal theories, including claims under the ESA and the NEPA. Most recently, this year plaintiffs Westlands Water District and San Luis Delta Mendota Water Authority sought preliminary injunctions against the implementation of certain RPAs identified by NMFS and USFWS in their biological opinions for the protection of Delta smelt and Central Valley steelhead and salmonids. In May 2010, Judge Wanger issued a ruling concluding that injunctive relief was appropriate with respect to the NMFS biological opinion PRA Action IV.2.1, which limits pumping based on San Joaquin River inflow from April 1 through May 31, and RPA Action IV.2.3, which imposes restrictions on negative OMR flows in generally between January 1 and June 15. Later that month, he also ruled that injunctive relief was appropriate with respect to RPA Component 2 of Action 3 of the USFWS Opinion, which requires net OMR flows to remain between -1,250 and -5,000 cfs during a certain period for the protection of larval and juvenile delta smelt. The validity of the biological opinions likely will continue to be litigated in the foreseeable future, creating uncertainty about implementation of the RPAs.

3.3 Environmental Setting

Figure 1 is a map of the Bay-Delta Estuary that was included in the 2006 Bay-Delta Plan. The map depicts the location of monitoring stations used to collect baseline water quality data for the Bay-Delta Estuary and stations used to monitor compliance with water quality objectives set forth in the Bay-Delta Plan.

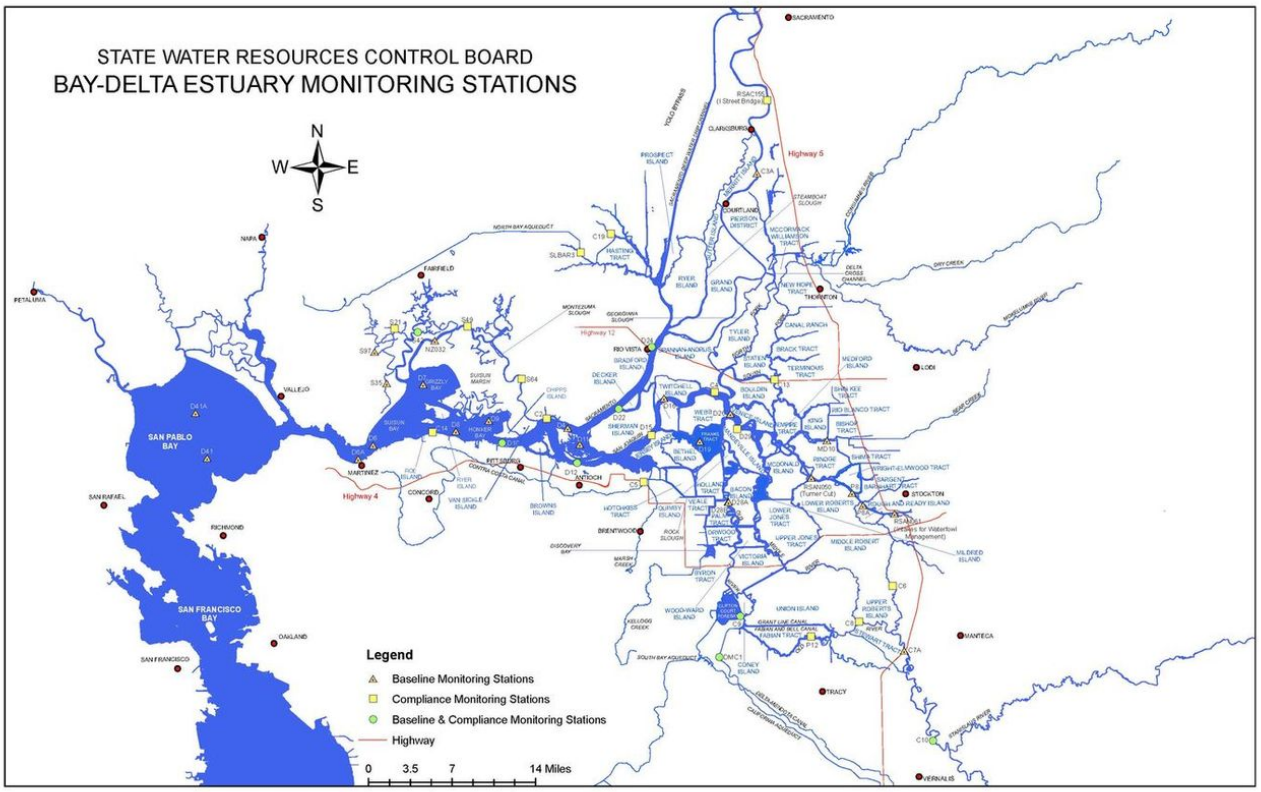


Figure 1. Map of the Bay-Delta Estuary

3.3.1 Physical Setting

The Delta is located where California's two major river systems, the Sacramento and San Joaquin rivers, converge from the north and south and are joined by several tributaries from the Central Sierras to the east, before flowing westward through the San Francisco Bay to the Pacific Ocean. The Sacramento and San Joaquin rivers drain water from the Central Valley Basin, which includes about 40 percent of California's land area.

Outflow from the Delta enters Suisun Bay just west of the confluence of the Sacramento and San Joaquin rivers. Suisun Marsh, which is located along the north shore of Suisun Bay, is one of the few major marshes remaining in California and is the largest remaining brackish wetland in Western North America. The marsh is subject to tidal influence and is directly affected by Delta outflow. Suisun Marsh covers approximately 85,000 acres of marshland and water ways and provides a unique diversity of habitats for fish and wildlife.

The Old Delta

The Delta formed as a freshwater marsh through the interaction of river inflow and the strong tidal influence of the Pacific Ocean and San Francisco Bay. The growth and decay of tules and other marsh plants resulted in the deposition of organic material, creating layers of peat that formed the soils of the marsh. Hydraulic mining during the Gold Rush era washed large amounts of sediment into the rivers, channels and bays, temporarily burying the wetlands. The former wetland areas were reclaimed into more than 60 islands and tracts that are devoted primarily to farming. A network of levees protects the islands and tracts from flooding, because most of the islands lie near or below sea level due to the erosion and oxidation of the peat soils.

As shown in Figure 2 (Courtesy, Chris Enright, DWR, using Atwater data), prior to reclamation, the channels in the Delta were connected in a dendritic, or tree-like, pattern and may have included 5 to 10 times as many miles of interconnected channels as it does today, with largely unidirectional flow.

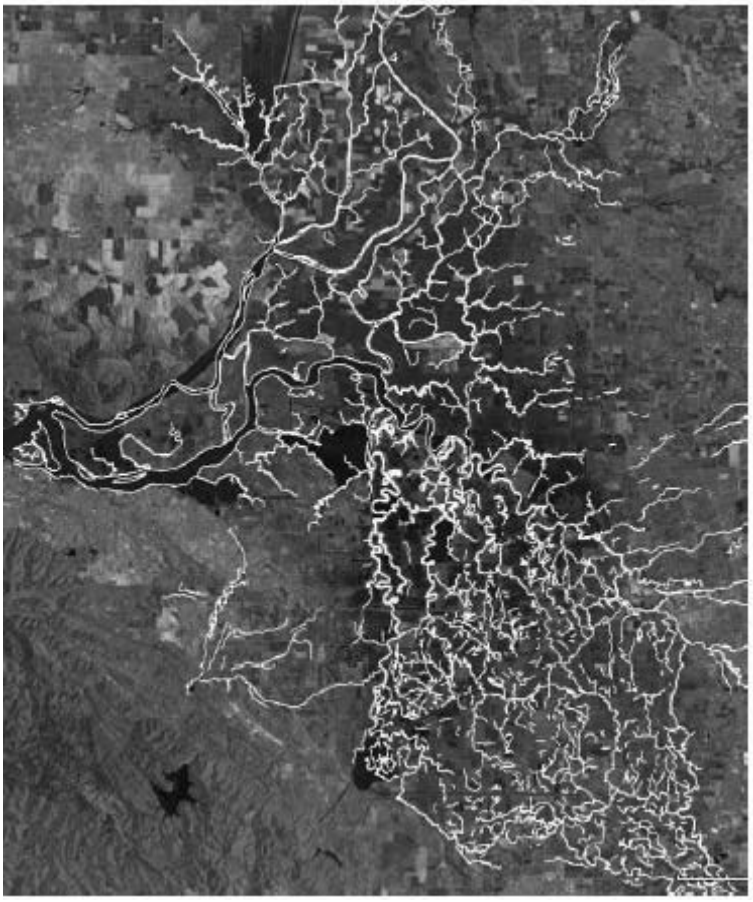


Figure 2. The Old Delta (*ca.* 1860).

The Recent Delta

Today's Delta covers about 738,000 acres, of which about 48,000 acres are water surface area, and is interlaced with about 700 miles of waterways. As shown in Figure 3 (Courtesy, Chris Enright, DWR, using Atwater data), today's remaining Delta waterways have been greatly modified to facilitate the bi-directional movement of water and the river banks have been armored to protect against erosion, thus changing the geometry of the stream channels and eliminating most of the natural vegetation and habitat of the aquatic and riparian environment. The interconnected geometry and channelized sloughs of the present Delta result in much less variability in water quality than the past dendritic pattern, and today's mostly open ended sloughs results in water quality and habitat being relatively homogenous throughout the system. (Moyle et al. 2010.)

Figure 3. The Recent Delta

The Changing Delta

The Delta Environmental Flows Group (DEFG 2) describes in *Changing Ecosystems: a Brief Ecological History of the Delta* how the Delta has undergone significant physical and biological modification over the past 150 years. Initial development occurred during the Gold Rush when large amounts of sediment washed into the Delta, followed by diking and dredging of rivers. This was followed by increasing diversions and developments, including fixing of levees and channels, and most recently with large-scale dam development and diversions from the Delta. The Moyle et al. history also suggests what is likely to happen in the future:

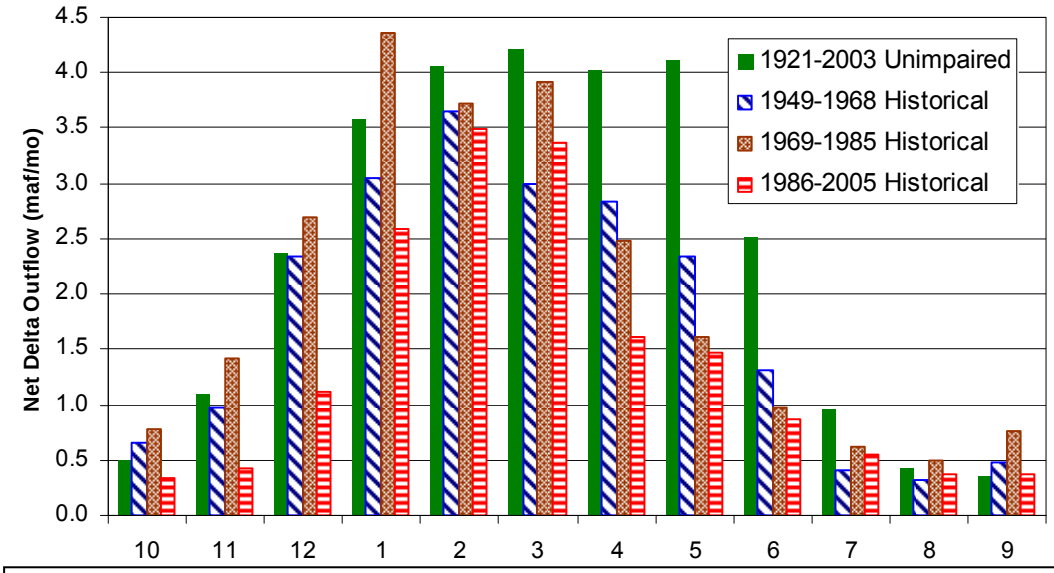
> The Delta ecosystem is likely to dramatically shift again within 50 years due to large-scale levee collapse in the Delta and Suisun Marsh. Major levee failures are inevitable due to continued subsidence, sea level rise, increasing frequency of large floods, and high probability of earthquakes. These significant changes will create large areas of open water and increased salinity intrusion, as well as new tidal and subtidal marshes. Other likely changes include reduced freshwater inflow during prolonged droughts, altered hydraulics from reduced export pumping, and additional alien invaders (e.g., zebra and quagga mussels). The extent and effects of all these changes are unknown but much will depend on how the estuary is managed in response to change or even before change takes place. Overall, these major changes in the estuary's landscape are likely to promote a more variable, heterogeneous estuary, especially in the Delta and Suisun Marsh. This changed environment is likely to be better for desirable estuarine species; at least it is unlikely to be worse.

3.3.2 Hydrology/Hydrodynamics

California's climate and hydrology are Mediterranean, which is characterized by most precipitation falling during the winter-spring wet season, a dry season extending from late spring through early fall, and high inter-annual variation in total runoff. The life history strategies of all native estuarine Delta fishes are adapted to natural variability. (Moyle and Bennett 2008, as cited in Fleenor et al. 2010.) Although the unimpaired flow record does not indicate precise, or best, flow requirements for fish under current conditions, the general timing (e.g., seasonality), magnitudes, and directions of flows seen in the unimpaired flow record are likely to remain important for native species under contemporary and future conditions. (Fleenor et al. 2010.)

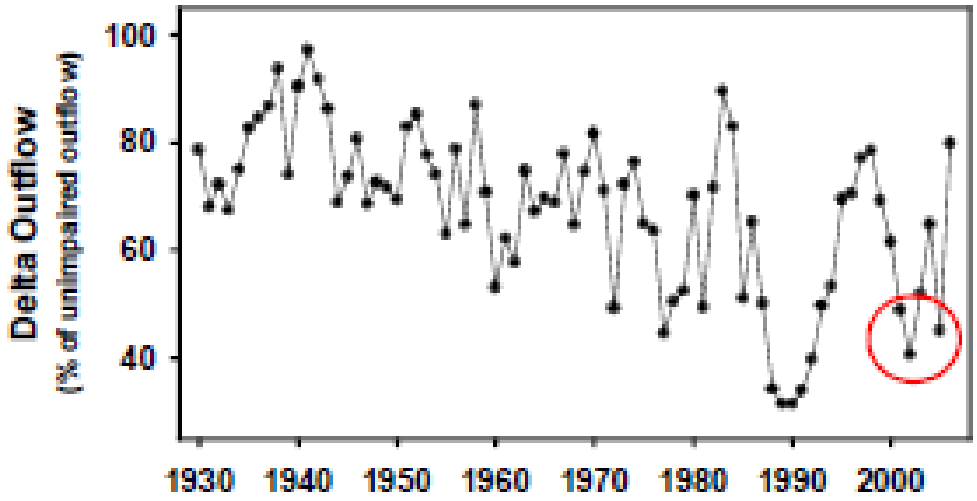
Inflow to the Delta comes primarily from the Central Valley Basin's Sacramento and San Joaquin river systems and is chiefly derived from winter and spring runoff originating in the Cascade and Sierra Nevada mountains, with minor amounts from the Coast Ranges. Precipitation totals vary annually with about 80 percent of the total occurring between the end of October and the beginning of April. Snow storage in the high Sierra delays the runoff from that area until the snow melts in April, May, and June. Normally, about half of the annual runoff from the Central Valley Basin occurs during this period. In recent years, the Sacramento River contributed roughly 75 to 80□ of the Delta inflow in most years, while the San Joaquin River contributed about 10 to 15□. The minor flows of the Mokelumne, Cosumnes, and Calaveras rivers, which enter into the eastern side of the Delta, contributed the remainder of the inflow to the Delta.

Net Delta outflow represents the difference between the sum of freshwater inflows from tributaries to the Delta and the sum of exports and net in-Delta consumptive uses. (Kimmerer 2004, DOI 1, p.17.) As noted above, the majority of the freshwater flow into the Delta occurs in winter and spring; however, upstream storage and diversions have reduced the winter-spring flow and increased flow in summer and early fall. (Figure 4, Kimmerer 2002b; Kimmerer 2004; DOI 1, p. 16.) The April-June reductions are largely the result of the San Joaquin River diversions. (Fleenor et al. 2010.) During the summer-fall dry season the Delta channels essentially serve as a conveyance system for moving water from reservoirs in the north to the CVP and SWP export facilities, as well as the smaller Contra Costa Water District facility, for subsequent delivery to farms and cities in the San Joaquin Valley, southern California, and/or other areas outside the watershed. (Kimmerer 2002b.) Figure 5 shows the reduction in annual Delta outflow as a percentage of unimpaired outflow. The combined effects of water exports and upstream diversions reduced average annual net outflow from the Delta from unimpaired conditions by 33□ and 48□ during the 1948 □1968 and 1986 □2005 periods, respectively. (Fleenor et al. 2010.)



This figure shows monthly average net delta outflows (in million acre-feet per month) compared to the unimpaired flows from 1921-2003. Unimpaired flow data is from DWR (2006) and other from Dayflow web site. (Source: Fleenor et al. 2010, Figure 7.)

Figure 4. Monthly Average Net Delta Outflows from Fleenor et al. 2010

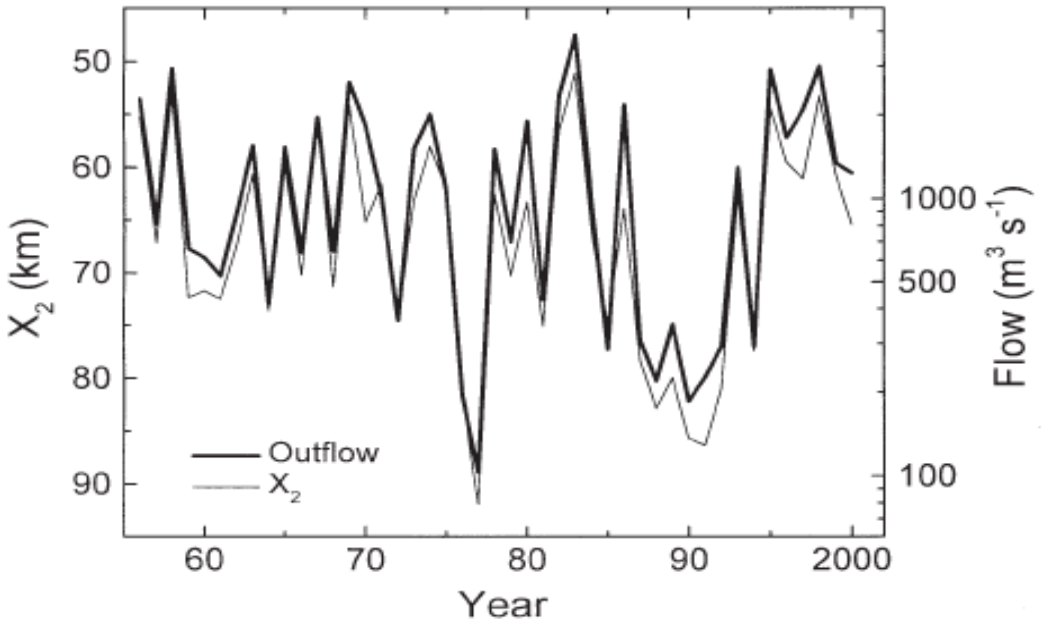


Delta outflow shown as a percentage of unimpaired outflow (1930-2005); in the last decade annual outflow is reduced by more than 50□ in 2001, 2002, and 2005. (Source: TBI 2007, as cited in DOI 1, p. 17.)

Figure 5. Delta Outflow as a Percent of Unimpaired Outflow from TBI 2007

Delta outflows and the position of X2 are closely and inversely related, with a time lag of about two weeks. (Jassby et al. 1995; Kimmerer 2004.) A time series of the annual averages for January to June of X2 and Delta outflow is depicted in Figure 6. X2 is defined as the horizontal distance in kilometers up the axis of the estuary from the Golden Gate Bridge to where the tidally averaged near-bottom salinity is 2 practical salinity units (psu). (Jassby et al. 1995,

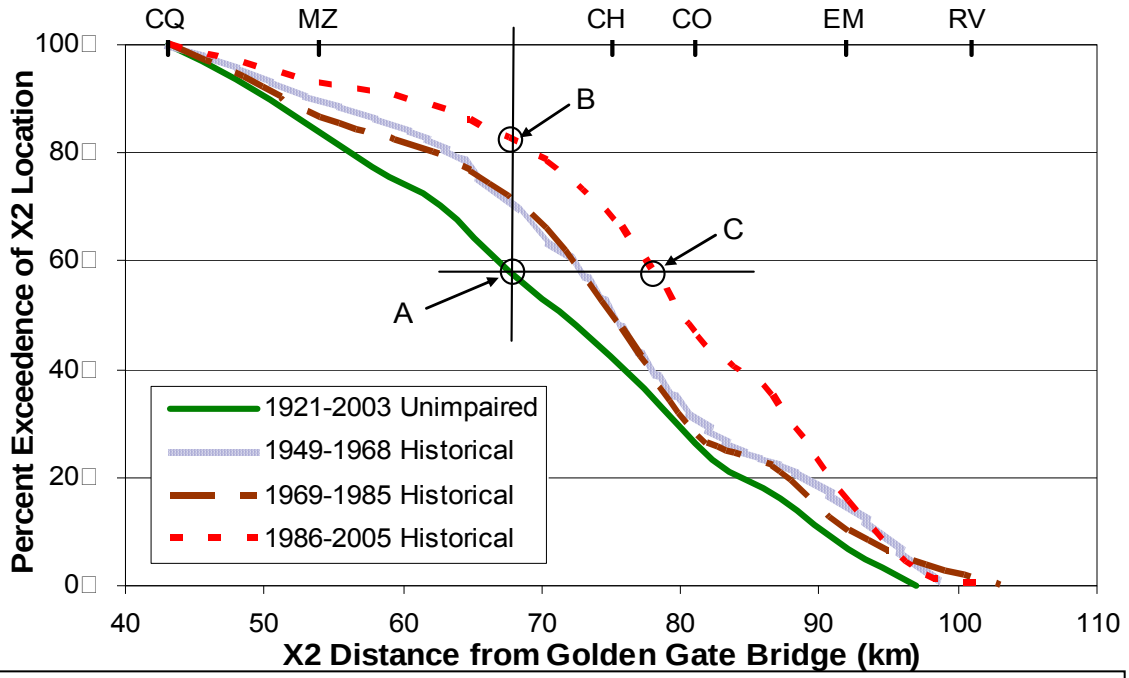
Kimmerer 2002a.) The position of X2 roughly equates to the center of the low salinity zone (defined as salinity of 0.5 to 6 psu). (Kimmerer 2002a.) The X2 objectives in the 2006 Bay-Delta Plan were designed to restore a more natural hydrograph and salinity pattern by requiring maintenance of the low salinity zone at specified points and durations based on the previous month's Eight River Index. (State Water Board 2006a.) The relationships between outflow and several measures of the health of the Bay-Delta Estuary have been known for some time (Jassby *et al*. 1995) and are the basis for the current X2 objectives.



Time series of X2 (thin line, left axis, scale reversed) and flow (heavy line, right axis, log scale), annual averages for January to June; flow data from DWR; X2 calculated as in Jassby et al. (1995) (Source: Kimmerer 2002a, Figure 3).

Figure 6. X2 and Delta Outflow for January to June from Kimmerer 2002a

Both Delta outflow and the position of X2 have been altered as a result of numerous factors including development and operation of upstream storage and diversions, land use changes, and increasing water demand. Hydrodynamic simulations conducted by Fleenor et al. (2010) indicate that the position of X2 has been skewed eastward in the recent past, as compared to unimpaired conditions and earlier impaired periods, and that the variability of salinity in the western Delta and Suisun Bay has been significantly reduced (Figure 7). The higher X2 values shown in this figure (refer to Point B) indicate the low salinity zone is farther upstream for a more prolonged period of time. Point B demonstrates that during the period from 1986 to 2005 the position of X2 was located upstream of 71 km nearly 80 of the time, as opposed to unimpaired flows which were equally likely to place X2 upstream or downstream of the 71 km location (50 probability). (Fleenor *et al*. 2010.) Historically, X2 exhibited a wide seasonal range tracking the unimpaired Delta outflows; however, seasonal variation in X2 range has been reduced by nearly 40 , as compared to pre-dam conditions. (TBI 2003, as cited in DOI 1, pp. 21-22.)



This graph shows the cumulative probability distributions of daily X2 locations showing unimpaired flows (green solid line) and three historical periods, 1949-1968 (light solid blue line), 1969-1985 (long-dashed brown line) and 1986-2005 (short-dashed red line), illustrating progressive reduction in salinity variability from unimpaired conditions. Paired letters indicate geographical landmarks: CQ, Carquinez Bridge; MZ, Martinez Bridge; CH, Chipps Island; CO, Collinsville; EM, Emmaton; and RV, Rio Vista (Source: Fleenor et al. 2010, Figure 8).

Figure 7. Cumulative Probability of Daily X2 Locations from Fleenor *et al*. 2010

In their key points on Delta environmental flows for the State Water Board, the DEFG (DEFG 1) noted that the recent flow regimes both harm native species and encourage non-native species and provided the following justification:

> "The major river systems of the arid western United States have highly variable natural flow regimes. The present-day flow regimes of western rivers, including the Sacramento and San Joaquin, are highly managed to increase water supply reliability for agriculture, urban use, and flood protection (Hughes et al. 2005, Lund et al. 2007). Recent Delta inflow and outflow regimes appear to both harm native species and encourage non-native species. Inflow patterns from the Sacramento River may help riverine native species in the north Delta, but inflow patterns from the San Joaquin River encourage non-native species. Ecological theory and observations overwhelmingly support the argument that enhancing variability and complexity across the estuarine landscape will support native species. However, the evidence that flow stabilization reduces native fish abundance in the upper estuary (incl. Delta) is circumstantial:
>
> 1) High winter-spring inflows to the Delta cue native fish spawning migrations (Harrell and Sommer 2003; Grimaldo et al. 2009), improve the reproductive success of resident native fishes (Meng et al. 1994; Sommer et al. 1997; Matern et al. 2002; Feyrer 2004), increase the survival of

juvenile anadromous fishes migrating seaward (Sommer *et al*. 2001; Newman 2003), and disperse native fishes spawned in prior years (Feyrer and Healey 2003; Nobriga et al. 2006).

2) High freshwater outflows (indexed by X2) during winter and spring provide similar benefits to species less tolerant of freshwater including starry flounder, bay shrimp, and longfin smelt (Kimmerer 2002; Kimmerer *et al*. 2009). Freshwater flows provide positive benefits to native fishes across a wide geographic area through various mechanisms including larval-juvenile dispersal, floodplain inundation, reduced entrainment, and increased up-estuary transport flows. Spring Delta inflows and outflow have declined since the early 20th century, but average winter-spring X2 has not had a time trend during the past 4-5 decades (Kimmerer 2004).

3) The estuary s fish assemblages vary along the salinity gradient (Matern et al. 2002; Kimmerer 2004), and along the gradient between predominantly tidal and purely river flow. In tidal freshwater regions, fish assemblages also vary along a gradient in water clarity and submerged vegetation (Nobriga et al. 2005; Brown & Michniuk 2007), and smaller scale, gradients of flow, turbidity, temperature and other habitat features (Matern et al. 2002; Feyrer & Healey 2003). Generally, native fishes have their highest relative abundance in Suisun Marsh and the Sacramento River side of the Delta, which are more spatially and temporally variable in salinity, turbidity, temperature, and nutrient concentration and form than other regions.

4) In both Suisun Marsh and the Delta, native fishes have declined faster than non-native fishes over the past several decades (Matern et al. 2002; Brown and Michniuk 2007). These declines have been linked to persistent low fall outflows (Feyrer et al. 2007) and the proliferation of submerged vegetation in the Delta (Brown and Michniuk 2007). However, many other factors also may be influencing native fish declines including differences in sensitivity to entrainment (sustained or episodic high fishing pressure as productivity declines), and greater sensitivity to combinations of food-limitation and contaminants, especially in summer-fall when many native fishes are near their thermal limits.

The weight of the circumstantial evidence summarized above strongly suggests flow stabilization harms native species and encourages non-native species, possibly in synergy with other stressors such as nutrient loading, contaminants, and food limitation.

Diversion and Use

Irrigation is the primary use of water in the Sacramento and San Joaquin river watershed. Water is used to a lesser extent to meet municipal, industrial, environmental, and instream needs. Water is also exported from the Central Valley Basin for many of these same purposes. Local irrigation districts, municipal utility districts, county agencies, private companies and corporations, and State and federal agencies have developed surface water projects throughout the basin to control and conserve the natural runoff and provide a reliable water supply for beneficial uses. Many of these projects are used to produce hydroelectric power and to

enhance recreational opportunities. Flood control systems, water storage facilities, and diversion works exist on all major streams in the basin, altering the timing, location, and quantity of water and the habitat associated with the natural flow patterns of the basin. (State Water Board 1999.)

The major surface water supply developments of the Central Valley include the CVP, other federal projects built by the USBR and the U.S. Army Corps of Engineers (USACE), the SWP, and numerous local projects (including several major diversions). The big rim dams, developed mostly since the 1940s, dramatically changed river flow patterns. The dams were built to provide flood protection and a reliable water supply. Collection of water to storage decreased river flows in winter and spring, and changed the timing of high flow periods (except for extreme flood flows). The San Joaquin River has lost most of its natural summer flows because the majority of the water is exported via the Friant project or diverted from the major tributaries for use within the basin. Even though natural flows have been substantially reduced, agricultural return flows during the summer have actually resulted in higher flows than would have occurred under unimpaired conditions at times. Winter and spring flows collected to storage by the State and federal projects in the Sacramento Basin are released in the late spring and throughout the summer and fall, largely to be rediverted from the Delta for export. The federal pumping plants in the southern Delta started operating in the 1950s, exporting water into the Delta-Mendota Canal. The State pumps and the California Aqueduct started operating in the late 1960s, further increasing exports from the Delta. (Moyle, et al. 2010.)

In-Delta Diversions and Old and Middle River Reverse Flows

The USBR and the DWR are the major diverters in the Delta. The USBR exports water from the Delta at the Tracy Pumping Plant and the Contra Costa Water District diverts CVP water at Rock Slough and Old River under a water supply contract with the USBR. The DWR exports from the Delta at the Banks Delta Pumping Plant and Barker Slough to serve the SWP contractors. Operation of the CVP and SWP Delta export facilities are coordinated to meet water quality and flow standards set by the Board, the USACE, and by fisheries agencies. In addition, there are approximately 1,800 local diversions within the Delta that amount to a combined potential instantaneous flow rate of more than 4,000 cfs. (State Water Board 1999.)

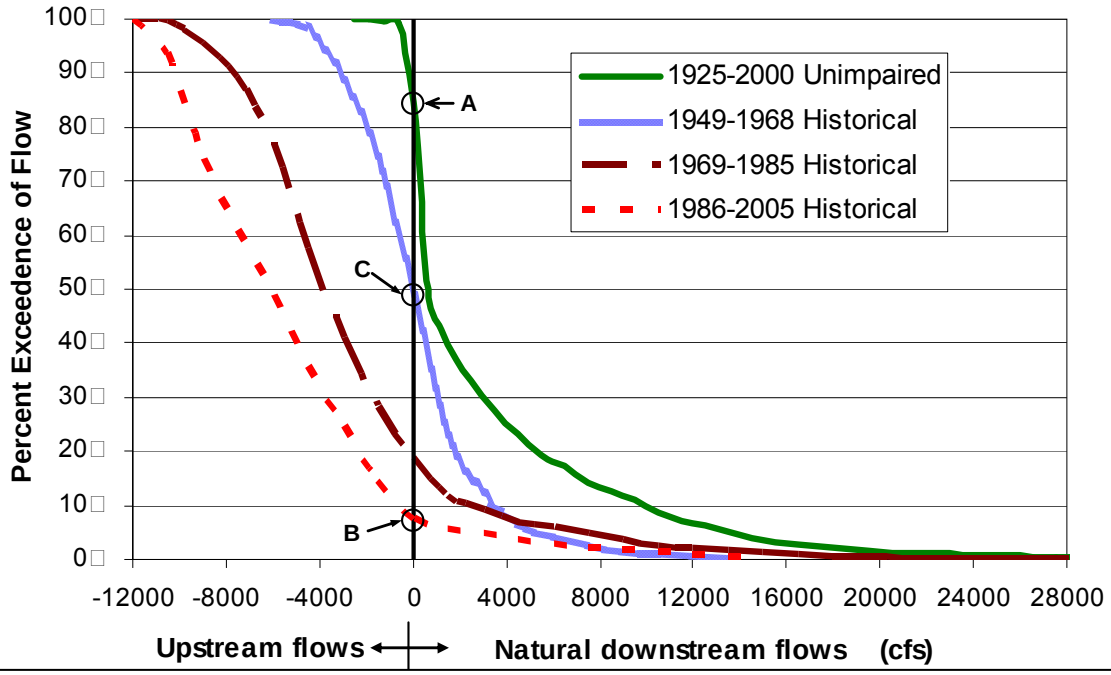
Net OMR reverse flows are now a regular occurrence in the Delta (Figure 8). Net OMR reverse flows are caused by the fact that the major freshwater source, the Sacramento River, enters on the northern side of the Delta while the two major pumping facilites, the SWP and CVP, are located in the south (Figure 1). This results in a net water movement across the Delta in a north-south direction along a web of channels including Old and Middle rivers instead of the more natural pattern from east to west or from land to sea. Net OMR is calculated as half the flow of the San Joaquin River at Vernalis minus the combined SWP and CVP pumping rate. (CCWD closing comments, p. 2.) A negative value, or a reverse flow, indicates a net water movement across the Delta along Old and Middle river channels to the State and Federal pumping facilities. Fleenor *et al* (2010) has documented the change in both the magnitude and frequency of net OMR reverse flows as water development occurred in the Delta (Figure 8). The 1925-2000 unimpaired line in Figure 8 represents the best estimate of □quasi-natural□or net OMR values before most modern water development. (Fleenor et al. 2010.) The other three lines represent changes in the frequency and magnitude of net OMR flows with increasing development. Net OMR reverse flows are estimated to have occurred naturally about 15□ of the time before most modern water development, including construction of the major pumping facilities in the South Delta (point A, Figure 8). The magnitude of net OMR reverse flows was seldom more negative than a couple of thousand cfs. In contrast, between1986-2005 net OMR

reverse flows had become more frequent than 90 percent of the time (Point B). The magnitude of net OMR reverse flows may now be as much as -12,000 cfs. High net OMR reverse flows have several negative ecological consequences. First, net reverse OMR flows draw fish, especially the weaker swimming larval and juvenile forms, into the SWP and CVP export facilities. The export facilities have been documented to entrain most species of fish present in the upper estuary. (Brown *et al*. 1996,.) Approximately 110 million fish were salvaged at the SWP pumping facilities and returned to the Delta over a 15 year period, (Brown et al. 1996.) However, this number underestimates the actual number of fish entrained, as it does not include losses at the CVP nor does it account for fish less than 20 mm in length which are not collected and counted at the fish collection facilities. Second, net OMR reverse flows reduce spawning and rearing habitat for native species, like delta smelt. Any fish that enters the Central or Southern Delta has a high probability of being entrained and lost at the pumps. (Kimmerer and Nobriga, 2008.) This has restricted their habitat to the western Delta and Suisun and Grizzly bays. Third, net OMR reverse flows have led to a confusing environment for migrating juvenile salmon leaving the San Joaquin Basin. Through-Delta exports reduce salinity in the central and southern Delta and as a result juvenile salmon migrate from higher salinity in the San Joaquin River to lower salinity in the southern Delta, contrary to the natural historical conditions and their inherited migratory cues. Finally, net OMR reverse flows reduce the natural variability in the Delta by drawing Sacramento River water across and into the Central Delta. The UC Davis Delta Solutions Group recommends:

> Achieving a variable, more complex estuary requires establishing seaward gradients in salinity and other water quality variables These goals in turn encourage policies which establish internal Delta flows that create a tidally-mixed, upstream-downstream gradient (without cross-Delta flows) in water quality and restoring environmental variability in the Delta is fundamentally inconsistent with continuing to move large volumes of water through the Delta for export. The drinking and agricultural water quality requirements of through-Delta exports, and perhaps even some current in-Delta uses, are at odds with the water quality and variability needs of desirable Delta species.
> (Moyle et al., 2010.)

Net OMR reverse flow restrictions are included in the USFWS Opinion (Actions 1 through 3), the NMFS Opinion (Action IV.2.3), and the DFG Incidental Take Permit (Conditions 5.1 and 5.2) for the protection of delta smelt, salmonids, and longfin smelt, respectively. (NMFS 3. p. 648; USFWS 2008, DFG 2009.) Additional net OMR reverse flow restrictions are recommended in this report for protection of longfin and delta smelt and Chinook salmon.

Further north in the Delta, the Delta Cross Channel is used to divert a portion of the Sacramento River flow into the interior Delta channels. The purpose of the Delta Cross Channel is to preserve the quality of water diverted from the Sacramento River by conveying it to southern Delta pumping plants through eastern Delta channels rather than allowing it to flow through more saline western Delta channels. The Delta Cross Channel is also operated to protect fish and wildlife beneficial uses (specifically Chinook salmon), while recognizing the need for fresh water to be moved through the system. With a capacity of 3,500 cfs, the Delta Cross Channel can divert a significant portion of the Sacramento River flows into the eastern Delta, particularly in the fall.



Cumulative probability distribution of sum of Old and Middle River flows (cfs) resulting from through Delta conveyance showing unimpaired flows (green solid line) and three historical periods, 1949-1968 (solid light blue line), 1969-1985 (long-dashed brown line) and 1986-2005 (short-dashed red line) (Source: Fleenor et al. 2010, Figure 9).

Figure 8. OMR Cumulative Probability Flows from Fleenor et al. 2010

3.3.3 Water Quality

Water quality in the Delta may be negatively impacted by contaminants in sediments and water, low DO levels, and blue green algal blooms. Additionally, changes in hydrology and hydrodynamics affect water quality. The conversion of tidal wetlands to leveed Delta islands has altered the tidal exchange and prism. These changes can contribute to spatial and temporal shifts in salinity and other physical and chemical water quality parameters (temperature, DO, contaminants, etc.).

Contaminants

The Delta and San Francisco Bay are listed under section 303(d) of the Federal Clean Water Act as impaired for a variety of toxic contaminants that may contribute to reduced population abundance of important fish and invertebrates. The contaminants include: organophosphate and pyrethrin pesticides, mercury, selenium and unknown toxicity. In addition, low DO levels periodically develop in the San Joaquin River in the Stockton Deep Water Ship Channel (DWSC) and in Old and Middle rivers. The low DO levels in the DWSC inhibit the upstream migration of adult fall-run Chinook salmon and adversely impact other resident aquatic organisms. The Central Valley and San Francisco Regional Boards are systematically developing Total Maximum Daily Loads (TMDLs) for all listed pollutants and adopting programs to implement control actions.

There is concern that a number of non-303(d) listed contaminants, such as ammonia, pharmaceuticals, endocrine disrupting compounds and blue-green algal blooms could also limit biological productivity and impair beneficial uses. More work is needed to determine their

impact on the aquatic community. Sources of these contaminants include: agricultural, municipal, and industrial wastewater; urban storm water discharges; discharges from wetlands; and channel dredging activities.

Ammonia has emerged as a contaminant of special concern in the Delta. Recent hypotheses are that ammonia is causing toxicity to delta smelt, other local fish, and zooplankton, and is reducing primary production rates in the Sacramento River below the Sacramento Regional Wastewater Treatment Plant (SRWTP) and in Suisun Bay. A third, newer, hypothesis is that ammonia and nitrogen to phosphorus ratios have altered phytoplankton species composition, and these changes have had a detrimental effect on zooplankton and fish population abundance. (Glibert, 2010.)

The SRWTP is the primary source of ammonia to the Delta. (Jassby 2008.) The SRWTP has converted the Delta from a nitrate to an ammonia dominated nitrogen system. (Foe et al. 2010.) Seven-day flow-through bioassays by Werner et al. (2008, 2009) have demonstrated that ammonia concentrations in the Delta are not acutely toxic to delta smelt. Monthly nutrient monitoring by Foe *et al*. (2010) has demonstrated that ammonia concentrations are below the recommended USEPA (1999) chronic criterion for the protection of juvenile fish. Results from the nutrient monitoring suggest that ammonia-induced toxicity to fish is not regularly occurring in the Delta.

Elevated ammonia concentrations inhibit nitrate uptake and that appears to be one factor preventing spring diatom blooms from developing in Suisun Bay. (Dugdale et al. 2007; Wilkerson et al. 2006.) One of the primary hypotheses for the POD is a decrease in the availability of food at the base of the food web. (Sommer et al. 2007.) Staff from the San Francisco Regional Board has informed the Central Valley Regional Board that ammonia may be impairing aquatic life beneficial uses in Suisun Bay (letter to Kathy Harder with the Central Valley Regional Board from Bruce Wolfe of the San Francisco Regional Board dated June 4, 2010).

Ammonia concentrations are higher in the Sacramento River below the SRWTP than in Suisun Bay. This led to a hypothesis that ammonia might be inhibiting nitrate uptake and reducing primary production rates in the Sacramento River and downstream Delta, as occurs in Suisun Bay. Experimental results for the Sacramento River are more ambiguous than for Suisun Bay. (Parker *et al*., 2010.) Five-day cubitainer grow out experiments conducted using water collected above and below the SRWTP usually demonstrated more chlorophyll in water collected below the SRWTP. Short-term bottle primary production rate measurements conducted using water collected above and below the SRWTP also demonstrate no decrease in the rate when normalized by the amount of chlorophyll in the bottle. However, effluent dosed into upstream Sacramento River water at environmentally realistic concentrations does show a decrease in primary production. Elevated ammonia concentrations consistently decrease nitrate uptake. Whether the shift in nitrogen utilization indicates that different algal species are beginning to grow in the ammonia rich water is not known. A recent paper by Glibert (2010) demonstrates significant correlations between the form and concentration of nutrients discharged by the SRWTP, and changes in phytoplankton, zooplankton, and fish abundance in the Delta.

Salinity

Elevated salinity can impair the uses of water by municipal, industrial, and agricultural users and by organisms that require lower salinity levels. There are at least three factors that may cause salinity levels to exceed water quality objectives in the Delta: saltwater intrusion from the Pacific

Ocean and San Francisco Bay moving into the Delta on high tides during periods of relatively low flows of fresh water through the Delta; salts from agricultural return flows, municipalities, and other sources carried into the southern and eastern Delta with the waters of the San Joaquin River; and localized increases in salinity due to irrigation return flows into dead-end sloughs and low-capacity channels (null zones). The effects of saltwater intrusion are seen primarily in the western Delta. Due to the operation of the State and federal export pumping plants near Tracy, the higher salinity areas caused by salts in the San Joaquin River tend to be restricted to the southeast corner of the Delta. Null zones, and the localized areas of increased salinity associated with them, exist predominantly in three areas of the Delta: Old River between Sugar Cut and the CVP intake; Middle River between Victoria canal and Old River; and the San Joaquin River between the head of Old River and the City of Stockton.

Suspended Sediments and Turbidity

Turbidity in the Delta is caused by factors that include suspended material such as silts, clays, and organic matter coming from the major tributary rivers; planktonic algal populations; and sediments stirred up during dredging operations to maintain deep channels for shipping. Turbidity affects large river and estuarine fish assemblages because some fishes survive best in turbid (muddy) water, while other species do best in clear water. Studies suggest that changes in specific conductance and turbidity are associated with declines in upper estuary habitat for delta smelt, striped bass, and threadfin shad. Laboratory studies have shown that delta smelt require turbidity for successful feeding.

Turbidity in the Delta has decreased through time. The primary hypotheses to explain the turbidity decrease are: (1) reduced sediment supply; (2) sediment washout from very high inflows during the 1982 to 1983 El Nino; and (3) trapping of sediment by submerged aquatic vegetation. (Wright and Schoellhamer 2004, Jassby et al. 2005, Nobriga et al. 2005, and Brown and Michniuk 2007 as cited in Nobriga et al. 2008.)

Dissolved Oxygen

Low DO levels are found along the lower San Joaquin River and in certain localized areas of the Delta. Dissolved oxygen impairment is caused, in part, by loads of oxygen demanding substances such as dead algae or waste discharges. Low DO in the Delta occurs mainly in the late summer and coincides with low river flows and high temperatures. Fish vary greatly in their ability to tolerate low DO concentrations, based on the environmental conditions the species has evolved to inhabit. Salmonids are relatively intolerant of low DO concentrations. Within the lower San Joaquin River, DO concentrations can become sufficiently low to impair the passage and/or cause mortality of migratory salmonids. (DFG 3, p. 3; DOI 1, p. 25; TBI/NRDC 3, p. 26.)

The DWSC is a portion of the lower San Joaquin River between the City of Stockton and the San Francisco Bay that has been dredged to allow for the navigation of ocean-going vessels to the Port of Stockton. A 14-mile stretch of the DWSC, from the City of Stockton to Disappointment Slough, is listed as impaired for DO and, at times, does not meet the objectives set forth in the San Joaquin Riverwater quality control plan. Studies have identified three main contributing factors to the problem: loads of oxygen demanding substances that exert an oxygen demand (particularly the death and decay of algae); DWSC geometry, which reduces the assimilative capacity for loads of oxygen demanding substances by reducing the efficiency of natural re-aeration mechanisms and by magnifying the effect of oxygen demanding reactions; and, reduced flow through the DWSC, which reduces the assimilative capacity by reducing upstream inputs of oxygen and increasing the residence time for oxygen demanding reactions. (Central Valley Regional Board 2003.)

3.3.4 Biological Setting

The Bay-Delta Estuary is one of the largest, most important estuarine systems for fish and waterfowl production on the Pacific Coast of the United States. The Delta provides habitat for a wide variety of freshwater, estuarine, and marine fish species. Channels in the Delta range from dead-end sloughs to deep, open water areas that include several flooded islands that provide submerged vegetative shelter. The complex interface between land and water in the Delta provides rich and varied habitat for wildlife, especially birds. The Delta is particularly important to waterfowl migrating via the Pacific Flyway as these birds are attracted to the winter-flooded fields and seasonal wetlands. (State Water Board 1999.)

Existing Setting

A wide variety of fish are found throughout the waterways of the Central Valley and the Bay-Delta Estuary. About 90 species of fish are found in the Delta. Some species, such as the anadromous fish, are found in particular parts of the Bay-Delta Estuary and the tributary rivers and streams only during certain stages of their life cycle. The Delta s channels serve as a migratory route and nursery area for Chinook salmon, striped bass, white and green sturgeon, American shad, and steelhead trout. These anadromous fishes spend most of their adult lives either in the lower bays of the estuary or in the ocean, moving inland to spawn. Resident fishes in the Bay-Delta Estuary include delta smelt, longfin smelt, threadfin shad, Sacramento splittail, catfish, largemouth and other bass, crappie, and bluegill.

Food supplies for Delta fish communities consist of phytoplankton, zooplankton, benthic invertebrates, insects, and forage fish. The entrapment zone, where freshwater outflow meets and mixes with the more saline water of the Bay, concentrates sediments, nutrients, phytoplankton, some fish larvae, and other fish food organisms. Biological standing crop (biomass) of phytoplankton and zooplankton in the estuary has generally been highest in this zone. However, the overall productivity at the lower trophic levels has decreased over time. (State Water Board 1999.)

Non-Native and Invasive Species

Invasive aquatic organisms are known to have deleterious effects on the Delta ecosystem. These effects include reductions in habitat suitability, reductions in food supply, alteration of the aquatic food-web, and predation on or competition with native species. There are many notable examples of exotic species invasions in the Bay-Delta, so much so, that the Delta has been labeled the most invaded estuary on earth.

Of particular importance potentially in the recent decline in pelagic organisms is the introduction of the Asian clam, *Corbula amurensis*. The introduction of the clam has lead to substantial declines in the lower trophic production of the Bay-Delta Estuary. In addition to reductions in planktonic production caused by *Corbula*, the planktonic food web composition has changed dramatically over the past decade or so. Once dominant copepods in the food web have declined leading to speculation that estuarine conditions have changed to favor alien species. The decrease in these desirable copepods may further increase the likelihood of larval fish starvation or result in decreased growth rates. (State Water Board 2008.)

The proliferation of invasive, aquatic weeds, such as *Egeria densa*, which filter out particulate materials and further reduce planktonic growth, are also having a impact on the Bay-Delta. Areas with low or no flow, such as warm, shallow, dead-end sloughs in the eastern Delta also support objectionable populations of plants during summer months including planktonic blue-green algae and floating and semi-attached aquatic plants such as water primrose, water

hyacinth, and *Egeria densa*. All of these plants contribute organic matter that reduces DO levels in the fall, and the floating and semi-attached plants interfere with the passage of small boat traffic. In addition, native fishes in the Bay-Delta face growing challenges associated with competition and predation by non-native fish. (State Water Board 1999; State Water Board 2008.)

Recent Species Declines

Historical fisheries within the Central Valley and the Bay-Delta Estuary were considerably different than the fisheries present today. Many native species have declined in abundance and distribution, while several introduced species have become well established. The Sacramento perch is believed to have been extirpated from the Delta; however, striped bass and American shad are introduced species that, until recently, have been relatively abundant and have contributed substantially to California's recreational fishery. (State Water Board 1999.)

In 2005, scientists with the Interagency Ecological Program (IEP) announced observations of a precipitous decline in several pelagic organisms in the Delta, beginning in 2002, in addition to declining levels of zooplankton. Zooplankton are the primary food source for older life stages of species such as delta smelt. The decline in pelagic organisms included delta smelt, striped bass, longfin smelt, and threadfin shad. Scientists hypothesized that at least three general factors may be acting individually, or in concert, to cause this recent decline in pelagic productivity: 1) toxic effects; 2) exotic species effects; and 3) water project effects. Scientists and resources agencies have continued to investigate the causes of the decline, and have prepared plans that identify actions designed to help stabilize the Delta ecosystem and improve conditions for pelagic fish species. (State Water Board 2008.)

In January of 2008, the Pacific Fisheries Management Council reported unexpectedly low Chinook salmon returns to California, particularly to the Central Valley, for 2007. Adult returns to the Sacramento River, the largest of Central Valley Chinook salmon runs, failed to meet resource management goals (122,000-180,000 spawners) for the first time in 15 years. (State Water Board 2008.) The Sacramento River fall Chinook salmon escapement to the Central Valley was estimated to be 88,000 adults in 2007; 66,000 in 2008; and 39,530 □ the lowest on record -- in 2009. (PCFFA 2.) The NMFS concluded that poor ocean conditions were a major factor contributing to the low fall-run abundance; however, other conditions may exacerbate these effects. (State Water Board 2008.)

In April 2008, the Pacific Fisheries Management Council and the Commission adopted the most restrictive ocean and coastal salmon seasons ever for California by closing the ocean and coastal fishery to commercial and recreation fishing for the 2008 fishing season. The Commission further banned salmon fishing in all Central Valley rivers, with the exception of limited fishing on a stretch of the Sacramento River. (State Water Board 2008.) The ban on all salmon fishing was extended through the 2009 season, but the restrictions were eased somewhat for 2010.

3.3.5 How Flow-Related Factors Affect Public Trust Resources

Flow is important to sustaining the ecological integrity of aquatic ecosystems, including the public trust resources that are the subject of this proceeding. Flow affects water quality, food resources, physical habitat, and biotic interactions. Alterations in the natural flow regime affect aquatic biodiversity and the structure and function of aquatic ecosystems.

In its key points on Delta environmental flows for the State Water Board, the DEFG (DEFG 1) noted that:

- Flow related factors that affect public trust resources include more than just volumes of inflow and outflow and no single rate of flow can protect all public trust resources at all times. The frequency, timing, duration, and rate of change of flows, the tides, and the occurrence of overbank flows, all are important. Seasonal, interannual, and spatial variability in flows, to which native species are adapted, are as important as the quantity of flow. Biological responses to flows rest on combinations of quantity, timing, duration, frequency and how these inputs vary spatially in the context of a Delta that is geometrically complex, highly altered by humans, and fundamentally tidally driven.

- Recent flow regimes in the Delta have contributed to the decline of native species and encouraged non-native species. Flows into and within the estuary affect turbidity, salinity, aquatic plant communities, and nutrients that are important to both native and non-native species. However, flows and habitat structure are often mismatched and now favor non-native species.

- Flow is a major determinant of habitat and transport. The effects of flow on transport and habitat are controlled by the geometry of the waterways. Further, because the geometry of the waterways will change through time, flow regimes needed to maintain desired habitat conditions will also change through time. Delta inflow is an important factor affecting the biological resources of the Delta because inflow has a direct effect on flood plain inundation, in-Delta net channel flows, and net Delta outflows.

- Flow modification is one of the few immediate actions available to improve conditions to benefit native species. However, habitat restoration, contaminant and nutrient reduction, changes in diversions, control of invasive species, as well as flood plain inundation and island flooding all interact with flow to affect aquatic habitats.

4. Methods and Data

The notice for the informational proceeding requested scientific information on the volume, quality, and timing of water needed for the Delta ecosystem under different hydrologic conditions to protect public trust resources pursuant to the State Water Board's public trust obligations and the requirements of SB 1. Specifically, the notice focused on Delta outflows, but also requested information concerning the importance of the source of those flows and information concerning adaptive management, monitoring, and special study programs. In addition to the requested information concerning Delta outflows, the State Water Board also received information on Sacramento River inflows, San Joaquin River inflows, hydrodynamics including Old and Middle River flows, and other information that is relevant to protection of public trust resources in the Delta ecosystem. This section presents the recommendations received by the State Water Board and discusses approaches used to evaluate the recommendations and develop flow criteria responsive to SB1.

4.1 Summary of Participants' Submittals

Information submitted by interested parties over the course of this proceeding has resulted in the development of a substantive record; submittals are available on the State Water Board's website at:
http://www.waterboards.ca.gov/waterrights/water_issues/programs/bay_delta/deltaflow/entity_index.shtml

The exhibits include discussions pertaining to: the State Water Board's public trust obligations; methodologies that should be used to develop flow criteria; the importance of the source of flows when determining outflows; means by which uncertainty should be addressed; and specific recommendations concerning Delta outflows, Sacramento and San Joaquin river inflows, hydrodynamics, operation of the Delta Cross Channel Gates, and floodplain activation.

The State Water Board received a wide range of recommendations for the volume, quantity and timing of flow necessary to protect public trust resources. Delta outflow recommendations ranged from statements that the current state of scientific understanding does not support development of numeric Delta flow criteria that differ from the current outflow objectives included in D-1641 (DWR closing comments; SFWC closing comments) to flow volumes during above normal and wet water year types that are two to four times greater than currently required under D-1641 (TBI/NRDC closing comments; AR/NHI closing comments; EDF closing comments, CSPA closing comments; CWIN closing comments). Appendix A: Summary of Participant Recommendations, provides summary tables of the recommendations received for Delta outflows, Sacramento River inflows, San Joaquin River inflows, hydrodynamics, floodplain inundation, and Delta Cross Channel Gate closures.

4.2 Approach to Developing Flow Criteria

Fleenor et al. (2010) examined the following four approaches for prescribing environmental flows for the Delta:

- Unimpaired (quasi-natural) inflows
- Historical impaired inflows that supported more desirable ecological conditions
- Statistical relationships between flow and native species abundance
- The appropriate accumulation of flows estimated to provide specific ecological functions for desirable species and ecosystem attributes based on available literature.

Fleenor *et al*. (2010) concludes:

> Generally, approaches that rely on data from the past will become more risky as the underlying changes in the Delta accumulate. However, since the objective is to provide flows for species which evolved under past conditions, information on past flows and life history strategies of fish provide considerable insight and context. Aggregate statistical approaches, which essentially establish correlations between past conditions and past species abundance, are likely to be less directly useful as the Delta changes. However, statistical approaches will continue to be useful, especially if developed for causal insights. More focused statistical relationships can be of more enduring value in the context of more causal models, even given underlying changes. In the absence of more process-based science, empirical relationships might be required for some locations and functions on an interim basis. Insights and information can be gained from each approach. Given the importance of the problem and the uncertainties involved,

the strengths of each approach should be employed to provide greater certainty or improve definition of uncertainties.

Among other things, the Fleenor report recommends:

1. Flow prescriptions should be supported preferably by causally or process-based science, rather than correlative empirical relationships or other statistical relationships without supporting ecological basis. Having a greater causal basis for flow prescriptions should make them more effective and readily adapted to improvements in knowledge and changing conditions in the Delta. A more explicit causal basis for flow prescriptions will also create incentives for improved scientific understanding of this system and its management as well as better integration of physical, chemical, and biological aspects of the problem.
2. Ongoing managed and unmanaged changes in the Delta will make any static set of flow standards increasingly irrelevant and obsolete for improving conditions for native fishes. Flows should be tied to habitat, fish, hydrologic, and other management conditions, as well as our knowledge of the system. Flows needed for fish native to the Delta will change.

Information received during this proceeding supports these conclusions and recommendations. The record for this proceeding contains a mix of data and analyses that uses the four approaches identified by Fleenor et al. (2010):

- Unimpaired flows
- Historical impaired inflows that supported more desirable ecological conditions
- Statistical relationships between flow and native species abundance
- Ecological functions-based analysis for desirable species and ecosystem attributes

All four types of information are relied upon to develop the flow criteria in this report. Emphasis, however, is placed on ecological function-based information, followed by information on statistical relationships between flow and native species abundance. In all cases, the criteria are supported by the best available scientific information submitted into the record for this proceeding. The species and ecosystem function-based needs assessments and criteria in this report are supported by references to specific scientific and empirical evidence, and cite to exhibits and testimony in the record or conclusions in published and peer reviewed articles. Criteria based upon statistical relationships between flow and native species abundance are also supported by references to specific scientific and empirical evidence, and cite to exhibits and testimony in the record or conclusions in published and peer reviewed articles.

Furthermore, the conceptual bases for all of the criteria in this report are supported by scientific information on function-based species or ecosystem needs. In other words, there is sufficiently strong scientific evidence to support the need for functional flows. This does not necessarily mean that there is scientific evidence to support *specific* numeric criteria. Recommendations are therefore divided into two categories: Category A criteria have more and better scientific information, with less uncertainty, to support specific numeric criteria than do Category B criteria. In all cases, the assumptions upon which the criteria are based are identified and discussed. The following steps were followed to develop flow criteria and other recommendations:

1. Establish general goals and objectives for protection of public trust resources in the Delta
2. Identify species to include based on ecological, recreational, or commercial importance
3. Review and summarize species life history requirements, including description of:
    - general life history and species needs
    - population distribution and abundance
    - population abundance and relationship to flow
    - specific population goals
    - species-specific basis for flow criteria
4. Summarize numeric and other criteria for each of: Delta outflows, Sacramento River inflows, San Joaquin River inflows, and hydrodynamics
5. Review other flow-related and non-flow measures that should be considered
6. Provide summary determinations for flow criteria and other measures

The following information was assembled and considered for each species, if available in the record for this proceeding:

- Life history information including timing of migrations
- Seasons or time periods when flow characteristics are most important
- Relationships of species abundance or habitat to Delta outflows, Delta inflows, hydrodynamics, or water quality parameters linked to flow, etc.
- Species environmental requirements (e.g., DO, temperature preferences, salinity, X2 location, turbidity, toxicity to specific pollutants, etc.)
- Relationship of species abundance to invasive species, to the extent possible
- Key quantifiable population responses or habitat characteristics linked to flow
- Mechanisms or hypotheses about mechanisms that link species abundance, habitat, and other metrics to flow or other variables

4.2.1 Biological and Management Goals

The goal of this report is discussed in Section 3.1.4 (Scope of this Report). The following biological and management goals are used to guide the development of criteria that support species life history requirements.

Biological Goals

- Depending on water year type or hydrologic condition, provide sufficient flow to increase abundance of desirable species that depend on the Delta (longfin smelt, delta smelt, starry flounder, bay shrimp, American shad, and zooplankton).

- Create shallow brackish water habitat for longfin smelt, delta smelt, starry flounder, bay shrimp, American shad, and zooplankton in Suisun Bay (and farther downstream).

- Provide floodplain inundation of appropriate timing and sufficient duration to enhance spawning and rearing opportunities to support Sacramento splittail, Chinook salmon, and other native species.

- Manage net OMR reverse flows and other hydrodynamic conditions to protect sensitive life stages of desirable species.

- Provide sufficient flow in the San Joaquin River to transport salmon smolts through the Delta during spring in order to contribute to attainment of the State Water Board's salmon protection water quality objective. (2009 Bay-Delta Plan, p. 14.)

- Provide sufficient flow in the Sacramento River to transport salmon smolts through the Delta during the spring in order to contribute to the attainment of the salmon protection water quality objective. (*Id.*)

- Provide sufficient flow in eastside streams that flow to the Delta, including the Mokelumne and Consumes rivers, to transport salmon smolts to the Delta during the spring in order to contribute to the attainment of the salmon protection water quality objective.

- Maintain water temperatures and DO in mainstem rivers that flow into the Delta and their tributaries at levels that will support adult Chinook salmon migration, egg incubation, smolting, and early-year and late-year juvenile rearing.

Management Goals

- Combine freshwater flows needed to protect species and ecosystem functions in a manner that is comprehensive, does not double count flows, uses an appropriate time step, and is well-documented

- Establish mechanisms to evaluate Delta environmental conditions, periodically review underpinnings of the biological objectives and flow criteria, and change biological objectives and flow criteria when warranted

- Periodically review new research and monitoring to evaluate the need to modify biological objectives and flow criteria

- Do not recommend overly complex flow criteria so as not to infer a greater understanding of specific numeric flow criteria than the available science supports

4.2.2 Selection of Species[10]

Information received during the informational proceeding links the abundance and habitat of several key species that live in, move through, or otherwise depend upon for their survival, the Delta and its ecosystem. DFG Exhibits 1 through 4 present information on the relationship between abundance and the quantity, quality, and timing of flow for the following species: (1) Chinook salmon, (2) Pacific herring, (3) longfin smelt, (4) prickly sculpin, (5) Sacramento splittail, (6) delta smelt, (7) starry flounder, (8) white sturgeon, (9) green sturgeon, (10) Pacific lamprey, (11) river lamprey, (12) bay shrimp, (13) mysid shrimp and a copepod, *Eurytemora affinis*, and (14) American shad. In general, the available data and information indicates:

- For many species, abundance is related to timing and quantity of flow (or the placement of X2).
- For many species, more flow translates into greater species production or abundance.
- Species are adapted to use the water resources of the Delta during all seasons of the year, yet for many species, important life history stages or processes consistently

[10] This section is largely drawn from DFG exhibits 1 through 4.

coincide with the winter-spring seasons and its associated increased flows because this is the reproductive season for most native fishes, and the time that most salmonid fishes are emigrating.

- The source, quantity, quality, and timing of Central Valley tributary outflow affects the same characteristics of mainstem river flow into and through the Delta. Flows in all three of these areas, Delta outflows, tributary inflows, and hydrodynamics, influence production and survival of Chinook salmon in both the San Joaquin River and Sacramento River basins.
- Some invasive species negatively influence native species abundance.

This report is consistent with DFG's recommendation to establish flow criteria for species of priority concern that will benefit most by improving flow conditions. (DFG closing comments, p. 3.) Table 2 (from DFG closing comments p.4) identifies select species that have the greatest ecological, commercial, or recreational importance and are influenced by Delta inflows (including mainstem river tributaries) or Delta outflows. The table identifies the species life stage most affected by flows, the mechanism most affected by flows, and the time when flows are most important to the species.

Table 2. Species of Importance (from DFG closing comments p.4)

Priority Species	Life Stage	Mechanism	Time When Water Flows are Most Important	Reference
Chinook salmon (San Joaquin River basin)	Smolt	Outmigration	March – June	DFG Exhibit 1 – page 2; DFG Exhibit 3 – pages 7-10, 21-35.
Chinook salmon (Sacramento River basin)	Juvenile	Outmigration	November – June	DFG Exhibit 1 – page 1-2, 6-8
Chinook salmon (San Joaquin River tributaries)	Egg/fry	Temperature, DO, upstream barrier avoidance	October – March	DFG Exhibit 3, pages 2-4; DFG Exhibit 4
Longfin smelt	Egg	Freshwater-brackish habitat	December – April	DFG Exhibit 1 – page 2, 9-12
Longfin smelt	Larvae	Freshwater-brackish habitat; transport; turbidity	December – May	DFG Exhibit 1 – page 2, 9-12
Sacramento Splittail	Adults	Floodplain inundating flows	January – April	DFG Exhibit 1 – page 2, 13-14
Sacramento Splittail	Eggs and larvae	Floodplain habitat persistence	January – May	DFG Exhibit 1 – page 3, 13-14

Priority Species	Life Stage	Mechanism	Time When Water Flows are Most Important	Reference
Delta smelt	Larvae and Pre-adult	Transport; habitat	March November September November	DFG Exhibit 1 page 2,14-15
Starry flounder	Settled juvenile; Juvenile-2 yr old	Estuary attraction; habitat	February May	DFG Exhibit 1 page 3, 15-16
Bay shrimp	Late-stage larvae and small juveniles	Transport	February June	DFG Exhibit 1 page 4; 22-25
Bay shrimp	Juveniles	Nursery habitat	April June	DFG Exhibit 1 page 4; 22-25
Mysid shrimp (zooplankton)	All	Habitat	March November	DFG Exhibit 1 page 5; 25-26
Eurytemora affinis (zooplankton)	All	Habitat	March May	DFG Exhibit 1 page 5; 25-26
American shad	Egg/larvae	Transport; dispersal; habitat	March June	DFG Exhibit 1 page 5; 26-28

While many species found in the Delta are of ecological, commercial, and/or recreational interest, specific flow needs for some of those species may not be directly addressed in this report because: they overlap with the needs of more sensitive species otherwise addressed in the report; the relationships between flow and abundance of those species are not well understood; or the needs of those species may be outside the scope of this report. For example, placement of X2 at certain locations in the Delta to protect longfin smelt or starry flounder will also protect striped bass (*Morone saxatilis*). Striped bass survival from egg to 38 mm is significantly increased as X2 shifts downstream in the estuary. (Kimmerer 2002a.) Kimmerer et al. (2009) showed that as X2 location moved downstream, several measures of striped bass survival and abundance significantly increased, as did several measures of striped bass habitat. Similarly, it is assumed that improved stream flow conditions for Chinook salmon will benefit steelhead, but additional work is needed to assure that these flow criteria are adequate for the protection of steelhead. Adult steelhead in the Central Valley migrate upstream beginning in June, peaking in September, and continuing through February or March. (Hallock *et al*. 1961, Bailey 1954, McEwan and Jackson 1996, as cited in SJRRP FMWG 2009.) Spawning occurs primarily from January through March, but may begin as early as December and may extend through April. (Hallock et al. 1961, as cited in McEwan and Jackson 1996.) Steelhead also rear in tributaries to the Delta throughout the year. Consequently, additional inflow criteria may be needed to protect steelhead at times when flows are not specifically recommended to protect Chinook salmon. As will be discussed in the species needs section for Chinook salmon, additional flow criteria may also be needed to protect various runs and life-stages of Chinook salmon. Adequate information is not currently available, however, upon which to base criteria.

Other species are influenced by very high and infrequent flows, far in excess of what could be provided by the State and federal water projects because they occur only during very wet years when project operations are not controlling. For example, white sturgeon are influenced by high winter and spring Delta and river flows (March-June Delta outflow greater than 60,000 cfs) that attract migrating adults, cue spawning, transport larvae, and enhance nursery habitat. These types of flows occur episodically in very wet years. Historical flow patterns combined with the unique life history (long-lived, late maturing, long intervals between spawning, high fecundity) result in infrequent strong recruitment.

There is adequate information in the record, and adequate time to evaluate life history requirements and develop species-specific flow criteria for the following species:

- Chinook Salmon (various runs) (primarily mirgration flows)
- American Shad
- Longfin Smelt
- Delta Smelt
- Sacramento Splittail
- Starry Flounder
- Bay Shrimp
- Zooplankton

4.2.3 Life History Requirements – Anadromous Species

Following are life history and species-specific requirements for Chinook Salmon (including Sacramento River winter-run, Central Valley spring-run, Central Valley fall-run, and Central Valley late fall-run) and American shad.

Chinook Salmon (Sacramento River Winter-Run, Central Valley Spring-Run, Central Valley Fall-Run, and Central Valley Late Fall-Run)

Status

Sacramento River winter-run Chinook salmon is listed as endangered pursuant to the ESA and the CESA. Central Valley spring-run Chinook salmon is listed as threatened pursuant to both the ESA and the CESA. Central Valley fall/late fall-run Chinook salmon are classified as species of special concern pursuant to the ESA.[11]

Life History[12]

Chinook salmon exhibit two generalized freshwater life history types (Healey 1991). Adult stream-type Chinook salmon enter freshwater up to several months before spawning, and juveniles reside in freshwater for a year or more, whereas ocean-type Chinook salmon spawn soon after entering freshwater and migrate to the ocean as fry or parr within their first year. Adequate instream flows and cool water temperatures are more critical for the survival of Chinook salmon exhibiting a stream-type life history due to over-summering by adults and/or juveniles.

[11] Source: http://www.dfg.ca.gov/fish/Resources/Chinook/index.asp

[12] This section was largely extracted from NMFS 3, pages 76 through 79.

Chinook salmon typically mature between 2 and 6 years of age (Myers et al. 1998). Freshwater entry and spawning timing generally are thought to be related to local water temperature and flow regimes. Runs are designated on the basis of adult migration timing. However, distinct runs also differ in the degree of maturation of the fish at the time of river entry, thermal regime, and flow characteristics of their spawning sites, and the actual time of spawning (Myers et al. 1998). Both winter-run and spring-run tend to enter freshwater as immature fish, migrate far upriver, and delay spawning for weeks or months. Fall-run enter freshwater at an advanced stage of maturity, move rapidly to their spawning areas on the mainstem or lower tributaries of the rivers, and spawn within a few days or weeks of freshwater entry (Healey 1991).

During their upstream migration, adult Chinook salmon require streamflows sufficient to provide olfactory and other orientation cues used to locate their natal streams. Adequate streamflows are necessary to allow adult passage to upstream holding habitat. The preferred temperature range for upstream migration is 38°F to 56°F (Bell 1991, DFG 1998). Boles (1988) recommends water temperatures below 65°F for adult Chinook salmon migration, and Lindley et al. (2004) report that adult migration is blocked when temperatures reach 70°F, and that fish can become stressed as temperatures approach 70°F.

Information on the migration rates of adult Chinook salmon in freshwater is scant and primarily comes from the Columbia River basin (Matter and Sanford 2003). Keefer et al. (2004) found migration rates of Chinook salmon ranging from approximately 10 kilometers (km) per day to greater than 35 km per day and to be primarily correlated with date, and secondarily with discharge, year, and reach, in the Columbia River basin. Matter and Sanford (2003) documented migration rates of adult Chinook salmon ranging from 29 to 32 km per day in the Snake River.

Adult Chinook salmon inserted with sonic tags and tracked throughout the Delta and lower Sacramento and San Joaquin rivers were observed exhibiting substantial upstream and downstream movement in a random fashion, for several days at a time, while migrating upstream (CALFED 2001). Adult salmonids migrating upstream are assumed to make greater use of pool and mid-channel habitat than channel margins (Stillwater Sciences 2004), particularly larger salmon such as Chinook salmon, as described by Hughes (2004). During their upstream migration, adults are thought to be primarily active during twilight hours.

Spawning Chinook salmon require clean, loose gravel in swift, relatively shallow riffles or along the margins of deeper runs, and suitable water temperatures, depths, and velocities for redd construction and adequate oxygenation of incubating eggs. Chinook salmon spawning typically occurs in gravel beds that are located at the tails of holding pools (USFWS 1995). The range of water depths and velocities in spawning beds that Chinook salmon find acceptable is very broad. The upper preferred water temperature for spawning Chinook salmon is 55°F to 57°F (Chambers 1956, Smith 1973, Bjornn and Reiser 1991, and Snider 2001).

Incubating eggs are vulnerable to adverse effects from floods, siltation, desiccation, disease, predation, poor gravel percolation, and poor water quality. Studies of Chinook salmon egg survival to hatching conducted by Shelton (1995) indicated 87% of fry emerged successfully from large gravel with adequate subgravel flow. The optimal water temperature for egg incubation ranges from 41°F to 56°F [44°F to 54°F (Rich 1997), 46°F to 56°F (NMFS 1997), and 41°F to 55.4°F (Moyle 2002)]. A significant reduction in egg viability occurs at water temperatures above 57.5°F and total embryo mortality can occur at temperatures above 62°F (NMFS 1997). Alderdice and Velsen (1978) found that the upper and lower temperatures resulting in 50% pre-hatch mortality were 61°F and 37°F, respectively, when the incubation

temperature was held constant. As water temperatures increase, the rate of embryo malformations also increases, as well as the susceptibility to fungus and bacterial infestations. The length of development for Chinook salmon embryos is dependent on the ambient water temperature surrounding the egg pocket in the redd. Colder water necessitates longer development times as metabolic processes are slowed. Within the appropriate water temperature range for embryo incubation, embryos hatch in 40 to 60 days, and the yolk-sac fry remain in the gravel for an additional 4 to 6 weeks before emerging from the gravel.

During the 4 to 6 week period when alevins remain in the gravel, they utilize their yolk-sac to nourish their bodies. As their yolk-sac is depleted, fry begin to emerge from the gravel to begin exogenous feeding in their natal stream. Fry typically range from 25 mm to 40 mm at this stage. Upon emergence, fry swim or are displaced downstream (Healey 1991). The post-emergent fry disperse to the margins of their natal stream, seeking out shallow waters with slower currents, finer sediments, and bank cover such as overhanging and submerged vegetation, root wads, and fallen woody debris, and begin feeding on zooplankton, small insects, and other microcrustaceans. Some fry may take up residence in their natal stream for several weeks to a year or more, while others are displaced downstream by the stream s current. Once started downstream, fry may continue downstream to the estuary and rear there, or may take up residence in river reaches farther downstream for a period of time ranging from weeks to a year (Healey 1991).

Fry then seek nearshore habitats containing riparian vegetation and associated substrates important for providing aquatic and terrestrial invertebrates, predator avoidance, and slower velocities for resting (NMFS 1996). The benefits of shallow water habitats for salmonid rearing have been found to be more productive than the main river channels, supporting higher growth rates, partially due to higher prey consumption rates, as well as favorable environmental temperatures (Sommer et al. 2001).

When juvenile Chinook salmon reach a length of 50 to 57 mm, they move into deeper water with higher current velocities, but still seek shelter and velocity refugia to minimize energy expenditures (Healey 1991). Catches of juvenile salmon in the Sacramento River near West Sacramento exhibited larger-sized juveniles captured in the main channel and smaller-sized fry along the margins (USFWS 1997). When the channel of the river is greater than 9 to 10 feet in depth, juvenile salmon tend to inhabit the surface waters (Healey 1982). Migrational cues, such as increasing turbidity from runoff, increased flows, changes in day length, or intraspecific competition from other fish in their natal streams, may spur outmigration of juveniles from the upper Sacramento River basin when they have reached the appropriate stage of maturation (Kjelson et al. 1982, Brandes and McLain 2001).

As fish begin their emigration, they are displaced by the river s current downstream of their natal reaches. Similar to adult movement, juvenile salmonid downstream movement is crepuscular. Juvenile Chinook salmon migration rates vary considerably presumably depending on the physiological stage of the juvenile and hydrologic conditions. Kjelson *et al*. (1982) found Chinook salmon fry to travel as fast as 30 km per day in the Sacramento River, and Sommer et *al.* (2001) found travel rates ranging from approximately 0.5 miles up to more than 6 miles per day in the Yolo Bypass. As Chinook salmon begin the smoltification stage, they prefer to rear further downstream where ambient salinity is up to 1.5 to 2.5 parts per thousand (ppt, Healey 1980, Levy and Northcote 1981).

Fry and parr may rear within riverine or estuarine habitats of the Sacramento River, the Delta, and their tributaries (Maslin et al. 1997, Snider 2001). Within the Delta, juvenile Chinook

salmon forage in shallow areas with protective cover, such as intertidal and subtidal mudflats, marshes, channels, and sloughs (McDonald 1960, Dunford 1975, Meyer 1979, Healey 1980). Cladocerans, copepods, amphipods, and larvae of diptera, as well as small arachnids and ants are common prey items (Kjelson et al. 1982, Sommer et al. 2001, MacFarlane and Norton 2002). Shallow water habitats are more productive than the main river channels, supporting higher growth rates, partially due to higher prey consumption rates, as well as favorable environmental temperatures (Sommer et al. 2001). Optimal water temperatures for the growth of juvenile Chinook salmon in the Delta are between 54□F to 57□F (Brett 1952). In Suisun and San Pablo bays, water temperatures reach 54□F by February in a typical year. Other portions of the Delta (*i.e*., South Delta and Central Delta) can reach 70□F by February in a dry year. However, cooler temperatures are usually the norm until after the spring runoff has ended.

Within the estuarine habitat, juvenile Chinook salmon movements are dictated by the tidal cycles, following the rising tide into shallow water habitats from the deeper main channels, and returning to the main channels when the tide recedes (Levings 1982, Levy and Northcote 1982, Levings et al. 1986, Healey 1991). As juvenile Chinook salmon increase in length, they tend to school in the surface waters of the main and secondary channels and sloughs, following the tides into shallow water habitats to feed (Allen and Hassler 1986). In Suisun Marsh, Moyle et al. (1989) reported that Chinook salmon fry tend to remain close to the banks and vegetation, near protective cover, and in dead-end tidal channels. Kjelson et al. (1982) reported that juvenile Chinook salmon demonstrated a diel migration pattern, orienting themselves to nearshore cover and structure during the day, but moving into more open, offshore waters at night. The fish also distributed themselves vertically in relation to ambient light. During the night, juveniles were distributed randomly in the water column, but would school up during the day into the upper 3 meters of the water column. Available data indicate that juvenile Chinook salmon use Suisun Marsh extensively both as a migratory pathway and rearing area as they move downstream to the Pacific Ocean. Juvenile Chinook salmon were found to spend about 40 days migrating through the Delta to the mouth of San Francisco Bay and grew little in length or weight until they reached the Gulf of the Farallones (MacFarlane and Norton 2002). Based on the mainly oceantype life history observed (*i.e.*, fall-run), MacFarlane and Norton (2002) concluded that unlike other salmonid populations in the Pacific Northwest, Central Valley Chinook salmon show little estuarine dependence and may benefit from expedited ocean entry.

Population Distribution and Abundance

Four seasonal runs of Chinook salmon occur in the Central Valley, with each run defined by a combination of adult migration timing, spawning period, and juvenile residency and smolt migration periods. (Fisher 1994 as cited in Yoshiyama et al. 2001 p. 73.) The runs are named after the season when adults move upstream to migrate-- winter, spring, fall, and late-fall. The Sacramento River basin supports all four runs resulting in adult salmon being present in the basin throughout the year. (Stone 1883a; Rutter 1904; Healey 1991; Vogel and Marine 1991 as cited in Yoshiyama *et. al,* 2001 p. 73.) Historically, different runs occurred in the same streams staggered in time to correspond to the appropriate stream flow regime for which that species evolved, but overlapping. (Vogel and Marine 1991; Fisher 1994 as cited in Yoshiyama et al*.,* 2001, p. 73.) Typically, fall and late-fall runs spawn soon after entering natal streams and spring and winter runs typically □hold□ for up to several months before spawning. (Rutter 1904; Reynolds and others 1993 as cited in Yoshiyama *et. al,* 2001, p. 73.) These runs and their life-cycle timing are summarized in Table 3 and described in more detail below.

Winter-Run - Due to a need for cool summer flows, Sacramento River winter-run originally likely only spawned in the upper Sacramento River tributaries, including the McCloud, Pit, Fall, and Little Sacramento rivers and Battle Creek. (NMFS 5, p. 16.) As a result of construction of

Shasta and Keswick Dams, today all spawning habitat above Keswick Dam has been eliminated and approximately 47 of the 53 miles of habitat in Battle Creek has been eliminated. (Yoshiyama et al. 1996, as cited in NMFS 5, p. 16.) Currently, winter-run habitat is likely limited to the Sacramento River reach between Keswick Dam downstream of the Red Bluff Diversion Dam. (NMFS 5, p. 16.)

The winter-run population is currently very vulnerable due to its low population numbers and the fact that only one population exists. (Good et al. 2005, as cited in NMFS 5, p. 16.) In the late 1960s escapement was near 100,000 fish declining to fewer than 200 fish in the 1990s. (*Id*.) Recent escapement estimates from 2004 to 2006 averaged 13,700 fish. (DFG Website 2007, as cited in NMFS 5, p. 16.) However, in 2007 and 2008 escapements were less than 3,000 fish. Since 1998, hatchery produced winter-run have been released likely contributing to the observed increased escapement numbers. (Brown and Nichols 2003 as cited in NNFS 5, p. 16.) In addition, a temperature control device was installed on Shasta Dam in 1997 likely improving conditions for winter-run. (NMFS 5, p. 18.)

Spring-Run - Historically, spring-run were likely the most abundant salmonid in the Central Valley inhabiting headwater reaches of all major river systems in the Central Valley in the absence of natural migration barriers. (NMFS 5, p. 28.) Since the 1880s, construction of dams and other factors have significantly reduced the numbers and range of spring-run in the Central Valley. (*Id*.) Currently, the only viable populations occur on Mill, Deer, and Butte creeks, but those populations are small and isolated. (DFG 1998, as cited in NMFS 5, p. 28.) In addition, the Feather River Fish Hatchery which opened in 1967 produces spring-run salmon. However, significant hybridization of these hatchery fish with fall-run has occurred. (NMFS 5, p. 28-31.)

Historically, Central Valley spring-run numbers were estimated to be as large as 600,000 fish. (DFG 1998 as cited in NMFS 5, p. 28.) Nearly 50,000 spring-run adults were counted on the San Joaquin River prior to construction of Friant Dam. (Fry 1961 as cited in NMFS 5, p. 28.) Shortly after construction of Friant Dam, spring-run were extirpated on the San Joaquin River. (Yoshiyama et al. 1998 as cited in NMFS 5, p. 28.) Since 1970, estimates of spring-run populations in the Sacramento River have been as high as 30,000 fish and as low as 3,000 fish. (NMFS 5, p. 28.)

Fall-Run - Historically, fall run likely occurred in all Central Valley streams that had adequate flows during the fall months, even if the streams were intermittent during other parts of the year. (Yoshiyama *et. al* 2001, p. 74.) Due to their egg-laden and deteriorating physical condition, fall-run likely historically spawned in the valley floor and lower foothill reaches and probably were limited in their upstream migration. (Rutter 1904 as cited in Yoshiyama *et. al* 2001, p. 74.)

Currently, fall-run Chinook inhabit both the Sacramento and San Joaquin river basins and are currently the most abundant of the Central Valley races, contributing to large commercial and recreational fisheries in the ocean and popular sportfisheries in the freshwater streams. Fall-run Chinook are raised at five major Central Valley hatcheries which release more than 32 million smolts each year. In the past few years, there have been large declines in fall-run populations with escapements of 88,0000 and 66,000 fish in 2007 and 2008. (NMFS 2009, p. 4.) NMFS concluded that the recent declines were likely primarily due to poor ocean conditions in 2005 and 2006. (*Id*.) Other factors contributing to the decline of fall-run include: loss of spawning grounds due to dams and other factors, degradation of spawning habitat from water diversions, introduced species, altered sediment dynamics, hatchery practices, degraded water quality, and loss of riparian and estuarine habitat. (*Id*.)

Late-Fall Run - Historically, late fall-run probably spawned in the mainstem Sacramento River and major tributary reaches and possibly in the San Joaquin River upstream of its tributaries. (Hatton and Clark 1942; Van Cleve 1945; Fisher 1994 as cited in Yoshiyama *et. al* 2001.) Today, late-fall run are mostly found in the upper Sacramento River where the river remains deep and cool enough in the summer for juvenile rearing. (Moyle 2002, p. 254.) The late fall-run has continued low, but potentially stable abundance. (NMFS 2009, p. 4.) Estimates from 1992 ranged from 6,700 to 9,700 fish and in 1998 were 9,717 fish. However, changes in estimation methods, lack of data, and hatchery influences make it difficult to accurately estimate abundance trends for this run. (*Id*.)

Table 3. Generalized Life History Timing of Central Valley Chinook Salmon Runs

	Migration Period	**Peak Migration**	**Spawning Period**	**Peak Spawning**	**Juvenile Emergence Period**	**Juvenile Stream Residency**
Sacramento River Basin Late Fall-Run	October□ April	December	Early January□ April	February□ March	April-June	7-13 months
Winter-Run	December-July	March	Late April-early August	May-June	July-October	5-10 months
Spring-Run	March-September	May- June	Late August-October	Mid-September	November-March	3-15 months
Fall Run	June-December	September-October	Late September-December	October-November	December-March	1-7 months
San Joaquin (Tuolumne River) Fall-Run	October-early January	November	Late October-January	November	December-April	1-5 months

Source: Yoshiyama *et al*. (1998) as cited in Moyle 2002, p. 255.

Population Abundance and Relationship to Flow

Delta outflows and inflows affect rearing conditions and migration patterns for Chinook salmon in the Delta watershed. Freshwater flow serves as an important cue for upstream adult migration and directly affects juvenile survival and abundance as they move downstream through the Delta. (DOI 1, p. 23.) Decreased flows may decrease migration rates and increase exposure to unsuitable water quality and temperature conditions, predators, and entrainment at water diversion facilities. (DFG 1, p. 1.) For the most part, relationships between salmon survival and abundance have been developed using tributary inflows rather than Delta outflows, however, the Delta is an extension of the riverine environment until salmon reach the salt water interface. (DOI 1, p. 29.) Prior to development and channelization, the Delta provided hospitable habitat for salmon. With channelization and other development, the environment is no longer hospitable for salmon. As a result, the most beneficial Delta outflow pattern for salmon may currently be one that moves salmon through the Delta faster. (*d*.)

Salmon respond behaviorally to variations in flows. Monitoring shows that juvenile and adult salmon begin migrating during the rising limb of the hydrograph. (DOI 1, p. 30.) For juveniles, pulse flows appear to be more important than for adults. (*Id*.) For adults, continuous flows through the Delta and up to each of the natal tributaries appears to be more important. (*Id*.) Flows and water temperatures are also important to maintain populations with varied life history strategies in different year types to insure continuation of the species over different hydrologic

and other conditions. For salmon migrating as fry within a few days of emigration from redds, increased flows provide improved transport downstream and improved rearing habitat, and for salmon that stay in the rivers to rear, increased flows provide for increased habitat and food production. (DOI 1, 30.)

Population Abundance Goal

The immediate goal is to significantly improve survival of all existing runs of Chinook salmon that migrate through the Delta in order to facilitate positive population growth in the short term and subsequently achieve the narrative salmon protection objective identified in the 2006 Bay-Delta Plan to double the natural production of Chinook salmon from the average production from 1967 to 1991 consistent with the provisions of State and federal law. (State Water Board 2006a, p. 14.)

Species- Specific Recommendations

Delta Outflow

No specific Delta outflow criteria are recommended for Chinook salmon. Any flow needs would generally be met by the following inflow criteria and by the Delta outflow criteria determined for estuarine dependant species discussed elsewhere in this report.

Sacramento River Inflows

The 2006 Bay-Delta Plan includes flow objectives for the Sacramento River at Rio Vista for the protection of fish and wildlife beneficial uses from September through December ranging from 3,000 to 4,500 cfs. (State Water Board 2006a, p. 15.) These flow objectives are in part intended to provide attraction and transport flows and suitable habitat conditions for Chinook salmon. (State Water Board 2006b, p. 49.) The 2006 Bay-Delta Plan includes Delta outflow objectives for the remainder of the year, which effectively provide Sacramento River inflows. However, the Bay-Delta Plan does not include any specific Sacramento River flow requirements for the remainder of the year, including the critical spring period.

Habitat alterations in the Delta limit Sacramento River salmon production primarily through reduced survival during the outmigrant (smolt) stage. Decreases in flow through the estuary, increased temperatures, and the proportion of flow diverted through the Delta Cross Channel and Georgiana Slough on the Sacramento River are associated with lower survival in the Delta of marked juvenile fall-run Sacramento River salmon. (DOI 1, p. 24.) In 1981 (p. 17-18) and 1982 (p. 404), Kjelson et al. reported that flow was positively correlated with juvenile fall-run Chinook salmon survival through the Delta and that temperature was negatively correlated with survival. In testimony before the State Water Board in 1987 Kjelson presented additional analyses that again showed that survival of fall-run Chinook salmon smolts through the Delta between Sacramento and Suisun Bay was found to be positively correlated to flow and negatively correlated to water temperature. (p. 36.) Smolt survival increased with increasing Sacramento River flow at Rio Vista, with maximum survival observed at or above about 20,000 and 30,000 cfs from April through June (p. 36), while no apparent relationship was found at flows between 7,000 and 19,000 cfs (p. 27), suggesting a potential threshold response to flow. Smolt survival was also found to be highest when water temperatures were below 66□F. (p. 61.) In addition to increased survival, juvenile abundance has also been found to be higher with greater Sacramento River flow. (DFG 3, pp. 1 and 6.) The abundance of juvenile Chinook salmon leaving the Delta at Chipps Island was found to be highest when Rio Vista flows averaged above 20,000 cfs from April through June. (*Id*.)

Dettman et al. (1987) reanalyzed data from the 1987 Kjelson experiments and found a positive correlation between an index of spawning returns, based on coded-wire tagged fish, and both

June and July outflow from the Delta. (p. 1.) In 1989, Kjelson and Brandes updated and confirmed Kjelson's 1987 findings again reporting that survival of smolts through the Delta from Sacramento to Suisun Bay was highly correlated to mean daily Sacramento River flow at Rio Vista. (p. 113.) In the State Water Board's 1992 hearings, USFWS (1992) presented additional evidence, based on data collected from 1988 to 1991, that increased flow in the Delta may increase migration rates of both wild and hatchery fish migrating from the North Delta (Sacramento and Courtland) to Chipps Island. (DOI 1, p. 26.)

In 2001, Brandes and McLain confirmed the relationships between water temperature, flow, and juvenile salmonid survival. (p. 95.) In 2006, Brandes et al. updated findings regarding the relationship between Sacramento River flows and survival and found that the catch of Chinook salmon smolts surveyed at Chipps Island between April and June of 1978 to 2005 was positively correlated with mean daily Sacramento River flow at Rio Vista between April and June. (p. 41-46.)

In addition to the flow versus juvenile fall-run Chinook salmon survival relationships discussed above, several studies show that loss of migrating salmonids within Georgiana Slough and the interior Delta is approximately twice that of fish remaining in the mainstem Sacramento River. (Kjelson and Brandes 1989; Brandes and McLain 2001; Vogel 2004, 2008; and Newman 2008 as cited in NMFS 3, p. 640). Recent studies and modeling efforts have found that increasing Sacramento River flow such that tidal reversal does not occur in the vicinity of Georgiana Slough and at the Cross Channel Gates would lessen the proportion of fish diverted into channels off the mainstem Sacramento River. (Perry et al. 2008, 2009.) Thus, closing the Delta Cross Channel and increasing the flow on the Sacramento River to levels where there is no upstream flow from the Sacramento River entering Georgiana Slough on the flood tide during the juvenile salmon migration period (November to June) will likely reduce the number of fish that enter the interior Delta and improve survival. (DOI 1, p. 24.) To achieve no bidirectional flow in the mainstem Sacramento River near Georgiana Slough, flow levels of 13,000 (personal communication Del Rosario) to 17,000 cfs at Freeport are needed. (DOI 1, p. 24.)

Monitoring of emigration of juvenile Chinook salmon on the lower Sacramento River near Knights Landing also indicates a relationship between timing and magnitude of flow in the Sacramento River and the migration timing and survival of Chinook salmon approaching the Delta from the upper Sacramento River basin. (Snider and Titus 1998, 2000a, 2000b, 2000c, and subsequent draft reports and data as cited in DFG 1, p. 7.) The emigration timing of juvenile late fall, winter, and spring-run Chinook salmon from the upper Sacramento River basin depends on increases in river flow through the lower Sacramento River in fall, with significant precipitation in the basin by November to sustain downstream migration of juvenile Chinook salmon approaching the Delta. (Titus 2004 as cited in DFG 1, p. 7.) Sacramento River flows at Wilkins Slough of 15,000 to 20,000 cfs following major precipitation events are associated with increased emigration. (DFG 1, p. 7 and NMFS 7, p. 2-4.)

Delays in precipitation producing flows result in delayed emigration which may result in increased susceptibility to in-river mortality from predation and poor water quality conditions. (DFG 1, p. 7.) Allen and Titus (2004) suggest that the longer the delay in migration, the lower the survival of juvenile salmon to the Delta. (as cited in DFG 1, p. 7.) DFG indicates that juvenile Chinook salmon appear to need increases in Sacramento River flow that correspond to flows in excess of 20,000 cfs at Wilkins Slough by November with similar peaks continuing past the first of the year. (DFG 1, p. 7.) Pulse flows in excess of 15,000 to 20,000 cfs may also be necessary to erode sediment in the upper Sacramento River downstream of Shasta to create turbid inflow pulses to the Delta. (AR/NHI 1, p. 32.)

Salmon are the only species considered for the Sacramento River inflow criteria; discussion of the flow criteria for Sacramento River inflows is therefore continued in Section 5.2, Sacramento River Inflow criteria.

San Joaquin River Inflows

Currently the Merced, Tuolumne, and Stanislaus river tributaries to the San Joaquin River support fall-run Chinook salmon. Historically spring-run also inhabited the basin. Pursuant to the San Joaquin River Restoration effort, there are plans to reintroduce spring-run Chinook salmon to the main-stem river beginning in 2012. Since the 1980s (1980-1989), San Joaquin basin fall-run Chinook salmon escapement numbers have declined from approximately 26,000 fish to 13,000 fish in the 2000s (2000-2008). (TBI/NRDC 3, p. 22.) Flow related conditions are believed to be a significant cause of this decline.

The 2006 Bay-Delta Plan includes flow objectives for the San Joaquin River at Vernalis, largely for the protection of fall-run Chinook salmon. The plan includes base flows during the spring (February through June with the exception of mid-April through mid-May) that vary between 700 and 3,420 cfs based on water year type and required location of X2. To improve juvenile fall-run Chinook salmon outmigration, the Plan also includes spring pulse flows (mid-April through mid-May) that vary between 3,110 and 8,620 cfs, however, those flows have never been implemented and have instead been replaced with the Vernalis Adaptive Management Plan (VAMP) flow targets for the past 10 years. The VAMP flows are lower than the pulse flow objectives and vary between 2,000 and 7,000 cfs based on existing flows and other conditions. (State Water Board 2006a, p. 24-26.) The 2006 Bay-Delta Plan also includes a flow objective of 1,000 to 2,000 cfs during October to support adult fall-run Chinook salmon migration. (State Water Board 2006b, p. 15-16.) The 2006 Bay-Delta Plan does not include any specific flow requirements during the remainder of the year. (State Water Board 2006b, pg. 50.)

Inflows from the San Joaquin River affect various life stages of Chinook salmon including adult migration, spawning, egg incubation, juvenile rearing, and juvenile emigration to the ocean. Evidence indicates that to maintain a viable Chinook salmon population, escapements should not decline below approximately 833 adult salmon per year (a total of 2,500 salmon in 3 years), and fluctuations in escapement between wet and dry years should be reduced by increasing dry year escapements and the percentages of hatchery fish should be reduced to no more than 10□. (Lindley and others 2007, as cited in CSPA 14, p. 3-4.) Mesick estimates that the Tuolumne River population is currently at a high risk of extinction (Mesick 2009); and that the Stanislaus and Merced river populations are also likely soon to be at a high risk of extinction due to high percentages of hatchery fish. (CSPA 7, p.4.)

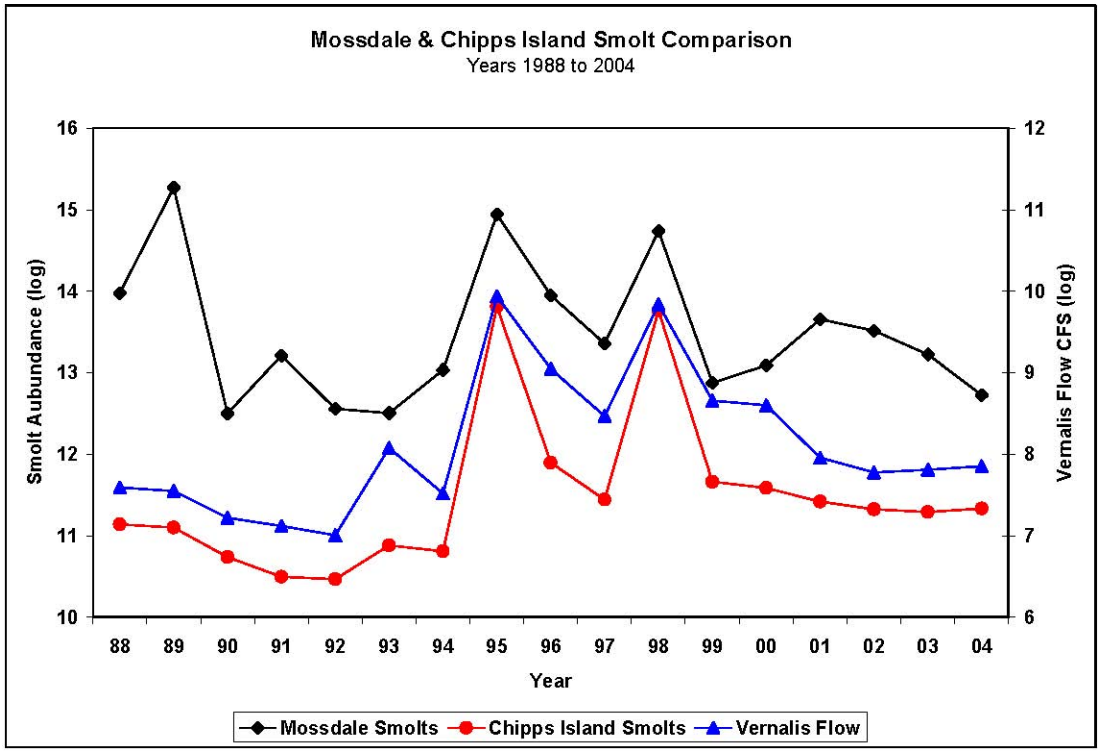
Mesick estimates that the decline in escapement on the Tuolumne River from 130,000 salmon in the 1940s to less than 500 in recent years is primarily due to inadequate minimum instream flow releases from La Grange Dam in late winter and spring during non-flood years. (CSPA 14, p. 1.) Mesick suggests that escapement has been primarily determined by the rate of juvenile survival, which is primarily determined by the magnitude and duration of late winter and spring flows since the 1940s. (CSPA 14, p. 2.) Mesick indicates that other analyses show that spawner abundance, spawning habitat degradation, and the harvest of adult salmon in the ocean have not caused the decline in escapement. (CSPA 14, p. 1.)

Successful adult Chinook salmon migration depends on environmental conditions that cue the response to return to natal streams. Optimal conditions help to reduce straying and maintain egg viability and fecundity rates. (DFG 3, p. 2 and CSPA 7, p. 1.) Analyses of flow needs for

the protection of adult fall-run migration conducted by Hallock and others from 1964 to 1967 indicate that the presence of Sacramento River water in the central and south Delta channels results in migration delays for both San Joaquin River and Sacramento River basin salmon. (Hallock et al., 1970 as cited in DOI 1, p. 25.) These analyses also show that reverse flows on the San Joaquin River delay and potentially hamper migration. (*Id.*) In addition, analyses by Hallock show that water temperatures in excess of 65□F and low DO conditions of less than 5 mg/l in the San Joaquin River near Stockton act as a barrier to adult migration. (as cited in AFRP 2005, p. 11.) Delayed migration may result in reduced gamete viability under elevated temperatures and mortality to adults prior to spawning. (AFRP 2005, p. 12.)

Mesick found that up to 58□ of Merced River Hatchery Chinook salmon strayed to the Sacramento River Basin when flows in the San Joaquin River were less than 3,500 cfs for ten days in late October, but stray rates were less than 6□ when flows were at least 3,500 cfs. (CSPA 14, p. 15 and CSPA 7, p. 1.) Mesick indicates that providing 1,200 cfs flows from the tributaries to the San Joaquin River (Merced, Tuolumne, and Stanislaus) for ten days in late October increases escapement by an average of 10□. (Mesick 2009 as cited in CSPA 7, p. 1.) The 2005 AFRP includes similar recommendations for flows of 1,000 cfs from each of the San Joaquin River tributaries. (AFRP, p. 12.) Such flows would likely improve DO conditions, temperatures, and olfactory homing fidelity for San Joaquin basin salmon. (Harden Jones 1968, Quinn et al. 1989, Quinn 1990 as cited in EDF 1, p. 48.) To achieve olfactory homing fidelity and continuous flows for adult migration, the physical source of this water is at least as important as the volume or rate of flow, especially given that the entire volume of the San Joaquin River during the fall period is typically diverted at the southern Delta export facilities. (EDF 1. p. 48.) Even in the absence of exports, it is necessary for the scent of the San Joaquin basin watershed to enter the Bay in order for adult salmonids to find their way back to their natal rivers. (NMFS 2009, p.407 as cited in EDF 1, p. 48.)

Outmigration success of juvenile Chinook salmon is affected by multiple factors, including water diversions and conditions related to flow. Data show that smolt survival and resulting adult production is better in wet years. (Kjelson and Brandes, 1989, SJRGA, 2007 as cited in DOI 1, p. 24.) VAMP analyses indicate that San Joaquin River flow at Vernalis is positively associated with the probability of survival for outmigrating smolts from Dos Reis (downstream of the Old River bifurcation) to the Delta (Jersey Point). (Newman, 2008 as cited in DOI 1, p. 24.) A positive relationship has also been shown between salmon survival indices and flow at Jersey Point for fish released at Jersey Point. (USFWS 1992, p. 21 as cited in DOI 1, p. 24.) Data indicate that maximum San Joaquin basin adult fall-run chinook salmon escapement may be achieved with flows exceeding 20,000 cfs at Vernalis during the smolt emigration period of April 15 through June 15. (2006 VAMP report page 65; DOI 1, p. 25.) As indicated below in Figure 9, DFG found that more spring flow from the San Joaquin River tributaries results in more juvenile salmon leaving the tributaries, more salmon successfully migrating to the South Delta, and more juvenile salmon surviving through the Delta. (DFG 3, p. 17.) DFG concludes that the primary mechanism needed to substantially produce more smolts at Jersey Point is to substantially increase the spring Vernalis flow level (magnitude, duration, and frequency) which will produce more smolts leaving the San Joaquin River tributaries, and produce more smolts surviving to, and through, the South Delta. (DFG 3, p. 17-18.) DFG indicates that random rare and unpredictable poor ocean conditions may cause stochastic high mortality of juvenile salmon entering the ocean, but that the overwhelming evidence is that more spring flow results in higher smolt abundance, and higher smolt abundance equates to higher adult production. (DFG 3, p.17.)



Note: This figure shows the relationship of smolt abundance (log transformed) at Mossdale to estimate smolt abundance at Chipps Island by average spring (3/15 to 6/15) Vernalis flow level (log transformed). To estimate the number of smolts at Chipps Island the smolt survival vs. flow level relationship developed by Dr. Hubbard was applied on a daily basis to the Mossdale smolt abundance and out-migration pattern. Smolt abundance at Chipps Island (or stated differently smolt survival through the Delta on an annual basis) can change by an order of magnitude pending Vernalis flow rate. (DFG 3, p. 16.)

Figure 9. Salmon Smolt Survival and San Joaquin River Vernalis Flows

Elevated flows during the smolt outmigration period function as an environmental cue to trigger migration, facilitate transport of juveniles downstream, improve migration corridor conditions to inundate floodplains, reduce predation and improve temperature and other water quality conditions; these are all functions that are currently extremely impaired on the San Joaquin River. (e.g., Steelhead stressor matrix, NMFS 2009 as cited in TBI/NRDC 3, p. 7.) Under the 2006 Bay-Delta Plan, elevated flows are limited to approximately the mid-April to mid-May period. However, outmigration timing in the San Joaquin River basin occurs over a prolonged time frame from mid-March through June. (TBI/NRDC 3, p. 12-13.) This restricted window may impair population viability by limiting survival of fish that migrate outside of this time period, thus reducing the life history diversity and the genetic diversity of the population. (TBI/NRDC 3, p. 11-12.) Diverse migration timing increases population viability by making it more likely that at least some portion of the population is exposed to favorable ecological conditions in the Delta and into the ocean. (Smith et al. 1995 as cited in TBI/NRDC 3, p. 12.)

Temperature conditions in the San Joaquin River basin may limit smolt outmigration and survival. Lethal temperature thresholds for Pacific salmon depend, to some extent, on acclimation temperatures. (Myrick and Cech 2004 as cited in TBI/NRDC 3, p. 18.) Central Valley salmonids are generally temperature-stressed through at least some portion of their freshwater life-cycle. (e.g. Myrick and Cech 2004, 2005 as cited in TBI/NRDC 3, p. 18.) Lethal temperature effects commence in a range between 71.6 and 75.2 F (Baker et al.1995 as cited

in TBI/NRDC 3, p. 18), with sub-lethal effects occurring at lower temperatures. Access to food also affects temperature responses. When fish have adequate access to food, growth increases with increasing temperature, but when food is limited (which is typical), optimal growth occurs at lower temperatures. (TBI/NRDC 3, p 18.) Marine and Cech (2004) observed decreased growth, smoltification success, and predator avoidance at temperatures above 68□F and that fish reared at temperatures between 62.6□and 68□F experienced increased predation compared to fish reared at between 55.4□and 60.8□F. (as cited in TBI/NRDC 3, p. 18.) Several studies indicate that optimal rearing temperatures for Chinook salmon range from 53.6□to 62.6F (Richter and Kolmes 2005 as cited in TBI/NRDC 3, p. 18.) Mesick found that Tuolumne River smolt outmigration rates and adult recruitment were highest when water temperatures were at or below 59□F when smolts were migrating in the lower river. (Mesick 2009, p. 25.) Elevated temperatures may also affect competition between different species. (Reese and Harvey 2002 as cited in TBI/NRDC 3, p. 18.)

Temperature is determined by a number of factors including reservoir releases, channel geometry, and ambient air temperatures. As a result, a given flow may achieve different water temperatures depending on the other conditions listed above. Cain estimates that flows over 5,000 cfs in late spring (April to May) generally provide water temperatures (below 65□F) suitable for Chinook salmon, but that flows less than 5,000 cfs may be adequate to provide sufficient temperature conditions. (Cain 2003 as cited in TBI/NRDC 3, p 13-14.) Mesick indicates that salmon smolt survival can be improved by maintaining water temperatures near 59□F from March 15 to May 15 and as low as practical from May 16 to June 15. (CSPA 7, p. 2-3.) To maintain mean water temperatures near 59□F and maximum temperatures below 65□F from March 15 to May 15 in the tributaries downstream to the confluence with the San Joaquin River, Mesick indicates that flows need to be increased in response to average air temperature. (CSPA 7, p. 3.)

There are several different estimates for flow needs on the San Joaquin River during the spring period to improve or double salmon populations on the San Joaquin River. The USFWS□s 2005 *Recommended Streamflow Schedules to Meet the AFRP Doubling Goal in the San Joaquin River Basin* (2005 AFRP) concludes that the declines in salmon in the San Joaquin River basin primarily resulted from reductions in the frequency and magnitude of spring flooding in the basin from 1992-2004 compared to the baseline period of 1967-1991. (2005 AFRP, p. 1.) The AFRP states that the most likely method to increase production of fall-run Chinook salmon is to increase flows from February to March to increase survival of juveniles in the tributaries and smolts in the mainstem and then to increase flows from April to mid-June to increase smolt survival through the Delta. (*Id*.) Using salmon production models for the San Joaquin River Basin, the AFRP provides recommendations for the amount of flow at Vernalis that would be needed to double salmon production in the San Joaquin River basin. On average, over the four month period of February to May, the AFRP recommends that flows range from less than 4,000 cfs in critical years to a little more than 10,000 cfs in wet years. From March through June, AFRP recommends that flows average between about 4,500 cfs in critical years to more than 12,000 cfs in wet years. (2005 AFRP, p. 8-10.)

Using a non-linear regression empirical data driven fall-run Chinook salmon production model, DFG developed flow recommendations for the San Joaquin River from March 15 through June 15 to double Chinook salmon smolt production. DFG developed a variety of modeling scenarios to evaluate the effects of various combinations of flow magnitudes and durations in order to identify the combination of flow levels varied by water year type to achieve doubling of juveniles. Base flows for the March 15 through June 15 period vary between 1,500 cfs in critical years to

6,315 cfs in wet years. Pulse flow recommendations vary between 7,000 cfs and 15,000 cfs for durations of 31 to 70 days depending on water year type. (DFG 3, p. 34.)

In analyzing the relationship between Vernalis flow and cohort return ratios of San Joaquin River Chinook salmon, TBI/NRDC found that Vernalis average March through June flows of approximately 4,600 cfs corresponded to an equal probability for positive population growth or negative population growth. (TBI/NRDC 3, p. 24.) TBI/NRDC found that average March through June flows exceeding 5,000 cfs resulted in positive population growth in 84 of years with only 66 growth in years with flows less than 5,000 cfs. (*Id.)* TBI/NRDC found that flows of 6,000 cfs produced a similar response as the 5,000 cfs flows and flows of 4,000 cfs or lower resulted in significantly reduced population growth of only 37 of years. (*Id*.) The TBI/NRDC analysis suggests that 5,000 cfs may represent an important minimum flow threshold for salmon survival on the San Joaquin River. (*Id*.) Based on abundance to prior flow relationships, TBI/NRDC estimates that average March through June inflows of 10,000 cfs are likely to achieve the salmon doubling goal. (TBI/NRDC 3, p. 16-17.)

In addition to fall pulse flows for adult migration and spring flows to support juvenile emigration, additional flows on the San Joaquin River may be needed at other times of year to support Chinook salmon and their habitat. The 2006 Bay-Delta Plan does not include base flow objectives for the San Joaquin River. However, the Central Valley Regional Board s Water Quality Control Plan for the Sacramento and San Joaquin River Basins does include a year round DO objective of 5.0 mg/l at all times on the San Joaquin River within the Delta. (Central Valley Regional Board 2009,. III-5.0). The 2006 Bay-Delta Plan and the Central Valley Basin Plan also include a DO objective of 6.0 mg/L between Turner Cut and Stockton from September 1 through November 30. (*Id*.)

Current flow conditions on the San Joaquin River result in DO conditions below the existing DO objectives in the fall and winter in lower flow years. These conditions may result in delayed migration and mortality to San Joaquin River Chinook salmon, steelhead and other species. Increased flows would improve DO levels in the lower San Joaquin River. Additional flows at other times of year in the tributaries to the San Joaquin River would also provide improved conditions for steelhead inhabiting tributaries to the San Joaquin River (NMFS 3, p. 105) and would have additional benefits by reducing nutrients pollution and biological oxygen demand. (TBI/NRDC 3, p. 27.)

To reduce crowding of spawning adults during the fall, increased flows in the tributaries may also be needed from November through January to ensure protection of Chinook salmon. (AFRP, p. 12.) However, there is no evidence that increased flows would reduce spawner crowding or improve juvenile production. (*Id*.) Habitat modeling indicates that flows of up to 300 cfs on the San Joaquin River tributaries may provide optimum physical habitat during the fall. (AFRP 2005, p. 14.)

To maintain the ecosystem benefits of a healthy riparian forest, minimum flows and ramping rates for riparian recruitment may also be needed during late spring and early summer. (AFRP 2005, p. 14.) To protect over-summering steelhead and salmon, flows in the tributaries during the summer and fall are needed. To maintain minimal habitat of a suitable temperature (less than 65F), flows between 150 and 325 cfs may be needed on each of the tributaries to the San Joaquin River. (AFRP 2005, pp. 14-15.)

The magnitude, duration, timing, and source of San Joaquin River inflows are important to San Joaquin River Chinook salmon migrating through the Delta and several different aspects of their

life history. Inflows are needed to provide appropriate conditions to cue upstream adult migration to the San Joaquin River and its tributaries, adult holding, egg incubation, juvenile rearing, emigration from the San Joaquin River and its tributaries, and other functions. San Joaquin River inflows are important during the fall to provide attraction flows and are especially important during juvenile emigration periods. Flows on tributaries to the San Joaquin River are also important for egg incubation and rearing, in addition to migration.

As with the Sacramento River inflows, Chinook salmon are the only species considered for the San Joaquin River inflow criteria; discussion of flow criteria for San Joaquin River inflows is therefore continued in Section 5.3, San Joaquin River inflow criteria.

Hydrodynamics

All Central Valley Chinook salmon must migrate out of the Delta as juveniles and back through the Delta as adults returning to spawn. In addition, many Central Valley Chinook salmon also rear in the Delta for a period of time. (DOI 1, p. 53.) Delta exports affect salmon migrating through and rearing in the Delta by modifying tidally dominated flows in the channels. It is, however, difficult to quantitatively evaluate the direct and indirect effects of these hydrodynamic changes. Delta exports can cause a false attraction flow drawing fish to the export facilities where direct mortality from entrainment may occur. (DOI 1, p. 29.) More important than direct entrainment effects, however, may be the indirect effects caused by export operations increasing the amount of time salmon spend in channelized habitats where predation is high. (*Id*.) Steady flows during drier periods (as opposed to pulse flows that occur during wetter periods) may increase these residence time effects. (DOI 1.)

Direct mortality from entrainment at the south Delta export facilities is most important for San Joaquin River and eastside tributary salmon (and steelhead). (DOI 1, p. 29.) Juvenile salmonids emigrate downstream on the San Joaquin River during the winter and spring. Salmonids from the Calaveras River basin and the Mokelumne River basin also use the lower San Joaquin River as a migration corridor. This lower reach of the San Joaquin River between the Port of Stockton and Jersey Point has many side channels leading toward the export facilities that draw water through the channels to the export pumps. (NMFS 3, p. 651.) Particle tracking model (PTM) simulations and acoustic tagging studies indicate that migrating fish may be diverted into these channels and may be affected by flow in these channels. (Vogel 2004, SJRGA 2006, p. 68, SJRGA 2007, pp. 76-77, and NMFS 3, p. 651.) Analyses indicate that tagged fish may be more likely to choose to migrate south toward the export facilities during periods of elevated diversions than when exports are reduced. (Vogel 2004.)

Similarly, salmon that enter the San Joaquin River through Georgiana Slough from the Sacramento River may also be vulnerable to export effects. (NMFS 3, p. 652.) While fish may eventually find their way out of the Central Delta channels after entering them, migratory paths through the Central Delta channels increase the length and time that fish take to migrate to the ocean increasing their exposure to predation, increased temperatures, contaminants, and unscreened diversions. (NMFS 3, p. 651-652.)

PTM analyses indicate that as net reverse flows in Old and Middle rivers increase from -2,500 cfs to -3,500 cfs, particle entrainment changes from 10□ to 20□ and then again to 40□ when flows are -5,000 cfs and 90□ when flows are -7,000 cfs. (*Id*.) Based on these findings, NMFS□s Opinion includes requirements that exports be reduced to limit negative net Old and Middle river flows to -2,500 cfs to -5,000 cfs depending on the presence of salmonids from January 1 through June 15. (NMFS 3, p. 648.)

In addition to effects of net reverse flows in Old and Middle rivers, analyses concerning the effects of net reverse flows in the San Joaquin River at Jersey Point were also conducted and documented in the USFWS, 1995 *Working Paper on Restoration Needs, Habitat Restoration Actions to Double the Natural Production of Anadromous Fish in the Central Valley California* (1995Working Paper). These analyses show that net reverse flows at Jersey Point decrease the survival of smolts migrating through the lower San Joaquin River. (USFWS 1992b as cited in USFWS 1995b, p. 3Xe-19.) Net reverse flows on the lower San Joaquin River and diversions into the central Delta may also result in reduced survival for Sacramento River fall-run Chinook salmon. (USFWS 1995b, p. 3Xe-19) Based on these factors, the 1995 Working Paper includes a recommendation to maintain positive flows at Jersey Point of 1,000 cfs in critical and dry years, 2,000 cfs in below- and above-normal years, and 3,000 cfs in wet years from October 1 through June 30 to improve survival for all races and stocks of juvenile salmon and steelhead migrating through and rearing in the Delta. (*Id*.)

In addition to relationships between reverse flows and entrainment effects, flows on the San Joaquin River versus exports also appear to be an important factor in protecting San Joaquin River Chinook salmon. Various studies show that, in general, juvenile salmon released downstream of the effects of the export facilities (Jersey Point) have higher survival out of the Delta than those released closer to the export facilities. (NMFS 3-Appendix 3, p. 74.) Studies also indicate that San Joaquin basin Chinook salmon production increases when the ratio of spring flows to exports increases. (DFG 2005, SJRGA 2007 as cited in NMFS 3-Appendix 3, p. 74.) However, it should be noted that flow at Vernalis appears to be the controlling factor. Increased flows in the San Joaquin River in the Delta may also benefit Sacramento basin salmon by reducing the amount of Sacramento River water that is pulled into the central Delta and increasing the amount of Sacramento River water that flows out to the Bay. (NMFS 3, Appendix 3, p. 74-75.) Based on these findings, the NMFS Opinion calls for export restrictions from April 1 through May 31 with Vernalis flows to export ratios ranging from 1.0 to 4.0 based on water year type, with unrestricted exports above flows of 21,750 cfs at Vernalis, in addition to other provisions for health and safety requirements. (NMFS 3, Appendix 3, p.73-74.)

Analyses by TBI/NRDC indicate that Vernalis flow to export ratios above 1.0 during the San Joaquin basin juvenile salmon outmigration period in the spring consistently correspond to higher escapement estimates two and half years later, with more than 10,000 fish in 76 of years. (TBI/NRDC 4, p. 11.) Vernalis flows to export ratios of less than 1.0 correspond to lower escapement estimates two and half years later, with more than 10,000 fish in only 33 of years. (*Id*.) TBI/NRDC estimates that Vernalis flows to export ratios of greater than 4.0 would reach population abundance goals. (TBI/NRDC 4, pp. 11-12.)

Vernalis flows to export ratios also appear to be important during the fall period to provide improved migration conditions for adult fall-run San Joaquin basin Chinook salmon. Adult fall-run San Joaquin basin Chinook salmon migrate upstream through the Delta primarily during October when San Joaquin River flows are typically low. (AFRP 2005, p. 12.) As a result, when exports are high, little if any flow from the San Joaquin basin may make it out to the ocean to help guide San Joaquin basin salmon back to the basin to spawn. (*Id*.) Analyses indicate that increased straying occurs when more than 400 of the flow at Vernalis is exported at the Delta pumping facilities (equivalent to a Vernalis flow to export ratio of 0.25). (*Id*.) Straying rates decreased substantially when export rates were less than 300 of Vernalis flow. (*Id.*)

Export related criteria for salmon are provided in section 5.4, Hydrodynamic Recommendations.

Floodplain Flows

Juvenile salmon will rear on seasonally inundated floodplains when available. Such rearing in the Central Valley, in the Yolo Bypass and the Cosumnes River floodplain, has been found to have a positive effect on growth and apparent survival of juvenile Central Valley salmon through the Delta. (Sommer *et al*. 2001 and Jeffres *et al*. 2005 as cited in DOI 1, p. 27 and Sommer *et al*. 2005 and Jeffres *et al*. 2008 as cited in NMFS 3, p. 609.) The increased growth rates may be due to increased temperatures and increased food supplies. (DOI 1, p. 27, DFG 3, p. 3.) Floodplain rearing provides conditions that promote larger and faster growth which improves outmigration, predator avoidance, and ultimately survival. (Stillwater Science 2003 as cited in DFG 3, p. 6.) Increased survival may also be related to the fact that ephemeral floodplain habitat and other side-channels provide better habitat conditions for juvenile salmon than intertidal river channels during high flow events when, in the absence of such habitat, juvenile salmon may be displaced to these intertidal areas. (Grosholz and Gallo 2006 as cited in DOI 1, p. 27 and Stillwater Science as cited in DFG 3, p. 6.) The improved growing conditions provided by floodplain habitat are also believed to improve ocean survival resulting in higher adult return rates. (Healy 1982, Parker 1971 as cited in DOI 1, p. 28.)

While floodplain habitat is generally beneficial to salmon, it may also be detrimental under certain conditions. Areas with engineered water control structures have comparatively higher rates of stranding. (Sommer *et al*. 2005 as cited in DOI 1, p. 28.) In addition, high temperatures, low DO, and other water quality conditions that may occur on floodplains may adversely affect salmon. (DFG 3, p. 6.) Reduced depth may also make salmon more susceptible to predation. (*Id*.) Water depths of 30 cm or more are believed to reduce the risk of avian predation. (Gawlik 2002 as cited in DFG 3, p. 6.) Further, the most successful native fish are those that use the floodplain for rearing, but leave before the floodplain becomes disconnected to the river. (Moyle *et al*. 2007, DFG 3, p. 6.) From a restoration perspective, projects should be designed to drain completely to minimize formation of ponds in order to avoid stranding. (Jones and Stokes, 1999 as cited in DOI 1, p. 28.) Bioenergetic modeling indicates that with regard to increased temperatures, increased food availability may be sufficient to offset increased metabolic demands from higher water temperatures. (DFG 3, p. 6.) However, as temperatures increase, juveniles may be unable to migrate to areas of lower temperatures due to reduced swimming ability. (DFG 3, p. 7.) As a result, as summer temperatures increase, floodplain habitat should also decrease. (*Id*.)

The timing of floodplain inundation for the protection of Central Valley Chinook salmon should generally occur from winter to mid-spring to coincide with the peak juvenile Chinook salmon outmigration period (which itself generally coincides with peak flows) and to avoid non-native access to the floodplain (which would generally occur in late-spring). (AR/NHI 1, p. 25.) The benefits of floodplain inundation generally increase with increasing duration, with even relatively short periods of two-weeks providing potential benefits to salmon. (Jeffres *et al*., 2008 as cited in AR/NHI 1, p. 25.) Benefits to salmon may also increase with increasing inter-annual frequency of flooding. Repeated pulse flows and associated increased residence times may be associated with increased productivity which would benefit salmon growth rates and potentially reduce stranding. (*Id*.)

Table 4, developed by AR/NHI, provides estimated thresholds for inundating floodplain habitat under existing and potentially modified conditions. Inundation threshold refers to the discharge when floodwaters begin to inundate the floodplain. Target discharge is the amount of water necessary to produce substantial inundation and flow across the floodplain. (Source: AR/NHI 1, p. 30.)

Floodplain inundation criteria for protection of salmon are provided in section 5.6.2, Floodplain Activation, under Other Measures.

Table 4. Inundation Thresholds for Floodplains and Side Channels at Various Locations Along the Sacramento River

Location	Stage (in feet)	Inundation Threshold (cfs)	Target Discharge (avg. cfs)	Gauge Location	Source
Freemont Weir					
Existing crest	33.5	56,000	63,000	Verona	USGS
Proposed notch	17.5	23,100	35,000	Verona	USGS
Sutter Bypass					
Tisdale weir	45.5	21,000		Colusa	NOAA; Feyrer
Tisdail with notch					
Lower Sutter Bypass	25	30,000	30,000	Verona	USGS
Upper Sacramento Meander belt side channels	Various	10,000	12,000	Red Bluff	USGS

American Shad (*Alosa sapidissima*)

Status

This species is not listed pursuant to either the ESA or CESA.

Life History[13]

The American shad (*Alosa sapidissima*) is an anadromous fish, introduced into California in the late 1880s, that has become an important sport fish within the San Francisco Estuary. American shad range from Alaska to Mexico and use major rivers between British Columbia and the Sacramento watershed for spawning. (Moyle 2002.)

American shad adults, at 3 to 5 years of age, return from the ocean and migrate into the freshwater reaches of the Sacramento and San Joaquin rivers during March through May, with peak migration occurring in May (Stevens *et al*. 1987). Within California, the major spawning run occurs in the Sacramento River up to Red Bluff and in the adjoining American, Feather, and Yuba rivers with lesser use of the Mokelumne, Cosumnes, and Stanislaus rivers and the Delta (Moyle 2002). Spawning takes place from May through early July (Stevens *et al*. 1987). Following their first spawning event, American shad will return annually to spawn up to seven years of age (Stevens *et al*. 1987). It is believed that river flow will affect the distribution of first time spawners, with numbers of newly mature adults spawning in rivers proportional to flows at the time of arrival (Stevens *et al*. 1987). Spawning takes place in the main channels of the rivers with flows washing negatively buoyant eggs downstream. Depending upon temperature, larvae hatch from eggs in 3 to 12 days and will remain planktonic for 4 weeks (Moyle 2002).

[13] This section was largely extracted from DFG Exhibit 1, pages 26-27.

The lower Feather River and the Sacramento River from Colusa to the northern Delta provide the major summer nursery for larvae and juveniles. Flows drive the transport of young downstream, with wet years changing the location of the concentration of young and their nursery area further downstream into the northern Delta (Stevens *et al*. 1987). Out migration of young American shad through the Delta occurs from June through November (Stevens 1966). American shad spawned and rearing in the Delta and those that travel through the Delta during out migration are vulnerable to entrainment at the State and federal pumping facilities; catches at the facilities in some years have numbered in the millions (Stevens and Miller 1983). During migration to the ocean, young fish feed upon zooplankton, including copepods, mysids, and cladocerans, as well as amphipods (Stevens 1966, Moyle 2002). Most American shad migrate to the ocean by the end of their first year, but some remain in the estuary (Stevens *et al*. 1987).

Population Abundance and its Relationship to Flow

Year class strength correlates positively with river flow during the spawning and nursery period (April-June). (Stevens and Miller 1983.) American shad exhibit a weak but significant relationship to X2, (Kimmerer 2002a). After 1987, the relationship changed such that abundance increased per unit flow. (Kimmerer 2002a, Kimmerer 2009.) The X2 versus abundance relationship has remained intact into recent years. (Kimmerer *et al*. 2009.) In addition, Kimmerer *et al*. (2009) found that American shad had a habitat relationship (defined by salinity and Secchi depth) to X2 that appeared consistent with its relationship of abundance to X2 (i.e., slopes for abundance versus X2 and habitat versus X2 were similar), which provides some support for the idea that increasing quantity of habitat could explain the X2 relationship for this species (a possible causal mechanism for the abundance versus X2 relationship). Stevens and Miller (1983) determined that the apparent general effect of high flow on all of the species they examined, including American shad, is to increase the quality and quantity of nursery habitat and more widely disperse the young fish, thus reducing density-dependent mortality.

Population Goal

The immediate goal is to maintain viable populations of this species by providing sufficient flows to facilitate attraction of spawners, survival of eggs and larvae, and dispersal of young fish to suitable nursery habitats.

Species-Specific Recommendations

Delta Outflow

The DFG s current science-based conceptual model is that placement of X2 in Suisun Bay represents the best interaction of water quality and landscape for fisheries production given the current estuary geometry. (DFG 2, p. 6.) Maintaining X2 at 75 km and 64 km corresponds to net Delta outflows of approximately 11,400 cfs and 29,200 cfs, respectively. As noted by DFG, X2, in this instance, is a surrogate for tributary and mainstem river inflows to the Delta that support egg and larval survival. The species specific flow criteria to protect American shad shown in Table 5 are consistent with those submitted by DFG. (closing comments, p. 7.)

Inflows

No explicit recommendations for inflows to support American shad were identified in the record. The DFG provided outflow criteria for this species based on positioning X2 in Suisun Bay (DFG closing comments, p. 7); noting that in this instance X2 is a surrogate for tributary and mainstem river inflows. As noted above, year class strength correlates positively with river flow during the spawning and nursery period (April to June). (Steven and Miller 1983.) Flows must be sufficient to attract American shad spawners into Sacramento River tributaries, transport and disperse the young fish to suitable nursery habitat, and reduce the probability of entrainment of young fish

and their food organisms in water diversions. (DFG 1987 [Exh 23, p. 23].) Water development has reduced flows during the spring and early summer periods which are most critical in this respect. (*Id*.) The spawning and nursery period, during which inflows appear to be most critical for this species, generally correspond to important periods for other more sensitive species (e.g., salmon outmigration, longfin smelt spawning and rearing). It is anticipated that by providing sufficient flows to meet the outflow criteria recommended above, favorable river conditions will be provided to support American shad spawning and rearing.

Old and Middle River Flows

American shad spawned and rearing in the Delta and those that travel through the Delta during out migration are vulnerable to entrainment at the State and Federal export facilities; in some years catches at the facilities have numbered in the millions. (Stevens and Miller 1983.) Although evaluations of screening efficiency comparable to studies for striped bass and salmon had not been completed for American shad, DFG believed in 1987 that larger fish in the fall were screened fairly efficiently, while screening efficiencies for newly metamorphosed juveniles in the late spring and early summer were quite low. (DFG 1987 [Exh 23, p. 20].) American shad are notoriously intolerant of handling. Tests have shown that losses of American shad that were successfully screened exceeded 50□ during the summer months, with slightly lower mortalities during the cooler fall months. (DFG 1987 [Exh 23, p. 22].) These high handling mortalities suggest the only practical strategy for reducing losses may be pumping schedules that minimize shad entrainment. (*Id.*). However, no recommendations specific to American shad for net OMR flows or pumping restrictions were identified in the record. Net OMR flow criteria are intended to protect salmon, delta smelt, and longfin smelt populations and are also likely to reduce the number of American shad entrained at the export facilities. In addition, restrictions stipulated in the OCAP Biological Opinions (NMFS 3, pp. 648-653; USFWS 2008) will also reduce entrainment of American shad.

Table 5. Delta Outflows to Protect American Shad

Effect or Mechanism	Water Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Spawning; Nursery	All	--	--	--	X2[1] □75 to 64 km (□11400 □29200 cfs)			--	--	--	--	--	--
[1] For this species, X2 is a surrogate for tributary and mainstem river inflows to the Delta that support egg and larval survival. Source: DFG 1, p. 26; DFG 2, p. 6, DFG closing comments, p. 7.													

4.2.4 Life History Requirements – Pelagic Species

Following are life history and species-specific requirements for longfin smelt, Delta smelt, Sacramento splittail, starry flounder, Bay shrimp, and zooplankton

Longfin Smelt (*Spirinchus thaleichthys*)

Status

Longfin smelt is listed as a candidate for threatened status under the CESA. (DFG 2010.)

Life History

Longfin smelt are a native species that live two years with females reproducing in their second year. Both juveniles and adults feed on zooplankton. Longfin smelt is an anadromous, open water species moving between fresh and salt water. Adults spend time in San Francisco Bay and may go outside the Golden Gate for short periods. Adults aggregate in Suisun Bay and the

western Delta in late fall and migrate upstream to spawn in freshwater as water temperatures drop below 18□C. (Baxter *et al*. 2009.) The spawning habitat is between the confluence of the Sacramento and San Joaquin rivers (around Point Sacramento) to Rio Vista on the Sacramento side and Medford Island on the San Joaquin River. Spawning activity appears to decrease with distance from the low salinity zone, so the location of X2 influences how far spawning migrations extend into the Delta. (Baxter *et al*. 2009.) Spawning takes place between November and April with peak reproduction in January. Eggs are deposited on the bottom and hatch between December and May into buoyant larvae. Peak hatch is in February. Net Delta outflow transports the larvae and juvenile fish to higher salinity water.

Population Abundance and its Relationship to Flow

The population abundance of longfin smelt is positively correlated with spring Delta outflow and inversely related to net OMR spring reverse flows. The correlations are interpreted to mean that net Delta outflow and net reverse OMR flows are, at least partially, responsible for controlling the abundance of longfin smelt. Modifications in the two flow regimes are intended to begin to stabilize and increase the population abundance of longfin smelt. Each correlation is discussed below.

The population abundance of longfin smelt is positively related to Delta outflow during winter and spring. (Jassby *et al*. 1995; Rosenfield and Baxter 2007; Kimmerer 2002a; Kimmerer *et al*. 2009.) The statistically strongest outflow averaging period is January-June. The abundance relationships are from the fall mid-water trawl (FMWT) survey, the bay study mid-water trawl, and the bay study otter trawl. All three surveys show statistically significant positive relationships between the abundance of juveniles/adults and Delta outflow. There has been a decrease in the carrying capacity of the estuary since 1988, presumably because of the invasion of the clam *Corbula*, but the overall winter spring relationship is still statistically significant. More spring outflow results in more smelt as measured by all three indices. The biological basis for the spring outflow relationship is not known. Baxter et al. (2009) speculate that the larvae may benefit from increased downstream transport, increased food production, and a reduction in entrainment losses at the SWP and CVP pumps.

The population abundance of juvenile and adult longfin smelt, as measured by the FMWT index, is also inversely related to the number of fish salvaged at the SWP and CVP pumping facilities. (TBI/NRDC 4, pp. 19-20.) High pumping rates at the two facilities cause net OMR reverse flows which passively move all age groups of longfin smelt toward entrainment at the pumps. A subset of the juvenile and adult populations are counted at the pumping facilities. Larval longfin smelt (□20 mm) pass through the louvers and are not counted. Peak adult and juvenile longfin smelt salvage occurs in January and April to May, respectively. (Baxter *et al*. 2009.) Entrainment of larval smelt, although not counted, are likely greatest between March and April. (TBI/NRDC 4, p.16.) Adult and juvenile longfin smelt salvage is an inverse logarithmic function of net OMR flows. (Grimaldo *et al*. 2009.) Increasing OMR reverse flows results in an exponential increase in salvage loss. Juvenile longfin smelt salvage is a negative function of Delta outflow between March and May. (TBI/NRDC 4, p.17.) Higher outflow in these three months results in lower entrainment loss. This may result from the fact that during low outflow years spawning occurs higher in the system, placing adults and subsequent larvae and juveniles closer to the pumps. Also, negative net OMR flows can either passively draw fish to the pumps or at high levels mis-cue them as to the direction of higher salinity. A consequence is that juvenile longfin smelt are most in danger of entrainment at the CVP and SWP pumping facilities during low outflow years with high net negative OMR flows.

The OMR flow results discussed above are consistent with the findings of Baxter *et al* (2009). The authors used the Delta Simulation Model (DSM2, PTM subroutine) to predict the fate of larval longfin smelt. The PTM predicted that larval entrainment at the SWP might be substantial (2 to10), particularly during the relatively low outflow conditions modeled. Baxter *et al*. (2009) also identified a significant negative relationship between spring (April to June) net negative OMR flows and the sum of combined SWP and CVP juvenile longfin smelt salvage. Juvenile longfin smelt salvage increased rapidly as OMR became more negative than -2,000 cfs. However, as winter-spring or just spring outflows increased, shifting the position of X2 downstream, the salvage of juvenile longfin smelt decreased significantly. Also, particle entrapment decreased, even with a high negative net OMR, when the flow of the Sacramento River at Rio Vista increased above 40,000 cfs. Entrainment of particles almost ceased at flows of 55,000 cfs.

TBI/NRDC (TBI/NRDC 2, pp. 15-19) conducted a generation to generation population abundance analysis for longfin smelt versus Delta outflow. The authors found that the probability of an increase in the FMWT longfin smelt index was greater than 50 in years when Delta outflow averaged 51,000 and 35,000-cfs between January to March and March to May, respectively. The analysis is important because it suggests a potential outflow trigger for growing the population.

There is also evidence that longfin smelt is food limited. (SFWC 1, p.59.) The FMWT index for longfin smelt is positively correlated in a multiple linear regression with the previous spring s *Eurytemora affinis* abundance (an important prey organism) after weighting the data by the proportion of smelt at each *Eurytemora* sampling station and normalizing by the previous years FMWT index. The spring population abundance of *Eurytemora* has itself been positively correlated with outflow between March and May since the introduction of *Corbula.* (Kimmerer, 2002a.) The positive correlation between *Eurytemora* abundance and spring outflow provides further support for a spring outflow criterion.

Longfin smelt populations are at an all time low. The average FMWT index for years 2001-2009 are only 3 percent of the average value for 1967 to 1987, a time period when pelagic fish did better in the estuary. The FMWT index for two of the last three years is the lowest on record.

Delta outflow recommendations to protect longfin smelt received from participants are summarized in Table 6. The DFG (DFG closing comments, p.7) recommended a Delta outflow between 12,400 and 28,000 cfs from January to June of all water year types to help transport larval/juvenile longfin smelt seaward in the estuary. TBI/NRDC (TBI/NRDC 2, pp. 19-26; TBI/NRDC Closing Comments, pp. 6-7) also made spring Delta outflow recommendations based on five sets of hydrologic conditions for the Central Valley. The TBI/NRDC recommendations range between 14,000 and 140,000 cfs for January through March and 10,000 to 110,000 cfs between April and May. The TBI/NRDC recommendations are based on their longfin smelt population abundance analysis which demonstrated positive growth in years with high spring outflow.

The four sets of OMR recommendations to protect longfin smelt received from participants are summarized in Table 7. TBI/NRDC (TBI/NRDC 4, pp. 21 and 30; TBI/NRDC closing comments, p. 11) recommended reducing entrainment losses of longfin smelt in dry years (March to May when outflow is less than 18,000 cfs) and population abundance is low (FMWT index less than 500) by maintaining positive net OMR flows in April and May. Alternatively, if the index is greater than 500 and Delta outflow is low, then net OMR flows should not be more negative than -1,500 cfs. The DOI (DOI 1, p.53) made a non-species specific recommendation that OMR

flows should be positive in all months between January and June. CSPA/CWIN made a non-species specific recommendations that combined export rates equal zero from mid-March through June. (CSPA 1, p.8; CWIN 2, p. 26.) Finally, the DFG has issued an Incidental Take Permit for longfin smelt (2081-2009-001-03) that restricts net OMR flows in some years based on the recommendations of the Delta Smelt Workgroup. (Baxter *et al*. 2009.)

Table 6. Participant Recommendations for Delta Outflow to Protect Longfin Smelt

Organization	Water Year	Jan	Feb	Mar	April	May	Jun
TBI/NRDC	81-100 (driest years)	14,000 – 21,000			10,000 – 17,500		3000 – 4200
	61-80	21,000 – 35,200			17,500 – 29,000		4200 – 5000
	41-60	35,200 – 55,000			29,000 – 42,000		5000 – 8500
	21-40	55,000 – 87,500			42,000 – 62,500		8500 – 25000
	0-20 (wettest years)	87,500 – 140,000			62,500 – 110,000		25000 – 50000
DFG	all	12,400 to 28,000					

Population Goal

The immediate goal is to stabilize the longfin smelt population, as measured by the FMWT index, and to begin to grow the population. The long-term goal is to achieve the objective of the Recovery Plan for the Sacramento/San Joaquin Delta Native Fishes (USFWS 1996). The plan states that longfin smelt will be considered recovered when its abundance is similar to the 1967 to 1984 period.

Species- Specific Recommendations

Table 8 contains the species-specific flow criteria to protect longfin smelt. The purpose of the Delta outflow criteria is to stabilize and begin to grow the longfin smelt population; positive population growth is expected in half of all years with these flows. The net OMR flow criteria are intended to protect the longfin smelt population from entrainment in the CVP and SWP pumping facilities during years with limited Delta outflow (dry and critically dry years). As noted above, longfin smelt spawn in the Delta on both the Sacramento and San Joaquin rivers. Longfin smelt optimally need positive flow on both river systems to move buoyant larvae downstream and away from the influence of the pumps.

Table 7. Participant Recommendations for Net OMR Reverse Flows to Protect Longfin Smelt

Organization	Water Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
2006 Bay-Delta Plan	all	Some restrictions, given in terms of E/I ratios											
DFG Take Permit	all	-1,250 to -5,000[1]											
TBI/NRDC	C/D				□0[2] or -1,500[3]								
DOI	all	□0											
CSPA/CWIN	all			Combined export rates □ 0									

[1] This condition is not likely to occur in many years and is based on requirements in the DFG Incidental Take Permit 2081-2009-001-03 and the advice of the Smelt Working Team. The condition is most likely to occur in dry or critical years when longfin smelt spawn higher in the Delta and hydrology does not rapidly transport hatched larvae from the central and south Delta.

[2] If FMWT index is less than 500

[3] If FMWT index is greater than 500

Table 8. Delta Outflows to Protect Longfin Smelt

Flow Type	Water Year Type	Jan	Feb	Mar	April	May	Jun
Net Delta Outflow	C	14,000 □ 21,000			10,000 □ 17,500		3,000 □ 4,200
	D	21,000 □ 35,200			17,500 □ 29,000		4,200 □ 5,000
	BN	35,200 □ □50,000			29,000 □ 42,000		5,000 □ 8,500
	AN	□50,000			□42,000		8,500 □ 25,000
	W	□50,000			□42,000		25,000 □ 50,000
OMR	C/D				□0[1] or -1,500[2]		

[1] If FMWT index is less than 500

[2] If FMWT index is greater than 500

Delta Smelt (*Hypomesus transpacificus*)

Status

Delta smelt is listed as endangered under the CESA and threatened under the ESA. (DFG 2010.)

Life History

Delta smelt are endemic to the Delta. Delta smelt have an annual, one-year life cycle although some females may live and reproduce in their second year. (Bennett 2005.) Delta smelt complete their entire life cycle in the Delta and upper estuary. Delta smelt feed primarily on planktonic copepods, cladocerans, and amphipods. (Baxter *et al*. 2008.) In September or October delta smelt begin a slow upstream migration toward their freshwater spawning areas in the upper Delta, a process that may take several months. (Moyle 2002.) The upstream migration may be triggered by Sacramento River flows in excess of 25,000 cfs. (DSWG 2006.) Spawning can occur from late February to July, although most reproduction appears to take place between early April and mid-May. (Moyle 2002.) Spawning areas include the lower Sacramento, Mokelumne, and San Joaquin rivers, the west and south Delta, Suisun Bay, Suisun Marsh, and occasionally in wet years, the Napa River. (Wang 2007.) Eggs are negatively buoyant and adhesive with larvae hatching in about 13 days. (Wang, 1986; Mager 1996.) Upon hatching, the larvae are semi-buoyant staying near the bottom. Within a few weeks, larvae develop an air bladder and become pelagic, utilizing vertical water column movement to maintain their longitudinal position in the estuary. (Moyle 2002.)

Freshwater outflow during spring (March to June) affects the distribution of larvae by transporting them seaward toward the low salinity zone. (Dege and Brown 2004.) High Delta outflow during spring can carry some smelt downstream of their traditional rearing areas in the west Delta and Suisun Bay and into San Pablo Bay where long-term growth and survival may not be optimal. Conversely, periods of low outflow increase residence time in the Delta. Increasing residence time in the Delta probably prolongs the exposure of delta smelt to higher water temperatures and increased risk of entrainment at the State and Federal pumping facilities. (Moyle 2002.) Ideal rearing habitat conditions are believed to be shallow water areas most commonly found in Suisun Bay. (Bennett 2005.) When the mixing zone was located in Suisun Bay, it may in the past have provided optimal conditions for algal and zooplankton growth, an important food source for delta smelt. (Moyle 2002.) However, the quality of habitat in Suisun Bay appears to have deteriorated with the introduction of the clam *Corbula* which now consumes much of the phytoplankton that previously supported large populations of zooplankton. Since 2005, approximately 40□ of the delta smelt population now remains in the Cache Slough complex north of the Delta. This may represent an alternative life history strategy in which the fish stay upstream of the low salinity zone (LSZ) through maturity. (Sommer et al., 2009.)

Population Abundance and Relationship to Flow

Delta smelt population abundance is measured in the summer tow net survey, the FMWT survey and the 20-mm spring-summer survey of juvenile fish. (Kimmerer et al. 2009.) All three indices indicate that delta smelt populations are at an all time low and may be in danger of extinction. The average FMWT index for 2001-2009 is only 20□ of the value measured between 1967 and 1987, a time period when pelagic fish did better in the estuary. FMWT indices for the last six years (2004 to 2009) include all of the lowest values on record. The cause of the decline is unclear but likely includes some combination of flow, export pumping, food limitation, and introduced species.

Three types of flow have been hypothesized to affect delta smelt abundance. These are spring and fall Delta outflow and net OMR reverse flow. Testimony was received at the public proceeding recommending management changes to all three types of flow (Table 9 and Table 10). In the past, there has been a weak negative relationship between spring Delta outflow and delta smelt abundance as measured by the FMWT, however, the relationship has now disappeared. (Kimmerer *et al*. 2009.) The cause for the disappearance of the spring outflow-abundance relationship is not known but may result from the deterioration of rearing habitat in Suisun Bay because of colonization by the clam *Corbula.*

Several organizations recommend fall Delta outflow criteria for protection of delta smelt (Table 9). The primary purpose of a fall Delta outflow criterion is to increase the quality and quantity of rearing habitat for Delta smelt. (Nobriga et al. 2008; Feyrer et al. 2007; Feyrer et al., in review.) Rearing habitat is hypothesized to increase when the fall LSZ is downstream of the confluence of the Sacramento and San Joaquin rivers. This corresponds to Delta outflows greater than about 7,500 cfs between September and November, which would have to be achieved by release of water from upstream reservoirs in most years. Grimaldo et al. (2009) found that X2 was a predictor for salvage of adult delta smelt at the intra-annual scale when net OMR flows were negative. Moving X2 westward in the fall serves to increase the geographic and hydrologic distance of delta smelt from the influence of the export facilities and therefore likely reduces the risk of entrainment. (DOI 1, p. 34.) The USFWS (2008) recommended in their Opinion that the LSZ be maintained in the fall of above normal and wet water year types in Suisun Bay (Action 4). The action was restricted to above average water years to insure that sufficient cold water pool resources remained for steelhead and salmon and because these are the years in which SWP and CVP operations have most significantly affected fall conditions. (USFWS 2008.) The National Academy of Sciences (NAS) (2010) commented on this action in their review:

> The statistical relationship is complex. When the area of highly suitable habitat is low, either high or low FMWT indices can occur. In other words, delta smelt can be successful even when habitat is restricted. More important, however, is that the lowest abundances all occurred when the habitat-area index was less than 6,000 ha. This could mean that reduced habitat area is a necessary condition for the worst population collapses, but it is not the only cause of the collapse. The action is conceptually sound to the degree that the amount of habitat available for smelt limits their abundance, however, the weak statistical relationship between the location of X2 and the size of smelt populations makes the justification for this action difficult to understand. The National Academy of Sciences noted approvingly that the U.S. Fish and Wildlife Service (2008) required additional studies addressing elements of the habitat conceptual model to be formulated and implemented promptly.

Table 9. Participant Recommendations for Delta Outflows to Protect Delta Smelt

	Water Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
2006 Bay-Delta Plan [1]	C	4500 [2]	7100 □ 29200 [3]					4000	3000	3000	3000	3500	
	D	4500	7100 - 29200					5000	3500	3000	4000	4500	
	BN	4500	7100 - 29200					6500	4000	3000	4000	4500	
	AN	4500	7100 - 29200					8000	4000	3000	4000	4500	
	W	4500	7100 - 29200					8000	4000	3000	4000	4500	
USFWS Opinion[1]	AN									7000 [4]			
	W									12400			
EDF/Stillwater Sciences	C			26800	17500	17500	7500	4800	4800	4800	4800	4800	
	D			26800	17500	17500	7500	4800	4800	4800	4800	4800	
	BN			26800	26800	26800	11500	7500	7500	7500	7500	7500	
	AN			26800	26800	26800	11500	11500	11500	11500	11500	11500	
	W			26800	26800	26800	17500	17500	17500	17500	17500	17500	
TBI/NRDC	81-100□									5750 - 7500			
	61-80□									7500 - 9000			
	41-60□									9700 - 12400			
	21-40□									12400 - 16100			
	0-20□									16100 - 19000			

[1] 2006 Bay-Delta Plan and USFWS Opinion flows shown for comparative purposes.

[2] All water year types - Increase to 6000 if the December Eight River Index is □than 800 thousand acre-feet (TAF).

[3] Minimum Delta outflow calculated from a series of rules that are described in Tables 3 and 4 of the 2006 Bay-Delta Plan.

[4] USFWS Opinion (RPA concerning Fall X2 requirements [pp282-283] - improve fall habitat [quality and quantity] for delta smelt) (references USFWS 2008, Feyrer *et al* 2007, Feyrer *et al* in revision) - September-October in years when the preceding precipitation and runoff period was wet or above normal, as defined by the Sacramento Basin 40-30-30 Index, USBR and DWR shall provide sufficient Delta outflow to maintain monthly average X2 no greater than 74 km and 81 km in Wet and Above Normal years, respectively. During any November when the preceding water year was wet or above normal, as defined by Sacramento Basin 40-30-30 index, all inflow into the CVP/SWP reservoirs in the Sacramento Basin shall be added to reservoir releases in November to provide additional increment of outflow from Delta to augment Delta outflow up to the fall X2 of 74 km and 81 km for wet and above normal water years, respectively. In the event there is an increase in storage during any November this action applies, the increase in reservoir storage shall be released in December to augment the December outflow requirements in the 2006 Bay-Delta Plan.

Table 10. Participant Recommendations for Net OMR Flows to Protect Delta Smelt

	Water Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
2006 Bay-Delta Plan	all	Some restrictions, given in terms of exports to inflow ratios											
USFWS - Opinion	all	Action 1: -2000 cfs for 14 days once turbidity or salvage trigger has been met; Action 2: range btw -1250 and -5000 cfs [1]			Range between -1,250 and -5,000 [2]								See Jan-Mar
USFWS	all	□0 [3]											
CSPA/ CWIN				Combined Export Rates □ 0[3]									
TBI/ NRDC	all	□-1,500 cfs											□-1500 cfs

[1] USFWS Opinion - RPA re: net OMR flows. Component 1 - Adults (December - March) - Action 1 (protect upmigrating delta smelt) - once turbidity or salvage trigger has been met, -2000 cfs OMR flow for 14 days to reduce flows towards the pumps. Action 2 (protect delta smelt after migration prior to spawning) □ Net OMR flow range between -1250 and -5000 cfs determined using adaptive process until spawning detected. (pp.280-282.)

[2] USFWS Opinion - RPA re: net OMR flows. Component 2 - Larvae/juveniles - action starts once temperatures hit 12□C at three Delta monitoring stations or when spent female is caught. Net OMR flow range between -1250 and -5000 cfs determined using adaptive process. OMR flow restrictions continue until June 30 or when Delta water temperatures reach 25□C, whichever comes first. (pp. 280-282.)

[3] Recommendations by the USFWS and CSPA/CWIN were not species specific.

It should be reiterated that this measure should be implemented within an adaptive framework, including completing studies designed to clarify the mechanism(s) underlying the effects of fall habitat on the delta smelt population, and a comprehensive review of the outcomes of the action and its effectiveness. Until additional studies are conducted demonstrating the importance of fall X2 to the survival of delta smelt, additional fall flows, beyond those stipulated in the fall X2criteria, for the protection of delta smelt are not recommended if it will compete with preservation of cold water pool resources needed for the protection of salmonids.

Net negative OMR flows can affect delta smelt by pulling them into the central Delta where they are at risk of entrainment in the SWP and CVP pumps. Recent studies have shown that entrainment of delta smelt and other pelagic species increases as net OMR flows become more negative. (Grimaldo et al. 2009; Kimmerer 2008.) Delta smelt are at risk as juveniles in the spring during downstream migration to their rearing area, and as adults between the fall and early spring as they move upstream to spawn. Salvage of age-0 delta smelt at the SWP /CVP fish collection facilities at the intra-annual scale has been found to be related to the abundance of these fish in the Delta, while net OMR flows and turbidity were also strong predictors. (Grimaldo et al. 2009.) This suggests that within a given year, the mechanism influencing entrainment is probably a measure of the degree to which their habitat overlaps with the hydrodynamic footprint of net negative OMR flows. (Grimaldo et al. 2009.) PTM results suggest that entrainment is a function of both net OMR flows and river outflows. (Kimmerer and Nobriga 2008.) PTM results may be more applicable to neutrally buoyant larvae and poorly swimming juveniles than adult delta smelt. Particle entrainment increased as a logarithmic function of increasing net negative OMR flows and decreases in river outflows. The highest entrainment was observed at high net negative OMR flows and low outflows. PTM results suggest that entrainment losses might be as high as 40 of the total delta smelt population in some years. (Kimmerer 2008.) Similar results were obtained by Baxter et al. (2009) when evaluating entrainment of longfin smelt using PTM. Juvenile longfin smelt salvage increased rapidly as net OMR flows became more negative than -2,000 cfs. Also, particle entrapment decreased, even with high net negative OMR flows, when the flow of the Sacramento River at Rio Vista increased above 40,000 cfs. Entrainment of particles almost ceased at flows of 55,000 cfs.

Field population investigations support some of the spring PTM results. Gravid females and larvae are present in the Delta as early as March and April. (Bennett 2005.) However, analysis of otolith data on individuals collected later in the year by Bennett *et al*. (unpublished data) show that few of the early progeny survived if spawned prior to the VAMP time period (typically April 15 to May 15). The hydrodynamic data showed high net negative OMR flows in the months preceding and after the VAMP, leading the researchers to conclude that high winter and early spring net negative OMR flows were selectively entraining the early spawning and/or early hatching cohort of the delta smelt population. However, Baxter *et al*. (2008) stated that under this hypothesis, the most important result of the loss of early spawning females would manifest itself in the year following the loss, and would therefore not necessarily be detected by analyses relating fall abundance indices to same-year predictors. No statistical relationships have been found between either OMR flows or CVP and SWP pumping rates and Delta smelt population abundance. (Bennett 2005.)

Entrainment of adult delta smelt occurs following the first substantial precipitation event (first flush), characterized by sudden increases in river inflows and turbidity, in the

estuary as they begin their migration into the tidal freshwater areas of the Delta. (Grimaldo *et al*. 2009.) Patterns of adult entrainment are distinctly unimodal, suggesting that migration is a large population-level event, as opposed to being intermittent or random. (DOI 1, p. 36.) Grimaldo *et al*. (2009) provided evidence suggesting that entrainment during these first flush periods could be reduced if export reductions were made at the onset of such periods.

The USFWS Opinion identifies turbidity criteria for which to trigger first flush export reductions, but total Delta outflow greater than 25,000 cfs could serve as an alternate or additional trigger since such flows are highly correlated with turbidity. (Grimaldo *et al*. 2009, DOI 1, p. 36.) Managing OMR flows to thresholds at which entrainment or populations losses increase rapidly, represents a strategy for providing additional protection for adult delta smelt in the winter period (Dec-Mar). (DOI 1, p.36.). The USFWS Opinion identified the lower net OMR flow threshold as - 5000 cfs based on observed OMR flow versus salvage relationships from a longer data period (USFWS 2008) and additional data summarized over a more recent period. (Grimaldo et al. 2009.) The -5000 cfs OMR flow threshold is appropriate because it is the level where population losses consistently exceed 10 . (USFWS 2008, DOI 1, p. 36.) Adult delta smelt entrainment varies according to their distribution in the Delta following their upstream migration. The population is at higher entrainment risk if the majority of the population migrates into the south Delta, which may require net OMR flows to be more positive than -5000 cfs to reduce high entrainment. Conversely, if the majority of the population migrates up the lower Sacramento River or north Delta, a smaller entrainment risk is presumed, which would allow for OMR flows to be more negative than -5000 cfs for an extended period of time, or until conditions warrant a more protective OMR flow. (DOI 1, p.36.)

The USFWS Opinion for delta smelt includes net negative OMR flow restrictions to protect both spawning adult and out-migrating young. Component 1 of the USFWS Opinion has two action items; both are to protect adult delta smelt. Action 1 restricts OMR flow in fall to -2,000 cfs for 14 days when a turbidity or salvage trigger has been met. Both triggers have previously been correlated with the upstream movement of spawning adult smelt. Action 2 commences immediately after Action 1. Action 2 is to protect adult delta smelt after migration, but prior to spawning, by restricting net OMR flows to between -1250 and -5,000 cfs based on the recommendations of the Delta Smelt Workgroup. Component 2 of the USFWS Opinion is to protect larval and juvenile fish. Component 2 actions start once water temperatures hit 12°C at three monitoring stations in the Delta or when a spent female is caught. OMR flows during this phase are to be maintained more positive than -1,250 to -5000 cfs based on a 14-day running average. Component 2 actions are to continue until June 30 or when the 3-day-mean water temperature at Clifton Court Forebay is 25°C. The Delta Smelt Working Group is to make recommendations on the specific OMR flow restrictions between -1250 and -5000 cfs.

The NAS (2010) reviewed the USFWS Opinion OMR flow restrictions and concluded:

> it is scientifically reasonable to conclude that high negative OMR flows in winter probably adversely affect smelt populations. Thus, the concept of reducing OMR negative flows to reduce mortality of smelt at the SWP and CVP facilities is scientifically justified but the data do not permit a confident identification of the threshold values to use and do not

> permit a confident assessment of the benefits to the population. As a result, the implementation of this action needs to be accompanied by careful monitoring, adaptive management and additional analyses that permit regular review and adjustment of strategies as knowledge improves.

The negative impact of negative OMR flows on delta smelt, like on longfin smelt, is likely to be greatest during time periods with high negative OMR flows and low Sacramento River outflow. (Baxter *et al*. 2009; Kimmerer and Nobriga 2008.) The work of Grimaldo *et al*, (2009) suggests that impacts associated with the export facilities can be mitigated on a larger scale by altering the timing and magnitude of exports based on the biology of the fishes and changes in key physical and biological variables.

For the protection of longfin smelt, Delta outflow criteria between January and March range from 35,000 cfs in below normal water years to greater than 50,000 cfs in wet water years (Table 8). For the protection of longfin smelt, flow criteria between April and May range from 29,000 cfs to more than 42,000 cfs. These flows should also afford protection for larval delta smelt from excessive negative OMR flows and entrainment at the CVP and SWP pumping facilities. Under this criterion, lower outflows will still likely occur during critically dry and dry water year types (Table 6). These outflows may not be sufficient to prevent longfin and delta smelt entrainment at the pumping facilities. Therefore, the recommended criterion for longfin smelt specifies that net OMR flows should not be more negative than -1500 cfs in April and May of dry and critically dry water years to protect longfin smelt. The State Water Board determines that this criterion should be extended to include March and June of dry and critically dry water years to protect early and late spawning delta smelt (Table 11).

Minimizing net negative OMR flows during periods when adult delta smelt are migrating into the Delta could also substantially reduce mortality of the critical life stage. For example, one potential strategy is to reduce exports during the period immediately following the first flush, based on a turbidity or flow trigger. (Grimaldo et al. 2009.) This supports a recommendation that net OMR flows be more positive than -5000 cfs during the period between December and March. Additional OMR flow restrictions may be warranted during periods when a significant portion of the adult delta smelt population migrates into the south or central Delta. In such instances, the determination of specific thresholds should be made through an adaptive approach that takes into account a variety of factors including relative risk (e.g., biology, distribution and abundance of fishes), hydrodynamics, water quality, and key physical and biological variables. The State Water Board agrees with the NAS (2010) that the data, as currently available, do not permit a confident assessment of the threshold OMR flow values nor of the overall benefit to the delta smelt population. Development of a comprehensive life-cycle model for delta smelt would be valuable in that it would allow for an assessment of population level impacts associated with entrainment. Such life-cycle models for delta smelt are currently under development. Therefore, net OMR flow criteria need to be accompanied by a strong monitoring program and adaptive management to adjust OMR flow criteria as more knowledge becomes available.

Delta smelt are food limited. Delta smelt survival is positively correlated with zooplankton abundance. (Feyrer et al., 2007; Kimmerer 2008; Grimaldo et al., 2009.) A new analysis by the SFWC (SFWC 1, p.60) also demonstrates a positive relationship between FMWT delta smelt indices and the previous spring and summer abundance of

Eurytemora and *Psuedodiaptomus.* There are several hypotheses for the cause of the decline in zooplankton abundance. First, zooplankton abundance in Suisun and Grizzly bays, prime habitat for delta smelt, declined after the introduction of the invasive clam *Corbula. Corbula* is thought to compete directly with zooplankton for phytoplankton food and lower phytoplankton levels may limit zooplankton abundance. A second hypothesis is that changes in nutrient loading and nutrient form in the Delta that result from the SRWTP discharge can have major impacts on food webs, from primary producers through secondary producers to fish. (Glibert, 2010.) Changes in nutrient concentrations and their ratios may have caused the documented shift in phytoplankton species composition from large diatoms to smaller, less nutritious algal forms for filter feeding organisms like zooplankton. If true, both of the above hypotheses could indirectly result in lower densities of delta smelt. Therefore, all recommended flow modifications should be accompanied by a strong monitoring and adaptive management process to determine whether changes in OMR flows result in an improvement in delta smelt population levels.

Population Abundance Goal

The immediate goal is to stabilize delta smelt populations, as measured by the FMWT index, and begin to grow the population. The long term goal should be to achieve the objective of the Recovery Plan for the Sacramento/San Joaquin Delta Native Fishes (USFWS 1996.)

Species-Specific Recommendations

Although a positive correlation between Delta outflows and delta smelt is lacking, Delta outflows do have significant positive effects on several measures of delta smelt habitat. (Kimmerer *et al*. 2009), and spring outflow is positively correlated with spring abundance of *Eurytemora affinis* (Kimmerer 2002a), an important delta smelt prey item. No specific spring Delta outflow criteria are therefore recommended for delta smelt. Flow criteria to protect longfin smelt in the spring of wetter years (Table 8) may, however, afford some additional protection for the Delta smelt population.

The State Water Board advances the OMR flow criteria in Table 11 for dry and critically dry years to protect the delta smelt population from entrainment in the CVP and SWP pumping facilities during years with limited Delta outflow. The OMR flow restrictions are an extension of the criteria for longfin smelt. In addition, the State Water Board includes criteria for OMR flows to be more positive than -5,000 cfs between December and February of all water year types to protect upstream migrating adult delta smelt. The -5,000 cfs criteria may need to be made more protective in years when delta smelt move into the central Delta to spawn. The more restrictive OMR flows would be recommended after consultation with the USFWS Delta Smelt Working Group. In the absence of any other specific information, the State Water Board determines that the existing 2006 Bay-Delta Plan Delta outflow objectives for July through December are needed to protect delta smelt.

Table 11. Net OMR Flows for the Protection of Delta Smelt

Flow Type	Water Year Type	Dec	Jan	Feb	Mar - June
Net OMR flows	C/D				-1,500 cfs
Net OMR flows	All	- 5000 cfs (thresholds determined through adaptive management)			

Sacramento Splittail (*Pogonichthys macrolepidotus*)

Status

Sacramento splittail is currently recognized by the DFG as a species of special concern. Splittail was listed as a threatened species pursuant to the ESA in 1999; however, its status was remanded in 2003 on the premise of recent increases in abundance and population stability. This decision was subsequently challenged and the USFWS is revisiting the status of splittail and will make a new 12-month finding on whether listing is warranted by September 30, 2010.

Life History

Sacramento splittail (*Pogonichthys macrolepidotus*) is a cyprinid native to California that can live seven to nine years and has a high tolerance to a wide variety of water quality parameters including moderate salinity levels. (Moyle 2002, Moyle et al. 2004.)

Adult splittail are found predominantly in Suisun Marsh, Suisun Bay, and the western Delta, but are also found in other brackish water marshes in the San Francisco Estuary as well as the fresher Delta. Splittail feed on detritus and a wide variety of invertebrates; non-detrital food starts with cladocerans and aquatic fly larvae on the floodplains, progresses to insects and copepods in the rivers, and to mysid shrimps, amphipods and clams for older juveniles and adults. (Daniels and Moyle 1983, Feyrer et al. 2003, Feyrer et al. 2007a, as cited in DFG 1, p. 13.) In winter and spring when California's Central Valley experiences increased runoff from rainfall and snowmelt, adult splittail move onto inundated floodplains to forage and spawn. (Meng and Moyle 1995; Sommer et al. 1997, Moyle et al. 2004, as cited in DFG 1, p. 13.) Spawning takes place primarily between late February and early July, and most frequently during March and April (Wang 1986, Moyle 2002) and occasionally as early as January. (Feyrer et al. 2006a.) Splittail eggs, laid on submerged vegetation, begin to hatch in a few days and the larval fish grow fast in the warm and food rich environment. (e.g., Moyle et al. 2004, Ribeiro et al. 2004.) After spawning, the adult fish move back downstream.

Once they have grown a few centimeters, the juvenile splittail begin moving off of the floodplain and downstream into similar habitats as the adults. These juveniles become mature in two to three years. In the Yolo Bypass, two flow components appear necessary for substantial splittail production (Feyrer et al. 2006a): (1) inundating flows in winter (January to February) to stimulate and attract migrating adults; and (2) sustained floodplain inundation for 30 or more days from March through May or June to allow successful incubation through hatching (3 to 7 days, see Moyle 2002), and extended rearing until larvae are competent swimmers (10 to 14 days; Sommer et al. 1997) and beyond to maximize recruitment. (DFG 1, p. 13.)

Large-scale spawning and juvenile recruitment occurs only in years with significant protracted (greater than or equal to 30 days) floodplain inundation, particularly in the

Sutter and Yolo bypasses. (Meng and Moyle 1995, Sommer et al. 1997, Feyrer et al. 2006a, as cited in DFG 1, p. 13.) Some spawning also occurs in perennial marshes and along the vegetated edges of the Sacramento and San Joaquin rivers. (Moyle et al. 2004.) During periods of low outflow, splittail appear to migrate farther upstream to find suitable spawning and rearing habitats. (Feyrer et al. 2005.) Moyle et al. (2004) noted that though modeling shows splittail to be resilient, managing floodplains to promote frequent successful spawning is needed to keep them abundant.

Population Abundance and its Relationship to Flow

Age-0 splittail abundance has been significantly correlated to mean February through May Delta outflow and days of Yolo Bypass floodplain inundation, representing flow/inundation during the incubation and early rearing periods. (Meng and Moyle 1995, Sommer et al. 1997.) The flow-abundance relationship is characterized by increased abundance (measured by the FMWT) as mean February□May X2 decreases, indicating a significant positive relationship between FMWT abundance and flow entering the estuary during February□May. (Kimmerer 2002a.)

Feyrer et al. (2006a) proposed the following lines of evidence to suggest the mechanism supporting this relationship for splittail lies within the covarying relationship between X2 and flow patterns upstream entering the estuary: the vast majority of splittail spawning occurs upstream of the estuary in freshwater rivers and floodplains (Moyle et al. 2004); the averaging time frame (February□May) for X2 coincides with the primary spawning and upstream rearing period for splittail; the availability of floodplain habitat, as indexed by Yolo Bypass stage, is directly related to X2 during February□May (y □ 4.38 - 2.21x; p□0.001; r^2 □ 0.97); the center of age-0 splittail distribution does not reach the estuary until summer (Feyrer et al. 2005); and the splittail X2-abundance relationship has not been affected by dramatic food web changes (Kimmerer 2002a) that have significantly altered the diet of young splittail in the estuary. (Feyrer et al. 2003.)

Population Abundance Goal

The immediate goal is to stabilize the Sacramento Splittail population, as measured by the FMWT index, and to begin to grow the population. The long-term goal is to maintain population abundance index as measured by FMWT in half of all years above the long term population index value.

Species- Specific Recommendations

Delta Outflow - Upstream covariates of X2, such as the availability of suitable floodplain and off-channel spawning and nursery habitat, appear to be the attributes supporting the flow-abundance relationship for splittail. Therefore, the flow needs of this species, with respect to spawning and rearing habitat, are most effectively dealt with through establishment of flow criteria that address the timing, duration, and magnitude of floodplain inundation from a river inflow standpoint.

Delta Inflow - Information in the record on conditions conducive to successful spawning and recruitment of splittail shows that the species depends on inundation of off-channel areas. Sufficient flows are therefore needed to maintain continuous inundation for at least 30 consecutive days in the Yolo Bypass, once floodplain inundation has been achieved based on runoff and discharge for ten days between late-February and May, during above normal and wet years (Table 12). (DFG closing comments, p. 7.)

Opportunities to provide floodplain inundation in other locations (e.g., the San Joaquin River) warrant further examination.

Feyrer *et al* (2006a) noted that manipulating flows entering Yolo Bypass such that floodplain inundation is maximized during January through June will likely provide the greatest overall benefit for splittail, especially in relatively dry years when overall production is lowest. Within the Yolo Bypass, floodplain inundation of at least a month appears to be necessary for a strong year class of splittail (Sommer *et al*. 1997); however, abundance was highest when the period of inundation extended 50 days or more. (Meng and Moyle 1995.) Floodplain inundation during the months of March, April, and May appears to be most important. (Wang 1986, Moyle 2002.) Managing the frequency and duration of floodplain inundation during the winter and spring, followed by complete drainage by the end of the flooding season, could favor splittail and other native fish over non-natives. (Moyle et al. 2007, Grimaldo et al. 2004.) Duration and timing of inundation are important factors that influence ecological benefits of floodplains.

Yolo Bypass Inundation The Fremont Weir is a passive facility that begins to spill into the Yolo Bypass when the Sacramento River flow at Verona exceeds 55,000 to 56,000 cfs. (AR/NHI 1, p. 21; EDF 1, p. 50; TBI/NRDC 3, p. 35; Sommer et al. 2001b.) Water also enters the bypass at the Sacramento Weir and from the west via high flow events in small west-side tributaries. (Feyrer et al. 2006b.) Each of these sources joins the Toe Drain, a perennial channel along the east side of the Yolo Bypass floodplain, and water spills onto the floodplain when the Toe Drain flow exceeds approximately 3,500 cfs. (Feyrer et al. 2006b.) The Yolo Bypass typically floods in winter and spring in about 60 of years (DOI 1, p. 54; Sommer et al. 2001a; Feyrer et al. 2006a), with inundation occurring as early as October and as late as June, with typical peak period of inundation during January-March. (Sommer et al. 2001b.) In addition, studies suggest phytoplankton, zooplankton, and other organic material transported from the Yolo Bypass enhances the food web of the San Francisco Estuary. (Jassby and Cloern 2000; Mueller-Solger et al. 2002; Sommer et al. 2004.) Much of the water diverted into the bypass drains back into the north Delta near Rio Vista. Besides the Yolo Bypass, the only other Delta region with substantial connectivity to portions of the historical floodplain is the Cosumnes River, a small undammed watershed. (Sommer et al. 2001b.)

Multiple participants provided recommendations concerning the magnitude and duration of floodplain inundation along the Sacramento River, lower San Joaquin River, and within the Yolo and Sutter bypasses. (AR/NHI 1, p. 32; DFG closing comments; DOI 1, p. 54, EDF 1, pp. 50-52, 53-55; SFWC closing comments; TBI/NRDC 3, p. 36.) In addition, the draft recovery plan for the Sacramento River winter-run Chinook salmon, Central Valley spring-run Chinook salmon, and Central Valley Steelhead (NMFS 2009) calls for the creation of annual spring inundation of at least 8,000 cfs to fully activate the Yolo Bypass floodplain. (NMFS 5, p.157.)

Overtopping the existing weirs and flooding the bypasses (e.g., Yolo and Sutter) to achieve prolonged periods (30 to 60 days) of floodplain inundation in below normal and dry water years would require excessive amounts flows given the typical runoff patterns during those year types. (AR/NHI 1, p. 29.) From a practical standpoint, it is probably only realistic to achieve prolonged inundation during drier water year types by notching the upstream weirs and possibly implementing other modifications to the existing system. (AR/NHI 1, p. 29.)

The BDCP is currently evaluating structural modifications to the Fremont Weir (e.g., notch the weir and install operable inundation gates), as a means of increasing the interannual frequency and duration of floodplain inundation in the Yolo Bypass. (BDCP 2009.) TBI/NRDC (TBI/NRDC 3, p. 36) and AR/NHI (AR/NHI 1, p. 32) provided floodplain inundation recommendations for the Yolo Bypass assuming structural modifications to the Fremont Weir were implemented. A potential negative impact of notching the Fremont Weir is that it will affect stage height and Sutter Bypass flooding, and the resulting spawning and rearing of splittail and spring-run Chinook salmon. (personal communication R. Baxter.)

The NMFS Opinion stipulates that USBR and DWR, in cooperation with DFG, USFWS, NMFS, and USACE, shall, to the maximum extent of their authorities (excluding condemnation authority), provide significantly increased acreage of seasonal floodplain rearing habitat, with biologically appropriate durations and magnitudes, from December through April, in the lower Sacramento River basin, on a return rate of approximately one to three years, depending on water year type. (NMFS 3, p.608.) USBR and DWR are to submit a plan to implement this action to NMFS by December 31, 2011. (NMFS 3, p. 608.) This plan is to include an evaluation of options to, among other things, increase inundation of publicly and privately owned suitable acreage within the Yolo Bypass and modify operations of the Sacramento Weir or Fremont Weir to increase rearing habitat. (NMFS 3, p. 608.) The NMFS Opinion specifies that in the event that this action conflicts with Shasta Operations Actions I.2.1 to I.2.3 (e.g., carryover storage requirements), the Shasta Operations Actions shall prevail. (NMFS 3, p. 608.)

OMR Flows - Entrainment of splittail at the SWP and CVP export facilities is highest during adult spawning migrations and periods of peak juvenile abundance in the Delta. (Meng and Moyle 1995, Sommer et al. 1997.) The incidence of age-0 splittail entrainment increased during wet years when abundance was also high (Sommer et al. 1997.) However, analyses conducted by Sommer et al. (1997) suggested that entrainment at the export facilities did not have an important population-level effect. However, Sommer et al. (1997) noted that their evidence does not demonstrate that entrainment never affects the species. For example, if the core of the population's distribution were to shift toward the south Delta export facilities during a dry year, there could be substantial entrainment effects to a year-class. (Sommer et al. 1997.) Criteria for net OMR flows intended to protect salmon, delta smelt, and longfin smelt populations, as well as restrictions stipulated in the Opinions (NMFS 3, pp. 648-653; USFWS 2008) are likely to reduce the number of splittail entrained at the export facilities.

Table 12. Floodplain Inundation Criteria for Sacramento Splittail

Mechanism	Water Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Spawning and Rearing Habitat	AN / W	--	30 day floodplain inundation				--	--	--	--	--	--	--

Starry Flounder (*Platichthys stellatus*)

Status

Starry flounder is not listed pursuant to either the ESA or CESA.

Life History

Starry flounder is a native to the Bay-Delta Estuary. The geographic distribution of flounder is from Santa Barbara, California, to Alaska and in the western Pacific as far south as the Sea of Japan. (Miller and Lea 1972.) Starry flounder are important in both the recreational and commercial catch in both central and northern California. (Haugen 1992; Karpov et al. 1995.)

Starry flounder is an estuarine dependent species. (Emmett et al. 1991.) Spawning occurs in the Pacific Ocean near the entrance to estuaries and other freshwater sources between November and February. (Orcutt 1950.) Juveniles migrate from marine to fresh water between March and June and remain through at least their second year of life before returning to the ocean. (Baxter 1999.) Young individuals are found in Suisun Bay and Marsh and in the Delta. Older individuals range from Suisun to San Pablo bays. Maturity is reached by males at the end of their second year and by females in their third or fourth years. (Orcott 1950.)

Population abundance of young of the year and one year old starry flounder have been measured by the San Francisco Otter Trawl Study since 1980 and reported as an annual index. (Kimmerer et al. 2009.) The index declined between 2000 and 2002 but has since recovered to values in the 300 to 500 range. The median index value for the 29 years of record is 293.

Population Abundance Relationship to Flow

Starry flounder age-1 abundance in the San Francisco Bay otter trawl study is positively correlated with the March through June outflow of the previous year. (Kimmerer et al. 2009.) The mechanism underlying the abundance outflow relationship is not known but may be increased passive transport of juvenile flounder by strong bottom currents during high outflow years. (Moyle 2002.) There has been a decline in the abundance of flounder for any given outflow volume since 1987, presumably because of the invasion by the clam Corbula, however, the overall abundance-flow relationship is still statistically significant. (Kimmerer 2002a.)

Population Abundance Goal

The goal is to maintain the starry flounder population abundance index, as measured by the San Francisco Otter Trawl Study, in half of all years above the long term population median index value of 293.

Species-Specific Recommendations

Outflow recommendations were only received from the DFG. (DFG 1, p. 16.) DFG recommends maintaining X2 between 65 and 74 km between February and June. This corresponds to an average outflow of 11,400 to 26,815 cfs. Table 13 contains the criteria needed for protection of starry flounder. The purpose of this outflow criteria is to

maintain population abundance near the long term median index value of 293. This net Delta outflow criteria is similar to those proposed for the protection of longfin smelt, delta smelt, and *Crangon sp*. The State Water Board's criteria for Delta outflow for the protection of both longfin and delta smelt and *Crangon* will also protect starry flounder. The proposed outflow is consistent with DFG's recommendation for starry flounder. There is no information in the record to support criteria for inflows or hydrodynamics to protect starry flounder.

Table 13. Criteria for Delta Outflow to Protect Starry Flounder

Flow Type	Water Year Type	Jan	Feb	Mar	April	May	Jun
Net Delta Outflow	C	14,000 □ 21,000			10,000 □ 17,500		
	D	21,000 □ 35,200			17,500 □ 29,000		
	BN	35,200 □ □50,000			29,000 □ 42,000		
	AN	□50,000			□42,000		
	W	□50,000			□42,000		

California Bay Shrimp (*Crangon franciscorum*)

Status

The California bay shrimp is not listed pursuant to either ESA or CESA.

Life History

There are three native species of Crangon, collectively known as bay shrimp or grass shrimp, common to the San Francisco Estuary: *Crangon franciscorum, C. nigricauda*, and *C. nigromaculata.* (Hieb 1999.) Bay shrimp are fished commercially in the lower estuary and sold as bait. (Reilly et al. 2001.) *C. franciscorum* species is targeted by the commercial fishery because of its larger size. Bay shrimp are also important prey organisms for many fish in the estuary. (Hatfield, 1995.)

The California bay shrimp (*Crangon franciscorum*) is an estuary dependent species that is distributed along the west coast of North America from Alaska to San Diego. Larvae hatch from eggs carried by females in winter in the lower estuary or offshore in the Pacific Ocean. Most late-stage larvae and juvenile *C. franciscorum* migrate into the estuary and upstream to nursery areas between April and June. Juvenile shrimp are common in San Pablo and Suisun bays in high outflow years. Their center of distribution moves upstream to Honker Bay and the lower Sacramento and San Joaquin rivers during low flow years. (Hieb 1999.) Mature shrimp migrate back down to higher salinity waters after a four to six month residence in the upper estuary. (Hatfield 1985.) *C. franciscornum* mature at one year and may live up to two years. Some females hatch more than one brood of eggs during a breeding season.

Population abundance of juvenile *C. franiscorum* is measured by DFG's San Francisco Bay Study and is reported as an annual index. (Jassby et al. 1995, Hieb 1999.) Indices over the 29 years of record have varied from 31 to 588 with a median value of about 103.

Population Abundance and Relationship to Flow

There is a positive correlation between the abundance of *C. franciscorum* and net Delta outflow from March to May of the same year. (Jassby et al. 1995; Kimmerer et al. 2009.) The statistical relationship has remained constant since the early years of the San Francisco Bay Study, which began in 1980. The mechanism underlying the abundance relationship is not known but may be an increase in the passive transport of juvenile shrimp up-estuary by strong bottom currents during high outflows years. (Kimmerer et al. 2009, Moyle 2002, DFG 1992.) Other potential mechanisms include the effects of freshwater outflow on the amount and location of habitat, the abundance of food organisms and predators, and the timing of the downstream movement of mature shrimp. (DFG 1, p. 23.)

Delta outflow recommendations (Table 14) were received from both the DFG (DFG 1, p. 23) and TBI/NRDC. (TBI/NRDC 2, p. 17). TBI/NRDC analyzed the productivity of *C. franciscorum* as a function of net Delta outflow between March and May. The analysis suggests that estuary populations increased in about half of all years when flows between March and May were approximately 5 million acre-feet (MAF), or about 28,000 cfs per month. TBI/NRDC recommended that flow be maintained in most years above 28,000 cfs during these three months to insure population growth about half the time. The DFG recommended a net Delta outflow criterion of 11,400 to 26,800 cfs between February and June of all water years to aid immigration of late stage larvae and small juveniles.

Table 14. Participant Recommendations for Delta Outflows to Protect Bay Shrimp

	Water Year	**Feb**	**Mar**	**Apr**	**May**	**Jun**
TBI/NRDC Exhibit 2	Most years		28,000			
Fish and Game Exhibit 1	all	11,400 to 26,815				

Population Abundance Goal

The goal is to maintain the juvenile C*. franciscorum* population abundance index, as measured by the San Francisco Bay Study otter trawl, in half of all years above a target value of 103. An index of 103 is the median longterm index value for this species in the San Francisco Estuary.

Species-Specific Recommendations

The State Water Board determines the Delta outflow criteria in Table 15 are needed to protect C*rangon franciscorum*. The purpose of the outflow criteria is to maintain population abundance at a long term median index value of 103. Positive population growth is expected in half of all years under these flow conditions. The Delta outflow criteria are similar to those proposed for protection of both longfin smelt and delta smelt. The nursery area for C*. franciscorum* is usually downstream of the influence of the pumps, therefore no OMR flow recommendations were received and no review was conducted.

Table 15. Criteria for Delta Outflows to Protect Bay Shrimp

Flow Type	Water Year Type	Jan	Feb	Mar	April	May
Net Delta Outflow	C	14,000 □ 21,000			10,000 □ 17,500	
	D	21,000 □ 35,200			17,500 □ 29,000	
	BN	35,200 □ □50,000			29,000 □ 42,000	
	AN	□50,000			□42,000	
	W	□50,000			□42,000	

Zooplankton (*E. affinis* and *N. mercedis*)

Status

Eurytemora affinis is a non-native species that is not listed pursuant to either the ESA or CESA. *Neomysis mercedis* is a native species that is not listed pursuant to either the ESA or CESA.

Life History[14]

Zooplankton is a general term for small aquatic animals that constitute an essential food source for fish, especially young fish and all stages of pelagic fishes that mature at a small size, such as longfin smelt and delta smelt (DFG 1987b). Although DFG follows trends of numerous zooplankton taxa (e.g., Hennessy 2009), two upper estuary zooplankton taxa of particular importance to pelagic fishes have exhibited abundance relationships to Delta outflow. The first is the mysid shrimp *Neomysis mercedis*, which before its decline, beginning in the late 1980s, was an important food of most small fishes in the upper estuary (see Feyrer et al. 2003). Prior to 1988, *N. mercedis* mean summer abundance (June through October) increased significantly as X2 moved downstream (mean March through November location, Kimmerer 2002a. Table 1). After 1987, *N. mercedis* abundance declined rapidly and is currently barely detectable (Kimmerer 2002a, Hennessy 2009). The second is a calanoid copepod, *Eurytemora affinis*, which also declined sharply after 1987, but more so in summer than in spring (Kimmerer 2002a). Before 1987, *E. affinis* was abundant in the low salinity habitat (0.8-6.3 □) throughout the estuary (Orsi and Mecum 1986). *E. affinis* is an important food for most small fishes, particularly those with winter and early spring larvae, such as longfin smelt, delta smelt and striped bass (Lott 1998, Nobriga 2002, Bryant and Arnold 2007, DFG unpublished).

Population Abundance and Relationship to Flow

E. affinis was historically abundant throughout the year, particularly in spring and summer, but after 1987 abundance declined in all seasons, most notably in summer and fall. (Hennessy 2009, as cited in DFG 1, p. 26.) After 1987, *E. affinis* spring abundance (March through May) has significantly increased as spring X2 has moved downstream. (Kimmerer 2002a. Table 1, as cited in DFG 1, p. 26.) Relative abundance in recent years is highest in spring and persistence of abundance is related to spring outflow. As flows decrease in late spring, abundance decreases to extremely low levels throughout the estuary. (Hennessey 2009, as cited in DFG 1, p. 26.)

[14] This section was largely extracted from DFG Exhibit 1, page 25.

The only outflow recommendation identified in the record specifically for *E. affinis* and *N. mercedis* was submitted by DFG, in their closing comments (Table 16). According to DFG, their current science-based conceptual model is that placement of X2 in Suisun Bay represents the best interaction of water quality and landscape for fisheries production given the current estuary geometry. (DFG 2, p. 6.) Maintaining X2 at 75 km and 64 km corresponds to net Delta outflows of approximately 11,400 cfs and 29,200 cfs, respectively. The Bay Institute provided flow recommendations for a suite of species, including *E. affinis (*Table 17*).*

Table 16. DFG's Delta Outflow Recommendation to Protect *E. affinis* and *N. mercedis* (DFG Closing Comments)

Species	Parameter	Effect or Mechanism	Timing	Minimum	Maximum	Reference
Zooplankton	Flows	Habitat	February - June	X2 at 75 km	X2 at 64 km	DFG Exhibit 1, p.25-26; Exhibit 2, p.6

Table 17. The Bay Institute's Delta Outflow Recommendations to Protect Zooplankton Species Including *E. affinis*

Species	Mechanism	Water Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Eurytemora affinis	Habitat	81-100 (driest years)	14000-21000 cfs		10000-17500 cfs			3000-4200 cfs						
		61-80	21000-35000 cfs		17500-29000 cfs			4200-5000 cfs						
		41-60	35200-55000 cfs		29000-42500 cfs			5000-8500 cfs						
		21-40	55000-87500 cfs		42500-62500 cfs			8500-25000 cfs						
		0-20 (wettest years)	87500-140000 cfs		62500-110000 cfs			25000 - 50000 cfs						

Species-Specific Recommendations

Table 18 shows the State Water Board's determination for Delta outflows needed to protect zooplankton. These recommendations are consistent with those submitted by DFG. (closing comments, p. 7.) The State Water Board concurs with DFG's current science-based conceptual model which concludes that placement of X2 in Suisun Bay represents the best interaction of water quality and landscape for fisheries production given the current estuary geometry. (DFG 2, p. 6.) Maintaining X2 at 75 km and 64 km corresponds to net Delta outflows of approximately 11,400 cfs and 29,200 cfs,

respectively. No explicit recommendations concerning zooplankton and inflow or hydrodynamic requirements were identified in the record.

Table 18. Criteria for Delta Outflows to Protect Zooplankton

Effect or Mechanism	Water Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Habitat	All	--	X2[1] 75 to 64 km (11400 29200 cfs)					--	--	--	--	--	--

4.3 Other Measures

Information in the record for this proceeding broadly supports the five key points submitted by the DEFG of experts (DEFG 1):

1) Environmental flows are more than just volumes of inflows and outflows
2) Recent flow regimes both harm native species and encourage non-native species
3) Flow is a major determinant of habitat and transport
4) Recent Delta environmental flows are insufficient to support native Delta fishes for today s habitats
5) A strong science program and a flexible management regime are essential to improving flow criteria

These key points recognize that although adequate environmental flows are a necessary element to protect public trust resources in the Delta ecosystem, flows alone are not sufficient to provide this protection. These key points and other information in the record warrant a brief summary discussion of other information in the record that should be considered in the development of flow criteria, consistent with the charge of SB1 that the flow criteria include the volume, quality, and timing of water necessary for the Delta ecosystem. Based on review of the information in the record this charge is expanded to include specific consideration of:

- Variability, flow paths, and the hydrograph
- Floodplain activation and other habitat improvements
- Water quality and contaminants
- Cold water pool management
- Adaptive management

4.3.1 Variability, Flow Paths, and the Hydrograph

The first of the five key points submitted by the DEFG of experts stated, in part: There is no one correct flow number. Seasonal, interannual, and spatial variability, to which our native species are adapted, are as important as quantity. Species and biological systems respond to combinations of quantity, timing, duration, frequency and how these inputs vary spatially. (DEFG 1.) Based on their review of the literature in *Habitat Variability and Complexity in the Upper San Francisco Estuary*, Moyle *et al* (2010) find:

> unmodified estuaries are highly variable and complex systems, renowned for their high production of fish and other organisms (McClusky and Elliott 2004). The San Francisco Estuary, however, is one of the most highly modified and controlled estuaries in the world (Nichols et al. 1986). As a consequence, the

estuarine ecosystem has lost much of its former variability and complexity and has recently suffered major declines of many of its fish resources (Sommer et al. 2007).

 the concept of the natural flow regime (Poff et al. 1997) is increasingly regarded as an important strategy for establishing flow regimes to benefit native species in regulated rivers (Postel and Richter 2003; Poff et al. 2007; Moyle and Mount 2007). For estuaries worldwide, the degree of environmental variability is regarded as fundamental in regulating biotic assemblages (McLusky and Elliott 2004). Many studies have shown that estuarine biotic assemblages are generally regulated by a combination of somewhat predictable changes (e.g., tidal cycles, seasonal freshwater inflows) and stochastic factors, such as recruitment variability and large-scale episodes of flood or drought (e.g., Thiel and Potter 2001). The persistence and resilience of estuarine assemblages is further decreased by various human alterations, ranging from diking of wetlands, to regulation of inflows, to invasions of alien species (McLusky and Elliott 2004, Peterson 2003).

 a key to returning the estuary to a state that supports more of the desirable organisms (e.g., Chinook salmon, striped bass, delta smelt) is increasing variability in physical habitat, tidal and riverine flows, and water chemistry, especially salinity, over multiple scales of time and space. It is also important that the stationary physical habitat be associated with the right physical-chemical conditions in the water at times when the fish can use the habitat most effectively (Peterson 2003).

An example of a major change in the natural flow regime of the Delta is demonstrated by the increase in net OMR reverse flows just north of the SWP and CVP pumping facilities. Reverse flows are now a regular occurrence in the Delta channels because Sacramento River water enters on the northern side of the Delta while the two major pumping facilities, the SWP and CVP, are located in the south. This results in a net water movement across the Delta in a north-south direction along a web of channels including OMR instead of the more natural pattern from east to west or from land to sea. Positive net flows, connected flow paths, and salinity gradients are important features of an estuary. Natural net channel flows move water and some biota toward Suisun Bay and maintain downstream directed salinity gradients. Today, Delta gates and diversions can substantially redirect tidal flows creating net flow patterns and salinity and turbidity distributions that did not occur historically. These changes may influence migratory cues for some fishes. These cues are further scrambled by a reverse salinity gradient in the south Delta caused by higher salinity in agricultural runoff. (DEFG 1.)

Per the DEFG s paper, *Habitat Variability and Complexity in the Upper San Francisco Estuary* (Moyle et al., 2010), a more variable Delta has multiple benefits:

Achieving a variable, more complex estuary requires establishing seaward gradients in salinity and other water quality variables, diverse habitats throughout the estuary, more floodplain habitat along inflowing rivers, and improved water quality. These goals in turn encourage policies which: (1) establish internal Delta flows that create a tidally-mixed, upstream-downstream gradient (without cross-Delta flows) in water quality; (2) create slough networks with more natural channel

> geometry and less diked rip-rapped channel habitat; (3) improve flows from the Sacramento and San Joaquin rivers; (4) increase tidal marsh habitat, including shallow (1-2 m) subtidal areas, in both fresh and brackish zones of the estuary; (5) create/allow large expanses of low salinity (1-4 ppt) open water habitat in the Delta; (6) create a hydrodynamic regime where salinities in parts of the Delta and Suisun Bay and Marsh range from near-fresh to 8-10 ppt periodically (does not have to be annual) to discourage alien species and favor desirable species; (7) take species-specific actions that reduce abundance of non-native species and increase abundance of desirable species; (8) establish abundant annual floodplain habitat, with additional large areas that flood in less frequent wet years; (9) reduce inflow of agricultural and urban pollutants; and (10) improve the temperature regime in large areas of the estuary so temperatures rarely exceed 20□C during summer and fall months.□

Similarly, reliance upon water year classification as a trigger for flow volumes has contributed to reduced flow variability in the estuary. The information received during this proceeding supports the notion that reliance upon water year classification as a trigger for flow volumes is an imperfect means of varying flows. Any individual month or season might have a dramatically different hydrology than the overall hydrology for the year. A critically dry year, for example, can have one or two very wet months, just as a wet year may have several disproportionately dry months. Figure 10 demonstrates how this actually occurs. Unimpaired Delta outflow for the month of June from 1922 through 2003 has historically been highly variable. Many June months that occur in years classified as wet have had much lower flows than June flows in years classified as below normal. The opposite is also true; several June flows in years classified as critically dry are higher than some years classified as above normal. Depending on the direction of this divergence of monthly flows (higher or lower) relative to the water year, reliance upon water year classification can provide less than optimal protection of the ecosystem or more than needed water supply impacts. The figure also shows the actual June flows for various periods of years, demonstrating how much lower actual flows have been than unimpaired flows. The primary reason for the lower historical flows is consumption of water in the watershed. The three periods shown, however, are not directly comparable to the unimpaired flow record because the shorter time frame may have been wetter or drier than the full historical record.

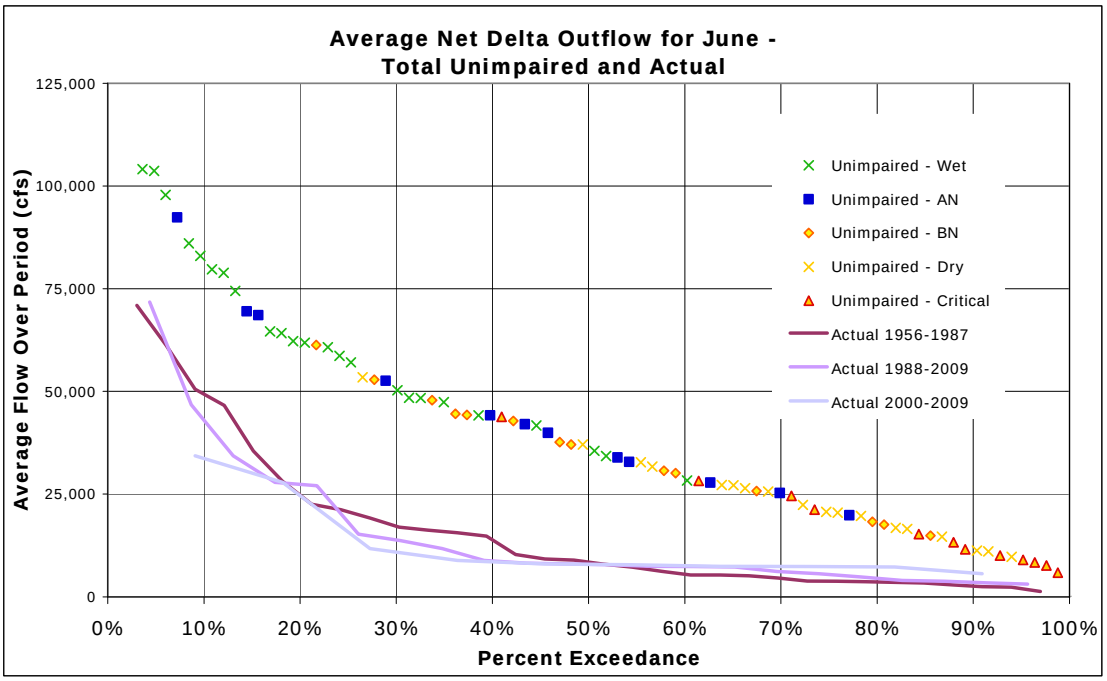


Figure 10. Actual and Unimpaired June Delta Outflow

Proportionality is one of the key attributes of restoring ecosystem functions by mimicking the natural hydrograph in tributaries to the Delta and providing for connectivity. Currently, inflows to the Delta are largely controlled by upstream water withdrawals and releases for water supply, power production, and flood control. As a result, inflows from tributaries frequently do not contribute flow to the Delta in the same proportions as they would have naturally, and to which native fish adapted. There is consensus in contemporary science that improving ecosystem function in the watershed, mainstem rivers, and the Delta is a means to improving productivity of migratory species. (e.g.,Williams 2005; NRC 1996, 2004a, 2004b as cited in NAS 2010, p. 42.) NAS found that, "Watershed actions would be pointless if mainstem passage conditions connecting the tributaries to, and through, the Delta were not made satisfactory."(NAS 2010, p. 42.) "Propst and Gido (2004) support this hypothesis and suggest that manipulating spring discharge to mimic a natural flow regime enhances native fish recruitment (Propst and Gido, 2004 and Marchetti and Moyle, 2001)."(DOI, 1 p. 25.) Specifically, providing pulse flows to mimic the natural hydrograph could diversify ocean entry size and timing for anadromous fishes so that in many years at least some portion of the fish arrive in saltwater during periods favoring rapid growth and survival. (DOI 1, p. 30.) Food production may also be improved by maintaining the attributes of a natural hydrograph (EFG 1, p. 8.) Connectivity between natal streams and the Delta is critical for anadromous species that require sufficient flows to emigrate out of natal streams to the Delta and ocean, and sufficient flows upon returning, including flows necessary to achieve homing fidelity. Specifically, it is necessary for the scent of the river to enter the Bay in order for adult salmonids to find their way back to their natal river. (NMFS 2009, p.407 as cited in EDF 1, p. 48.) Further, insuring adequate flows from all of the tributaries that support native fish is important to maintain genetic diversity and species resilience in the face of catastrophic events.

4.3.2 Floodplain Activation and Other Habitat Improvements

Most floodplains in the Central Valley have been isolated from their rivers by levees. Due to the effects of levees and dams, side channel and floodplain inundating flows have been substantially reduced. At present, besides the Yolo Bypass, the only other Delta region with substantial connectivity to portions of the historical floodplain is the Cosumnes River, a small undammed watershed. (Sommer et al. 2001b.) Floodplains are capable of providing substantial benefits to numerous aquatic, terrestrial, and wetland species. (Sommer et al. 2001b.) Inundation of floodplains facilitates an exchange of organisms, nutrients, sediment, and organic material between the river and floodplain, and provides a medium in which biogeochemical processes and biotic activity (e.g., phytoplankton blooms, zooplankton and invertebrate growth and reproduction) can occur. (AR/NHI 1, p. 22.) This exchange of material can benefit downstream areas. For example, studies suggest phytoplankton, zooplankton, and other organic material transported from the Yolo Bypass enhances the food web of the San Francisco Estuary. (Jassby and Cloern 2000; Mueller-Solger et al. 2002; Sommer et al. 2004.)

Many fishes rear opportunistically on floodplains. (Moyle et al. 2007, as cited in Moyle et al. 2010), and juvenile salmon grow faster and become larger on floodplains than in the main-stem river channels. (Sommer et al. 2001a; Jeffres et al. 2008; DOI 1, p. 27; AR/NHI 1, p. 24.) Splittail require floodplains for spawning (Moyle et al. 2007), with large-scale juvenile recruitment occurring only in years with significant protracted (greater than or equal to 30 days) floodplain inundation, particularly in the Sutter and Yolo bypasses. (Meng and Moyle 1995, Sommer et al. 1997, Feyrer et al. 2006a.) Managing the frequency and duration of floodplain inundation during the winter and spring, followed by complete drainage by the end of the flooding season, could favor splittail and other native fish over non-natives. (Moyle et al. 2007, Grimaldo et al. 2004.) In addition, modeling conducted by Moyle et al. (2004) shows that while splittail are resilient, managing floodplains to promote frequent successful spawning is needed to keep them abundant. Improving management of the Yolo Bypass for fish, increasing floodplain areas along other rivers (e.g., Cosumnes and Mokelumne rivers), and developing floodplain habitat along the lower San Joaquin River, including a bypass in the Delta, represent opportunities to increase the frequency and extent of floodplain inundation. (Moyle et al. 2010.) The BDCP is currently evaluating structural modifications to the Fremont Weir (e.g., notch weir and install operable inundation gates), as a means of increasing the interannual frequency and duration of floodplain inundation in the Yolo Bypass. (BDCP 2009.)

The NMFS Opinion stipulates that USBR and DWR, in cooperation with DFG, USFWS, NMFS, and USACE, shall, to the maximum extent of their authorities (excluding condemnation authority), provide significantly increased acreage of seasonal floodplain rearing habitat, with biologically appropriate durations and magnitudes, from December through April, in the lower Sacramento River basin, on a return rate of approximately one to three years, depending on water year type. (NMFS 3, p. 608.) Per this NMFS Opinion, USBR and DWR are to submit a plan to implement this action to NMFS by December 31, 2011. (Id.) This plan is to include an evaluation of options to, among other things, increase inundation of publicly and privately owned suitable acreage within the Yolo Bypass, and modify operations of the Sacramento Weir or Fremont Weir to increase rearing habitat. (Id.)

Moyle et al. (2010) discuss the value of creating more slough networks with natural geometry and less diked, rip-rapped channel habitat, the value of tidal marsh habitat, and low salinity, open water habitat in the Delta:

> Re-establishing the historical extensive dendritic sloughs and marshes is essential for re-establishing diverse habitats and gradients in salinity, depth and other environmental characteristics important to desirable fish and other organisms (e.g., Brown and May 2008). These shallow drainages are likely to increase overall estuarine productivity if they are near extensive areas of open water, because they can deliver nutrients and organic matter to the more open areas. Dendritic slough networks will develop naturally in Suisun Marsh after large areas become inundated following dike failures and they can be recreated fairly readily in the Cache Slough region by reconnecting existing networks. In the Delta, the present simplified habitat in the channels between islands needs to be made more suitable as habitat for desirable species. Many levees are maintained in a nearly vegetation-free state, providing little opportunity for complex habitat (e.g., marshes and fallen trees) to develop. Much of the low-value channel habitat in the western and central Delta will disappear as islands flood, but remaining levees in submerged areas should be managed to increase habitat complexity (e.g., through planting vegetation), especially in the cooler northern and eastern parts of the Delta.
>
> [Subtidal] habitat has been greatly depleted because marshes in the Delta and throughout the estuary have been diked and drained, mostly for farming and hunting (Figure 3). Unfortunately, most such habitat in shallow water today is dominated by alien fishes, including highly abundant species such as Mississippi silverside which are competitors with and predators on native fishes (Moyle and Bennett 1996; Brown 2003). Such habitat could become more favorable for native fishes with increased variability in water quality, especially salinity. In particular, increasing the amount of tidal and subtidal habitat in Suisun Marsh should favor native fishes, given the natural variability in salinity and temperature that occurs there. The few areas of the marsh with natural tidal channels tend to support the highest diversity of native fishes, as well as more striped bass (Matern et al. 2002; Moyle, unpublished data). With sea level rise, many diked areas of Suisun Marsh currently managed for waterfowl (mainly dabbling ducks and geese) will return to tidal marsh and will likely favor native fishes such as splittail and tule perch (Hysterocarpus traski), as well as (perhaps) migratory fishes such as juvenile Chinook salmon. Experimental (planned) conversions of some of these areas would be desirable for learning how to manage these inevitable changes to optimize habitat for desired fishes.
>
> Open water habitat is most likely to be created by the flooding of subsided islands in the Delta, as well as diked marshland islands in Suisun Marsh (Lund et al. 2007, 2010; Moyle 2008). The depth and hydrodynamics of many of these islands when flooded should prevent establishment of alien aquatic plants while variable salinities in the western Delta should prevent establishment of dense populations of alien clams (Lund et al. 2007).

> Although it is hard to predict the exact nature of these habitats, they are most likely to be better habitat for pelagic fishes than the rock-lined, steep-sided and often submerged vegetation-choked channels that run between islands today (Nobriga et al. 2005). Experiments with controlled flooding of islands should provide information to help to ensure that these changes will favor desired species. Controlled flooding also has the potential to allow for better management of hydrodynamics and other characteristics of flooded islands (through breach location and size) than would be possible with unplanned flooding.

4.3.3 Water Quality and Contaminants

Toxic effects are one of three general factors identified by scientists with the IEP in 2005 as contributing to the decline in pelagic productivity. The life history requirements and water quality sections above identify specific species sensitivities to water quality issues.

Though the information received in this proceeding supports the recommendation that modification to flow through the Delta is a necessary first step in improving the health of the ecosystem, it also supports the recommendation that flow alone is insufficient. The Delta and San Francisco Bay are listed under section 303(d) of the Federal Clean Water Act as impaired for a variety of toxic contaminants that may contribute to reduced population abundance of important fish and invertebrates. The contaminants include organophosphate and pyrethrin pesticides, mercury, selenium and unknown toxicity. In addition, low DO levels periodically develop in the San Joaquin River at the DWSC and in OMR. The low oxygen levels in the DWSC inhibit the upstream migration of adult fall-run Chinook salmon and adversely impact other resident aquatic organisms.

There is concern that a number of non-303(d) listed contaminants, such as ammonia, pharmaceuticals, endocrine disrupting compounds, and blue-green algal blooms could also limit biological productivity and impair beneficial uses. Sources of these contaminants include agricultural, municipal and industrial wastewater, urban storm water discharges, discharges from wetlands, and channel dredging activities. More work is needed to determine their impact on the aquatic community.

Ammonia has emerged as a contaminant of special concern in the Delta. Recent hypotheses are that ammonia is causing toxicity to delta smelt, other local fish, and zooplankton and is reducing primary production rates in the Sacramento River below the SRWTP and in Suisun Bay. A newer hypothesis is that ammonia and nitrogen to phosphorus ratios have altered phytoplankton species composition and these changes have had a detrimental effect on zooplankton and fish population abundance. (Glibert 2010.) More experiments are needed to evaluate the effect of nutrients, including ammonia, on primary production and species composition in the Sacramento River and Delta.

4.3.4 Cold Water Pool Management

As mentioned in the specific flow criteria, the criteria contained in this report should be tempered by the additional need to maintain cold water resources in reservoirs on tributaries to the Delta until improved passage and other measures are taken that would reduce the need for maintaining cold water reserves in reservoirs. As discussed in the Chinook salmon section, salmon have specific temperature tolerances during various portions of their life-cycle. Historically salmonids were able to take advantage of cooler

upstream temperatures for parts of their life-cycle to avoid adverse temperature effects. Since construction of the various dams in the Central Valley, access to much of the cooler historic spawning and rearing habitat has been blocked. To mitigate for these impacts, reservoirs must be managed to preserve cold water resources for release during salmonid spawning and rearing periods. As reservoir levels drop, availability of cold water resources also diminishes. Accordingly, it may not be possible to attain all of the identified flow criteria in all years and meet the thermal needs of the various runs of Chinook salmon and other sensitive species. Thorough temperature and water supply modeling analyses should be conducted to adaptively manage any application of these flow criteria to suit real world conditions and to best manage the competing demands for water needed for the protection of public trust resources, especially in the face of future climate change.

Specifically, these criteria should not be construed as contradicting existing and future cold water management requirements that may be needed for the protection of public trust resources, including those for the Sacramento River needed to protect the only remaining population of winter-run Chinook salmon. (see NMFS 3, p. 590-603.)

4.3.5 Adaptive Management

Any environmental flow prescription for native species in the Delta will be imperfect. The problem is too complex, uncertainties are too large, and the situation in the Delta is changing too rapidly in too many ways for any single flow prescription to be correct, or correct for long. (Fleenor et al. 2010.) Some degree of certainty regarding future conditions in the Delta is needed before long term flow criteria can be developed. Since it is unlikely that certainty will be achieved before actions or responses are required by geologic, biological, and legal processes, it might be valuable to provide substantial financial and water reserve resources, along with responsible institutional wherewithal to respond to changes and undertake necessary experiments for more successfully transitioning into the largely unexplored new Delta. (Fleenor et al. 2010.) This confounding need for certainty of operations and water supply at the same time there is uncertainty underlying ecosystem needs, provides good rationale to rely upon adaptive management to address this uncertainty.

The Delta is continually changing. Flow criteria developed for the present Delta ecosystem will become less reflective of ecosystem needs with the passage of time. Accordingly, it is important that flow criteria be adaptive to future changes. Flows, habitat restoration, and measures to address other stressors should be managed adaptively. (AR/NHI Closing Comments.)

Adaptive management is an iterative process, based on a scientific paradigm that treats management actions as experiments subject to modification, rather than as fixed and final rulings, and uses them to develop an enhanced scientific understanding about whether or not and how the ecosystem responds to specific management actions. (NRC 1999 as cited in DOI Ex.1.) This notion of treating actions as experiments is key, because information received in this proceeding indicates that the mechanisms underlying the relationship between flows and the health of the Delta ecosystem are, at times, unclear. Adaptive management is the most suitable approach for managing with uncertainty. (DEFG 1.)

Murray and Marmorek (2004) describe an adaptive management approach as:

- exploring alternative ways to meet management objectives
- predicting the outcomes of alternatives based on the current state of knowledge
- implementing one or more of these alternatives
- monitoring to learn about the impacts of management actions
- using the results to update knowledge and adjust management actions

An adaptive approach provides a framework for making good decisions in the face of critical uncertainties, and a formal process for reducing uncertainties so that management performance can be improved over time. (Williams et al. 2007.)

Adaptive management does not postpone action until "enough" is known but acknowledges that time and resources are too short to defer *some* action, particularly actions to address urgent problems. (Lee 1999.) Adaptive management provides a means of informing planning and management decisions in spite of uncertainty. Key point number 5 of the DEFG states: a strong science program and a flexible management regime are essential to improving flow criteria. (DEFG 1.)

Adaptive management can be used to manage uncertainty in two ways, over two time frames. Over the short-term, adaptive management could allow for a specific response to real time conditions so long as the response is otherwise consistent with the constraints of some overarching regulatory framework. Over the longer term, adaptive management could allow for the more nimble modification of regulatory constraints, so long as these modifications fell within the clearly defined parameters of the overarching regulatory framework.

Short-term Adaptive Management

Per the DEFG s assessment regarding the role of uncertainty

> despite [our] extensive scientific understanding substantial knowledge gaps remain about the ecosystem's likely response to flows. First, ecosystem processes in a turbid estuary are mostly invisible, and can be inferred only through sampling. Second, monitoring programs only scratch the surface of ecosystem function by estimating numbers of fish and other organisms, whereas the system s dynamics depend on birth, growth, movement, and death rates which can rarely be monitored. Third, this system is highly variable in space (vertical, cross-channel, along-channel, and larger-scale), time (tidal, seasonal, and interannual), flow, salinity, temperature, physical habitat type, and species composition. Each of the hundreds of species has a different role in the system, and these differences can be subtle but important. As a result, we have little ability to predict how the ecosystem will respond to the numerous anticipated deliberate and uncontrolled changes. (DEFG 1.)

Flexible management can be designed into a regulatory framework so that any requirements rely upon real time information and real time decisions to guide specific real-time action. A current example of this is the Delta Smelt Working Group that provides information and analyses used to guide real time operation of export facilities so that these facilities can be operated in a manner that conforms with the current NMFS

and USFWS opinions. Any such flexible management will need to consider the processes and governance structures required to make sound scienfically-based real-time decisions. The Delta Smelt Working Group is a good example of how scientific assessment of real-time data, including the presence of fish, can better inform the real-time operation of export facilities.

Long-term Adaptive Management

Over the longer term, adaptive management can be used to more nimbly modify regulatory constraints so that fishery and water resource agencies are not locked into prescriptive constraints well past the time that current scientific understanding can support. This longer term adaptive management has bearing on a number of the flow criteria being considered in this report because many of these criteria lack sufficiently robust information to support a specific numeric criterion. Although the functional basis for a beneficial flow may be understood, the basis for a specific numeric criteria may not. Some regulatory flows may therefore need to take the form of an informed experimental manipulation. Such flows would need to be implemented as if they were experiments, with explicit conceptual and simulation models, predicting outcomes, and feedback loops so that the course of management and investigation can change as the system develops and knowledge is gained. A talented group of people tasked to integrate, synthesize, and recommend actions based on the data being gathered are essential for making such a system work. Failure to implement an effective adaptive management program will likely lead to a continued failure to learn from the actions, and a lack of responsiveness to changing conditions and increased understanding. (DEFG 1.)

The Delta Science Program, IEP, and other institutions could be relied upon to evaluate experimental flows and make recommendations to be considered for modifications of such flows.

4.4 Expression of Criteria as a Percentage of Unimpaired Flow

In some cases, participants recommendations were expressed as specific flows in specific months, to be applied during specific water year types or with specified probabilities of exceedance. Review of unimpaired hydrology shows there is great variability in the quantity of unimpaired flow during these specified months when categorized by water year type. Reliance upon monthly or seasonal flow prescriptions based on water year type would therefore result in widely ranging relative amounts of unimpaired flow depending upon the specific hydrology of the month or season. Also, the rather coarse division of the hydrograph into five water year types can lead to abrupt step-wise changes in flow requirements. In an attempt to more closely reflect the variation of the natural hydrograph, the State Water Board recommends that, when possible, the flow criteria be expressed as a percentage of unimpaired flow.

To develop criteria in this way, the unimpaired flow rate for a specified time period (e.g. average monthly flow over a range of months) was plotted on an exceedance probability graph (using the Weibull plotting position formula) along with the flow recommendations and desired return frequencies. The unimpaired flow rates were also plotted such that the associated water year type can be identified and their percent exceedance estimated. A percentage of unimpaired flow was selected by trial and error so that the desired flow rate and exceedance frequency was achieved. A separate exceedance plot was produced for each time period being evaluated.

The unimpaired flow estimates used in the development of these flow criteria are based on those developed in the DWR May 2007 document: *"California Central Valley Unimpaired Flow Data" Fourth Edition Draft.* (DWR 2007.) This report contains estimates of the monthly flow for 24 sub-basins in the Central Valley. Each sub-basin uses a separate calculation dependant on conditions specific to that sub-basin, available gauge data, and relationships to other sub-basins. In many cases the methods change over the period of record to incorporate changes to infrastructure within the sub-basins that need to be accounted for. Estimates are provided for 83 water years from 1922 through 2003. A water year begins in October of the previous calendar year through September of the named water year. The following describes the unimpaired flow estimates that are the basis for flow criteria for the Sacramento River at Rio Vista, the San Joaquin River at Vernalis, and Net Delta Outflow.

Sacramento Valley Unimpaired Total Outflow

Estimates of the unimpaired Sacramento Valley outflow were computed as the sum of estimates from 11 sub-basins in the watershed and are understood to represent the flow that would occur on the Sacramento River at approximately Freeport. These 11 sub-basins include the Sacramento Valley Floor, Putah Creek near Winters, Cache Creek above Rumsey, Stony Creek at Black Butte, Sacramento Valley West Side Minor Streams, Sacramento River near Red Bluff, Sacramento Valley East Side Minor Streams, Feather River near Oroville, Yuba River at Smartville, Bear River near Wheatland, and the American River at Fair Oaks.

The unimpaired Sacramento Valley outflow from DWR 2007 is used as the basis for flow criteria on the Sacramento River at Rio Vista, even though it is understood they are more representative of unimpaired flows expected at Freeport. This is a necessary simplification as such estimates do not exist at Rio Vista, but should be adequate for the purpose of these criteria. If future flow requirements are to be established at Rio Vista based on a percentage of unimpaired flow, it is recommended that new estimates of unimpaired flow be developed specific for this location.

San Joaquin Valley Unimpaired Total Outflow

Estimates of the unimpaired San Joaquin Valley outflow were computed as the sum of estimates from nine sub-basins in the watershed and are understood to represent the flow that would occur on the San Joaquin River at Vernalis. These nine sub-basins include the Stanislaus River at Melones Reservoir, San Joaquin Valley Floor, Tuolumne River at Don Pedro Reservoir, Merced River at Exchequer Reservoir, Chowchilla River at Buchanan Reservoir, Fresno River near Daulton, San Joaquin River at Millerton Reservoir, Tulare Lake Basin Outflow, San Joaquin Valley West Side Minor Streams.

Delta Unimpaired Total Outflow

Estimates of unimpaired Net Delta Outflow in DWR 2007 were computed generally as Delta Unimpaired Total Inflow minus unimpaired net use in the Delta, including both lowlands and uplands. Delta Unimpaired Total Inflows was calculated as the sum of the Sacramento Valley and San Joaquin Valley Unimpaired Total Outflows as described above and the East Side Streams Unimpaired Total Outflow. The later consists of four sub-basins including San Joaquin Valley East Side Minor Streams, Cosumnes River at Michigan Bar, Mokelumne River at Pardee Reservoir, and Calaveras River at Jenny Lind. Generally the unimpaired net use in the Delta is an estimate of the consumptive

use from riparian and native vegetation (replacing historical irrigated agriculture and urban areas), plus evaporation from water surfaces, minus precipitation, and assumes that existing Delta levees and island remain intact. Unimpaired flow graphs in this report use the unimpaired flow record from 1922 to 2003.

5. Flow Criteria

Two types of criteria are provided in this report: numeric flow criteria, and other, non-numeric, measures that should be considered to complement the numeric criteria. Numeric criteria are subdivided into two categories: category "A" criteria have more and better scientific information, with less uncertainty, to support specific numeric criteria than do Category "B" criteria. Summary numeric criteria are provided for Delta outflow, as well as Sacramento River and San Joaquin River inflows, and Hydrodynamics (Old and Middle River, Inflow-Export Ratios, and Jersey Point flows) in Tables 19 through 22.

In addition to new criteria for Delta outflows, inflows, and hydrodynamics, some of the objectives for the protection of fish and wildlife from the 2006 Bay-Delta Plan are advanced as criteria in this report. While the State Water Board did not specifically reevaluate the methodology and basis for the Bay-Delta Plan objectives, the State Water Board recognizes that these flows provide some level of existing protection for fish and wildlife and, in the absence of more specific information, merit inclusion in these criteria. At the time the Bay-Delta Plan objectives were adopted, they were supported by substantial evidence, including scientific information. While the purpose of this report is to develop flow criteria using best available scientific information, water quality objectives are established taking into account scientific and other factors pursuant to Water Code section 1241.

5.1 Delta Outflows

Following are Delta outflow criteria based on analysis of the species-specific flow criteria and other measures:

1) Net Delta Outflow: 75% of 14-day average unimpaired flow for January through June
2) Fall X2 for September through November
   - Wet years X2 less than 74 km (greater than approximately 12,400 cfs)
   - Above normal years X2 less than 81 km (greater than approximately 7,000 cfs)
3) 2006 Bay-Delta Plan Delta Outflow Objectives for July through December

Delta outflow criteria 1 is a Category A criterion because it is supported by more robust scientific information. Delta outflow criteria 2 and 3 are Category B criteria because there is less scientific information to support specific numeric criteria, but there is enough information to support the conceptual need for flows. Category A and B criteria are both equally important for protection of the public trust resource, but there is more uncertainty about the appropriate volume of flow required to implement Category B criteria. Following is discussion and rationale for these criteria.

The narrative objective of the flow criteria is to halt the population decline and increase populations of native species as well as species of commercial and recreational importance. The need to estimate the magnitude, duration, timing, and quality of Delta outflows necessary to support viable populations of these species is inherent to this

objective. McElhany et al. (2000) proposed that four parameters are critical for evaluating population viability: abundance, population growth rate, population spatial structure, and diversity. Delta outflow may affect one, all, or some combination of these parameters for a number of resident and anadromous species. A species-specific analysis of flow needs for a suite of upper estuary species is included in section 4.2.4.

An analysis of generation to generation population abundance versus Delta outflows indicates that the "likelihood" of an increase in the longfin smelt FMWT abundance index in 50% of years corresponded with flow volumes of approximately 9.1 MAF (51,000 cfs) and 6.3 MAF (35,000 cfs) during January through March and March through May, respectively. (TBI/NRDC 2, pp. 17-19.) The provision of sufficient flows to achieve these flow volumes during January through March and March through May in approximately 45% and 47% of years, respectively, is intended to promote increased abundance and improved productivity for longfin smelt and other desirable estuarine species. Based on a comparison of the flows needs identified in section 4.2.4, it appears that winter-spring outflows designed to be protective of longfin smelt would benefit the other upper estuary species evaluated. The DFG recommended that spring outflows extend through June to fully protect a number of estuarine species. (DFG 1, pp. 2-5.) During June, sufficient outflow should be provided to maintain X2 in Suisun Bay (between 75 km and 64 km). (DFG closing comments, p. 7; DFG 2, p. 6.)

The State Water Board recognizes that the target flow volumes of 9.1 MAF (Jan-Mar, 51,000 cfs) and 6.3 MAF (Mar-May, 35,000 cfs) in greater than or equal to approximately 45% and 47% of years, respectively, and the positioning of X2 in Suisun Bay during the month of June are necessary in order to promote increased abundance and improved productivity for longfin smelt and other desirable estuarine species. An approach based on a percentage of unimpaired flows is intended as a means of distributing flows to meet the above-mentioned criteria in a manner that more closely resembles the natural hydrograph. Such an approach also recognizes the importance of preserving the general attributes of the flow regimes to which the native estuarine species are adapted.

Analyses of historic conditions (1921 to 2003), indicates that at 75% of unimpaired flows, average flows of 51,000 cfs occurred between January and March in approximately 35% of years, while average flows of 35,000 cfs happened between March and May in 70% of years. At 75% of unimpaired flow, X2 would be maintained west of Chipps Island more than 90% of the time between January and June (analyses not shown). Rather than advance multiple static flow criteria for the January through March, March through May, and June time periods, the State Water Board determines, as a Category A criterion, that 75% of 14-day average unimpaired flow is needed during the January through June time period to promote increased abundance and improved productivity for longfin smelt and other desirable estuarine species. It is important to note that this criterion is not a precise number; rather it reflects the general timing and magnitude of flows needed to protect public trust resources in the Delta ecosystem. However, this criterion could serve as the basis from which future analysis and adaptive management could proceed.

Given the extensive modifications to the system there may be a need to diverge from the natural hydrograph at certain times of the year to provide more flow than might have actually occurred to compensate for such changes. Fall outflow criteria, intended to improve conditions for Delta smelt by enhancing the quantity and quality of habitat in wet and above normal water years, represent such an instance. As a Category B criterion, the State Water Board determines that sufficient outflow is needed from September

through November of wet and above normal water year types to position X2 at less than or equal to 74 km and 81 km, respectively (Fall X2 action). In addition, the Delta Outflow Objectives contained within the Bay-Delta Plan for July through December are advanced as a Category B criterion. The State Water Board does not recommend increasing fall flows beyond those stipulated in the Bay-Delta Plan and Fall X2 action at this time. The quantity and timing of fall outflows necessary to protect public trust resources warrants further evaluation.

Category A: Winter Spring Net Delta Outflows

The flow regime is important in determining physical habitat in aquatic ecosystems, which is in turn a major factor in determining biotic composition. (DEFG 1.) Bunn and Arthington (2002) highlight four principles by which the natural flow regime influences aquatic biodiversity: 1) developing channel form, habitat complexity, and patch disturbance, 2) influencing life-history patterns such as fish spawning, recruitment, and migration, 3) maintaining floodplain and longitudinal connectivity, and 4) discouraging non-native species. Altering flow regimes affects aquatic biodiversity and the structure and function of aquatic ecosystems. The risk of ecological change increases with greater flow regime alteration. (Poff and Zimmerman 2010.)

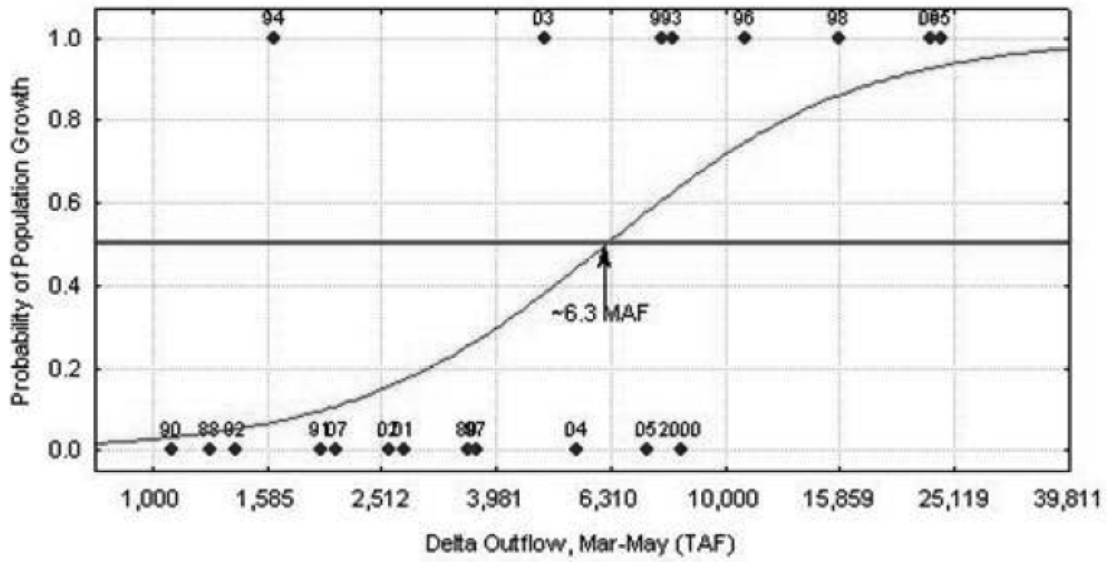
A suite of native, and recreationally or commercially important species were evaluated in an effort to assess the timing, volume, and quality of water necessary to protect public trust resources. Flow criteria were developed for each of the species identified by DFG as those that are priority concern and will benefit the most as a result of improved flow conditions. (DFG closing comments, p. 3.) For Delta outflow, this included longfin smelt, delta smelt, starry flounder, American shad, bay shrimp (*Crangon* sp.), mysid shrimp, and *Eurytemora affinis*. Through this process, data or information pertaining to life history attributes (e.g., timing of migration, spawning, rearing), relationships of species abundance or habitat to Delta outflow, season or time period when flow characteristics are most important, factors influencing and/or limiting populations, and other characteristics were assessed and summarized in the individual species write-ups.

Statistically significant relationships between annual abundance and X2 (or outflow) have been demonstrated for a diverse assemblage of species within the estuary. (Stevens and Miller 1983; Jassby et al. 1995; Kimmerer 2002a; Rosenfield and Baxter 2007; Kimmerer *et al*. 2009.) The causal mechanisms underlying the variation in annual abundance indices of pelagic species in the estuary are poorly understood, but likely vary across species and life stages.

Longfin smelt have the strongest X2-abundance relationship of those species for which such a relationship has been demonstrated. (Kimmerer et al. 2009.) Abundance indices for this species are inversely related to X2 during its winter-spring spawning and early rearing periods. (Stevens and Miller 1983; Jassby et al. 1995; Kimmerer 2002a; Rosenfield and Baxter 2007; Kimmerer et al. 2009.) However, a four-fold decline in the relationship, with no significant change in slope, occurred after 1987, coincident with the introduction and spread of the introduced clam *Corbula amurensis.* (Kimmerer 2002a.) Reduced prey availability due to clam grazing has been identified as a likely mechanism for the decline in the X2-abundance relationship. (Kimmerer 2002a.)

One of the key biological goals of the informational proceeding was to identify the flows needed to increase abundance of native and other desirable species. Logit regression (StatSoft 2010, as cited in TBI/NRDC 2, p.17) was used to address the question: What

outflow corresponded to positive longfin smelt population growth 50□ of the time in the past? Logit regression is used to find a regression solution when the response variable is binary. For the purpose of this analysis, the generation-over-generation changes in abundance indices were converted to a binary variable (increase □1 or decrease □0). The analysis was conducted using FMWT abundance indices for the period extending from 1988 to 2007 (post-*Corbula*). Two periods of the winter-spring seasons (January to March and March to May) were evaluated, as different life stages of longfin smelt are present in the Delta during those periods (spawning adults and larvae/juveniles, respectively) and the mechanisms underlying the flow-abundance relationship may occur and/or vary in some or all of the months during these periods. (TBI/NRDC 2, p. 13.) The results were statistically significant (p □0.015) and revealed that the □likelihood□of an increase in FMWT abundance index in 50□ of years corresponded with flows of approximately 9.1 MAF and 6.3 MAF during January through March and March through May, respectively. (Figure 11, TBI/NRDC 2, pp. 17-19.)



Logit regression showing relationship between March through May Delta outflow and generation-over-generation change in abundance of longfin smelt (measured as the difference between annual FMWT abundance indices). Positive changes in the abundance index were scored at □1□and declines were scored as □0□. Arrow indicates flows above which growth occurred in more than 50□ of years. Point labels indicate year of the FMWT index. (Source: TBI 2, Figure 15.)

Figure 11. Logit Regression Showing Relationship Between March through May Delta Outflow and Generation-Over-Generation Change in Longfin Smelt Abundance

A similar analysis was conducted for bay shrimp (*Crangon* sp.), a species whose flow-abundance relationship did not experience a □step decline□following the invasion of *Corbula.* (Kimmerer 2002a.) Results of the logit analysis indicate that abundance indices for this species increased in about 50□ of years when flows during March through May were approximately 5 MAF. (TBI/NRDC 1, p. 17.) Therefore, flows

associated with positive changes in the longfin smelt abundance index are anticipated to improve the likelihood of increases in bay shrimp abundance as well.

An analysis of historical longfin smelt flow-abundance relationships that corresponded to recovery targets in the Recovery Plan for the Sacramento/San Joaquin Delta Native Fishes (USFWS 1996) was also conducted. During the periods of January through March and March through May, cumulative Delta outflows of greater than 9.5 MAF and greater than 6.3 MAF, respectively, historically corresponded to abundance indices equal to or exceeding the recovery targets. (TBI/NRDC 2, p. 14.) These results are based on the intersection of the 1967 to1987 flow-abundance relationship and the recovery target. Use of the 1988 to 2007 flow-abundance relationship predicts lower abundance indices per any given flow, as compared to the historical relationship. Use of the pre-*Corbula* flow-abundance relationship underscores the need to address other stressors that may be affecting longfin smelt abundance concurrently with improved flow conditions. (TBI/NRDC 2, p. 14.) Applying this method and the logit regression produces very similar results.

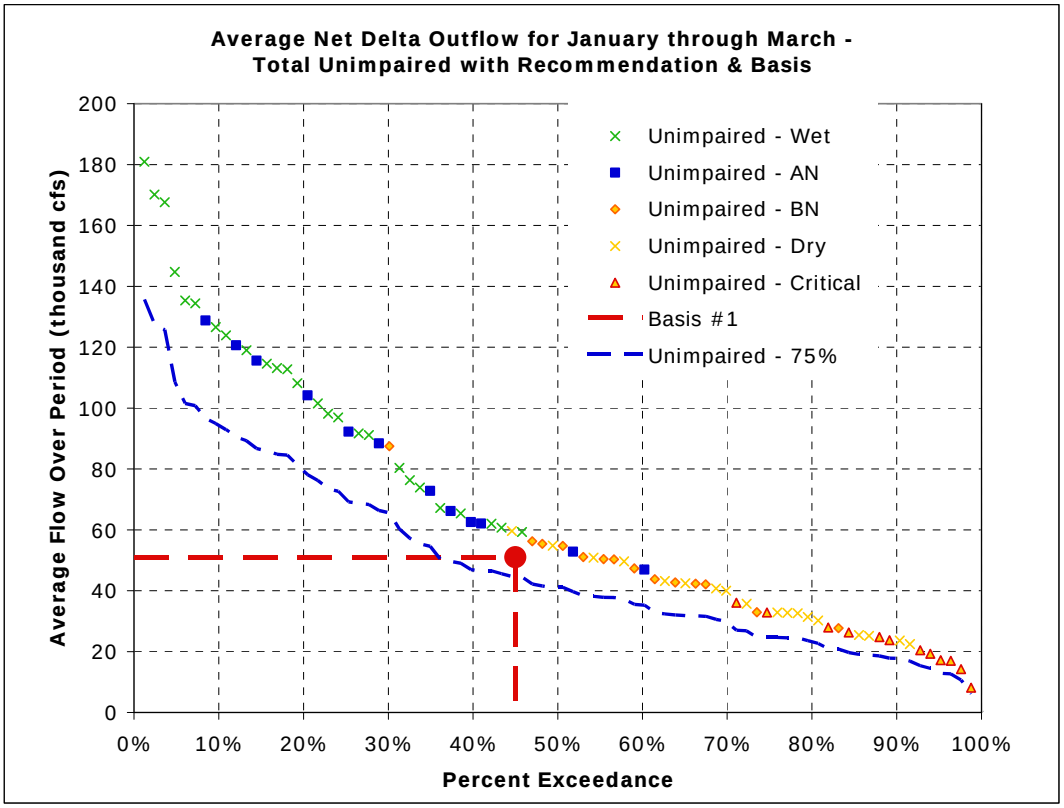
As noted above, the results of the logit analysis indicate that the □likelihood□of an increase in the longfin smelt FMWT abundance index in 50□ of years corresponded with flows of approximately 9.1 MAF and 6.3 MAF during January through March and March through May, respectively. (TBI/NRDC 2, pp. 17-19.) Hereafter, these two flow volumes are reported in cubic feet per second, as 51,000 cfs and 35,000 cfs, respectively. Analyses indicate that under historic unimpaired conditions (1921 to 2003) average flows of 51,000 cfs occurred between January and March in approximately 50□ of years (Figure 12a), while average flows of 35,000 cfs happened between March and May approximately 85□ of the time (Figure 13a). The review of the historic record suggests that it is unrealistic to expect a 100□ return frequency for the two magnitudes. A point of reference for determining a more realistic return frequency might be the actual (impaired) flows that occurred from 1956 to 1987. This was a time period when native fish were more abundant than today. Actual average flows between 1957 and 1987 of 51,000 cfs occurred between January and March in approximately 45□ of years (Figure 12b). Similarly average flows of 35,000 cfs occurred between March and May 47□ of the time (Figure 13b). However, since 2000, average flows of this magnitude only occurred about 27□ and 33□ of the time, respectively (Figures 12b and 13b). At 75□ of unimpaired flow, average flows of 51,000 and 35,000 cfs would happen 35□ and 70□ of the time, respectively (Figure 12a and Figure 13a). Finally, the DFG has indicated that spring outflows should continue through June to fully protect a number of estuarine species (DFG 1, pp.2-5.)

A fixed 75□ of unimpaired flow would extend the flow criteria to other years and distribute flows in a manner that more closely resembles the natural hydrograph. Expression of this criterion as a 14-day running average would better reflect the timing of actual flows (compared with a 30-day running average) while still allowing for a time-step to which reservoirs could be operated. The appropriateness of the 14 day averaging period warrants further evaluation. The unimpaired flows from which the 75□ criterion is calculated are monthly values. Estimates of 14-day average unimpaired flows have not been published, but a cursory analysis indicates that they are likely to generate an exceedance curve similar to one generated with monthly values.

The State Water Board therefore determines that the Net Delta Outflow criterion be 75□ of the 14-day average unimpaired flow between January and June (Figure 14a, Table

20). Consistent with the DFG recommendation (closing comments, p. 7) that X2 be maintained between 65 and 74 km (Chipps Island and Port Chicago) from January through June, a criterion of 75□ of unimpaired flow, would maintain X2 west of Chipps Island more than 90□ of the time, between January and June, based on monthly averages (analyses not shown). The return frequency for all months combined is about 98□ of the time (Figure 14a). This compares with about a 90□ percent return frequency between 2000 and 2009 (Figure 14b).

a)



b)

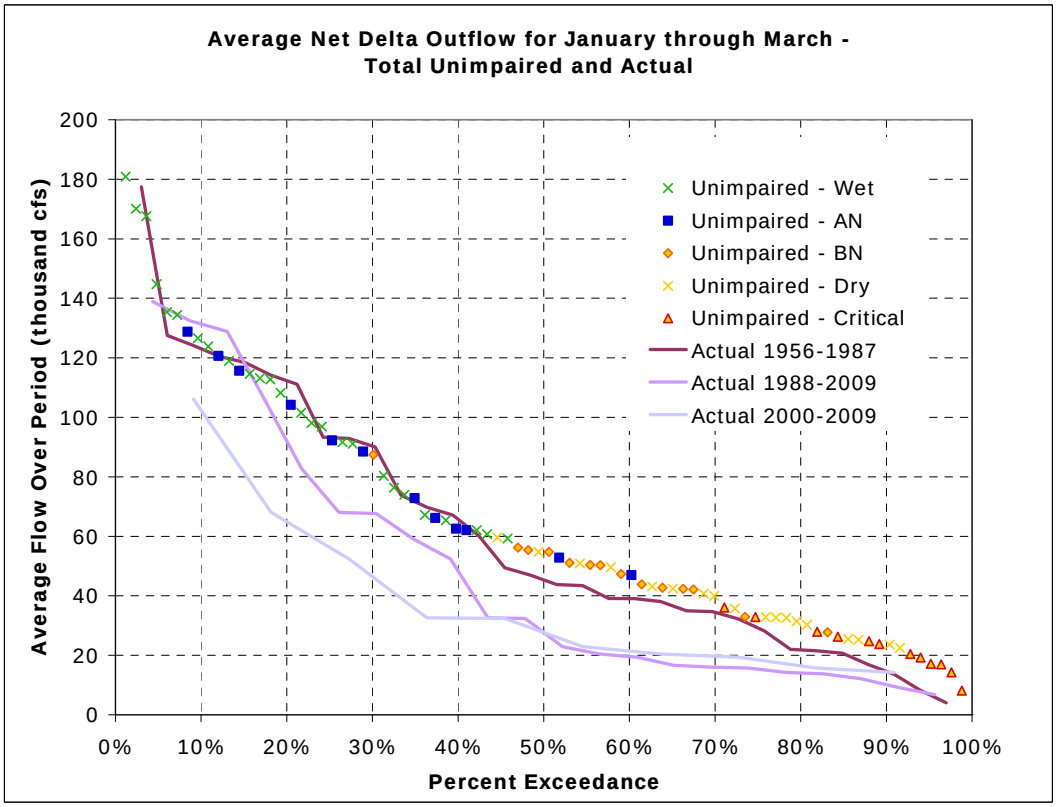
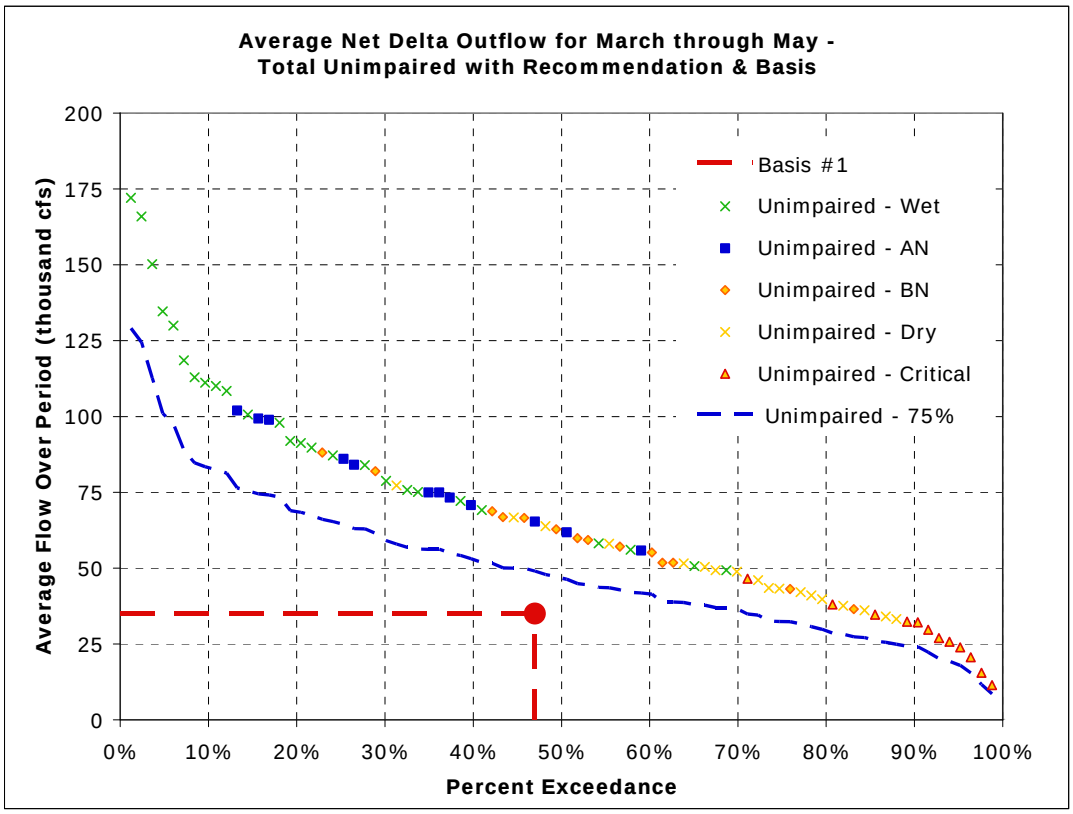


Figure 12. Net Delta Outflow Flow Exceedance Plot - January through March

a)



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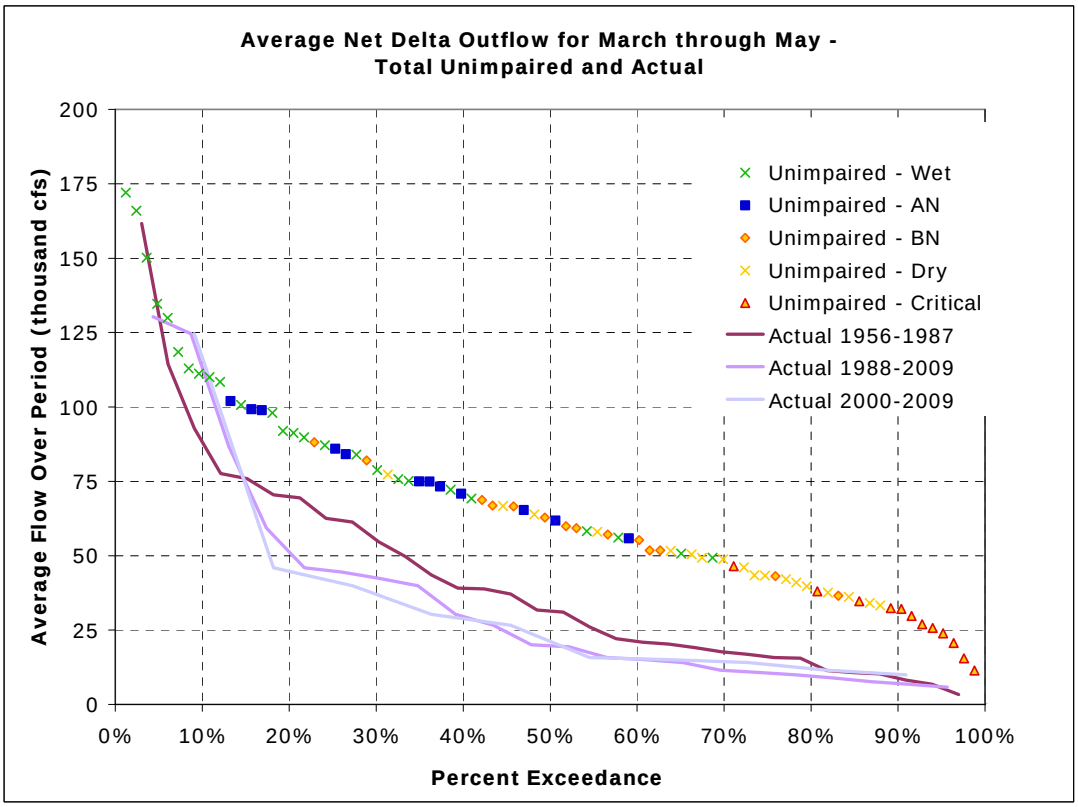
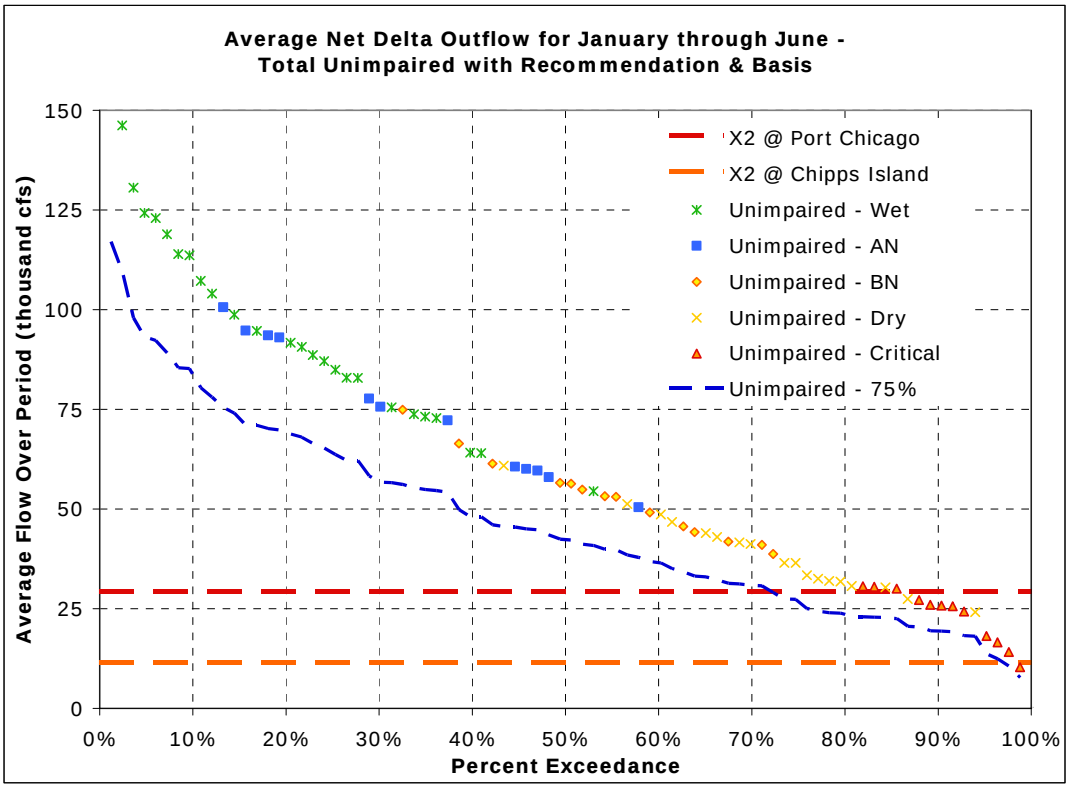


Figure 13. Net Delta Outflow Flow Exceedance Plot - March through May

a)



b)

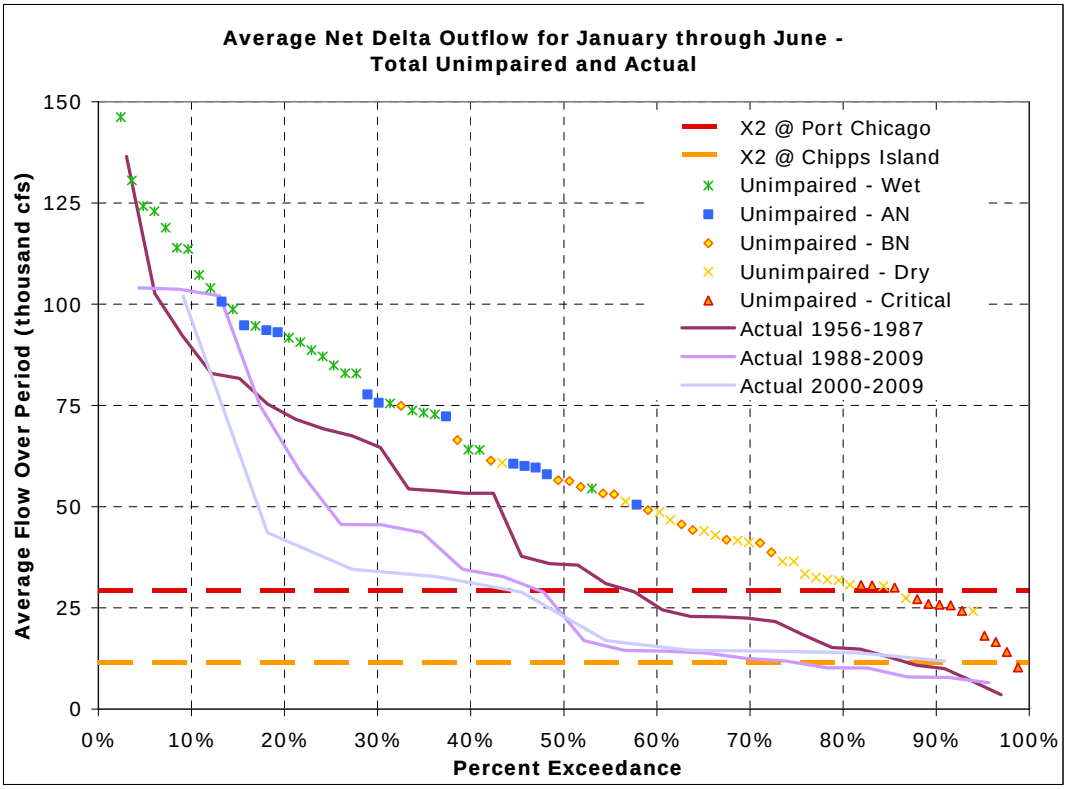


Figure 14. Net Delta Outflow Flow Exceedance Plot - January through June

The net Delta outflow criterion of 75 of unimpaired flows from January through June is anticipated to increase the likelihood of positive population growth for a number of other public trust species, notably those for which abundance-X2 relationships have been demonstrated, including American shad, striped bass, starry flounder, bay shrimp (*Crangon franciscorum*), and *Eurytemora affinis* (spring abundance). For example, the spring (March through May) abundance of *Eurytemora affinis* has been positively related to flow, following the invasion of *Corbula.* (Kimmerer 2002a.) This species represents an important prey item for most small fishes, particularly those with winter and early spring larvae, such as longfin smelt, delta smelt and striped bass. (Lott 1998, Nobriga 2002, Bryant and Arnold 2007, DFG unpublished.) Increases in the abundance of prey species, such as *E. affinis* and bay shrimp, has the potential to improve productivity of the estuarine food web and benefit a number of fishes, especially given that food limitation has been identified as a potential contributing factor in the POD. (Baxter *et al*. 2008.) Additional information concerning the relationship of population abundance to flow for these species is provided in the species life history section of this report.

Delta smelt abundance does not respond to freshwater outflow in a predictable manner similar to that of other numerous estuarine species. (Stevens and Miller 1983; Jassby et al. 1995; Kimmerer 2002a.) However, freshwater outflow during spring (March to June) does affect the distribution of delta smelt larvae by transporting them seaward toward the low salinity zone. (Dege and Brown 2004.) Ideal rearing habitat conditions for this species are believed to be shallow water areas most commonly found in Suisun Bay. (Bennett 2005.) Outflows that locate X2 in Suisun Bay (mean April through July location) produce the highest delta smelt abundance levels; however, low abundances have also been observed under the same conditions, which indicates several mechanisms must be operating. (Jassby et al. 1995; DFG 1, p. 15.) A criterion of 75 of unimpaired flow is expected to place X2 in Suisun Bay from March through June in nearly all years.

The DFG s current science-based conceptual model is that placement of X2 in Suisun Bay represents the best interaction of water quality and landscape for fisheries production given the current estuary geometry. (DFG 2, p. 6.) The DFG (closing comments, p. 7) provided recommended flow criteria for the Delta based on the placement of X2, for January through June (exact period varied by species), for longfin smelt, starry flounder, bay shrimp, zooplankton, and American shad. For each of these species, the DFG (*Id*.) recommends that sufficient outflow be provided to position X2 between 75 km and 64 km. These criteria are generally consistent with spring X2 requirements in the 2006 Bay-Delta Plan, which requires salinity at one compliance point (81 km) not to exceed 2 psu continuously, and at two other compliance points (64 km [Port Chicago] and 75 km [Chipps Island]) not to exceed 2 psu for a set number of days during February through June. Positioning X2 at 75 km and 64 km is equivalent to a 3-day running average Net Delta Outflow Index of 11,400 cfs and 29,200 cfs, respectively. Implementation of the 75 of unimpaired flow criteria would be largely consistent with the intent of the DFG s recommendations by placing X2 between Chipps Island and Port Chicago, or further to the west, in nearly all years during the January through June period.

The step-decline in the abundance-X2 relationship that occurred after 1987 for many of these species in combination with the lack of understanding concerning the causal mechanisms underlying those relationships leads to uncertainty regarding the future response of these species to elevated flows. In addition, a number of major changes to

the Delta landscape, including levee failure and island flooding, are likely to occur over the next several decades. (Lund et al. 2007, 2008.) Flow regimes needed to maintain desired environmental conditions will change through time, in response to changes in the geometry of waterways, climate, and other factors. A number of stressors are currently being evaluated as potential contributors to the POD, including attributes of physical and chemical fish habitat. (Sommer et al. 2007; Baxter et al. 2008.) Increasing flows, without concurrent improvements to habitat and water quality, would decrease the extent of expected improvements in native species abundances and habitats. (DOI 1, p. 40.) However, the scientific information received during this proceeding supports the conclusion that flow, though not sufficient in and of itself, is necessary to protect public trust resources and that the current flow regime has harmed native species and benefited non-native species. Each of these issues adds further support to the need for a strong adaptive management program.

The specific flow criteria may need to be tempered by the need to maintain water in reservoirs to provide adequate cold water resources to support egg incubation, juvenile rearing, and holding in the Sacramento River, San Joaquin River, and associated tributary basins. It may not be possible to attain the outflow criteria and meet the thermal needs of the various runs of Chinook salmon and other sensitive species in certain years. Water supply modeling and temperature analyses should be conducted to identify conflicting requirements to achieve both outflow and cold water temperature goals.

Category B: Fall X2

Abiotic habitat parameters for delta smelt have been described for both the summer and fall seasons as combinations of salinity, temperature, and turbidity. (Nobriga et al. 2008; Feyrer et al. 2007; Feyrer et al. in review.) During fall, delta smelt typically occur in low salinity rearing habitats located around the confluence of the Sacramento and San Joaquin Rivers. Suitable abiotic habitat for delta smelt during fall has been defined as relatively turbid water (Secchi depths 1.0 m) with a salinity of approximately 0.6-3.0 psu. (Feyrer et al. 2007.) Long-term trend analysis has shown that environmental quality, as defined by salinity and turbidity, has declined across a broad geographical range, most notably within the south-eastern and western regions of the Delta, leaving a relatively restricted area in the lower Sacramento River and around the confluence of the Sacramento and San Joaquin rivers with the least habitat alteration, compared to the rest of the upper estuary. (Feyrer et al. 2007, DOI 1, p.34.)

The amount of habitat available to delta smelt is controlled by freshwater flow and how that flow affects the position of X2, geographically, in the estuary (Figure 15). (Feyrer et al. in review.) Through the use of a 3D hydrodynamic model, Kimmerer et al. (2009) showed that the extent of delta smelt habitat, as defined by salinity, increases as X2 moves seaward. When X2 is located downstream of the confluence of the Sacramento and San Joaquin rivers, suitable abiotic habitat extends into Suisun and Grizzly bays, resulting in a large increase in the total area of suitable abiotic habitat. (Feyrer et al. in review.) The average position of X2 during fall has moved upstream, resulting in a corresponding reduction in the amount and location of suitable abiotic habitat. (Feyrer et al. 2007; Feyrer et al. in review.)

Average Net Delta Outflow for September, October, and November are presented in Figure 16, Figure 17, and Figure 18. Historically, unimpaired flows in fall were independent of water year type. Interestingly, actual outflow was greater than

unimpaired flow between 1956 and 1987. However, fall outflows have fallen since then and since 2000 are almost always less than unimpaired flow. This is consistent with the observations of Feyrer et al. (2007) that fall X2 has moved upstream and this has reduced the amount of available habitat for smelt in fall.

Fall conditions may be very important for delta smelt, since this period of time coincides with the pre-spawning period for adult delta smelt. (Feyrer et al. 2007.) In general, reductions in habitat constrict the range of these fishes, which combined with an altered food web, may affect their health and survival. (Feyrer et al. 2007.) There is a statistically significant stock-recruitment relationship for delta smelt in which pre-adult abundance measured by the FMWT positively affects the abundance of juveniles the following year in the Summer Townet survey. (Bennett 2005; Feyrer et al. 2007, as cited in USFWS 2008.) Incorporating the combined effects of specific conductance and Secchi depth improved the stock-recruitment relationship. (Feyrer et al. 2007.)

Feyrer et al. (In Review) demonstrated that delta smelt are more abundant when a large amount of habitat is available. However, the relationship between habitat area and FMWT abundance is complex and not strong. (NAS 2010.) When the area of highly suitable habitat is low, either high or low FMWT indices can occur (Figure 15). Therefore, delta smelt can be successful in instances where habitat is limited. More important, however, is that the lowest abundances all occurred when the habitat-area index was less than 6,000 ha. (Feyrer et al. in review; NAS 2010.) This potentially suggests that while reduced habitat area may be an important factor associated with the worst population collapses, it is not likely the only cause of the collapse. (NAS 2010.)

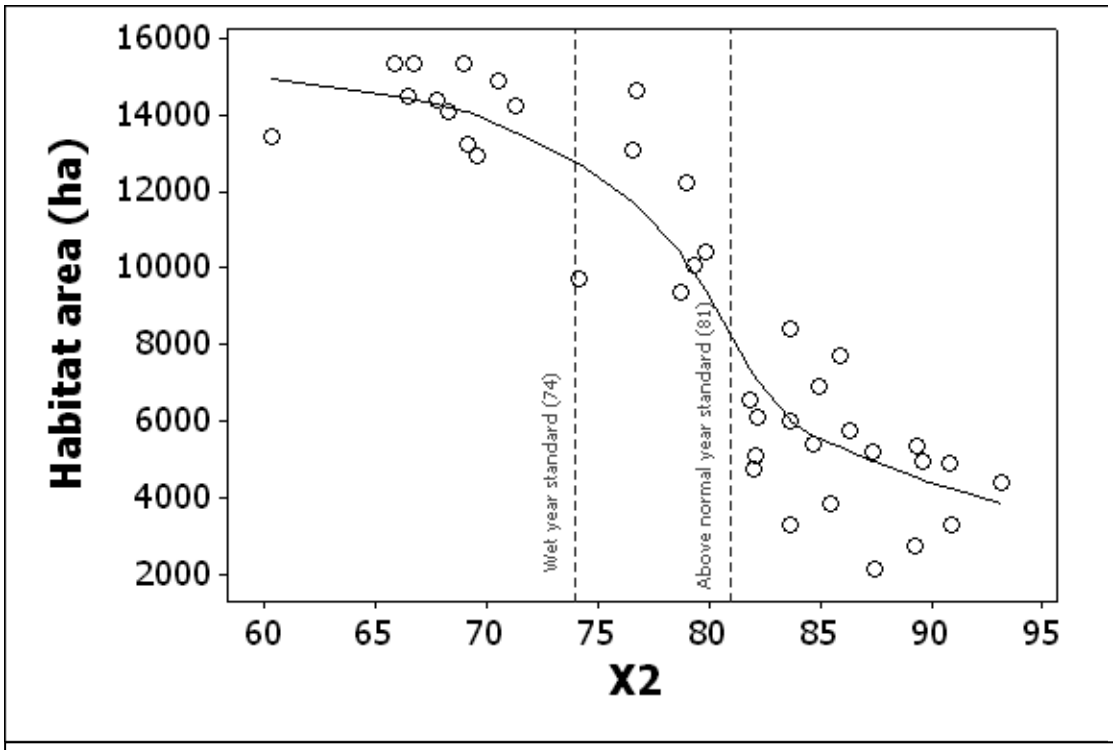
The fall X2 action described in the USFWS Opinion is focused on wet and above normal years because these are the years in which project operations have most significantly affected fall outflows. Actions in these years are more likely to benefit delta smelt. (USFWS 2008.) The action calls for maintaining X2 in the fall of wet years and above-normal years at 74 km and 81 km, respectively. (Figures 14, 15, and 16; USFWS 2008.) In addition to increasing the quality and quantity of habitat for delta smelt, moving X2 westward in the fall may also reduce the risk of entrainment by increasing the geographic and hydrologic distance of delta smelt from the influence of the Project export facilities. (DOI 1, p. 34.)

The NAS (2010) commented on this action in their review of the USFWS Opinion and concluded:

> The X2 action is conceptually sound in that to the degree that habitat for smelt limits their abundance, the provision of more or better habitat would be helpful. However, the examination of uncertainty in the derivation of the details of this action lacks rigor. The action is based on a series of linked statistical analyses (e.g., the relationship of presence/absence data to environmental variables, the relationship of environmental variables to habitat, the relationship of habitat to X2, the relationship of X2 to smelt abundance), with each step being uncertain. The relationships are correlative with substantial variance being left unexplained at each step. The action also may have high water requirements and may adversely affect salmon and steelhead under some conditions (memorandum from USFWS and NMFS, January 15, 2010). As a result, how specific X2

targets were chosen and their likely beneficial effects need further clarification.

The State Water Board determines that inclusion of the delta smelt fall X2 action as a Category B flow criterion, consistent with requirements stipulated in the USFWS Opinion will likely improve habitat conditions for delta smelt. However, in light of the uncertainty about specific X2 targets and the overall effectiveness of the fall X2 action, the State Water Board recommends this action be implemented within the context of an adaptive management program. The program should include studies designed to clarify the mechanisms underlying the effects of fall habitat on the delta smelt populations, the establishment and peer review of performance measures and performance evaluation related to the action, and a comprehensive review of the outcomes of the action and effectiveness of the adaptive management program. (USFWS 2008.) Absent study results demonstrating the importance of fall X2 to the survival of delta smelt, fall flows beyond those stipulated in the fall X2 action for the protection of delta smelt are not recommended at this time.



Relationship between X2 and habitat area for delta smelt during fall, with standard shown for wet and above normal years. (Source: USFWS 2008, Figure B17).

Figure 15. X2 Versus Habitat Area for Delta Smelt During Fall

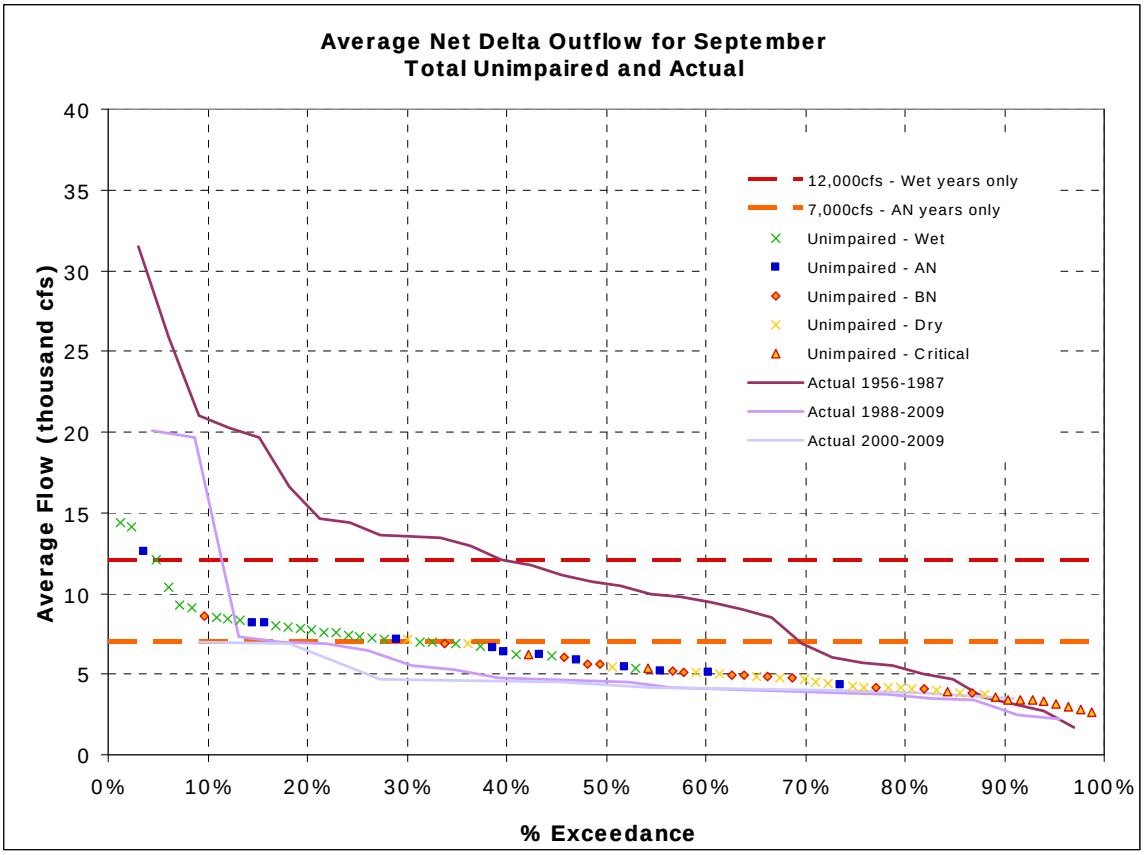


Figure 16. Net Delta Outflow Flow Exceedance Plot - September

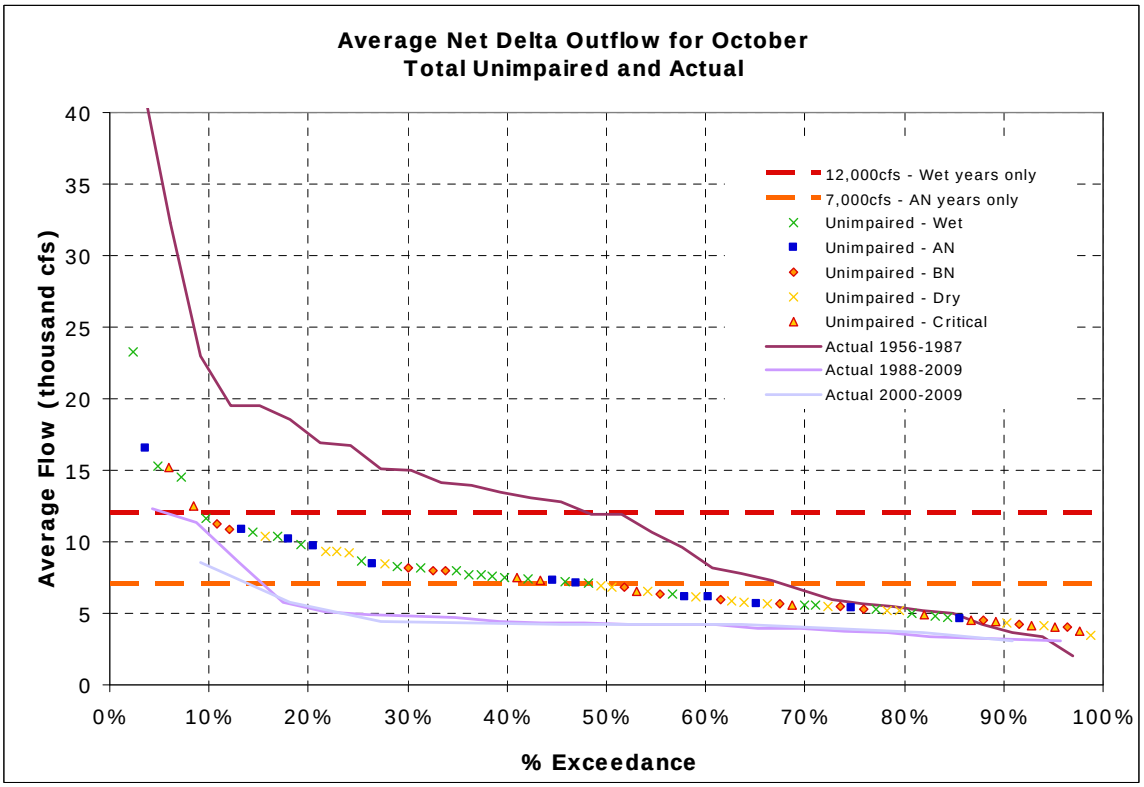


Figure 17. Net Delta Outflow Flow Exceedance Plot - October

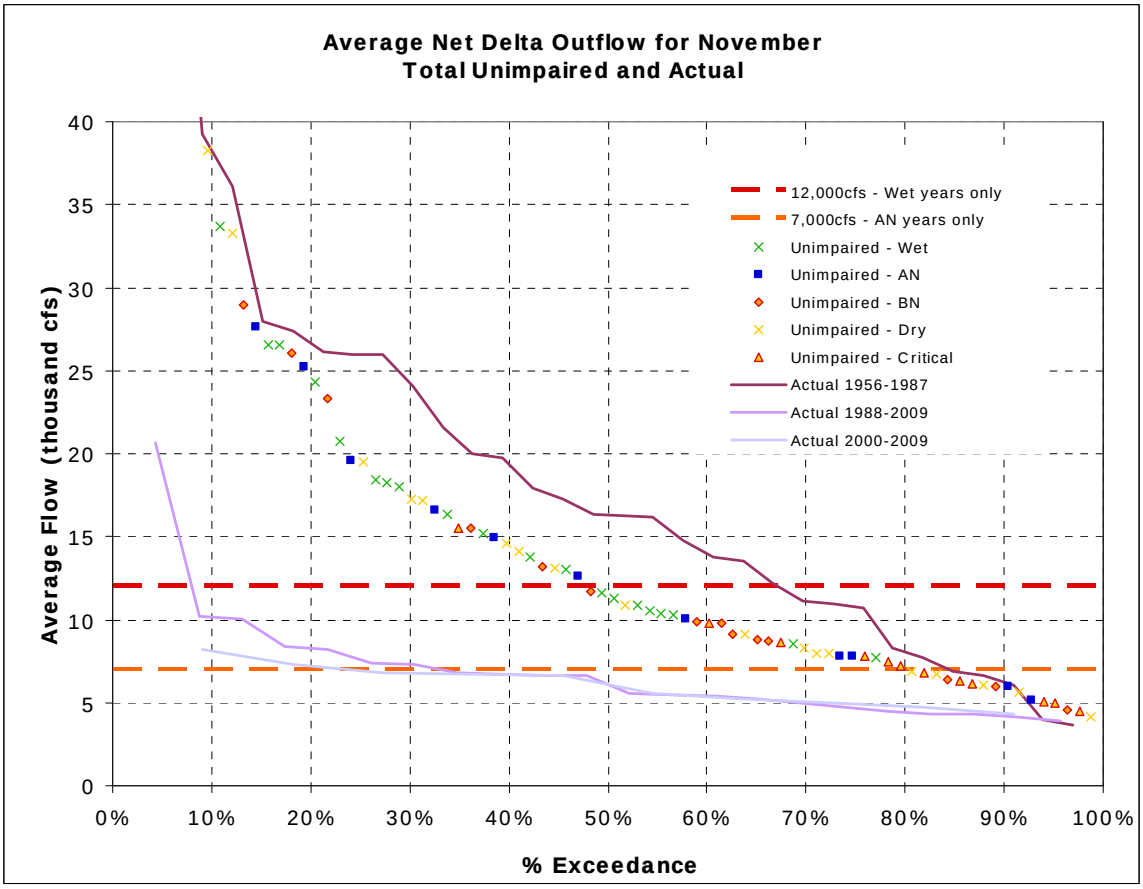


Figure 18. Net Delta Outflow Flow Exceedance Plot - November

The specific Delta outflow criteria may need to be tempered by the need to maintain water in reservoirs to provide adequate cold water and tributary specific flows on tributaries to the Delta. It may not be possible to attain both the flow criteria and meet the thermal and tributary specific flow needs of all of the sensitive species in the Delta Watershed. Water supply modeling and temperature analyses should be conducted to identify conflicting requirements to achieve both flow and cold water temperature goals.

Category B: 2006 Bay-Delta Plan Summer Fall Delta Outflow

Resident estuarine species, such as delta smelt, require flows sufficient to provide adequate habitat throughout the year. Delta outflow criteria for January through June are discussed above. In addition to providing flows to support resident species, sufficient flows must also be provided in the fall to provide attraction cues and a homing mechanism for returning adult salmon. Criteria for fall salmon attraction flows on the Sacramento and San Joaquin rivers are discussed in Sections 5.2 and 5.3. The 2006 Bay-Delta Plan contains summer fall Delta outflow water quality objectives for fish and wildlife beneficial uses, which are summarized below in Table 19.

Table 19. 2006 Bay-Delta Plan Delta Outflow Objectives for July through December

Water Year	July	Aug	Sept	Oct	Nov	Dec
Critical	4000	3000	3000	3000	3500	3500
Dry	5000	3500	3000	4000	4500	4500
Below Normal	6500	4000	3000	4000	4500	4500
Above Normal	8000	4000	3000	4000	4500	4500
Wet	8000	4000	3000	4000	4500	4500

Multiple participants submitted testimony concerning the need for additional flows in the fall to benefit delta smelt, striped bass, and other resident species (CSPA 1, p. 7; CWIN 2, p. 29; DOI 1, pp. 46-48; EDF 1, pp. 49-50; TBI/NRDC 2, pp. 27-37), and as a means to potentially control the spread of harmful invasive species (e.g., *Corbula* and toxic algae). (TBI/NRDC 2, pp. 27-37.) The recommendations were based largely on recent research conducted by Feyrer *et al*. (2007 and In Review) and the fall X2 action in the USFWS's Opinion. The Fall X2 action in the USFWS Opinion requires that sufficient outflow be provided in September through November of Above Normal and Wet water year types to position X2 at 81 km and 74 km, respectively. This action was restricted to Above Normal and Wet years because these are the years in which project operations have most significantly affected fall outflows and to limit potential conflicts with cold water pool storage. (USFWS 2008.)

Following its review of the USFWS Opinion, the NAS (2010) noted that:

> "[a]lthough there is evidence that the position of X2 affects the distribution of smelt, the weak statistical relationship between the location of X2 and the size of smelt populations makes the justification for this action difficult to understand." The X2 action is conceptually sound in that to the degree that the amount of habitat available for smelt limits their abundance, the provision of more or better habitat would be helpful." the committee concludes that how specific X2 targets were chosen and their likely beneficial effects need further clarification."

The USFWS Opinion also recognized uncertainty concerning the position of fall X2 and subsequent abundance of delta smelt and requires that the action be implemented with an adaptive management program to provide for learning and improvement of the action over time.

However, some participants provided flow recommendations that called for increased fall outflows during all water year types, as compared to the objectives in the 2006 Bay-Delta Plan, and in certain instances in excess of those required by the USFWS Opinion. Given the need for improved understanding concerning the fall X2 criterion, including the mechanisms underlying the effects of fall habitat on delta smelt populations, determination of specific X2 targets, potential conflicts with cold water pool storage, and the likely effectiveness of the action, the State Water Board is not advancing criteria for increased fall flows in Critical, Dry, and Below Normal water year types beyond those required in the 2006 Bay-Delta Plan and in Above Normal and Wet water year types beyond those stipulated in the fall X2 action (Category B). The quantity and timing of fall outflows necessary to protect public trust resources warrants further evaluation and underscores the need for a well-designed adaptive management program. The potential

to use variability in flows during summer and fall months as a means of controlling the distribution and abundance of invasive species should also be evaluated.

5.2 Sacramento River

Following are the Sacramento River inflow criteria based on analysis of the species-specific flow criteria and other measures:

1) Sacramento River Flow at Rio Vista: 75 percent of 14-day average unimpaired flow from April through June to increases juvenile salmon outmigration survival for fall-run Chinook salmon
2) Sacramento River Flow at Rio Vista: 75 percent of 14-day average unimpaired flow from November through March to increases juvenile salmon outmigration survival for other runs of Chinook salmon
3) Sacramento River at Wilkins Slough: Provide pulse flows of 20,000 cfs for 7 days starting in November coincident with fall/early winter storm events; the timing, magnitude, duration, and number of pulses should be determined on an adaptive management basis informed by unimpaired flow conditions and monitoring of juvenile salmon migration to promote juvenile salmon emigration
4) Sacramento River Flow at Freeport: Provide flows of 13,000 to 17,000 cfs in the Sacramento River downstream of confluence with Georgiana Slough when salmon are migrating through the Delta from November through June to increase juvenile salmon outmigration survival by reducing straying into Georgiana Slough and the central Delta
5) Sacramento River at Rio Vista: 2006 Bay-Delta Plan flow objectives for September and October to provide Fall adult Chinook salmon attraction flows

The magnitude, duration, timing, and source of Sacramento River inflows are important to all runs of Chinook salmon migrating through the Bay-Delta and several different aspects of their life history. Inflows are needed to provide appropriate conditions to cue upstream adult migration to the Sacramento River and its tributaries, adult holding, egg incubation, juvenile rearing, emigration from the Sacramento River and its tributaries, and other functions. Sacramento River inflows are important throughout the year to support various life stages of the different Chinook salmon runs inhabiting the Sacramento River. However, given the focus of this proceeding on inflows to the Delta and the importance of the juvenile salmon emigration period, the Sacramento River inflow criteria included in this report focus primarily on flows needed to support emigrating juvenile Chinook salmon from natal streams through the Delta. Following is a brief summary of the Sacramento River inflow criteria that were developed based on the species-specific flow needs analyses for salmon included in section 4.2.3 followed by a detailed discussion.

Available scientific information indicates that average April through June flows of 20,000 to 30,000 cfs on the Sacramento River at Rio Vista represent a flow threshold at which survival of juveniles and subsequent adult abundance is substantially improved for fall-run Chinook salmon. Less information is available for the other runs of Chinook salmon on the Sacramento River. However, outmigration flows needed to protect other races are assumed to be generally the same since factors that affect fall-run survival are generally applicable to other runs with some exceptions. In addition, analyses indicate that providing pulse flows of 20,000 cfs at Wilkins Slough on the Sacramento River beginning in November and extending through the first of the year provides for earlier

migration timing and increased survival of juvenile winter, spring, and late-fall run Chinook salmon. In addition, information indicates that flows of 13,000 cfs to 17,000 cfs may be needed on the Sacramento River at Freeport to prevent salmon from migrating through Georgiana Slough and the interior Delta where survival is substantially lower.

Continuity of flows from natal stream through the Delta and flow variability are also important so rather than static April through June threshold flows of 20,000 to 30,000 cfs, the State Water Board determines, as a Category A criterion, that 75□ of unimpaired flow is needed to achieve a threshold flow of 25,000 cfs (average of 20,000 and 30,000 cfs) approximately 50□ of the time. The same percentage of unimpaired flow for the November through March period is also advanced as a Category B criterion due to the lack of information upon which this criterion was based. In addition, as Category B criteria, the State Water Board determines that shorter pulse flows of 20,000 cfs for 7 days at Wilkins Slough are needed starting in November and extending through the first of the year and flows of 13,000 cfs to 17,000 cfs at Freeport are needed from November through June to provide additional protection for Sacramento River Chinook salmon. The State Water Board also advances the Sacramento River flow objectives from the Bay-Delta Plan during September and October to provide a minimal level of protection during these months pending development of additional information concerning flow needs during this period. All of the Sacramento River flow criteria are not precise; rather they reflect the general timing and magnitude of flows needed to protect public trust resources, but could serve as a reasonable basis from which future analysis and adaptive management could proceed. The criteria also do not consider other Sacramento River flow needs.

Sacramento River Inflow as a Percentage of Unimpaired Flows

It appears to be important to preserve the general attributes of the natural hydrograph to which the various salmon runs adapted over time. Information indicates that Chinook salmon respond to variations in flows and need some continuity of flow between natal streams and the Delta for transport and homing fidelity. As such, the historic practice of developing monthly flow criteria to be met from limited sources may be less than optimal for protecting Chinook salmon runs. At the same time, given the impediments to fish passage into historic spawning and rearing areas, there may also be a need to diverge from the natural hydrograph at certain times of year to provide more flow than might have naturally occurred or less flow such that those flows are available at other times of year to mitigate for passage and habitat issues (e.g. cold water pool management).

Based on the above, the State Water Board developed Sacramento River inflow criteria, intended to mimic the natural hydrograph during the peak emigration period, to protect emigrating juvenile Chinook salmon. While emigration of some runs may occur outside of this period, peak emigration is generally believed to occur between November through June. As such, the criteria are recommended to apply to this time period. To achieve the attributes of a natural hydrograph, the criteria are recommended as a percentage of unimpaired flow on a 14-day average, to be provided generally on a proportional basis from the tributaries to the Sacramento River. The 14-day average is intended to better capture the peaks of actual flows compared to a 30-day average time-step, while still allowing for a time-step at which facilities can be operated. The appropriateness of this time-step for protecting public trust resources should be further evaluated.

Spring Sacramento River Inflows at Rio Vista

The species-specific flow needs analyses for salmon in section 4.2.3 indicates that average April through June flows of 20,000 to 30,000 cfs on the Sacramento River at Rio Vista provide for improved survival and abundance of juvenile fall-run Chinook salmon on the Sacramento River.

Flow exceedance graphs were used to determine the percentage of flow needed to achieve various flows needed to protect Chinook salmon. Analysis of unimpaired flows at Freeport (Figure 19) shows that under historic unimpaired conditions, average April through June flows of 30,000 cfs or more would occur in approximately 60□ of years. Flows of 25,000 cfs or more would occur is approximately 72□ of years, and flows of 20,000 cfs or more would occur in roughly 85□ of years. At 75□ of unimpaired flows, average flows of 30,000 cfs would be achieved between April and June in roughly 37□ of years, flows of 25,000 cfs would be achieved in roughly 50□ of years, and flows of 20,000 cfs would be achieved in approximately 70□ of years. At 50□ of unimpaired flows, flows of 30,000 cfs would be achieved in approximately 15□ of years, flows of 25,000 cfs in roughly 25□ of years, and flows of 20,000 cfs in roughly 35□ of years. Actual flows of 30,000, 25,000, and 20,000 cfs were met in 26, 32, and 39□ of years, respectively between 1986 and 2005. It is important to note, however, that unimpaired flows between 1986 through 2005 are not necessarily representative of the longer term unimpaired flow record. Flow criteria equal to 75□ of unimpaired flows during the April through June period, on average, would therefore provide favorable conditions for fall-run juvenile Chinook salmon in at least 50□ of years (assuming 25,000 cfs flows). As a result, the State Water Board advances 75□ of unimpaired flows on a 14-day average from April through June as a potential means to achieve the 20,000 to 30,000 cfs Sacramento River flow threshold discussed above while maintaining variability and the attributes of the natural hydrograph. This criterion is included as criterion 1) for Sacramento River flows and is a Category A criterion.

The unimpaired estimates from which the 75□ criterion is calculated are monthly estimates. Estimates of 14-day unimpaired flow have not been published, but are expected to generate an exceedance curve similar to one generated with monthly estimates. This specific percent of unimpaired flow and the averaging period should be adaptively managed. More information and analyses should be conducted to determine if there are maximum flows above which no, or significantly diminishing, additional biological or geomorphological benefits are obtained. This criterion would allow for flows to vary over time coincident with precipitation events reflecting the natural hydrograph. Climate change, however, and its associated effect on flow patterns will likely change how effective such flows are in protecting Chinook salmon. As such, these flow criteria would need to be adaptively managed in the future to ensure the protection of Chinook salmon.

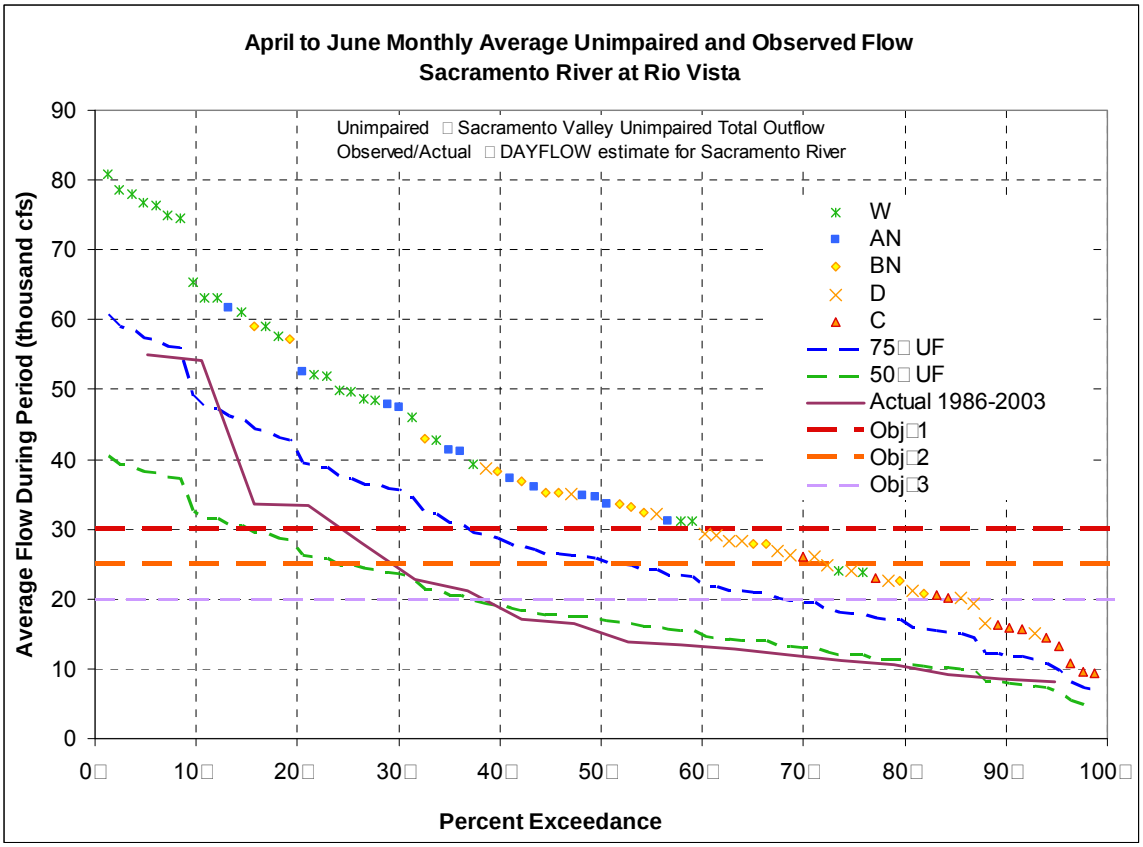


Figure 19. Sacramento River Flow Exceedance Plot - April through June

Fall and Winter Sacramento River Inflows at Rio Vista

Available data and analysis focus primarily on juvenile fall-run Chinook salmon outmigration. Outmigration flows to protect other races and life stages are assumed to be generally the same since factors that affect fall-run survival are generally applicable to other runs, with some exceptions including temperature, which may not be a concern in the winter months. (USFWS 1992, p. 8.) In the absence of sufficient data and analyses regarding flows needed for other Chinook salmon runs, however, the State Water Board advances 75□ of unimpaired flows between November and March as an initial criterion from which future analysis and adaptive management could proceed. There is, however, no specific information that indicates that 75□ is the correct percent of unimpaired flow. Additional quantitative analyses should be conducted to determine the specific flow needs of winter, spring, and late-fall run Chinook salmon.

Sacramento River Flow at Freeport

Analyses show that Chinook salmon survival is significantly lower for fish migrating through Georgiana Slough. Reverse flows in the vicinity of Georgiana Slough increase the occurrence of salmon migrating through Georgiana Slough. The available data show that flows of 13,000 to 17,000 cfs on the Sacramento River at Freeport provide adequate flow conditions to prevent reverse flows in Georgiana Slough. Flow criteria of 13,000 to 17,000 cfs on the Sacramento River at Freeport when salmon are migrating through the Delta during the November through June period is advanced as a Category B criterion. Additional analyses should be conducted to verify that flows of this magnitude are

needed to achieve the desired outcome of significantly reducing straying of outmigrating juvenile Chinook salmon. These flows are also expected to benefit adult Chinook salmon returning to the Sacramento River basin to spawn during this period. However, additional analyses regarding the relationship of adult Chinook salmon and reverse flows in Georgiana Slough should also be conducted.

Sacramento River Flow at Wilkins Slough

Information discussed in the species-specific flow needs analyses for salmon in section 4.2.3 indicates that significant precipitation in the Sacramento River in the fall facilitates emigration of juvenile Chinook salmon. When this flow is delayed, emigration of salmon is also delayed resulting in reduced survival to the Delta. The available data show that juvenile salmon require flows of 15,000 cfs to 20,000 cfs at Wilkins Slough by November continuing through the first of the year to facilitate emigration. These flows are needed to provide ecological continuity from natal streams to the Delta. Information supports a range of pulse flows of 15,000 cfs to 20,000 cfs at Wilkins Slough to be provided coincident with fall and early winter storm events. This range should be adaptively managed and further evaluated. Absent additional information, flows of 20,000 cfs for seven days are advanced. Such an approach will retain the attributes of the natural hydrograph and provide for ecological continuity. The timing, magnitude, duration, and number of pulses should be determined through adaptive management, informed by unimpaired flow conditions and monitoring of juvenile salmon migration. Additional analyses should be conducted regarding this flow relationship to refine these criteria and inform adaptive management.

Sacramento River at Rio Vista: 2006 Bay-Delta Plan Objectives

The above criteria cover flows on the Sacramento River from the November through June time period. In addition, the Bay-Delta Plan provides minimum flows from September through December. Aside from what is discussed above, there was no new information submitted in the record for this proceeding on fall flows and the Sacramento River fall flow objectives were not specifically reviewed. In the absence of any new information, the State Water Board advances the 2006 Bay Delta Plan Sacramento River inflow objectives for September and October as a Category B criterion. Given that Chinook salmon may also be present in the Sacramento River during July and August, it is likely warranted that some minimal flows be provided during those months as well. However, adequate information on which to base such flows was not readily available for this proceeding. Further, adequate minimal flows during this time period may be provided by temperature and other requirements and reservoir releases for power production and export operations.

The specific Sacramento River flow criteria may need to be tempered by the need to maintain water in reservoirs to provide adequate cold water and tributary specific flows in the Sacramento River basin. It may not be possible to attain both the flow criteria and meet the thermal and tributary specific flow needs of the various runs of Chinook salmon and other sensitive species in the Sacramento River basin. Water supply modeling and temperature analyses should be conducted to identify conflicting requirements to achieve both flow and cold water temperature goals.

5.3 San Joaquin River

Following are the San Joaquin River inflow criteria based on analysis of the species-specific flow criteria and other measures:

1) San Joaquin River at Vernalis: 60□ of 14-day average unimpaired flow from February through June
2) San Joaquin River at Vernalis: 10 day minimum pulse of 3,600 cfs in late October
3) San Joaquin River at Vernalis: 2006 Bay-Delta Plan flow objective for October

San Joaquin River inflow criterion 1 and 2 are Category A criteria because they are supported by sufficiently robust scientific information. The 2006 Bay-Delta Plan San Joaquin River inflow objective for October is included as a Category B criterion because it is not clear that eliminating this criterion in lieu of criteria 2 would provide adequate protection to migrating adult Chinook salmon. Following is discussion and rationale for these criteria. Category A and B criteria are both equally important for protection of the public trust resource, but there is more uncertainty about the appropriate volume of flow required to achieve the goals of the Category B criterion. Following is discussion and rationale for these criteria.

As discussed in the Sacramento River inflow section, the magnitude, duration, timing, and source of San Joaquin River inflows are important to Chinook salmon migrating through the Bay-Delta and several different aspects of their life history. Inflows are needed to provide appropriate conditions to cue upstream adult migration to the San Joaquin River and its tributaries, adult holding, egg incubation, juvenile rearing, emigration from the San Joaquin River and its tributaries, and other functions. San Joaquin River inflows are important for much of the year to support various life stages of San Joaquin basin fall-run Chinook salmon (and spring-run when they are reintroduced). However, given the focus of this proceeding on inflows to the Delta and the lack of information received concerning spring-run flow needs on the San Joaquin River, the San Joaquin River inflow criteria included in this report focus on flows needed to support migrating fall-run Chinook salmon from and to natal streams through the Delta. Following is a brief summary of the San Joaquin River inflow criteria that were developed based on the species-specific flow needs analyses for salmon included in section 4.2.3 followed by a detailed discussion.

Available scientific information indicates that average March through June flows of 5,000 cfs on the San Joaquin River at Vernalis represent a flow threshold at which survival of juveniles and subsequent adult abundance is substantially improved for fall-run Chinook salmon and that average flows of 10,000 cfs during this period may provide conditions necessary to achieve doubling of San Joaquin basin fall-run. Both the AFRP and DFG flow recommendations to achieve doubling also seem to support these general levels of flow, though the time periods are somewhat different (AFRP is for February through May and DFG is for March 15 through June 15). Available information also indicates that flows of 3,000 to 3,600 cfs for 10 to 14 days are needed during mid to late October to reduce straying, improve olfactory homing fidelity, and improve gamete viability for San Joaquin basin returning adult Chinook salmon.

Continuity of flows from natal stream through the Delta and flow variability are also important, so rather than advancing static flow criteria for the spring period to support emigration of juvenile San Joaquin basin fall-run Chinook salmon, the State Water Board

determines, as a Category A criterion, that 60□ of unimpaired flow from February through June is needed in order to achieve a threshold flow of 5,000 cfs or more in most years (over 85□ of years) and flows of 10,000 cfs slightly less than half of the time (45□ of years). Given that the focus of this proceeding is on protection of public trust resources, the State Water Board determines that the time period for these flows should be extended to cover all three periods supported by the DFG, AFRP, and TBI/NRDC analyses concerning flow needs. In addition, the State Water Board determines, as a Category A criterion, that flows of 3,600 cfs are needed for 10 days in late October. These flows could also be provided in a manner that better reflects the natural hydrograph to coincide with natural storm events. Until additional information is developed, maintaining the October pulse flow called for in the 2006 Bay-Delta Plan is also determined to be a Category B criterion to assure that the existing protection provided during this period is not diminished. All of the San Joaquin River flow criteria are not precise; rather they reflect the general timing and magnitude of flows needed to protect public trust resources, but could serve as a reasonable basis from which future analysis and adaptive management could proceed. The criteria also do not consider other San Joaquin River flow needs.

San Joaquin River Inflows as a Percentage of Unimpaired Flow During the Spring

As discussed in the Sacramento River inflow section, it is important to preserve the general attributes of the natural hydrograph to which the various salmon runs adapted to over time, including variations in flows and continuity of flows. Accordingly, as with the Sacramento River flow criteria, the State Water Board developed flow criteria for San Joaquin River inflows to protect emigrating juvenile Chinook salmon intended to mimic the natural hydrograph during the peak emigration period of February through June. This period may also cover a portion of the rearing period for juveniles as well. As with the Sacramento River flow criteria, to achieve the attributes of a natural hydrograph, the criteria are advanced as a percentage of unimpaired flow on a 14-day average, to be achieved on a proportional basis from the tributaries to the San Joaquin River. The unimpaired estimates from which the 60□ criterion is calculated are monthly estimates. Estimates of 14-day unimpaired flow have not been published, but the exceedance curve is likely similar to one generated with monthly estimates. The appropriateness of this time-step and the percentage of unimpaired flows should be further evaluated.

To determine the percentage of unimpaired flow needed to protect Chinook salmon, the State Water Board reviewed flow exceedance information to determine what percentage of flow would be needed to achieve various flows. The analysis in section 4.2.3 indicates that increasing spring flows on the San Joaquin River and its tributaries is needed to protect Chinook salmon in the San Joaquin River basin. The TBI/NRDC analyses of temperatures and population growth indicate that there is a threshold response for fall-run Chinook salmon survival to flows above 5,000 cfs during the spring period and that average flows of 10,000 cfs during this same period may provide adequate flows to achieve doubling. Both the AFRP and DFG modeling analyses also seem to support these flows. However, the time periods for the AFRP recommended flows is from February through May and the time period for the DFG recommended flows is from March 15 through June 15. AFRP, DFG, and TBI/NRDC provide different recommendations for how to distribute flows during the spring period in different years, with increasing flows in increasingly wet years. All are generally consistent with an approach that mimics the natural flow regime to which these fish were adapted. Other analyses speak to the validity of this approach. (Propst and Gido, 2004 and Marchetti and Moyle, 2001, as cited in DOI 1, p. 25.) San Joaquin River flow criteria for the

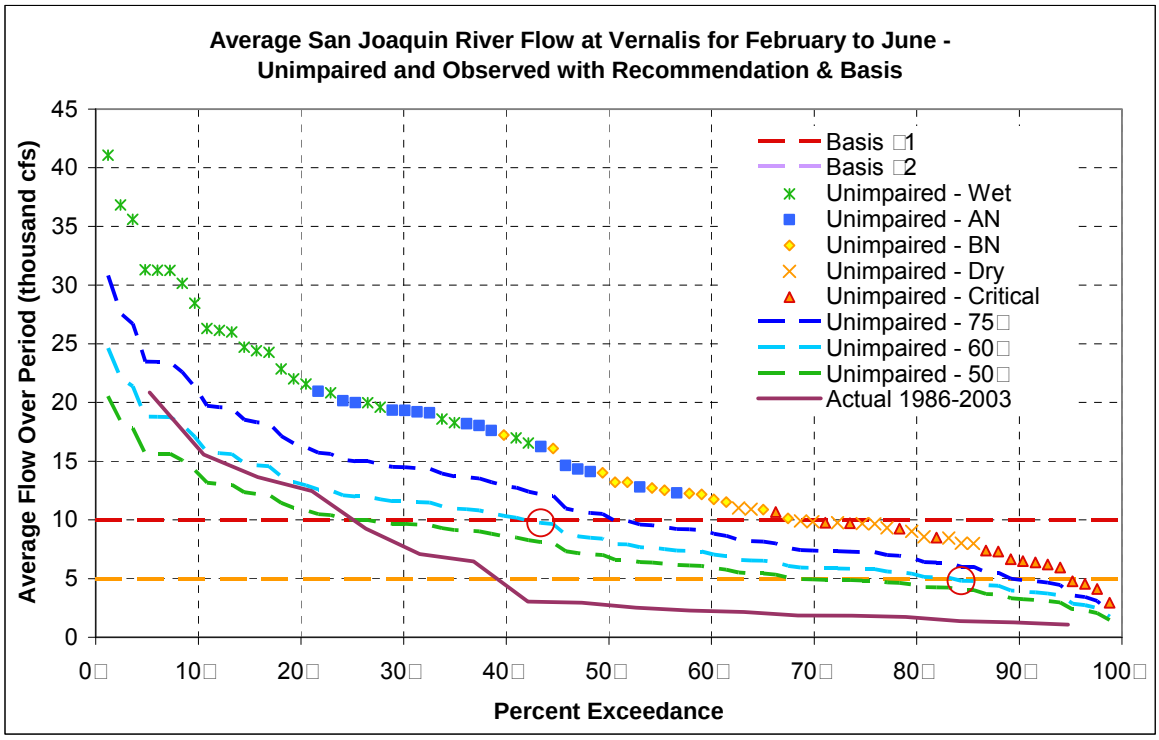
February through June period are determined to be 60□ of unimpaired flows. Figure 20b shows that if 60□ of unimpaired San Joaquin River flow at Vernalis were provided, average March through June flows would meet or exceed 5,000 cfs in over 85□ of years (shown by red circle). An unimpaired flow of 60□ during this period would also meet or exceed 10,000 cfs during the March through June time period in approximately 45□ of years. The exceedance rates are not significantly different if applied to the February through June period as shown in Figure 20a. Additional information should be developed to determine whether these flows could be lower or higher and still meet the Chinook salmon doubling goal in the long term.

San Joaquin River Fall Flows

In addition to spring flows, fall pulse flows on the San Joaquin River are needed to provide adequate temperature and DO conditions for adult salmon upstream migration, to reduce straying, improve gamete viability, and improve olfactory homing fidelity for San Joaquin basin salmon. Analyses support a range of flows from 3,000 to 3,600 cfs for 10 to 14 days during mid to late October. Absent additional information, the State Water Board determines flow criteria for late fall to be 3,600 cfs for a minimum of 10 days in mid to late October. Providing these flows from the tributaries to the San Joaquin River that support fall-run Chinook salmon appears to be a critical factor to achieve homing fidelity and continuity of flows from the tributaries to the mainstem and Delta. Until additional information is developed regarding the need to maintain the 2006 Bay-Delta Plan October flow objective, these flows supplement and do not replace the 2006 Bay-Delta Plan October flow requirements such that flows do not drop below historic conditions during the remainder of October when the pulse flow criteria would not apply. Additional analyses should be conducted to determine the need to expand the pulse flow time period and modify the criteria to better mimic the natural hydrograph by coinciding pulse flows with natural storm events in order to potentially improve protection by mimicking the natural hydrograph.

Given that salmon and steelhead may be present in the San Joaquin River and its tributaries for all or most of the year (including spring-run in the future) and that the Bay-Delta plan does not currently include any flow requirements from July through September and November through January, additional flow criteria for the remainder of the year may be needed to protect Chinook salmon and their habitat. Specifically, additional criteria for spawning, egg incubation, rearing and riparian vegetation recruitment may be needed. However, adequate information is not available in the record for this proceeding upon which to base such criteria at this time. Additional information, building on the AFRP and other analyses, should be developed to determine needed flows for the remainder of the year.

a)



b)

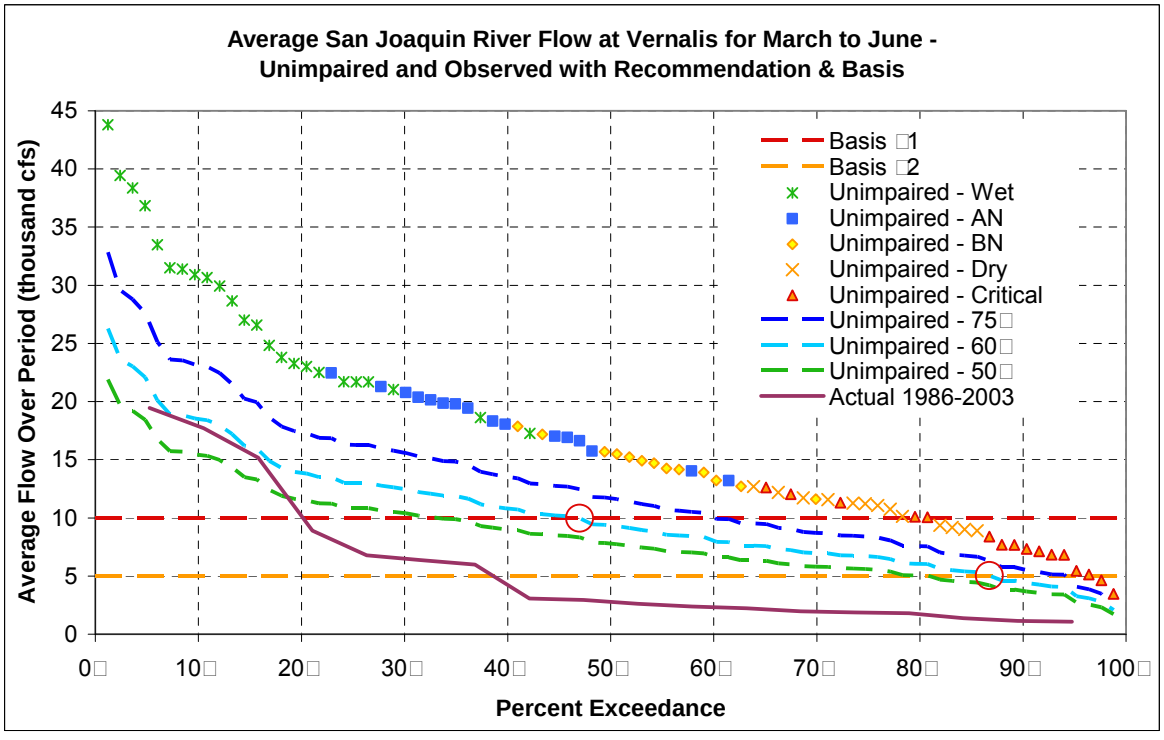


Figure 20. San Joaquin River Flow Exceedance Plot - February through June

The specific San Joaquin River flow criteria may need to be tempered by the need to maintain water in reservoirs to provide adequate cold water and tributary specific flows in the San Joaquin River basin. It may not be possible to attain both the flow criteria and meet the thermal and tributary specific flow needs of steelhead, fall-run Chinook salmon, and other sensitive species in the San Joaquin River basin. Water supply modeling and temperature analyses should be conducted to identify conflicting requirements to achieve both flow and cold water temperature goals.

5.4 Hydrodynamics

The following hydrodynamic related criteria have been developed based on analysis of the species-specific flow criteria and other measures discussed above:

1) San Joaquin River Flow to Export Ratio: Vernalis flows to exports great than .33 during the 10 day San Joaquin River pulse flow in October
2) Old and Middle River Flows: greater than -1,500 cfs in March and June of Critical and Dry water years
3) Old and Middle River Flows: greater than 0 or -1,500 cfs in April and May of Critical and Dry water years, when FMWT index for longfin smelt is less than 500, or greater than 500, respectively
4) Old and Middle River Flows: greater than -5,000 cfs from December through February in all water year types
5) Old and Middle River Flows: greater than -2,500 when salmon smolts are determined to be present in the Delta from November through June
6) San Joaquin River Flow to export Ratio: Vernalis flow to exports greater than 4.0 when juvenile San Joaquin River salmon are migrating in the mainstem San Joaquin River from March through June
7) San Joaquin River at Jersey Point Flows: Positive flows when salmon are present in the Delta from November through June
8) 2006 Bay-Delta Plan Exports to Delta Inflow Limits for the Entire Year

Hydrodynamic criteria 1 is a Category A criterion because it is supported by more robust scientific information. Hydrodynamic criteria 2-7 are Category B criteria because there is less scientific information, with more uncertainty, to support the specific numeric criteria. The 2006 Bay-Delta Plan exports to Delta inflow objective (criteria 8) is offered as a Category B criterion as a minimal level of protection when the other criteria above do not apply. However, the validity of the specific export restrictions included in the 2006 Bay-Delta Plan were not specifically reevaluated. Category A and B criteria are both equally important for protection of the public trust resource, but there is more uncertainty about the appropriate volume of flow required to achieve the goals of the Category B criteria. Following is discussion and rationale for these criteria.

<u>Pelagic Species Criteria</u>

Net OMR reverse flows have increased in both magnitude and frequency with the development of the California water projects (Figure 8) and are having a detrimental effect on biotic resources in the Delta. (Brown et al. 1996.) It is also clear that the negative impact of net OMR reverse flows increases as Sacramento River inflows and net Delta outflow decreases. (Grimaldo et al. 2009; Kimmerer 2008; USFWS 2008; NMFS, 2009.) Net OMR flow restrictions for the protection of longfin and Delta smelt are only recommended for dry and critically dry water years when less Delta outflow may be available (Table 23, criteria 2 and 3). No spring restrictions for the protection of longfin

and delta smelt are proposed for other water year types if the higher net Delta outflow criteria are met. If higher outflows are not provided in wetter years, then restrictions on OMR may be needed in these years as well. The State Water Board determines that net OMR flow criteria of greater than -5,000 cfs, from December through February in all water year types, to protect upstream migrating adult smelt are needed. The -5,000 cfs criterion may need to be made more protective if a large portion of the smelt population moves into the central Delta. The additional restrictions would be recommended after consultation with the USFWS (2008) Smelt Working Group. Spring and winter net OMR flow criteria for the protection of longfin and Delta smelt are classified as Category B because, as noted by the NAS (2010),

> □□ the data do not permit a confident identification of the threshold [OMR] values to use □ and □ do not permit a confident assessment of the benefits to the population□ As a result, the implementation of this action needs to be accompanied by careful monitoring, adaptive management and additional analyses that permit regular review and adjustment of strategies as knowledge improves□ □

Chinook Salmon Criteria

Salmon must migrate through the Delta past the effects of the south Delta export facilities and the associated inhospitable conditions in the central Delta, first as juveniles on their way to the ocean, and later as adults returning to spawn. Exports change the hydrodynamic patterns in the Delta, drawing water across the Delta rather than allowing water to flow out of the Delta in a natural pattern. Over the years, different criteria have been developed to attempt to protect migrating salmon from the adverse hydrodynamic conditions caused by the south Delta export facilities in order to preserve the functional flows needed for migration that could be used to protect public trust resources. Net OMR flows, Jersey Point flows, and Vernalis flow to export ratios are all criteria that can be used to protect migrating salmon. The State Water Board advances a combination of these criteria to protect migrating salmon from export effects.

Increasingly negative net OMR flows have been shown to increase particle entrainment, particularly beginning at flows between -2,500 and -3,500 cfs. While juvenile salmon do not necessarily behave like particles, the particle entrainment estimates are a useful guide until additional information can be developed using evolving acoustic tracking methods and other appropriate techniques. Reduced negative net OMR flows should also provide some level of protection from the indirect reverse flow effects related to fish entering the central Delta where predation and other sources of mortality are higher. Based on the above, the State Water Board determines criteria for net OMR flows should be for greater than -2,500 cfs when salmon are present in the Delta during the peak juvenile outmigration period of November through June, for the protection of Chinook salmon. This is a Category B criterion because there is limited information upon which to base a specific numeric criteria at this time. Such information should be developed to better understand the relationship between salmon survival and net OMR flows to determine more specific criteria that would protect against entrainment and other factors leading to indirect mortality.

Increased reverse flows at Jersey Point have also been shown to decrease survival of salmon smolts migrating through the lower San Joaquin River. However, the precise Jersey Point flow that is necessary to protect migrating salmon is unclear. In addition, it is unclear whether the same functions of such a flow could be better met using different

criteria such as net OMR flows or San Joaquin River flow to export ratios. The State Water Board therefore advances positive Jersey Point flows when salmon are present in the Delta during the peak juvenile salmon outmigration period of November through June. Again, this is a Category B criterion because there is limited information upon which to base a specific numeric criteria at this time.

Increased San Joaquin River flow to export ratios appear to improve survival for San Joaquin River salmon, though the exact ratio that is needed to protect public trust resources is not well understood. A San Joaquin River flow to export ratio of greater than 4.0 is recommended as a Category B criterion when San Joaquin River juvenile salmon are outmigrating from the San Joaquin River from March through June. There is, however, sufficient information in the record to support a Category A criterion for exports to be kept to less than 300 of San Joaquin River flows (equal to a San Joaquin River flow to export ratio of more than 0.33) at the same time that the recommended San Joaquin River pulse flows are provided. Additional analyses should be conducted to determine if this time frame should be extended to capture more of the San Joaquin River adult Chinook salmon return period between October and January.

The NAS review concerning OMR restrictions for salmon concluded that:

> the strategy of limiting net tidal flows toward the pump facilities is sound, but the support for the specific flows targets is less certain. In the near-term telemetry-based smolt migration and survival studies (e.g, Perry and Skalski, 2009) should be used to improve our understanding of smolt responses to OMR flow levels. (NAS 2010, p. 44.)

Much additional work is needed to better understand the magnitude and timing of the recommended criteria and how net OMR flow criteria should be integrated with other criteria for San Joaquin River flows, San Joaquin River flows to export ratios, Sacramento River flows, and net OMR flow restrictions for the protection of pelagic species. For all of the OMR, Jersey Point, and Vernalis flows to export ratiocriteria, further analysis and consideration is needed to determine: 1) how salmon presence should be measured and the information used to temper the criteria; 2) an appropriate averaging period; and 3) how to adaptively manage to assure that flows are sufficiently, but not overly, protective.

The October San Joaquin River flow to export ratio criteria is a Category A criterion since the basis for this minimum criterion is sufficiently understood to develop a quantitative criteria. Additional analyses should still, however, be conducted to determine if this criteria could be refined to provide better protection for migrating adult San Joaquin River Chinook salmon. All of the other hydrodynamic criteria for the protection of Chinook salmon are Category B criteria.

The San Joaquin River flow to export criterion during the spring is also a Category B criterion due to a lack of certainty regarding the needed protection level. Regarding this issue, the NAS concluded that:

> the rationale for increasing San Joaquin River flows has a stronger foundation than the prescribed action of concurrently managing inflows and exports. We further conclude that the implementation of the 6-year steelhead smolt survival study (action IV.2.2) could provide useful insight

> as to the actual effectiveness of the proposed flow management actions as a long-term solution. (NAS 2010, p. 45.)

In addition, based on similar uncertainty regarding needed protection levels and interaction between net OMR flows and San Joaquin River flows to export ratios, the San Joaquin River at Jersey Point criterion is also a Category B criterion. More work is needed to develop a suite of operational tools and an operational strategy for applying those tools to protect public trust resources in the Delta from the adverse hydrodynamic effects of water diversions, channel configurations, reduced flows, and other effects.

2006 Bay-Delta Plan Export Objectives

The 2006 Bay-Delta Plan includes export limitations for the entire year. From February through June exports are limited to 35-45 of Delta inflow. (State Water Board 2006a, pp. 184-187.) From July through January, exports are limited to 65 of Delta inflow. (*Id.)* The export to Delta inflow restrictions are intended to protect the habitat of estuarine-dependent species. (State Water Board 2006b, pp. 46-47.) These export restrictions provide a minimum level of protection for public trust uses and should be maintained to the extent that the other recommended criteria do not override them.

For all of the hydrodynamic criteria, biologically appropriate averaging periods need to be developed. Averaging periods may need to include a two-step approach whereby a shorter averaging period is included that allows for some divergence from the criteria and a longer averaging period is included that does not.

5.5 Other Inflows - Eastside Rivers and Streams

The Cosumnes and Mokelumne rivers, and smaller streams such as the Calaveras River, Bear Creek, Dry Creek, Stockton Diversion Channel, French Camp Slough, Marsh Creek, and Morrison Creek are all tributary to the Delta. Flows should generally be provided from tributaries in proportion to their contribution to unimpaired flow.

5.6 Other Measures

5.6.1 Variability, Flow Paths, and the Hydrograph

Criteria should reflect the frequency, duration, timing, and rate of change of flows, and not just volumes or magnitudes. Accordingly, whenever possible, the criteria specified herein are expressed as a percentage of the unimpaired flow rather than as a single number or range of numbers that vary by water year type. Additional efforts should focus on restoring habitat complexity. Inflows should generally be provided from tributaries to the Delta watershed in proportion to their contribution to unimpaired flow in order to assure connection between Delta flows and upstream tributaries, to the extent that such connections are beneficial to protecting public trust resources. Flows should be at levels that maintain flow paths and positive salinity gradients through the Delta. This concept is reflected in the specific determinations made above. More study is needed to determine to which tributaries such criteria should apply. For example, since the percent of unimpaired flow criteria determined to protect public trust uses for San Joaquin River inflows is at times lower than the criteria determined for Delta outflow, more study is needed to determine the appropriate source of such flows to protect public trust resources. All determined flow criteria must also be tempered by the need to protect health and safety. No flow criteria, for example, should be in excess of flows that would lead to flooding. For all of the flow criteria, there may be a need to reshape the

specified flows to better protect public trust resources based on real-time considerations. All of the criteria should be implemented adaptively to allow for such appropriate reshaping to improve biological and geomorphological processes.

Moyle *et al* (2010) concluded, however, that there is a fundamental conflict between restoring variability and maintaining the current Delta:

> restoring environmental variability in the Delta is fundamentally inconsistent with continuing to move large volumes of water through the Delta for export. The drinking and agricultural water quality requirements of through-Delta exports, and perhaps even some current in-Delta uses, are at odds with the water quality and variability needs of desirable Delta species.

5.6.2 Floodplain Activation and Other Habitat Improvements

Activated floodplains stimulate food web activity and provide spawning and rearing habitat for floodplain adapted fish. The frequency of low-magnitude floods that occurred historically has been reduced, primarily by low water control levees. The record supports the conclusion that topography changes associated with future floodplain restoration will provide improved ecosystem function with less water. Studies and demonstration projects for, and implementation of, floodplain restoration projects should therefore proceed to allow for the possible reduction of flows required to protect public trust resources in the Delta.

Floodplain Flow Determinations for Protection of Salmon and Splittail:
Floodplain and off-channel inundation are required for splittail spawning and appear to be important in protecting Chinook salmon. At the same time, it is also important how and when such inundation occurs. Due to the effects of levees and dams, natural side channel and floodplain inundating flows have been substantially reduced. As a result, modification to weirs and other changes may be needed to substantially improve floodplain inundation conditions on the Sacramento and San Joaquin rivers. Based on the above, the State Water Board determines that an effort be made to provide appropriate additional seasonal floodplain habitat for salmon, splittail, and other species in the Central Valley. The various recommendations the State Water Board received for floodplain inundation are included in Appendix A.1. The State Water Board has no specific flow determinations for floodplain inundation. The State Water Board recommends that BDCP, the Council, and others continue to explore the various issues concerning flood protection, weir modifications, and property rights related to floodplain inundation.

Other future habitat improvements will likely change the response of native fishes to flow and allow flow criteria to be modified. Habitat restoration should proceed to allow for the possible reduction of flows required to protect public trust resources in the Delta. Other future habitat restoration that should be reviewed and implemented include:

- Development of slough networks with natural channel geometry and less diked and rip-rapped channel habitat
- Increased tidal marsh habitat, including shallow (one to two meters) subtidal areas in both fresh and brackish zones of the estuary (in Suisun Marsh, for example)

- Create large expanses of low salinity open water habitat in the Delta

5.6.3 Water Quality and Contaminants

Any set of flow criteria should include the capacity to readily adjust the flows to adapt to changing future conditions and improved understanding. (DEFG 1.) As our understanding of the effect of contaminants on primary production and species composition in the Sacramento River and Delta improves, flow criteria may need to be revisited.

The Central Valley and San Francisco Regional Water Boards should continue developing Total Maximum Daily Loads (TMDLs) for all listed pollutants and adopting programs to implement control actions. Specifically, the Central Valley Regional Board should require additional studies and incorporate discharge limits and other controls into permits, as appropriate, for the control of nutrients, including ammonia.

5.6.4 Coldwater Pool Resources and Instream Flow Needs on Tributaries

The flow criteria contained in this report should be tempered by the need to maintain cold water resources and meet tributary specific flow needs in the Delta watershed. It may not be possible to attain all of the identified flow criteria in all years and meet the tributary flow needs and thermal needs of the various runs of Chinook salmon, steelhead, and other sensitive species. Temperature and water supply modeling analyses should be conducted to identify conflicting requirements to achieve both flow and cold water temperature goals. In addition, these flow determinations do not consider the needs of other non-fish species and terrestrial species which should be considered before any implementation of these criteria.

5.6.5 Adaptive Management

The numeric criteria are all short term criteria that are only appropriate for the current physical system and climate. There is uncertainty in these criteria even for the current physical system and climate, and therefore for the short term. Long term numeric criteria, beyond five years, for example, and assuming a modified physical system, are highly speculative. Only the underlying principles for the proposed numeric criteria and the other measures are advanced as long term determinations.

The information received in this proceeding suggests that the relationships between hydrology, hydrodynamics, water quality, and the abundance of desirable species are often unclear. In preparing for the long term, resources should be directed toward better understanding these relationships. In particular, there is significant uncertainty associated with Category B numeric criteria advcanced in this report. Category B criteria should therefore be high priority candidates for grant funded research.

A strong science program and a flexible management regime are critical to improving flow criteria. The relationship between flow, habitat, and abundance is not well enough understood to recommend flows in the Delta ecosystem without some reliance on adaptive management to better manage these flows. The State Water Board intends to work with the Council, the Delta Science Program, IEP, and others to develop the framework for adaptive management that could be relied upon for the management and regulation of flows in the Delta. The State Water Board will consider supporting and incorporating into its regulations greater reliance upon adaptive management in its flow regulations.

5.7 Summary Determinations

Table 20 through Table 23 provide summary determinations for Delta outflows, Sacramento inflows, San Joaquin River inflows, and hydrodynamics, respectively. Each table shows various numbered criteria, applicable to the shaded range of months. Criteria fall into two categories. Category "A" criteria have more robust scientific information to support specific numeric criteria than do Category "B" criteria. Both categories of criteria are considered equally important for protection of public trust resources in the Delta ecosystem, and are supported by scientific information on function-based species or ecosystem needs. The basis and explanation for each criterion is provided. Each table is appended with the following notes to explain the limitations and constraints of how the criteria should be considered:

- All flows are subject to appropriate ramping rates to avoid ramping impacts to public trust resources
- These flow criteria should be tempered by tributary specific flow needs and the need to manage cold-water resources for the protection of public trust resources
- Criteria for percentages of unimpaired flows apply only up to a specified maximum cap; appropriate maximum flow caps still need to be determined based on public trust needs and to avoid flooding.
- Additional flows may be needed for the protection of public trust resources for periods of time for which no flow criteria have been determined or where Bay-Delta Plan flow objectives are advanced, but adequate information is not available at this time to determine such flows

These criteria are made specifically to achieve the stated goal of halting the population decline and increase populations of native species as well as species of commercial and recreational importance. Additionally, positive changes in the Delta ecosystem resulting from improved flow or flow patterns will benefit humans as well as fish and wildlife, especially when accompanied by large-scale habitat restoration and pollution reduction. (Moyle *et al*, 2010.)

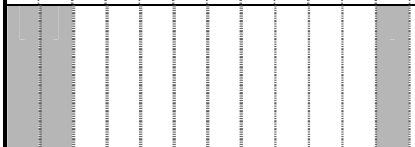
In addition, Table 24 contains a summary of other issues and concepts that should be considered in conjunction with the numeric criteria. These other measures are also based on a synthesis of the best scientific information submitted by participants in the State Water Board's Informational Proceeding. These criteria and other measures, however, must be further qualified as to their limitations. The limitations of this and any other flow prescription are described at the end of the Fleenor *et al*. (2010) "flow prescriptions" report as a "further note of caution":

> "How much water do fish need?" has been a common refrain in Delta water management for many years" it is highly unlikely that any fixed or predetermined prescription will be a "silver bullet". The performance of native and desirable fish populations in the Delta requires much more than fresh water flows. Fish need enough water of appropriate quality over the temporal and spatial extent of habitats to which they adapted their life history strategies. Typically, this requires habitat having a particular range of physical characteristics, appropriate variability, adequate food supply and a diminished set of invasive species. While folks ask "How much water do fish need?" they might well also ask, "How much habitat of different types and locations, suitable water quality,

> improved food supply and fewer invasive species that is maintained by better governance institutions, competent implementation and directed research do fish need? The answers to these questions are interdependent. We cannot know all of this now, perhaps ever, but we do know things that should help us move in a better direction, especially the urgency for being proactive. We do know that current policies have been disastrous for desirable fish. It took over a century to change the Delta's ecosystem to a less desirable state; it will take many decades to put it back together again with a different physical, biological, economic, and institutional environment.

The State Water Board concurs with this cautionary note and recommends the flow criteria and other conclusions advanced in this report be used to inform the planning efforts for the Delta Plan and BDCP and as a report that can be used to guide needed research by the Delta Science Program and other research institutions.

Table 20. Delta Outflow Summary Criteria

Delta Outflows	
Category A	
Water Year O N D J F M A M J J A S	**Criteria**
	1) Net Delta Outflows: 75□ of 14-day average unimpaired flow
Category B	
Water Year O N D J F M A M J J A S	**Criteria**
	2) Fall X2 a. Wet years: X2 less than 74 km (greater than approximately 12,400 cfs) b. Above normal years: X2 less than 81 km (greater than approximately 7,100 cfs)
	3) Net Delta Outflows: 2006 Bay-Delta Plan Delta Outflow Objectives - applies during critical, dry, and below normal years
Basis for Criteria and Explanation	

1) Promote increased abundance and improved productivity (positive population growth) for longfin smelt and other desirable estuarine species
2) Increase quantity and quality of habitat for delta smelt; fall X2 requirement limited to above normal and wet years to reduce potential conflicts with cold water pool storage, while promoting variability with respect to fall flows and habitat conditions in above normal and wet water year types; expected to result in improved conditions for delta smelt, however, the statistical relationship between fall X2 and abundance is not strong; note 2) above regarding need for improved understanding concerning the fall X2 action also applies
3) Fish and wildlife beneficial use protection

Notes:

- These flow criteria do not consider any balancing of public trust resource protection with public interest needs for water.
- All flows are subject to appropriate ramping rates to avoid ramping impacts to public trust resources.
- These flow criteria should be tempered by tributary specific flow needs and the need to manage cold-water resources for the protection of public trust resources.
- Criteria for percentages of unimpaired flows apply only up to a specified maximum cap; appropriate maximum flow caps still need to be determined based on public trust needs and to avoid flooding.
- Additional flows may be needed for the protection of public trust resources for periods of time for which no flow criteria are recommended or where 2006 Bay-Delta Plan flow objectives are recommended, but adequate information is not available at this time to recommend such flows.

Table 21. Sacramento River Inflow Summary Criteria

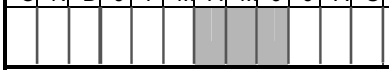
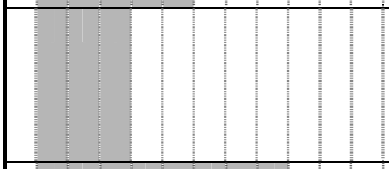
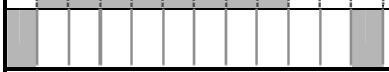
Sacramento River Inflows	
Category A	
Water Year (O N D J F M A M J J A S)	**Criteria**
	1) Rio Vista: 75□ of 14-day average unimpaired flow[1]
Category B	
Water Year (O N D J F M A M J J A S)	**Criteria**
	2) Rio Vista: 75□ of 14-day average unimpaired flow to support same functions as □1 for other runs of Chinook salmon
	3) Wilkins Slough: Provide pulse flows of 20,000 cfs for 7 days starting in November coinciding with storm events producing unimpaired flows at Wilkins Slough above 20,000 cfs until monitoring indicates that majority of smolts have moved downstream[2]
	4) Freeport: Positive flows in Sacramento River downstream of confluence with Georgiana Slough while juvenile salmon are present (approximately 13,000 to 17,000 cfs)
	5) Rio Vista: 2006 Bay-Delta Plan flow objectives
Basis for Criteria and Explanation, and Notes	
1) Increase juvenile salmon outmigration survival and abundance for fall-run Chinook salmon 2) Promote juvenile salmon emigration for other runs of Chinook salmon 3) Increase juvenile salmon outmigration survival by reducing diversion into Georgiana Slough and the central Delta 4) Increases juvenile salmon outmigration survival 5) Fall adult Chinook salmon attraction flows Notes: • These flow criteria do not consider any balancing of public trust resource protection with public interest needs for water. • All flows are subject to appropriate ramping rates to avoid ramping impacts to public trust resources. • These flow critiera should be tempered by tributary specific flow needs and the need to manage cold-water resources for the protection of public trust resources. • Criteria for percentages of unimpaired flows apply only up to a specified maximum cap; appropriate maximum flow caps still need to be determined based on public trust needs and to avoid flooding. • Additional flows may be needed for the protection of public trust resources for periods of time for which no flow criteria are recommended or where 2006 Bay-Delta Plan flow objectives are recommended, but adequate information is not available at this time to recommend such flows. [1] 75□ of unimpaired flow at Freeport applied to Rio Vista [2] Definition of storm, number of storms, and how to determine when the majority of juveniles have outmigrated needs to be determined.	

Table 22. San Joaquin River Inflow Summary Criteria

San Joaquin River Inflows	
Category A	
Water Year O N D J F M A M J J A S	**Criteria**
	1) Vernalis: 60 of 14-day average unimpaired flow
	2) Vernalis: 10 day minimum pulse flow of 3,600 cfs in late October (e.g., October 15 to 26)
Category B	
Water Year O N D J F M A M J J A S	**Criteria**
	3) Vernaisl: 2006 Bay-Delta Plan October flows
Basis for Criteria and Explanation, and Notes	

1) Increase juvenile Chinook salmon outmigration survival and abundance and provide conditions that will generally produce positive population growth in most years and achieve the doubling goal in more than half of years
2) Minimum adult Chinook salmon attraction flows to decrease straying, increase DO, reduce temperatures, and improve olfactory homing fidelity
3) Adult Chinook salmon attraction flows

Notes:

- These flow criteria do not consider any balancing of public trust resource protection with public interest needs for water.
- All flows are subject to appropriate ramping rates to avoid ramping impacts to public trust resources.
- These flow criteria should be tempered by tributary specific flow needs and the need to manage cold-water resources for the protection of public trust resources.
- Criteria for percentages of unimpaired flows apply only up to a specified maximum cap; appropriate maximum flow caps still need to be determined based on public trust needs and to avoid flooding.
- Additional flows may be needed for the protection of public trust resources for periods of time for which no flow criteria are recommended or where 2006 Bay-Delta Plan flow objectives are recommended, but adequate information is not available at this time to recommend such flows.

Table 23. Hydrodynamics Summary Criteria

Hydrodynamics: Net OMR, Inflow-Export Ratios, and Jersey Point	
Category A	
Water Year (O N D J F M A M J J A S)	**Criteria**
	1) San Joaquin River Flow to Export Ratio: Vernalis flows to exports greater than 0.33 during fall pulse flow (e.g., October 15 □ 26); complementary action to San Joaquin River inflow critieria □2
Category B	
Water Year (O N D J F M A M J J A S)	**Criteria**
	2) Net OMR Flows: greater than -1,500 cfs in Critical and Dry water years
	3) Net OMR Flows: greater than 0 or -1,500 cfs in Critical and Dry water years, when FMWT index for longfin smelt is less than 500, or greater than 500, respectively
	4) Net OMR Flows: greater than -5,000 cfs in all water year types
	5) Net OMR Flows: greater than -2,500 cfs when salmon smolts are determined to be present in the Delta
	6) San Joaquin River Flow to Export Ratio: Vernalis flows to exports greater than 4.0 when juvenile San Joaquin River salmon are migrating in mainstem San Joaquin River
	7) Jersey Point: Positive flows when salmon present in the Delta
	8) Exports to Delta Inflows: 2006 Bay-Delta Plan exports to inflows restrictions
Basis for Criteria and Explanation	

1) Reduce straying and improve homing fidelity for San Joaquin basin adult salmon
2) Reduce entrainment of larval / juvenile delta smelt, longfin smelt, and provide benefits to other desirable species
3) Same as number 2), but if the previous FMWT index for longfin smelt is less than 500, then OMR must be greater than 0 (to reduce entrainment losses when abundance is low), or greater than -1,500 if the previous FMWT index for longfin smelt is greater than 500
4) Reduce entrainment of adult delta smelt, longfin smelt, and other species; less negative flows may be warranted during periods when significant portions of the adult smelt population migrate into the south or central Delta; thresholds for such flows need to be determined
5) Reduce risk of juvenile salmon entrainment and straying to central Delta at times when juveniles are present in the Delta; will also provide associated benefits for adult migration
6) Improve survival of San Joaquin River juvenile salmon emigrating down the San Joaquin River and improve subsequent escapement 2.5 years later
7) Increase survival of outmigrating smolts, decrease diversion of smolts into central Delta where survival is low, and provide attraction flows for adult returns
8) Protection of estuarine dependent species

(cont.)

Notes:

- These flow criteria do not consider any balancing of public trust resource protection with public interest needs for water.
- All flows are subject to appropriate ramping rates to avoid ramping impacts to public trust resources.
- These flow critieria should be tempered by tributary specific flow needs and the need to manage cold-water resources for the protection of public trust resources.
- Criteria for percentages of unimpaired flows apply only up to a specified maximum cap; appropriate maximum flow caps still need to be determined based on public trust needs and to avoid flooding.
- Additional flows may be needed for the protection of public trust resources for periods of time for which no flow criteria are recommended or where 2006 Bay-Delta Plan flow objectives are recommended, but adequate information is not available at this time to recommend such flows.

Table 24. Other Summary Determinations

Variability and the Natural Hydrograph:

- Criteria should reflect the frequency, duration, timing, and rate of change of flows, and not just volumes or magnitudes. Accordingly, whenever possible, the criteria specified above are expressed as a percentage of the unimpaired hydrograph.
- Inflows should generally be provided from tributaries to the Delta watershed in proportion to their contribution to unimpaired flow unless otherwise indicated. This concept is reflected in the specific criteria above.

Floodplain Activation and Other Habitat Improvements:

- Studies and demonstration projects for, and implementation of, floodplain restoration, improved connectivity and passage, and other habitat improvements should proceed to provide additional protection of public trust uses and potentially allow for the reduction of flows otherwise needed to protect public trust resources in the Delta.

Water Quality and Contaminants:

- The Central Valley and San Francisco Regional Water Boards should continue developing TMDLs for all listed pollutants and adopting programs to implement control actions.
- The Central Valley Regional Board should require additional studies and incorporate discharge limits and other controls into permits, as appropriate, for the control of nutrients and ammonia.

Coldwater Pool Resources and Instream Flow Needs on Tributaries:

- Temperature and water supply modeling and analyses should be conducted to identify conflicting requirements to achieve both flow and cold water temperature goals.

Adaptive Management:

- A strong science program and a flexible management regime are critical to improving flow criteria. The State Water Board should work with the Council, the Delta Science Program, IEP, and others to develop the framework for adaptive management that could be relied upon for the management and regulation of Delta flows.
- The numeric criteria in this report are all short term criteria that are only appropriate for the current physical system and climate; actual flows should be informed by adaptive management
- Only the underlying principles for the numeric criteria and these other measures are advanced as long termcriteria.

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7. Appendices

Appendix A: Summary of Participant Recommendations

Appendix A, Table 1. Delta outflow recommendations summary table (cfs unless otherwise noted).

	Water Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Source / Note
Unimpaired Flow 1956-2003	C	16092	23292	31045	29103	27552	15301	5974	3880	4096	8167	8372	12531	
	D	24670	37460	52907	45810	39512	18994	6801	4759	5180	7221	16635	19339	
	BN	32402	63985	52056	53471	49644	25325	9091	5683	6004	7027	12842	16911	
	AN	88051	99722	86990	69589	78076	50019	18214	7932	7862	8162	13980	26763	
	W	113261	114512	103250	92975	96911	68197	27987	11354	8717	11804	30357	77204	
Historical Flow 1956-2003	C / D	14117	17916	17597	9193	7367	4504	3952	3334	4285	6896	9663	12734	87
	BN	27274	48832	32673	14991	10100	4336	3952	5025	7798	12116	15192	18996	
	AN	61801	70133	70404	32283	27876	13444	7172	5985	7865	6766	10940	17093	
	W	94930	111565	87497	67642	46530	29897	14279	10588	15545	13385	23024	60061	
D1641	C	4500 ([1])	7100 - 29200 ([2])					4000	3000	3000	3000	3500		1, 2
	D	4500	7100 - 29200					5000	3500	3000	4000	4500		
	BN	4500	7100 - 29200					6500	4000	3000	4000	4500		
	AN	4500	7100 - 29200					8000	4000	3000	4000	4500		
	W	4500	7100 - 29200					8000	4000	3000	4000	4500		
Draft D1630	All				6700									3
	C					3300	3100	2900						4
	D					4300	3600	3200						
	BN					11400	9500	6500						
	AN					14000	10700	7700						
	W					14000	14000	10000						
	W		10000											5
	BN & AN		12000											6
	All	6600 (if > flow not required by other standards)												7
TBI / NRDC / AR / NHI / EDF	81-100% (driest years)	14000 - 21000			10000 - 17500		3000 - 4200			5750 - 7500				8
	61-80%	21000 - 35000			17500 - 29000		4200 - 5000			7500 - 9000				
	41-60%	35200 - 55000			29000 - 42500		5000 - 8500			9700 - 12400				
	21-40%	55000 - 87500			42500 - 62500		8500 - 25000			12400 - 16100				
	0-20% (wettest years)	87500 - 140000			62500 - 110000		25000 - 50000			16100 - 19000				
CSPA / C-WIN	C	4100	9100		6700				4100					9
	D	9200	23500		10800				9200					
	BN	12100	41000		14400				12100					
	AN	14600	90800		23000				14600					
	W	29000	91800		43000				29000					
EDF / Stillwater (monthly average)	C	11500	26800	26800	17500	17500	7500	4800	4800	4800	6500	5300	7500	10, 11, 12
	D	11500	26800	26800	17500	17500	7500	4800	4800	4800	6500	5300	7500	
	BN	26800	26800	26800	26800	26800	11500	7500	7500	7500	7500	7500	11500	
	AN	26800	26800	26800	26800	26800	11500	11500	11500	11500	11500	11500	17500	
	W	26800	26800	26800	26800	26800	17500	17500	17500	17500	17500	17500	26800	
EDF / Stillwater (peak flows)	C	11500	26800	26800	17500	17500	7500	4800	4800	4800	6500	5300	7500	13
	D	11500	26800	26800	17500	17500	7500	4800	4800	4800	6500	5300	7500	
	BN	26800	90800 ([14])	90800 ([15])	26800	26800	11500	7500	7500	7500	7500	7500	11500	14, 15
	AN	26800	105600 ([16])	105600 ([17])	26800	26800	11500	11500	11500	11500	11500	11500	17500	16, 17
	W	26800	105600 ([18])	105600 ([19])	26800	26800	17500	17500	17500	17500	17500	17500	26800	18, 19
USFWS - OCAP Bio Op	AN									X2 ≤ 81 km (approx. 7000)		X2 ≤ 81 km		20
	W									X2 ≤ 74 km (approx. 12400)		X2 ≤ 74 km		

Appendix A, Table 1. Delta outflow recommendations summary table - con't. (p. 2 of 2)

	Water Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Source / Note
CDFG	All	Recommendation in X2 format: 64 - 75 km (approx. 29200 - 11400 cfs)												21
DWR / SFWC	All	Recommendation to maintain requirements stipulated in D-1641												22
The following is from Fleenor et al. 2010 (Preliminary Draft) - Functional flow approach with exports occurring via a peripheral canal, tunnel, or other alternative form of conveyance.														
Delta Solutions Group	5 of 10 yrs			48000										23

Appendix A, Table 2. Sacramento River inflow recommendations (cfs unless noted otherwise).

	Water Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Source / Note
D1641	C									3000		3500		
	D									3000	4000	4500		
	BN									3000	4000	4500		
	AN									3000	4000	4500		
	W									3000	4000	4500		
Draft D1630	All				≥18000									24
	All				≥13000 (14-day running average) and ≥9000 (min mean daily flow)									25
	C	1500	2500		2000			1000	1000	1500				26
	D	1500	2500		2500			1000	1000	1500				
	BN	2500	2500		3000			2000	1000	2500				
	AN	2500	2500		3000			2000	1000	2500				
	W	2500	3000		5000			3000	1000	5000				
CDFG	All		6000 (base flows)											27
	All				20000 - 30000 (pulse flows @ Rio Vista)									
C-WIN / CSPA	All		6000 (minimum base flows, measured @ Rio Vista)											28
	All				30000 (Freeport to Chipps Island)									29
PCFFA	All				25000 (Hood to Chipps Island)									30
USFWS					The catch of juvenile salmon at Chipps Island between April and June is correlated to flow at Rio Vista. The highest abundance leaving the Delta has been observed when flows at Rio Vista between April and June averaged above 20000 cfs..."									31
AR / NHI	All	Sac Riv at Bend Bridge - Pulse flows continuously exceed 8000, periodically exceed 12000, for a duration exceeding 2 weeks										See Jan - May		32
	All	Sac Riv at Wilkins Slough and Freeport - Pulse flows of 15000 at Wilkins Slough, and up to 20000 at Freeport, should occur for a duration of 7 days or longer. There should be at least 5 such events in dry years and more in wet years											See Jan - May	33
TBI / NRDC / AR / NHI	C (0-20 percentile)			27500 for 15 cont days										34
	D (20-40 percentile)				27500 for 30 cont days									
	BN					30000 for 60 cont days								
	AN					32500 for 90 continous days								
	W					35000 for 120 continuous days								
NMFS	AN & W					≥ 17700 (at Grimes RM125)								35
	AN & W					≥ 31100 (at Verona RM80)								
	All	Provide pulse flows ≥ 20000 cfs, measured at Freeport periodically during winter-run emigration season to facilitate outmigration past Chipps Island (ie, Dec-Apr)											See Jan-Apr	36

Appendix A, Table 2. Sacramento River inflow recommendations - con't. (p. 2 of 2)

	Water Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Source / Note
EDF / Stillwater	C	3500			10000		Determined based on Delta outflows ([38])			3000 - 3500 ([39])			3500	37, 38, 39
	D	4500			10000					3000 - 4500			4500	
	BN	4500			10000					3000 - 4500			4500	
	AN	64000 (pulse flow, 21 consecutive days)												
		4500			10000					3000 - 4500			4500	
	W	64000 (pulse flow, 35 consecutive days)												
		4500			10000					3000 - 4500			4500	
		64000 (pulse flow, 49 consecutive days)												
DWR / SFWC	All	Recommendation to maintain requirements stipulated in D-1641												22
The following is from Fleenor et al. 2010 (Preliminary Draft) - Functional flow approach with exports occurring via a peripheral canal, tunnel, or other alternative form of conveyance.														
Delta Solutions Group	6 of 10 yrs	10000									10000			40
	6 of 10 yrs			25000										
	1 of 10 yrs	70000												41
	8 of 10 yrs		Yolo Bypass 2500 (Sac Riv ~45750)											42
	6 of 10 yrs			Yolo Bypass 4000 (pulse) (Sac Riv ~ 50150)										

Appendix A, Table 3. San Joaquin River inflow recommendations summary table (cfs unless noted otherwise).

	Water Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Source / Note
D1641	C		710 or 1140 ([43])		3110 or 3540 ([44])	710 or 1140 ([43])					1000 ([45])			43, 44, 45
	D		1420 or 2280		4020 or 4880	1420 or 2280					1000			
	BN		1420 or 2280		4620 or 5480	1420 or 2280					1000			
	AN		2130 or 3420		5730 or 7020	2130 or 3420					1000			
	W		2130 or 3420		7330 or 8620	2130 or 3420					1000			
Draft D1630	C				2000 ([46])						≥2000 ([47])			46, 47
	D				4000						≥2000			
	BN				6000						≥2000			
	AN				8000						≥2000			
	W				10000						≥2000			
CDFG	C			1500 (Base)	5500 (Pulse) (4/15-5/15) (Total 7000)									48
	D			2125 (Base)	4875 (Pulse) (4/11-5/20) (Total 7000)									
	BN			2258 (Base)	6242 (Pulse) (4/6-5/25) (Total 8500)									
	AN			4339 (Base)	5661 (Pulse) (4/1-5/30) (Total 10000)									
	W			6315 (Base)	8685 (Pulse) (3/27-6/4) (Total 15000)									
C-WIN / CSPA	C		13400	4500	6700	8900	1200				5400			49
	D		13400 (2 days)	4500	6700	8900	1200				5400			
	BN		13400 (16 days), 26800 (2 days)	4500	6700	8900	11200	1200			5400			
	AN		13400 (13 days), 26800 (5 days)	4500	6700	8900	11200	1200			5400			
	W		13400 (17 days), 26800 (5 days)		13400			14900			5400			
TBI / NRDC	100% of years (all yrs)		2000		5000			2000						50
	80% (D yrs)		2000		5000	10000	7000	5000	2000					
	60% (BN yrs)		2000		20000	10000	7000	5000	2000					
	40% (AN yrs)		2000	5000	20000		7000		2000					
	20% (W yrs)		2000	5000	20000		7000		2000					

Appendix A, Table 3. San Joaquin River inflow recommendations summary table - con't. (p. 2 of 3)

	Water Year	Jan	Feb	Mar		Apr		May		Jun	Jul	Aug	Sept	Oct	Nov	Dec	Source / Note
AR / NHI	100% of years (all yrs)			3000	4000	5000				2000							51
	80% (D yrs)			3000	4000	5000	10000	7000	5000	2000							
	60% (BN yrs)			3000	5000	20000	10000	7000	5000	2000							
	40% (AN yrs)			3000	5000	20000		7000		2000							
	20% (W yrs)			3000	5000	20000		7000		2000							
	All			Flows of approx. 10000 cfs should occur at Vernalis for >5 days. There should be at least 2 such events in dry years, and more in wetter years.													
EDF / Stillwater	All												> 1800 in DWSC				52
	All			Discuss USFWS (1995) and D-1641, no clear recommendation ([55])						Determined based on Delta outflows ([38])				3500 (10-14 days) ([54])	FERC ([53])		38, 53, 54, 55
	C & D	1000 (positive flows at Jersey Pt)														See Jan-Feb	56
	BN & AN	2000 (positive flows at Jersey Pt)														See Jan-Feb	
	W	3000 (positive flows at Jersey Pt)														See Jan-Feb	
	AN	14800 (pulse flow, ≥ 21 consecutive days)															57
	W	14800 (pulse flow, ≥ 35 consecutive days)															
USFWS			"...the Board should consider the Vernalis flows contained in USFWS (2005) [AFRP] and DFG's San Joaquin Escapement Model as a starting point for establishing flow for the protection of salmon and steelhead migrating from the San Joaquin basin"														58
AFRP (salmon doubling)	C		1744	2832		4912		5665									59
	D		1784	3146		5883		7787									
	BN		1809	3481		6721		9912									
	AN		2581	5162		8151		13732									
	W		4433	8866		10487		17369									
AFRP (53% Increase in Salmon Production)	C		1250	1665		2888		3331									60
	D		1350	1850		3459		4579									
	BN		1450	1933		3733		5505									
	AN		1638	2703		4266		7194									
	W		2333	4667		5520		9142									
NMFS OCAP Bio Op						Interim Operations in 2010-2011, min flows at Vernalis ranging from 1500 - 6000 based on New Melones Index												61
		In addition, USBR/DWR shall seek supplemental agreement with SJRGA as soon as possible to achieve the min flows listed below at Vernalis															
	C					1500											
	D					3000											
	BN					4500											
	AN					6000											
	W					6000											

Appendix A, Table 3. San Joaquin River inflow recommendations summary table - con't. (p. 3 of 3)

	Water Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Source / Note
NMFS	AN & W		≥ 14000 (at Vernalis)											62
	AN & W		≥ 7000 (at Newman)											
DWR / SFWC	All	Recommendation to maintain requirements stipulated in D-1641												22
The following is from Fleenor et al. 2010 (Preliminary Draft) - Functional flow approach with exports occurring via a peripheral canal, tunnel, or other alternative form of conveyance.														
Delta Solutions Group	C	2000			5000		2000							63
	D	2000			7000		2000							
	BN	2000			10000		2000							
	AN	2000			15000		2000							
	W	2000			20000		2000							

Appendix A, Table 4. Old and Middle River flow, export restriction, San Joaquin River flows at Jersey Point (e.g., QWEST) recommendations summary table (cfs unless noted otherwise).

	Water Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Source / Note
D1641	All	See Jul-Dec	Export/Inflow Ratio: 35% of Delta Inflow ([64])					Export/Inflow Ratio: 65% of Delta Inflow						64
	All				Export Limit: > of 1500 or 100% of 3-day avg. Vernalis flow									65
Draft D1630	All	QWEST > -2000	No reverse flow for all year types on a 14-day running average in the Western Delta (QWEST > 0 cfs, as calculated in Dayflow)					QWEST > -1000	QWEST > -2000					66
	C & D				14-day running average combined export rate for Tracy, Banks, and Contra Costa pumping plants shall be ≤ 4000 cfs									
	BN, AN, W				14-day running average combined export rate for Tracy, Banks, and Contra Costa pumping plants shall be ≤ 6000 cfs									
CSPA / C-WIN	All			Combined Export Rates = 0										67
	All			2000 cfs daily flow in Old and Middle Rivers										68
	C	1000 (positive 14-day mean flows at SJ Riv at Jersey Pt)									See Jan-June			69
	D	1500 (positive 14-day mean flows at SJ Riv at Jersey Pt)									See Jan-June			
	BN	2000 (positive 14-day mean flows at SJ Riv at Jersey Pt)									See Jan-June			
	AN	2500 (positive 14-day mean flows at SJ Riv at Jersey Pt)									See Jan-June			
	W	3000 (positive 14-day mean flows at SJ Riv at Jersey Pt)									See Jan-June			
TBI / NRDC		Sac Salmonids, Delta Smelt, Longfin Smelt*		Sac & SJR Salmonids, D. Smelt, L. Smelt*	Sac & SJR Salmonids, D. Smelt, L. Smelt (C & D yrs)		Sac & SJR Salmonids, D. Smelt				Sac Basin Salmon		Sac Salmon, D. Smelt	70
	C	-1500 or >0*	-1500 or >0*	-1500 or >0*	>0	>0	-1500				-2000	-2000	-1500	
	D	-1500 or >0*	-1500 or >0*	>0	>0	>0	-1500				-2000	-2000	-1500	
	BN	-1500 or >0*	-1500 or >0*	>0	>0	>0	-1500				-2000	-2000	-1500	
	AN	-1500 or >0*	-1500 or >0*	>0	>0	>0	-1500				-2000	-2000	-1500	
	W	-1500 or >0*	-1500 or >0*	>0	>0	>0	-1500				-2000	-2000	-1500	
AFRP	C / D	1000 (net seaward flows at Jersey Pt)									See Jan-June			71
	BN / AN	2000 (net seaward flows at Jersey Pt)									See Jan-June			
	W	3000 (net seaward flows at Jersey Pt)									See Jan-June			
NMFS - OCAP Bio Op	All	Limit negative flows to -2000 to -5000 cfs in Old and Middle Rivers, depending on the presence of salmonids (see decision tree upon which the negative flow objective w/in the range shall be determined)												72
	All				Export restrictions based on Vernalis flow: <6000 cfs = 1500 cfs export limit 6000-21750 cfs = 4:1 (Vernalis flow:export ratio) >21750 = Unrestricted									

Appendix A, Table 4. Old and Middle River flow, export restriction, San Joaquin River flows at Jersey Point (e.g., QWEST) recommendations summary table - con't. (p. 2 of 2)

	Water Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Source / Note
USFWS	All	Board should develop reverse flow criteria that would maintain Old and Middle River flow positive during key months (Jan - Jun)												73
	All	"...the AFRP Working Paper (USFWS, 1995) Restoration Action #3 calls for maintaining positive QWEST flows, or an equivalent measure of net seaward flows at Jersey Point... Higher flow at Jersey Point has been provided during the VAMP period (mid-April to mid-May) with the adoption of VAMP flows and exports. We encourage the Board to retain or expand this type of action to assure the contribution of downstream flow from the San Joaquin Basin to Delta outflow..."									See Jan - June			74
USFWS - OCAP Bio Op	All	Action 1: -2000 cfs for 14 days once turbidity or salvage trigger has been met. Action 2: range btw -1250 and -5000 cfs ([75])			Range between -1250 and -5000 ([76])								See Jan-Mar	75, 76
CDFG Longfin Smelt Incidental Take Permit	All	Condition 5.1 (Dec - Feb): >-5000 ([77]) Condition 5.2 (Jan - June): OMR flow between -1250 and -5000 cfs ([78])											Condition 5.1 (Dec-Feb)	77, 78
DWR / SFWC	All	Recommendation to maintain requirements stipulated in D-1641												22

Appendix A, Table 5. Floodplain inundation flow recommendations summary table.

	Water Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Source / Note
CDFG	AN & W	≥ 30 day floodplain inundation												79
EDF / Stillwater	BN	64000 (pulse flow, 21 consecutive days)												37
	AN	64000 (pulse flow, 35 consecutive days)												Sacr Riv - Yolo Byp
	W	64000 (pulse flow, 49 consecutive days)												
TBI / NRDC / AR / NHI	C (0-20 percentile)		27500 for 15 cont days											34
	D (20-40 percentile)			27500 for 30 cont days										Sac Riv - Yolo Byp
	BN			30000 for 60 cont days										
	AN		32500 for 90 continous days											
	W		35000 for 120 continuous days											
AR / NHI	All	Sac Riv at Bend Bridge - Pulse flows continuously exceed 8000, periodically exceed 12000, for a duration exceeding 2 weeks										See Jan - May		32
USFWS	6 of 10 yrs	"The Board should consider the importance of more frequent floodplain inundation (especially Yolo Bypass flows) when determining the Delta outflows..."												80
NMFS - OCAP Bio Op	All	"...Reclamation and DWR shall, to the maximum extent of their authorities, provide significantly increased acreage of seasonal floodplain rearing habitat, with biologically appropriate durations and magnitudes, from December through April, in the lower Sacramento River basin, on a return rate of approximately one to three years, depending on water year type."											See Jan-Apr	81
NMFS - Recovery Plan	All	"Enhance the Yolo Bypass by re-configuring Fremont and Sacramento weirs to: ... and (6) create annual spring inundation of at least 8000 cfs to fully activate the Yolo Bypass floodplain."												82
Delta Solutions Group	8 of 10 yrs		Yolo Bypass 2500 (Sac Riv ~ 45750)											42
	6 of 10 yrs			Yolo Bypass 4000 (pulse) (Sac Riv ~ 50150)										
San Joaquin River														
EDF / Stillwater	AN	14800 (pulse flow, ≥ 21 consecutive days)												57
	W	14800 (pulse flow, ≥ 35 consecutive days)												
See TBI / NRDC and AR / NHI SJ River Inflow recommendations, flows >20000 cfs to trigger floodplain inundation														

Appendix A, Table 6. Delta Cross Channel closures summary table.

	Water Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Source / Notes
D-1641		see Nov	Gates Closed			Close for 14 days ([83])						Nov-Jan - gates may be closed for up to total of 45 days		83
Draft D-1630	All	Closed if daily DOI >12000	Operated based on results of real-time monitoring											84
CSPA / C-WIN	All		Gates Closed											85
	All		Acoustic Barrier at head of Georgiana Slough at Sacramento River											
NMFS - OCAP Bio Op	All	Dec 15 - Jan 31 Gates closed	Gates Closed per D1641			Gates closed up to 14 days per D1641					Gates closed if fish are present		Gates closed except for experiments/water quality / Dec 15 Jan 31 Gates closed	86

Appendix A, Table 7. Notes for Tables 1 through 6.

No.	Entity	Type	Notes (excerpts from source documents)
1	D1641	Outflow	All water year types - Increase to 6000 if the Dec 8RI is □ than 800 TAF
2	D1641	Outflow	Habitat Protection Flows, minimum Delta outflow calculated from a series of rules that are described in Tables 3 and 4 of D1641
3	Draft D1630	Outflow	Striped Bass, Antioch spawning - Delta outflow index, Sac Riv at Chipps Island, average for the period not less than value shown (cfs).
4	Draft D1630	Outflow	Striped Bass, general - Delta outflow index, Sac River at Chipps Island - average for period not less than value shown (cfs), May period □ May 6-31
5	Draft D1630	Outflow	Suisun Marsh - Delta outflow index at Sac River at Chipps Island - average of daily DOI for each month, not less than value shown (cfs)
6	Draft D1630	Outflow	Suisun Marsh - Delta outlflow index, Sac River at Chipps Island - minimum daily DOI for 60 consecutive days in the period
7	Draft D1630	Outflow	Suisun Marsh - Delta outflow index, Sac River at Chipps Island - average of daily DOI for each month, not less than value shown, in cfs: applies whenever storage is at or above minimum level in flood control reservation envelope at two of the following - Shasta Reservoir, Oroville Reservoir, and CVP storage on the American River
8	TBI et al	Outflow	Water year categories represent exceedance frequencies for the 8-river index, they are not equivalent to the DWR "water year types" (which account for storage and other conditions). TBI_Exhibit 2 (Outlfow). References for correlation btw winter-spring outlfow and abundance of numerous species on p.3. Winter-spring Delta outflow criteria approximate the frequence distribution of outflow levels, i.e., the relationship btw outflow and the 8 River Index, for the 1956-1987 period. Winter and spring outlfow recommendations to benefit public trust uses of pelagic species (as represented by abundance and productivity of longfin smelt, Crangon shrimp, and starry flounder and spatial distribution of longfin smelt) (see TBI Exhibit 2, pp 21-25). Two methods were used to develop outflow criteria: an analysis of historical flow-abundance relationships that corresponded to recovery targets for longfin smelt abundance (Native Fishes Recovery Plan, USFWS 1995), and an analysis of population growth response to outflows in order to identify outflows that produced population growth more than 50□ of the time. Applying these
8 cont	TBI et al	Outflow	two methods produces very similar results regarding desirable outflow levels. Break in summary table at mid-Mar is artificial, original table included Mar under both Winter and Spring, so for simplicity, it was split at 15 Mar. Fall outflows (TBI Exhibit 2, p. 35, Table 1 and Fig 27) - analyzed emerging statistical evidence of relationship btw outlfow and abundance and distribution of delta smelt and striped bass (Feyrer et al 2007; Feyrer et al In Review; DSWG notes, Aug 21, 2006), in order to develop recommendations. Recommendations occassionaly exceed unimpaired outflow in limited cases (would require reservoir releases in fall independent of antecedent conditions).

Appendix A, Table 7. Notes for Tables 1 through 6.

No.	Entity	Type	Notes (excerpts from source documents)
9	CSPA / C-WIN	Outflow	Net Delta Outflow, as a 14-day running average - Source WRINT-DFG Exh 8 (1992). Feb-Mar - flows correspond to Table 8 (p.23), Alternative C (Estuarine species - target mean monthly flows based on data from DWR's 1995 Level of Development □50□ increase). Orig. recommendations by month, C-WIN/CSPA took average of Feb and Mar, and reported as such. Apr-July - flows correspond to Table 2 (p16), Alternative C (mean Delta outflows required to maintain populations of 1.7 million adult striped bass). Aug-Jan - based on Alt C (discussed above), in combination with flow recommendations developed by C-WIN for Jan. DFG identified flows for all months except Jan, C-WIN developed a method for Jan flows from DayFlow information (C-WIN extracted monthly average Delta outflows from DayFlow, sorted them, and then allocated them to water years based on unimpaired runoff data from the California Data Exchange Center. The medians of the water year types were then used as January flows in developing our optimal conditions recommendations for mean Delta outflows in the August 1 through January 31 period).
10	EDF / Stillwater	Outflow	Stillwater Focal Species Approach - Source - EDF closing comments (Table 1), Supporting Info - EDF Exhibit 1 (Winter [Dec-Feb] outflows - p.52-53). A primary objective was to provide enough Delta outflow to maintain X2 westward of 65 km, w/ variations to allow eastward excursion of X2 as far as 80 km in drier water year types. Proximate function is to increasethe westward extent of fresh water into Suisun and San Francisco bays to more closely approximate historical conditions. "This will serve to increase the availability of food resources to larval fish species in late winter as well as improve access to low salinity habitat in the shallows of Grizzly and Honker bays (Feyrer et al 2009)." Flows also designed to limit the eastward distribution and density of overbite clam. "...low salinity may inhibit spawning and subsequent adult recruitment, thereby reducing grazing pressures on phytoplankton and the pelagic food web. Improvements in food resources to the western Delta will serve to increase populations of Delta smelt, striped bass, and other pelagic species that are currently in decline."
11	EDF / Stillwater	Outflow	Stillwater Focal Species Approach - Source - EDF closing comments (Table 1), Supporting Info - EDF Exhibit 1 (Spring [Mar-May] Outlfows - p.55-56). Spring flows primarily based on delta outflows needed to maintain X2 in locations that are beneficial to delta pelagic fish populations as well as the provision of floodplain inundation in the Yolo Bypass during March Primary objective was to provide enough Delta outflow to maintain X2 westward of 65 km, w/ variations to allow eastward excursion of X2 as far as 70 km in drier water year types. References in justification: Feyrer et al. In Revision, Bennett et al 2005. Herbold 1994, Hobbs et al 2004, Bennett et al. 2008, and others). Secondary goal is to provide sufficient flows to maintain inundated season floodplain habitat in Yolo Bypass and lower SJ Riv for varying periods in March based on water year type. These floodplain inundation flows should be coordinated with flows in late winter to provide prolonged periods of inundation.
12	EDF / Stillwater	Outflow	Stillwater Focal Species Approach - Source - EDF closing comments (Table 1), Supporting Info - EDF Exhibit 1 (Fall [Sept-Nov] - pp.49-50; Summer - pp.57-58) Summer (Jun-Aug) and Fall flows based primarily on Delta outflows needed to maintain X2 in the shallow-water habitats of Suisun Bay. Secondary objective for Fall outflows from the Delta were to provide attraction flows for upstream-migrating salmonids and to maintain adequate DO concentrations for fall-run chinook salmon within the lower SJ River system. Summer and Fall - in some months and water year types, depending on water year type and month, the projected monthly outflows are higher than the unimpaired and/or current flow ranges. Thus some modification of upstream reservoir release schedules may be required to meet these flows. Fall - references in justification - Feyrer et al 2007; Feyrer et al In revision; Bennet et al 2002; Jassby et al 1995; and others

Appendix A, Table 7. Notes for Tables 1 through 6.

No.	Entity	Type	Notes (excerpts from source documents)
13	EDF / Stillwater	Outflow	EDF_Closing Comments (Table 1) - Peak flows required to provide floodplain inundation are assumed to be concurrent between the Sac and SJ River basins as well as the east side tributaries. However, the duration of the peak flows varies by water year (see notes 69-74)
14	EDF / Stillwater	Outflow	EDF_Closing Comments (Table 1) - Includes 14 days of floodplain inundation flow of 64000 cfs in the Sac River
15	EDF / Stillwater	Outflow	EDF_Closing Comments (Table 1) - Includes 7 days of floodplain inundation flow of 64000 cfs in the Sac River
16	EDF / Stillwater	Outflow	EDF_Closing Comments (Table 1) - Includes 21 days of floodplain inundation flow of 64000 cfs in the Sac River and 14 days of floodplain inundation flow of 14800 cfs in the SJ River
17	EDF / Stillwater	Outflow	EDF_Closing Comments (Table 1) - Includes 14 days of floodplain inundation flow of 64000 cfs in the Sac River and 7 days of floodplain inundation flow of 14800 cfs in the SJ River.
18	EDF / Stillwater	Outflow	EDF_Closing Comments (Table 1) - Includes 28 days of floodplain inundation flow of 64000 cfs in the Sac River and 21 days of floodplain inundation flow if 14800 cfs in the SJ River
19	EDF / Stillwater	Outflow	EDF_Closing Comments (Table 1) - Includes 21 days of floodplain inundation flow of 64000 cfs in the Sac River and 14 days of floodplain inundation flow of 14800 cfs in the SJ River
20	USFWS	Outflow	Delta smelt biological opinion (RPA concerning Fall X2 requirements [pp. 282-283] - improve fall habitat [quality and quantity] for DS) (references USFWS 2008, Feyrer et al 2007, Feyrer et al in revision) - Sept-Oct in years when the preceeding precipitation and runoff period was wet or above normal, as defined by the Sacramento Basin 40-30-30 Index, USBR and DWR shall provide sufficient Delta outflow to maintain monthly average X2 no greater than 74 km and 81 km in Wet and Above Normal yrs, respectively. During any November when the preceding water yr was W or AN, as defined by Sac Basin 40-30-30 index, all inflow into the CVP/SWP reservoirs in the Sac Basin shall be added to reservoir releases in Nov to provide additional increment of outflow from Delta to augment Delta outflow up to the fall X2 of 74 km and 81 km for W and AN water yrs, respectively. In the event there is an increase in storage during any Nov this action applies, the increase in reservoir storage shall be released in December to augment the Dec outflow requirements in SWRCB D-1641.
21	CDFG	Outflow	Outflow recommendations from closing comments. Originally provided as X2 recommendations - Source - DFG Exhibit 1 and Exhibit 2 - Consolidates recommendations for American Shad, Longfin Smelt, Starry Flounder, Bay Shrimp, Zooplankton (consistent with D1641 requirements to maintain X2 at one of two compliance points in Suisun Bay [64 km or 75 km] from Feb-June). Longfin smelt Jan - June; Starry flounder, Bay shrimp, zooplankton Feb - Jun; and American Shad April - June.
22	DWR / SFWC	Outflow, SJ Riv Inflow, Sac Riv Inflow, OMR	DWR_closing comments, in response to request for a table identifing recommended flows, DWR submitted summary of D-1641 objectives.

Appendix A, Table 7. Notes for Tables 1 through 6.

No.	Entity	Type	Notes (excerpts from source documents)
23	UCDavis - Delta Solutions Group	Outflow	Functional Flow 5a - Delta Smelt flows, 48000 cfs, from March through May (5 out of 10 years, every other year). Maintain freshwater to low salinity habitat in the northeastern Delta to Napa River, facilitating a broad spatial and temporal range in spawning and rearing habitat (Bennett 2005, Hobbs et al 2005). Flow recommendation not based on water year type, but rather number of years out of 10. Based on exports through an alternative form of conveyance (e.g., peripheral canal or tunnel).
24	Draft D1630	Sac River Inflow	Function □ Chinook salmon. Sac River at Freeport. Average flow at Freeport □18000 cfs for a 14-day continuous period corresponding to release of salmon smolts from Coleman Nat Fish Hatchery. Anticipate to occur in late April or early May. If no fish are released from the hatchery, the Executive Director shall determine the appropriate timing of this pulse flow with advice from CDFG.
25	Draft D1630	Sac River Inflow	Function □ striped bass, general; Sac River at Freeport - 14-day running average at Freeport □13000 cfs for a 42-day continuous period, with minimum mean daily flow □9000 cfs. Requirement initiated when real-time monitoring indicates the presence of striped bass eggs and larvae in Sac River below Colusa. This period should begin in late April or early May in most years.
26	Draft D1630	Sac River Inflow	Function □ chinook salmon. Sac River at Rio Vista - 14-day running average of minimum daily flow.
27	CDFG	Sac River Inflow	Chinook salmon, smolt outmigration. (1) Feb - Oct base flows. Source - DFG Exhibit 14 (WRINT-DFG-8, p.11). (2) Apr - Jun pulse flows. Source - DFG Exhibit 1, page 1, 6, and USFWS Exhibit 31 (Kjelson).
28	CSPA	Sac River Inflow	CSPA Closing Comments. Source - CDFG_1992_WRINT-DFG-Exhibit □8, p.11. Minimum base flow, measured at Rio Vista. 14-day average flow.
29	CSPA / C-WIN	Sac River Inflow	Sacramento River from Freeport to Chipps Island - Pulse flows - flows needed to sustain viable migration corridor for optimal smolt passage and survival. Source - USFWS Exhibit 31 (Kjelson)
30	PCFFA	Sac River Inflow	Function □ salmonid juvenile outmigration. PCFFA closing comments, Source - USFWS Exhibit 31 (Kjelson). Kjelson and Brandes research - found that flows of 20000 to 30000 cfs yield the greatest survival of juvenile salmon during out-migration from Sac River to San Francisco Bay (PCFFA recommends splitting the difference and setting standard at 25000 cfs). Set from Hood to Chipps Island.
31	USFWS	Sac River Inflow	USFWS testimony concerning scientific information used to determine flow criteria. Source: U.S. Department Of the Interior - Comments Regarding the California State Water Resources Control Board's Notice of Public Informational Proceeding to Develop Delta Flow Criteria for the Delta Ecosystem Necessary to Protect Public Trust Resources, Sections II and III, pages 25, 54, and 57. "The catch of juvenile salmon at Chipps Island between April and June is correlated to flow at Rio Vista (USFWS, 1987; Brandes and McLain, 2001; Brandes et al., 2006). The highest abundance leaving the Delta has been observed when flows at Rio Vista between April and June averaged above 20,000 cfs which is also the level where we have observed maximum survival in the past (USFWS, 1987)" (p.25).

Appendix A, Table 7. Notes for Tables 1 through 6.

No.	Entity	Type	Notes (excerpts from source documents)
32	AR / NHI	Sac River Inflow	AR_NHI_Exh1 (testimony of Cain, Opperman, and Tompkins) and AR_NHI_closing comments. Purpose - interconnect side channels with main channel, contribute to foodweb productivity and rearing habitat for salmon. Inundated off-channel habitat such as high flow channels can also provide rearing habitat for salmon (Peterson and Reid 1984), but regulated spring flows are generally insufficient to inundate these habitats for prolonged periods (30-60 days), A recent study of these habitats in the Sac River determined that a large proportion of secondary channels between Red Bluff and Colusa become fully connected to the river at flows above 12000 cfs (Kondolf 2007). (from AR_NHI_Exh1 p.28)
33	AR / NHI	Sac River Inflow	AR_NHI_Exh1 (Testimony of Cain, Opperman, and Tompkins) and AR_NHI_closing comments - aid migration of winter-run chinook, in later months aid migration of spring and fall-run. Recent analyses indicate that the onset of emigration of winter-run fish to the Delta at Knights Landing is triggered by flow pulses of 15000 cfs at Wilkins Slough, and emigration from the Sac River to Chipps Island follows pulse flows of 20000 cfs at Freeport (del Rosario 2009). Previous studies found that smolt survival increased with increasing Sac River flow at Rio Vista, with maximum survival observed at or above about 20000 and 30000 cfs (USFWS 1987, Exhibit 31). Despite uncertainty about the exact magnitude of flow necessary to initiate substantial bank erosion, there is growing evidence that flows between 20000 and 25000 cfs will erode some banks while flows above 50000 to 60000 cfs are likely to cause widespread bank erosion (Stillwater 2007).
34	TBI / NRDC / AR / NHI	Sac River Inflow	TBI_Exh3 (Inflows - Table 3), TBI_closing comments (Table 3), AR/NHI_Exh1 (Testimony of Cain, Opperman, and Tompkins), AR/NHI closing comments - Table 3. Flows recommended for floodplain inundation (Sutter and Yolo Bypasses) - salmonid rearing, splittail spawning and early rearing. Flows measured at Verona. Flow magnitudes assume structural modifications to the weir to allow inundation at lower flow rates than is currently possible. Reservoir releases should be timed to coincide with and extend duration of high flows that occur naturally on less regulated rivers and creeks. The duration target is fixed for each year type, but actual timing of inundation should vary across the optimal window depending on hydrology and to maintain life history diversity.
35	NMFS	Sac River Inflow	NMFS_Exh9 (from ARFP 1995), Sturgeon (Grn and Wht) - adult migration to spawning and downstream larval transport
36	NMFS	Sac River Inflow	Public Draft Recovery Plan for Central Valley Salmon and Steelhead (October 2009). NMFS_Exhibit_5. Section 6.1.1 Recovery Action Narrative, Action 1.5.9, p.158.
37	EDF / Stillwater	Sac River Inflow	Source: EDF_Exh1 (Stillwater Sciences - Focal Species Approach). Spring flows - Establishing base flows of at least 10000 cfs in the Sac Riv in spring would improve transport of eggs and larval striped bass and other young anadromous fish and to reduce egg settling and mortality at low flows (USFWS 2001, EDF_Exh1, p.53). Proximate function of Delta inflows is to maintain net transport of passively swimming fishes (juv salmonids, larval delta smelt, and striped bass) and nutrients towards Suisun and San Francisco bays (USFWS 2008). Goal of winter and spring floodplain activation flows (managed pulse flows of approx 64000 cfs at Verona) is to maintain inundated seasonal floodplain habitat conditions in much of Yolo Bypass during January and April for a minimum of 21, 35, and 49 days in Below Normal, Above Normal, and Wet water year types, respectively. The NMFS (2009) draft recovery plan for Sac winter-run chinook, CV spring-run chinook, and CV steelhead ESUs calls for an annual spring flow of 8000 cfs (approx 64000 cfs at Verona) above the initial spill level "to fully activate the Yolo Bypass floodplain." For the

Appendix A, Table 7. Notes for Tables 1 through 6.

No.	Entity	Type	Notes (excerpts from source documents)
37 cont	EDF / Stillwater	Sac River Inflow	purposes of this assessment, Stillwater allocated the Delta inflows for floodplain inundation to February and March. Summer Delta inflows to be determined by Delta outflows. Fall Inflows - Maintenance of D1641 flow standards in necessary to provide attraction flows for Chinook salmon, although these levels would potentially need to be increased to provide adequate Delta outflows. Winter Inflows - Winter flows primarily designed to provide upstream migration passage for salmonids and striped bass during Dec and Jan, as well as to inundate floodplains such as Yolo Bypass for benefit of rearing juv salmonids and other floodplain associated species (p.50-51). See Spring for discussion of goal of combined winter-spring floodplain activation flows.
38	EDF / Stillwater	Sac Riv Inflow / SJ Riv Inflow	Inflows determined based on Delta outflows (EDF_Exh1 - Stillwater Focal Species)
39	EDF / Stillwater	Sac River Inflow	These levels may need to be increased to provide adequate Delta outflows (EDF_Exh1 - Stillwater Focal Species)
40	UCDavis - Delta Solutions Group	Sac River Inflow	Functional Flow 2a - Sac River adult salmon - 10000 cfs to to occur from Oct - June during 6 out of 10 years (references Newman and Rice 2002, Williams 2006, Harrell et al. 2009, USFWS Exhibit 31 1987, Kjelson and Brandes 1989). Functional Flow 2b - Sac River juvenile salmon migration - 25000 cfs from Mar - June during 6 out of 10 years (references Newman and Rice 2002, Williams 2006, Harrell et al. 2009, USFWS Exhibit 31 1987, Kjelson and Brandes 1989). Flows not based on water year type, but rather number of years out of ten.
41	UCDavis - Delta Solutions Group	Sac River Inflow	Functional Flow 2c - Sacr River adult sturgeon flows - 70000 cfs to occur between Jan and May during 1 out of 10 years (flows for salmon -2a, 2b, and 1a,1b) (Kohlhorst et al 1991 [flow rate], Harrell and Sommer 2003 [passage problems at Fremont Weir]). Flows not based on water year type, but rather number of years out of ten.
42	UCDavis - Delta Solutions Group	Sac River Inflow	Functional Flow 1a - yolo bypass inundation - salmon and splittail (area inundated based on recommended flows BDCP draft rpt 2008) (other references related to flow and corresponding extent of habitat in Yolo Bypass Moyle et al. 2004, Sommer et al. 2004, Harrell and Sommer 2003, Harrell et al. 2009). Functional Flow 1b - yolo bypass pulse - salmon and splittail (area inundated based on recommended flows BDCP draft rpt 2008) (other references related to flow and corresponding extent of habitat in Yolo Bypass Moyle et al. 2004, Sommer et al. 2004, Harrell and Sommer 2003, Harrell et al. 2009). Functional Flows 1a and 1b require flows at Freeport of approx. 45750 and 50150 cfs, respectively, based on regressions of historical data.
43	D1641	SJ River Inflow	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
44	D1641	SJ River Inflow	Pulse Vernalis minimum monthly average flow rate in cfs. Take the higher objective if X2 is required to be west of Chipps Island
45	D1641	SJ River Inflow	Pulse - up to an additional 28 TAF pulse/attraction flow to bring flows up to a monthly average of 2000 cfs except for a critical year following a critical year. Time period based on real-time monitoring and determined by CalFed Op's group

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No.	Entity	Type	Notes (excerpts from source documents)
46	Draft D1630	SJ River Inflow	SJ River at Vernalis. Function chinook salmon. Minimum daily flow, in cfs, for 21-day continuous period. Start date depends on beginning of chinook salmon smolt out-migration from SJ basin. During this time, water right holders on Mokelumne and Calaveras rivers shall bypass all inflows for 5 consecutive days. Daily mean combined pumping at Tracy, Banks, and Contra Costa pumping plants shall be 1500 cfs. All pumping restrictions are to be split equally between CVP and SWP. Total annual maximum of 150 TAF for the two salmon flows (these and fall attraction flows) from the SJ Basin reservoirs
47	Draft D1630	SJ River Inflow	SJ River at Vernalis. Function chinook salmon. Minimum daily flow, for 14-day continuous period. Start date depends upon beginning of chinook salmon adult spawning migration. Attraction flow shall be provided only if water is avaiable from the 150 TAF alloted for the two salmon flows. During this time, water right holders on Mokelumne and Calaveras rivers shall bypass all inflows for 5 consecutive days.
48	CDFG	SJ River Inflow	Source: SJR Salmon Model V.1.6 (CDFG 2009), DFG Exhibit 3 (Flows needed in the Delta to restore anadromous salmonid passage from the SJ River at Vernalis to Chipps Island) - Table 10 - South Delta (Vernalis) flows needed to double smolt production at Chipps Island (by water year type), and CDFG closing comments. Flows to support smolt outmigration.
49	CSPA / C-WIN	SJ River Inflow	CSPA and C-WIN Closing Comments - CSPA Table 2. Based on WRINT-DFG Exhibit 8 (1992) and C. Mesick 2010 (C-Win Exh 19). Pulse flows in all years to attract adult spawning salmonids, Oct 20-29, SJR at Vernalis. To the tributary flows (each measured at their confluence with SJ Riv mainstem (see Mesick 2010), C-WIN / CSPA added in a flow of the SJ Riv below Millerton Lake reflecting that river's fair share unimpaired flow, as well as accretions and other inflows. Combined valley flows at Vernalis assumes tributaries (Mer, Stan, Tuol) are 67.06 of total SJ River flow at Vernalis. Spring - pulse flows for temperature regulation, migration cues, habitat inundation. Oct - pulse flows to attract adult salmonids.
50	TBI / NRDC	SJ River Inflow	TBI Exhibit 3 - Delta Inflows (Table 1, p.28), TBI / NRDC closing comments (Table 3b). Flows 5000 cfs to maintain minimum temperature (65F) for migrating salmonids in April and May. Flows 20000 to trigger floodplain inundation. Year-round flows should exceed 2000 cfs to alleviate potential for DO problems in DWSC.
51	AR / NHI	SJ River Inflow	AR_NHI_Exh1 (testimony of Cain, Opperman, and Tompkins) and AR_NHI_closing comments (Table 2). SJ River flows to benefit salmon rearing habitat and smolt out-migration (increase flow velocities and turbidity), with focus on temperature (maintain temp at or below 65F) and floodplain inundation. Criteria recommended to be in addition to those stipulated in D1641.
52	EDF / Stillwater	SJ River Inflow	EDF / Stillwater Exh 1 (focal species approach, pp.47-49). Based upon investigations for the SJ River DO TMDL, minimum instream flows at the Stockton DWSC should be maintained in excess of 1,800 cfs during Sept and Oct of each year. Low DO in the lower SJ River has been found to impede upstream salmon migration (NMFS 2009, p.74). Studies by Hallock (1970) indicate that low DO at Stockton delay upmigration and straying rates.
53	EDF / Stillwater	SJ River Inflow	EDF / Stillwater Exh 1 (focal species approach, pp.47-49). Flows during November should correspond to current minimum Federal Energy Regulatory Commission (FERC) spawning flow requirements from the Stanislaus, Tuolumne, Merced, and upper San Joaquin rivers.

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No.	Entity	Type	Notes (excerpts from source documents)
54	EDF / Stillwater	SJ River Inflow	EDF / Stillwater Exh 1 (focal species approach, pp.47-49). Salmonid spawning attraction flows in excess if 3500 cfs at Vernalis should be provided for 10-14 days during October, using coordinated releases from the SJ River and tributaries. For remainder of fall, Delta inflows would be determined by the minimum instream flow requirements of the SJ River basin and east side tributaries. Upstream flow levels would likely be increased to meet the Delta outflow recommendations.
55	EDF / Stillwater	SJ River Inflow	EDF / Stillwater Exh 1 (focal species approach, pp.54). "Although USFWS (1995) previously recommended spring Delta inflows ranging from 4,050 cfs to 15,750 cfs at Vernalis based upon of regression models of Chinook salmon smolt survival. The current D-1641 flow minimums range from 3,110 cfs to 8,620 cfs (Table 1-5), depending upon water year type, have never been fully implemented. In addition to baseline flows, for the benefit of rearing Chinook salmon and other native fishes, floodplain activation flows should be provided..."
56	EDF / Stillwater	SJ River Inflow	EDF / Stillwater Exh 1 (focal species approach, pp.51-52). Winter Inflows - Minimum flows at Vernalis and the eastside tributaries should be coordinated to maintain net seaward flows at Jersey Point of 1000 cfs in Critical and Dry years, 2000 cfs in Below and Above Normal years, and 3000 cfs in Wet years (USFWS 1995 3-Xe-19). Net seaward flows for benefit of outmigrating juvenile salmon.
57	EDF / Stillwater	SJ River Inflow	EDF / Stillwater Exh 1 (focal species approach, pp.54-55). For the benefit of rearing chinook salmon and other native fishes, floodplain activation flows should be provided of 14800 cfs in the lower SJ River in Above Normal and Wet water year types. A series of pulse flows instead of a single extended high flow event might also be used to achieve the desired target of continuous days of inundated floodplain. Goal for combined winter and spring floodplain activation flows is to maintain inundated seasonal floodplain habitat conditions (or the potential for such conditions in sites where floodplain restoration actions may be undertaken in the future) in the lower SJ River during Jan through Apr for a minimum of 21 and 35 consecutive days in Above Normal and Wet water year types, respectively. For the purposes of this assessment, Stillwater allocated the Delta inflows for floodplain inundation to February and March. Also discusses inundation of Cosumnes River floodplain.
58	USFWS	SJ River Inflow	USFWS testimony concerning scientific information used to determine flow criteria. Source: U.S. Department Of the Interior - Comments Regarding the California State Water Resources Control Board's Notice of Public Informational Proceeding to Develop Delta Flow Criteria for the Delta Ecosystem Necessary to Protect Public Trust Resources, Sections II and III, pages 56-57 and 25. Quote in table from p.56-57. "The Anadromous Fish Restoration Program has developed estimates of flow levels needed at Vernalis to achieve a 53□ increase (page 9) and a doubling (page 10) in predicted Chinook salmon production for the basin (USFWS, 2005). These Vernalis flow criteria vary by water year type and by month between February and May. We recommend these flows as starting point for establishing minimum and maximum volume of flow for increasing juvenile salmon and steelhead survival in the San Joaquin basin." (p.25).
59	AFRP	SJ River Inflow	Anadromous Fish Restoration Program (ARFP). Recommended streamflow schedules to meet the AFRP Doubling Goal in the San Joaquin River Basin (USFWS, 27 Sept 2005). Salmon doubling - total average flow (Stanislaus, Tuolumne, Merced) that would be expected to double the total predicted Chinook salmon production for the basin.

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No.	Entity	Type	Notes (excerpts from source documents)
60	AFRP	SJ River Inflow	Anadromous Fish Restoration Program (ARFP) - Recommended streamflow schedules to meet the AFRP Doubling Goal in the San Joaquin River Basin (USFWS, 27 Sept 2005). Total average flow (Stanislaus, Tuolumne, Merced) that would be expected to achieve a 53□ increase in total predicted Chinook salmon production for the basin.
61	NMFS	SJ River Inflow	NMFS OCAP Bio Opinion, Action IV.2.1 (pp.641-644) San Joaquin River Inflow to Export Ratio - both interim (2010-2011) and long-term (beginning in 2012) requirements are stipulated. Interim flows are based on maintaining a minimum status quo for SJ River basin salmonid populations. Long term flow schedules for the SJ River are expected to result from SWRCB proceedings on SJ River flows. Export limitations and flows are also described on pp. 642-644
62	NMFS	SJ River Inflow	NMFS_Exh9 (from AFRP 1995) - Sturgeon (Green and White), mean monthly flows - ensure suitable conditions for sturgeon to migrate and spawn and for progeny to survive.
63	UCDavis - Delta Solutions Group	SJ River Inflow	Functional Flows 3a - transport juvenile salmon (references USFWS Exhibit 31, 1987; Newman and Rice 2002; Williams 2006) - wet years - 20000 cfs, Apr-Jun (2 out of 10 years); AN years - 15000 cfs, April - Jun 15 (4 out of 10 years); BN years - 10000 cfs, Apr-May (6 out of 10 years); Dry years - 7000 cfs, Apr-May 15 (8 out of 10 years); and Critical years - 5000 cfs, Apr (10 out of 10 years). Functional Flows 3c - adult salmon recruitment (reference USFWS Exhibit 31, 1987) - 2000 cfs year round (10 out of 10 years) (flows were not experienced in unimpaired conditions, but likely result from the disturbed conditions). Functional Flows 3b - Improve DO conditions in DWSC (2000 cfs, July-Oct, all years) (Lehman et al 2004, Jassby and VanNieuwenhuyse 2005).
64	D1641	OMR	Export/Inflow ratio - the maximum percent Delta inflow diverted for Feb may vary depending on the Jan 8RI (see D1641)
65	D1641	OMR	SWP/CVP Export Limit - All water year types, Apr 15 - May 15, the greater of 1500 cfs or 100□ of 3-day avg. Vernalis flow. Maximum 3-day average of combined export rate (cfs), which includes Tracy Pumping Plant and Clifton Court Forebay Inflow less Byron-Bethany pumping. The time period may need to be adjusted to coincide with fish migration. Maximum export rate may be varied by CalFed Ops Group.
66	Draft D1630	OMR	Reverse flow restrictions for all year types are relaxed when combined CVP and SWP exports are □2000 cfs. Export pumping restriction is relaxed for all year types when Delta outflow □50000 cfs, except for the export pumping restriction during the SJ River pulse period. July 1 - Jan 31 - 14-day running average flow (as calculated in DAYFLOW), these restrictions do not apply whenever the EC at the Mallard Slough monitoring station is □3 mmhos/cm. QWEST standards in 1630 discussed in DOI submittal, p.53, section concerning reverse flows.
67	CSPA / C-WIN	OMR	CSPA closing comments, C-WIN closing comments, CSPA_Exh1_Jennings. Combined export rates would be 0 cfs in all years from March 16 through June 30. Prevent entrainment and keep migration corridors open to maximize salmon juvenile and smolt survival. Facilitate SJ River salmonid migration down Old River.
68	CSPA / C-WIN	OMR	CSPA and C-WIN closing comments - flow direction, entrainment protection and provision of migration corridors

Appendix A, Table 7. Notes for Tables 1 through 6.

No.	Entity	Type	Notes (excerpts from source documents)
69	CSPA / C-WIN	OMR	SJ River at Jersey Point flow recommendations (positive 14-day mean flows). Source: CSPA_exh1_Jennings_test; CDFG_1992_WRINT-DFG-Exhibit □8, Alt C (p.11, flows at Jersey Pt from Apr 1 through June 30, salmon); AFRP Working Paper, 1995, p. 3-Xe-19 (salmon). Function maintain positive flow for salmonid smolt outmigration and protect Delta smelt, originally two separate recommendations. DS - Feb 1 - Jun 30, Salmon - Oct 1 - Jun 30, only difference between flow recommendations where overlap occurred was DS in AN years □2500 cfs, salmon in AN years □2000. For this table, recommendations merged and 2500 cfs used for AN years (□DFG Exh 8 recommends 2500 cfs in AN years)
70	TBI / NRDC	OMR	TBI/NRDC closing comments (Table 4). The hydrodynamic recommendations expressed as Vernalis flow and/or export to inflow ratios in TBI/NRDC Exh4 (Delta Hydrodynamics, p.30) were converted to OMR flows, using the San Joaquin flow recommendations as described in TBI/NRDC Exh 3 (Delta Inflows), for inclusion in Table 4. Note: recommended OMR flows assume SJ River flows recommended in TBI Exhibit 3 are also implemented. (□) - when the previous longin smelt FMWT index □500, OMR flows in Jan-Mar are □0. This corrects a typographical error in the table on p.30 of TBI Exhibit 4
71	AFRP	OMR	Anadromous Fish Restoration Program (ARFP) (Working Paper on Restoration Needs, Habitat Restoration Actions to Double Natural Production of Anadromous Fish in the Central Valley of California, Volume 3, 1995, p. 3-Xe-19). Action 3 - Maintain positive QWEST flows, or an equivalent measure of net seaward flows at Jersey Point, of 1000 cfs in Critical and Dry years, 2000 cfs in below- and above normal years, and 3000 cfs in wet years from Oct 1 through June 30. Objective - Increase survival of smolts migrating down the mainstem rivers, decrease the number of smolts diverted into the central Delta, increase the survival of smolts diverted into the central Delta, and provide attraction flows for San Joaquin Basin adults (Oct - Dec).
72	NMFS	OMR	NMFS OCAP Bio Opinion, Action IV.2.3 - Old and Middle River Flow Management (pp. 648-652). See action triggers on pp. 648-650. Actions will be taken in coordination with USFWS RPA for Delta Smelt and State-listed longfin smelt 2081 incidental take permit. During the Jan 1 - Jun 15 period, the most restrictive export reduction shall be implemented.
73	USFWS	OMR	USFWS testimony concerning scientific information used to determine flow criteria. Source: U.S. Department Of the Interior - Comments Regarding the California State Water Resources Control Board's Notice of Public Informational Proceeding to Develop Delta Flow Criteria for the Delta Ecosystem Necessary to Protect Public Trust Resources, Sections II and III, pages 50, 53, and 24-25 (references USFWS 1992; AFRP Working Paper p.3-Xe-19, USFWS 2005, Restoration Action □3; D-1630, pp44-47). "Based on the scientific information we reviewed, the Board should develop reverse flow criteria that would maintain the Old and Middle river flow positive during key months (January through June) of the year to protect important public trust resources in the Delta" (p.53).

Appendix A, Table 7. Notes for Tables 1 through 6.

No.	Entity	Type	Notes (excerpts from source documents)
74	USFWS	OMR	USFWS testimony concerning scientific information used to determine flow criteria. Source: U.S. Department Of the Interior - Comments Regarding the California State Water Resources Control Board's Notice of Public Informational Proceeding to Develop Delta Flow Criteria for the Delta Ecosystem Necessary to Protect Public Trust Resources, Sections II and III, pages 24,25, and 53. "In a previous Board exhibit (USFWS, 1992), we showed a positive relationship between temperature corrected juvenile survival indices and flow at Jersey Point for marked fish released at Jersey Point (QWEST) (USFWS, 1992, p.21). In addition, the AFRP Working Paper (USFWS, 1995) Restoration Action □3 calls for maintaining positive QWEST flows, or an equivalent measure of net seaward flows at Jersey Point, of 1000 cfs in critical and dry years, 2000 cfs in below- and above-normal years, and 3000 cfs in wet years from Oct 1 through June 30. Higher flow at Jersey Point has been provided during the VAMP period (mid-April to mid-May) with the adoption of VAMP flows and exports. We encourage the Board to retain or expand this
74 cont	USFWS	OMR	type of action to assure the contribution of downstream flow from the San Joaquin Basin to Delta outflow for the protection of juvenile and adult salmonids migrating from the San Joaquin basin."
75	USFWS	OMR	USFWS OCAP Bio Opinion - RPA re: OMR flows. Component 1 - Adults (Dec - Mar) - Action 1 (protect upmigrating delta smelt) - once turbidity or salvage trigger has been met, -2000 cfs OMR for 14 days to reduce flows towards the pumps. Action 2 (protect delta smelt after migration prior to spawning) - OMR range between -1250 and -5000 cfs determined using adaptive process until spawning detected. pp.280-282
76	USFWS	OMR	USFWS OCAP Bio Opinion - RPA re: OMR flows. Component 2 - Larvae/Juveniles - action starts once temperatures hit 12 degrees C at three delta monitoring stations or when spent female is caught. OMR range between -1250 and -5000 cfs determined using adaptive process. OMR flows continue until June 30 or when Delta water temperatures reach 25 degrees C, whichever comes first. pp. 280-282
77	CDFG	OMR	Longfin Smelt Incidental Take Permit (2009), p. 9-10, Condition 5.1. This Condition is not likely to occur in many years. To protect adult longfin smelt migration and spawning during December through February period, the Smelt Working Group (SWG) or DFG SWG personnel staff shall provide OMR flow advice to the Water Operations Management Team (WOMT) and to Director of DFG weekly. The SWG will provide the advice when either: 1) the cumulative salvage index (defined as the total longfin smelt salvage at the CVP and SWP in the December through February period divided by the immediately previous FMWT longfin smelt annual abundance index) exceeds five (5); or 2) when a review of all abundance and distribution survey data and other pertinent biological factors that influence the entrainment risk of adult longfin smelt indicate OMR flow advise is warranted. Permittee shall ensure the OMR flow requirement is met by maintaining the OMR flow 14-day running average is no more negative than -5000 cfs and the initial 5-day running average is not more negative than -6250 cfs. During any time OMR flow restrictions for
77 cont	CDFG	OMR	the FWS's 2008 Biological Opinion for delta smelt are being implemented, this condition (5.1) shall not result in additional OMR flow requirements for protection of adult longfin smelt. Once spawning has been detected in the system, this Condition terminates and 5.2 begins. Condition 5.1 is not required or would cease if previously required when river flows are 1) □55000 cfs in the Sac River at Rio Vista; or 2) □8000 cfs in the SJ River at Vernalis. If flows go below 40000 cfs in the Sac River at Rio Vista or 5000 cfs in the SJ River at Vernalis, the OMR flow in Condition 5.1 shall resume if triggered previously. Review of survey data and other pertinent biological factors that influence the entrainment risk of adult longfin smelt may result in a recommendation to relax or cease an OMR flow requirement.

Appendix A, Table 7. Notes for Tables 1 through 6.

No.	Entity	Type	Notes (excerpts from source documents)
78	CDFG	OMR	Longfin Smelt Incidental Take Permit (2009), p. 10-11, Condition 5.2. To protect larval and juvenile longfin smelt during Jan-June period, the SWG or DFG SWG personnel shall provide OMR flow advice to the WOMT and the DFG Director weekly. The OMR flow advice shall be an OMR flow between -1250 and -5000 cfs and be based on review of survey data, including all of the distributional and abundance data, and other pertinent biological factors that influence the entrainment risk of larval and juvenile longfin smelt. When a single Smelt Larval Survey (SLS) or 20 mm Survey sampling period results in: 1) longfin smelt larvae or juveniles found in 8 or more of the 12 SLS or 20mm stations in the central and south Delta (Stations 809, 812, 901, 910, 912, 918, 919) or, 2) catch per tow exceeds 15 longfin smelt larvae or juveniles in 4 or more of the 12 survey stations listed above, OMR flow advice shall be warranted. Permittee shall ensure the OMR flow requirement is met by maintaining the OMR flow 14-day running average no more negative than the required OMR flow and the 5-day running average is within 25 of the
78 cont	CDFG	OMR	required OMR. This Conditions OMR flow requirement is likely to vary throughout Jan through June. Based on prior analysis, DFG has identified three likely scenarios that illustrate the typical entrainment risk level and protective measures for larval smelt over the period: High Entrainment Risk Period: Jan - Mar OMR range from -1250 to -5000 cfs; Medium Entrainment Risk Period: April and May OMR range from -2000 to -5000 cfs, and Low Entrainment Risk Period: June OMR -5000 cfs. When river flows are: 1) greater than 55000 cfs in the Sac River at Rio Vista; or 2) greater than 8000 cfs in the SJ River at Vernalis, the Condition would not trigger or would be relaxed if triggered previously. Should flows go below 40000 cfs in Sac River at Rio Vista or 5000 cfs in the SJ River at Vernalis, the Condition shall resume if triggered previously. In addition to river flows, the SWG or DFG SWG personnel review of all abundance and distribution survey data and other pertinent biological factors that influence the entrainment risk of longfin smelt may result in a recommendation by DFG to WOMT to relax or cease an OMR flow requirement.
79	CDFG	Floodplain	DFG_Closing: DFG Exhibit 1, Page 13. Sacramento Splittail - floodplain inundation (habitat) - incubation, early rearing, egg and larval habitat and survival
80	USFWS	Floodplain	USFWS testimony concerning scientific information used to determine flow criteria. Source: U.S. Department Of the Interior - Comments Regarding the California State Water Resources Control Board's Notice of Public Informational Proceeding to Develop Delta Flow Criteria for the Delta Ecosystem Necessary to Protect Public Trust Resources, Sections II and III, pages 28 and 54. "The Board should consider the importance of more frequent floodplain inundation (especially Yolo Bypass flows) when determining the Delta outflows needed to restore the Delta ecosystem pursuant to the Board s public trust responsibilities" (p.28). "The Yolo Bypass floods via the Fremont Weir when flows on the Sacramento River exceed approximately 70,000 cfs, which it currently does in about 60 of years (Feyrer, et al. 2006). Flows on the Sacramento River should therefore exceed 70,000 cfs in at least six out of ten years. Recent historical floodplain inundation events are shown in Figure 4 (Sommer et al., 2001)" (p.54).

Appendix A, Table 7. Notes for Tables 1 through 6.

No.	Entity	Type	Notes (excerpts from source documents)
81	NMFS	Floodplain	NMFS OCAP Bio Opinion, Action I.6.1 - Restoration of Floodplain Rearing Habitat. p.608. " Objective: To restore floodplain rearing habitat for juvenile winter-run, spring-run, and CV steelhead in the lower Sacramento River basin. This objective may be achieved at the Yolo Bypass, and/or through actions in other suitable areas of the lower Sacramento River. Action: In cooperation with CDFG, USFWS, NMFS, and Corps, Reclamation and DWR shall, to the maximum extent of their authorities, provide significantly increased acreage of seasonal floodplain rearing habitat, with biologically appropriate durations and magnitudes, from December through April, in the lower Sacramento River basin, on a return rate of approximately one to three years, depending on water year type. In the event this action conflicts with Shasta Operations Actions I.2.1 to I.2.3., the Shasta Operations Actions shall prevail." By December 31, 2011, Reclamation and DWR shall submit to NMFS a plan to implement this action.
82	NMFS	Floodplain	NMFS - Public Draft Recovery Plan for the ESUs of Sacramento River Winter-run Chinook Salmon and Central Valley Spring-run Chinook Salmon and the DPS of Central Valley Steelhead (October 2009), Section 1.5.5, p.157. "Enhance the Yolo Bypass by re-configuring Fremont and Sacramento weirs to: (1) all for fish passage through Fremont Weir for multiple species; (2) enhance lower Putah Creek floodplain habitat; (3) improve fish passage along the toe drain/Lisbon weir; (4) enhance floodplain habitat along the toe drain; and (5) eliminate stranding events;and (6) create annual spring inundation of at least 8000 cfs to fully activate the Yolo Bypass floodplain."
83	D1641	DCC	For the May 21 - June 15 period, close the Delta Cross Channel gates for a total of 14 days per CALFED Ops Group. During the period the DCC gates may close 4 consecutive days each week, excluding weekends
84	Draft D1630	DCC	When monitoring indicates that significant numbers of salmon smolts or striped bass eggs and larvae are present or suspected to be present, the Executive Director (ED) or his designee shall order USBR to close the gates. The ED, with advice from other agencies, will develop specific monitoring and density criteria for closing and opening the gates.
85	CSPA / C-WIN	DCC	CSPA_Exh1_Jennings, C-WIN closing comments. Source CDFG_1992_WRINT-DFG-Exhibit □8, Alt C (p10). Function: reduce entrainment of Sacramento salmon smolts into the interior Delta
86	NMFS	DCC	NMFS OCAP Bio Opinion, Action Suite IV.1 (pp. 631-640)
87	EDF / Stillwater	Ouflow	EDF_Closing Comments (Table 1) - Mean Historical Delta Outflow Volumes (TAF) for 1956-2003 by month and water year type. Historical and unimpaired flow values are based on Water Years 1956-2003 using California Central Valley Unimpaired Flow Data, 4th ed. (CDWR 2007). In instances where there was a difference between Dry and Critically Dry years, the value for Critically Dry years was selected. Originally reported as volume (TAF). Conversion calculated as follows: (TAF/month)(1000 AF/TAF)(43560 ft3/AF)(month/X days)(day/86400 sec)

Appendix B: Enacting Legislation

California Water Code, Division 35 (Sacramento-San Joaquin Delta Reform Act of 2009), Part 2 (Early Actions), Section 85086

(a) The board shall establish an effective system of Delta watershed diversion data collection and public reporting by December 31, 2010.

(b) It is the intent of the Legislature to establish an accelerated process to determine instream flow needs of the Delta for the purposes of facilitating the planning decisions that are required to achieve the objectives of the Delta Plan.

(c)

(1) For the purpose of informing planning decisions for the Delta Plan and the Bay Delta Conservation Plan, the board shall, pursuant to its public trust obligations, develop new flow criteria for the Delta ecosystem necessary to protect public trust resources. In carrying out this section, the board shall review existing water quality objectives and use the best available scientific information. The flow criteria for the Delta ecosystem shall include the volume, quality, and timing of water necessary for the Delta ecosystem under different conditions. The flow criteria shall be developed in a public process by the board within nine months of the enactment of this division. The public process shall be in the form of an informational proceeding conducted pursuant to Article 3 (commencing with Section 649) of Chapter 1.5 of Division 3 of Title 23 of the California Code of Regulations, and shall provide an opportunity for all interested persons to participate. The flow criteria shall not be considered predecisional with regard to any subsequent board consideration of a permit, including any permit in connection with a final BDCP.

(2) Any order approving a change in the point of diversion of the State Water Project or the federal Central Valley Project from the southern Delta to a point on the Sacramento River shall include appropriate Delta flow criteria and shall be informed by the analysis conducted pursuant to this section. The flow criteria shall be subject to modification over time based on a science-based adaptive management program that integrates scientific and monitoring results, including the contribution of habitat and other conservation measures, into ongoing Delta water management.

(3) Nothing in this section amends or otherwise affects the application of the board s authority under Part 2 (commencing with Section 1200) of Division 2 to include terms and conditions in permits that in its judgment will best develop, conserve, and utilize in the public interest the water sought to be appropriated.

(d) The board shall enter into an agreement with the State Water Project contractors and the federal Central Valley Project contractors, who rely on water exported from the Sacramento River watershed, or a joint powers authority comprised of those contractors, for reimbursement of the costs of the analysis conducted pursuant to this section.

(e) The board shall submit its flow criteria determinations pursuant to this section to the council for its information within 30 days of completing the determinations.

Letter Regarding Valencia Water Company's Well 201
June 8, 2011

Valencia Water Company

24631 Avenue Rockefeller • Valencia, CA 91355-3907
(661) 294-0828 • Fax (661) 294-3806

June 8, 2011

William T. Fujioka
Chief Executive Officer
County of Los Angeles
500 West Temple Street
Los Angeles, CA 90012

Re: Valencia Water Company's Well 201

Dear Mr. Fujioka:

This letter is to inform the County of Los Angeles (County) that Valencia Water Company (Valencia) notified the Whittaker-Bermite property owners that Valencia will seek remediation funds to clean-up a closed well, located east of I-5, near City Hall in Santa Clarita, following routine water quality testing that detected low levels of perchlorate. The remediation funds are being sought under a 2007 settlement agreement among Castaic Lake Water Agency (CLWA), Newhall County Water District, Santa Clarita Water Division, Valencia Water Company, and Whittaker Corporation and others to address clean-up of impacted wells from the former munitions site. Under the settlement agreement, the closed well, Well 201, is eligible for "rapid response" funding. The balance of this letter provides further background, including plans for installation of wellhead treatment at Well 201.

Valencia's Well 201 is a Saugus municipal-supply well. In August, 2010, Valencia Water Company detected perchlorate in Well 201. Although the perchlorate levels were within safe drinking water standards, Valencia immediately took the well out of service and notified the California Department of Public Health. The Department requested that Valencia test the well on a quarterly basis. Valencia continued to monitor the inactive well on a monthly basis and the latest testing has confirmed that perchlorate is still present and that wellhead treatment is needed as outlined in the 2007 settlement agreement with Whittaker.

CLWA and the Whittaker-Bermite property owners negotiated the settlement of litigation over perchlorate contamination of a portion of the groundwater basin in April 2007. As part of the settlement, certain wells were identified as potentially threatened by perchlorate, including Valencia Well 201. As a result, the settlement included "rapid response" funding in the event that one or more of those wells were impacted by perchlorate in the future. This funding, from Whittaker, will be used to install wellhead treatment that removes perchlorate from the water, so that it meets safe drinking water standards. In April 2005, Valencia successfully worked with

the Department of Public Health in implementing wellhead treatment at Well Q2, utilizing the same treatment technology contemplated for Well 201. As a result, Well Q2 was returned to water supply service by October 2005. Since then, Valencia's Well Q2 has had no perchlorate detection, and has been regularly tested and monitored as specified by the Department of Public Health.

The removal of Well 201 from service will not have any near-term or long-term impacts on the quality or cost of water to the end users. Those costs will be addressed under the 2007 settlement agreement and the "rapid response" funding provisions in that agreement. The closing of the well also will not impact the Santa Clarita Valley water suppliers' ability to adequately provide water to customers. CLWA and the water retailers continue to ensure that all drinking water quality standards are met and solutions are put in place to address the presence of perchlorate in small portions of the Valley's groundwater aquifers.

In addition, the perchlorate detected in Valencia's Well 201 will be examined in detail in the pending update of 2010 Santa Clarita Valley Urban Water Management Plan. Based on the analysis already conducted for the draft 2010 UWMP, temporarily taking Well 201 out of service, while wellhead treatment is permitted and installed, will have no impact on the Valley's water supplies, which are sufficient to meet the current and projected water demands in the Santa Clarita Valley, even after taking into account the impacted well.

Last year, a $13 million treatment facility near Bouquet Canyon Road and the Santa Clara River came on line to treat perchlorate in groundwater emanating from the Whittaker-Bermite property site. This treatment facility is part of a larger regulatory program that includes the restoration of two perchlorate-impacted wells to extract contaminated groundwater and control the migration of perchlorate in the Saugus Formation aquifer. The cost of that "pump and treat" system also is covered under the 2007 settlement agreement, which protects the public from paying for the remediation costs.

As stated above, as part of the settlement, certain wells were identified as potentially threatened by perchlorate, including Well 201, due to their location. Thus, while the now-operational pump and treat system is intended to control migration of perchlorate, the possibility of further contamination in the direction of groundwater flow was recognized before installation of the pump and treat system, and provisions were incorporated in the overall program to treat additional wells impacted by perchlorate. Initial operation of the pump and treat system is functioning as planned, and is still applicable for both of its objectives, namely to control contaminant migration near the source, and to extract perchlorate from the Saugus formation aquifer. In short, the detection of perchlorate at Well 201 does not reflect any change in the anticipated long-term effectiveness of the pump and treat system.

Since 1997, seven wells in the Santa Clarita Valley, including this most recent well, have been impacted by perchlorate. Three of those wells have been successfully treated and returned to service, two have been replaced, one is planned to be replaced, and this most recent well will have treatment installed.

Perchlorate is a regulated drinking water contaminant in California with a maximum contaminant level of 6 parts per billion (ppb). Valencia's test in August 2010 at well 201 was 5 ppb. During the last several months, readings have varied from 5.7 ppb to 12 ppb in the most recent test.

Perchlorate is both a naturally occurring and a man-made ion used to form a variety of salts. The primary man-made use of perchlorate is as an oxidizer in solid rocket fuel and other propellants and to a lesser extent, in fireworks, explosives, and air-bag inflators. It is highly soluble in water and has been detected in groundwater and surface water in 26 states. It also has been detected in water supplies in close proximity to sites where solid rocket fuel is manufactured or used, such as in Santa Clarita, where the former Whittaker-Bermite company used rocket fuel on its site during World War II. Based on testing and other published data, Valencia believes the origin of the perchlorate found in well 201 is from the former Whittaker-Bermite site, located at 22116 West Soledad Canyon Road, Santa Clarita Valley, Los Angeles County, California. This site has been the subject of federal, state, and local oversight by several regulatory agencies. Ongoing monitoring of all active municipal wells near the former Whittaker-Bermite site has shown no detection of perchlorate in any other active well.

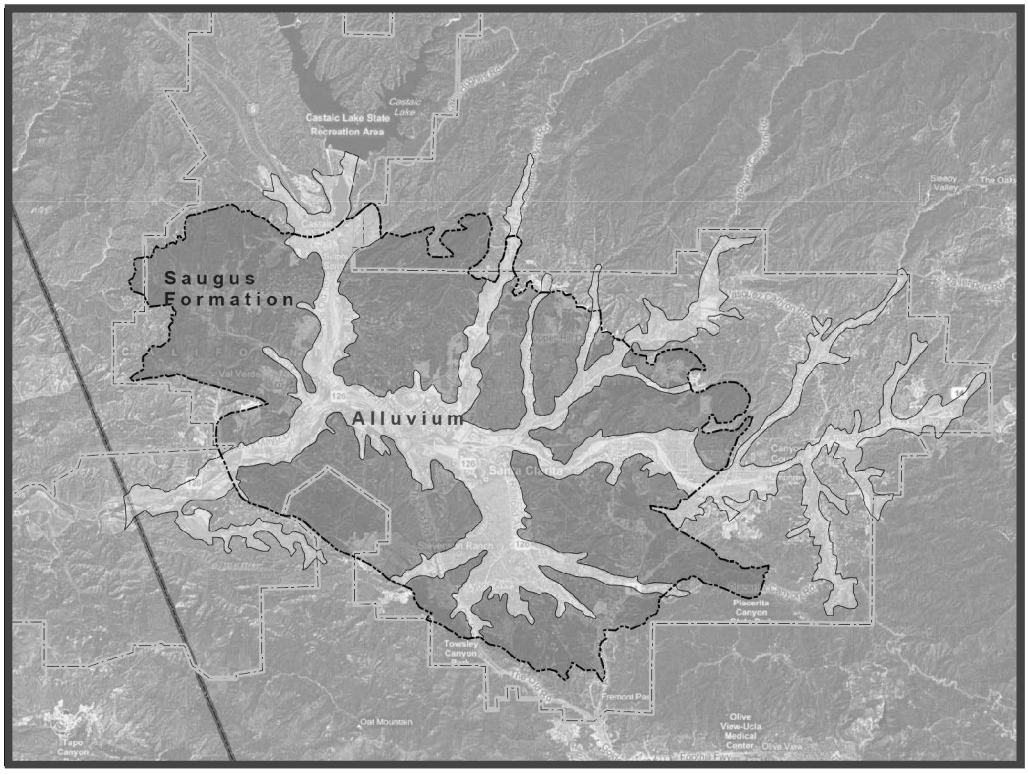
We believe the preemptive actions taken by Valencia Water Company, in coordination with the other water suppliers in the Santa Clarita Valley, ensure the safety and adequacy of the Valley's groundwater supplies. If you should have any questions, please call me at (661) 295-6501.

Sincerely,

Keith Abercrombie
General Manager

cc: Eric Lardiere, General Counsel, Whittaker Corporation
Dan Masnada, General Manager, Castaic Lake Water Agency
Mauricio Guardado, Retail Manager, Santa Clarita Water Division
Steve Cole, General Manager, Newhall County Water District
Adam Ariki, District Engineer, Los Angeles County Department of Public Works

2009
Santa Clarita Valley
Water Report



Castaic Lake Water Agency (CLWA)
CLWA Santa Clarita Water Division
Los Angeles County Waterworks District 36
Newhall County Water District
Valencia Water Company
May 2010

LUHDORFF & SCALMANINI
CONSULTING ENGINEERS

2009 Santa Clarita Valley Water Report

prepared for:

Castaic Lake Water Agency (CLWA)
CLWA Santa Clarita Water Division
Los Angeles County Waterworks District 36
Newhall County Water District
Valencia Water Company

LUHDORFF & SCALMANINI
CONSULTING ENGINEERS

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Executive Summary

This annual report, which is the twelfth in a series that began to describe water supply conditions in 1998, provides current information about the water requirements and water supplies of the Santa Clarita Valley. The report was prepared for the imported water wholesaler, Castaic Lake Water Agency (CLWA), and for the four local retail water Purveyors that serve the Valley: CLWA Santa Clarita Water Division, Los Angeles County Waterworks District 36, Newhall County Water District, and Valencia Water Company. These entities and representatives from the City of Santa Clarita and the County of Los Angeles Department of Regional Planning meet as required to coordinate the management of imported water with local groundwater and recycled water to meet water requirements in the Valley.

This report provides information about local groundwater resources, State Water Project (SWP) and other imported water supplies, water conservation, and recycled water. The report reviews the sufficiency and reliability of supplies in the context of existing water demand, with focus on actual conditions in 2009, and it provides a short-term outlook of water supply and demand for 2010.

ES.1 2009 Water Requirements and Supplies

In 2009, total water requirements in the Santa Clarita Valley were about 86,600 acre-feet (af), of which about 70,000 af (81 percent) were for municipal use and the remainder (16,600 af) was for agricultural and other (miscellaneous) uses, including individual domestic uses. Total demand in 2009 was about 4.5 percent lower than in 2008, less than what was estimated in the 2008 Water Report, and water requirements in 2009 were also lower than the average projection in the 2005 Urban Water Management Plan (UWMP) (but closer to the projection in the 2005 UWMP with conservation). The majority of decreased water demand is attributable to a significant (8%) decrease in municipal water use from 2008. Total water requirements in 2009 were met by a combination of about 47,700 af from local groundwater resources (about 31,100 af for municipal and about 16,600 af for agricultural and other uses), about 38,600 af of SWP and other imported water, and about 300 af of recycled water.

Of the 47,700 af of total groundwater pumping in the Valley in 2009, about 40,000 af were pumped from the Alluvium and about 7,700 af were pumped from the underlying, deeper Saugus Formation. Alluvial pumping represented about a 1,750 af decrease from 2008, and Saugus pumping was slightly higher than in 2008, by about 750 af. Neither pumping volume resulted in any notable overall change in groundwater conditions (water levels, water quality, etc.) in either

aquifer system. Imported water deliveries to the Purveyors decreased by about 3,200 af from the previous year. Water uses and supplies in 2009 are summarized in the following Table ES-1.

Table ES-1
Santa Clarita Valley
Summary of 2009 Water Supplies and Uses
(acre-feet)

Municipal		
SWP and other Imported		38,546
Groundwater (Total)		31,100
Alluvium	*24,396*	
Saugus	*6,704*	
Recycled Water		328
Subtotal		**69,974**
Agriculture/Miscellaneous		
SWP and other Imported		-
Groundwater (Total)		16,564
Alluvium	*15,590*	
Saugus	*974*	
Subtotal		**16,564**
Total		***86,538***

In accordance with the California Urban Water Management Planning Act, the Valley-wide UWMP was updated in 2005 to extend projected water demands through 2030, and to describe the combination of local groundwater, imported water supplies from the State Water Project and other sources, local recycled water supplies, and other water supplies planned to meet those existing and projected water demands in the Valley. The 2005 UWMP describes the reliability of local groundwater resources and the adequacy of groundwater supplies to meet groundwater demand, including consideration of the impacts of perchlorate contamination on several municipal water supply wells. The 2005 UWMP also describes the plans and ongoing work for integrated control of perchlorate migration and full restoration of perchlorate-impacted groundwater supply.

Notable details about each component of water supply in the Valley, and about the water supply outlook for 2010, include the following.

ES.2 Alluvial Aquifer

The groundwater operating plan in the 2005 UWMP includes Alluvial pumping in the range of 30,000 to 40,000 acre-feet per year (afy) following average/normal years, and slightly reduced pumping (30,000 to 35,000 afy) following dry years. An updated review of groundwater basin yield, completed in 2009, includes the same basic range of Alluvial pumping in the 2008 groundwater Operating Plan. Pumping from the Alluvium in 2009 was 40,000 af, which is at the upper end of the operating plan range for the Alluvium and had no adverse effects on groundwater levels and storage in the basin. On average, pumping from the Alluvium has been about 32,000 afy since supplemental imported water became available in 1980. That average rate remains near the lower end of the range of operational yield.

On a long-term basis, continuing through 2009, there is no evidence of any historic or recent trend toward permanent water level or storage decline. In general, throughout a large part of the basin, Alluvial groundwater levels have generally remained near historic highs during the last 30 years. Above average precipitation in late 2004 and 2005 resulted in significant water level recovery in the eastern part of the basin, continuing the overall trend of fluctuating groundwater levels within a generally constant range over the last 30 years. These ongoing data indicate that the Alluvium remains in good operating condition and can continue to support pumping in the operating range included in the 2005 UWMP, or slightly higher, without adverse results (e.g., long-term water level decline or degradation of groundwater quality.)

Based on an integration of water quality records from multiple wells completed in the Alluvium, there have been historical fluctuations in groundwater quality, typically associated with variations in precipitation and streamflow. However, like groundwater levels, there has been no long-term trend toward groundwater quality degradation; groundwater produced from the Alluvial aquifer remains a viable municipal and agricultural water supply.

In 2002, as part of ongoing monitoring of wells for perchlorate contamination, perchlorate was detected in one Alluvial well (the SCWD Stadium Well) located near the former Whittaker-Bermite facility. The detected concentration was slightly below the then-applicable Notification Level for perchlorate (6 μg/l, which was subsequently established as the Maximum Contaminant Level for perchlorate in October 2007), and the well has now been replaced to restore that component of municipal water supply that was impacted by perchlorate. In early 2005, perchlorate was detected in a second Alluvial well, VWC's Well Q2. After an interim period of wellhead treatment, that well has now been returned to regular water supply service. All other Alluvial wells operated by the Purveyors continue to be used for municipal water supply service;

those wells near the Whittaker-Bermite property are sampled in accordance with drinking water regulations and perchlorate has not been detected. As detailed in the 2005 UWMP, the ongoing inactivation of one Alluvial well due to perchlorate contamination does not limit the Purveyors' ability to produce groundwater from the Alluvium in accordance with the groundwater operating plan in the 2005 UWMP or the now updated 2008 groundwater Operating Plan.

The ongoing characterization and plan for control and cleanup of perchlorate in the Valley has focused on the Saugus Formation. In addition, however, on-site cleanup and control activities that began in 2006, and continued through 2009, include continuation of soil cleanup on the Whittaker-Bermite site, and continuation of pumping and treatment in the Northern Alluvium on the Whittaker-Bermite site. Expanded pumping and treatment, intended to effect perchlorate containment in the Northern Alluvium, became operational in October 2007. Under the direction of the State Department of Toxic Substances Control (DTSC), Whittaker has submitted a comprehensive site-wide remediation plan for the contaminants of concern in soil and groundwater detected on the site. A Draft Remedial Action Plan for Operable Units 2 through 6, focused on soil remediation, was submitted to DTSC in 2009. Whittaker has also completed a Draft Feasibility Study for Operable Unit 7 to identify and select treatment technologies for both on-site and off-site groundwater. Final approval of soil and groundwater clean-up plans by DTSC is expected by the end of 2010.

ES.3 Saugus Formation

The groundwater operating plan in the 2005 UWMP includes pumping from the Saugus in the range of 7,500 to 15,000 afy in average/normal years; it also includes planned dry-year pumping from the Saugus of 21,000 to 35,000 afy for one to three consecutive dry years. The 2005 UWMP recognizes the results of basin yield analyses in 2004 and 2005 which found that such short-term pumping can be recharged during subsequent wet/normal years to allow groundwater levels and storage to recover, as it has in historical periods. The 2008 groundwater Operating Plan includes the same broad ranges by Saugus pumping.

Pumping from the Saugus Formation was about 7,700 af in 2009; on average, Saugus pumping has been about 6,800 afy since 1980. Both rates remain near the lower end of the ranges included in the groundwater operating plans and in the UWMP. As a result of long-term relatively low pumping from the Saugus Formation, groundwater levels in that aquifer have remained generally constant to slightly increasing over the last 35 to 40 years; those trends continued in 2009.

In 1997, ammonium perchlorate was discovered in four wells completed in the Saugus Formation in the vicinity of the former Whittaker-Bermite facility located generally toward the east, on the south side of the basin. All four of those impacted wells remain out of active supply service; one of them has been permanently sealed and destroyed. In 2006, a very low level of perchlorate was detected in another Saugus municipal well (NCWD's Well NC-13). That low level detection has been interpreted to not indicate anything new about the migration of perchlorate; however, it has also prompted additional monitoring well installation and a focused study of the Saugus Formation in that area. Results are being integrated with other groundwater remediation efforts and reviewed by the DTSC. All other Saugus wells owned and operated by the Purveyors are available for municipal water supply service. As part of regular operation, those wells are sampled in accordance with drinking water regulations and perchlorate has not been detected. Despite the inactivated Saugus wells, the Purveyors still have sufficient pumping capacity in other wells to meet the planned normal range of Saugus pumping in the 2005 UWMP.

Work toward the ultimate remediation of perchlorate contamination, including the restoration of impacted groundwater supply continued to progress in 2009, with focus on construction of facilities to implement a jointly developed plan to "pump and treat" contaminated water from two of the originally impacted wells to stop migration of the contaminant plume, and to deliver treated water for municipal supply to partially replace impacted well capacity. Environmental review of the project was completed with adoption of a Mitigated Negative Declaration in September 2005. The Final Interim Remedial Action Plan was completed and approved by DTSC in January 2006. Construction of facilities and pipelines necessary to implement the pump and treat program and to also restore inactivated well capacity began in November 2007. Construction was completed in spring 2010, and operational start-up is ongoing as this report is being written.

ES.4 Imported Water

Historically comprised of only its SWP Table A Amount, CLWA's imported water supplies now consist of a combination of SWP water and water acquired from the Buena Vista Water Storage District in Kern County. CLWA's contractual Table A Amount is 95,200 af of water from the SWP. Under the 2007 Water Acquisition Agreement with the Buena Vista Water Storage District (Buena Vista) and the Rosedale-Rio Bravo Water Storage District (Rosedale-Rio Bravo), Buena Vista's high flow Kern River entitlements (and other acquired waters that may become available) are captured and recharged within the Rosedale-Rio Bravo's service area on an ongoing basis. CLWA will receive 11,000 af of these supplies annually through either exchange

of Buena Vista's and Rosedale-Rio Bravo's SWP supplies or through direct delivery of water to the California Aqueduct via the Cross Valley Canal.

CLWA's final allocation of SWP water for 2009 was 40 percent of its Table A Amount, or 38,080 af. The total available imported water supply in 2009 was 67,050 af, comprised of the 38,080 af of Table A supply, 11,000 af purchased from Buena Vista/Rosedale Rio Bravo, 14,610 af of 2008 carryover delivered in 2009, 1,650 af recovered from the Semitropic Water Banking and Exchange Program, 52 af from the 2009 SWP Turnback Pool and 1,658 af through the Yuba Accord. CLWA deliveries to the Purveyors were 38,546 af. Following disposition of available water supplies in 2009, carryover of 28,303 af from 2008 and 2009 is available for 2010 water supply. No additional banking of imported water occurred in 2009.

CLWA has two groundwater banking agreements with the Semitropic Water Storage District in Kern County. In accordance with those agreements, over a ten-year period (until 2012/13), CLWA could withdraw up to 50,870 af of its Table A water that was stored in 2002 and 2003 to meet future Valley demands when needed. Following the withdrawal of 4,950 af in 2009 (1,650 af utilized in 2009 and 3,300 af planned to be utilized in 2010), that balance is 45,920 af. In addition to the banking in Semitropic, CLWA finalized an agreement with the Rosedale-Rio Bravo Water Storage District in 2005 and can now bank up to 100,000 afy of surplus Table A Amount in that District's Water Banking and Exchange Program. In addition to 20,000 af previously banked in both 2005 and 2006, CLWA banked 8,200 af of water in 2007. In accordance with the provisions of that agreement, CLWA can withdraw up to a total of 42,900 af of that water, at a rate up to 20,000 afy, to meet Valley water demands when needed. Additionally, as part of the Buena Vista Water Acquisition Agreement, CLWA is entitled to 22,000 af of water that was stored in the Rosedale Rio-Bravo Water Banking and Exchange Program in 2005 and 2006 on CLWA's behalf. As of 2010, CLWA maintains a recoverable total of 64,900 af in the Rosedale Rio-Bravo Water Banking and Exchange Program.

Since SWP water deliveries are subject to reduction when dry conditions occur in Northern California, the UWMP includes programs, like the Semitropic and Rosedale-Rio Bravo programs, for enhancing water supply reliability during such occurrences. A capital improvement program funded by CLWA has been established to provide facilities and additional water supplies needed to firm up SWP water supplies during times of drought.

ES.5 Recycled Water

Recycled water service was initiated in July 2003 in accordance with CLWA's Draft Reclaimed

Water System Master Plan (2002). The amount of recycled water used for irrigation purposes, at a golf course and in roadway median strips, was approximately 328 af in 2009. CLWA completed programmatic CEQA analysis in early 2007 for full implementation of the recycled water system as outlined in the Master Plan. CLWA is preparing the design of the second phase of the Recycled Water Master Plan that will take water from the Saugus Water Reclamation plant and distribute it to identified users to the north, across the Santa Clara River and then to the west and the east, which will include service to Santa Clarita Central Park. Another new phase of the recycled water system is in design to extend the system south from Magic Mountain Parkway. Collectively, these phases will have design capacity to increase recycled water deliveries by about 1,500 afy.

ES.6 2010 Water Supply Outlook

In 2010, total water demands are expected to be between 82,000-84,000 af, less than actual water use over the last three years, and below the water demand projections in the 2005 UWMP. It is expected that water demands in 2010 will continue to be met with a generally similar mix of water supplies comprised of local groundwater, supplemental SWP and other imported water, and recycled water.

Announced on May 20, 2010, the final allocation of water from the SWP is 45 percent of CLWA's Table A Amount, or 42,840 af. Combined with local groundwater from the two aquifer systems (48,000 af), total Flexible Storage Account (6,060 af), net carryover of SWP Table A allocation from 2008 and 2009 (28,303 af), annual acquisition through the Buena Vista Water/Rosedale Rio-Bravo Water Acquisition Agreement (11,000 af), delivery of water previously recovered but not used from the Semitropic Groundwater Storage Bank (3,300 af), and recycled water (500 af), the total available water supplies for 2010 are 140,000 af. As a result, CLWA and the Purveyors anticipate having more than adequate supplies to meet all water demands in 2010.

In August, 2007, a federal court ruled that certain operational changes were required of the SWP in order to protect the endangered Delta smelt. The court order resulted in the preparation of a new Biological Opinion (BO) requiring DWR to implement mitigation requirements with resultant impacts on SWP water supply reliability. Since then, DWR has prepared two updates to its 2005 Reliability Report, which is issued biennially to assist SWP contractors in assessing the adequacy of the SWP component of their overall supplies under varying hydrologic scenarios, e.g. normal and dry years. The current Draft SWP Delivery Reliability Report 2009 was issued in February, 2010. With the objective of protecting endangered fish such as the Delta

smelt and spring-run salmon, the Draft incorporates restrictions on SWP operations according to the Biological Opinions of the U.S. Fish and Wildlife Service and the National Marine Fishery Service issued on December 15, 2008 and June 4, 2009, respectively. It also considers the impacts on SWP delivery reliability due to climate change, sea level rise, and vulnerability of the Delta's conveyance system and structure due to floods and earthquakes. The current Draft Reliability Report projects long-term reliability of 60 percent during normal year hydrology. CLWA staff has assessed the impact of the current Reliability Report on the CLWA reliability analysis contained in the Agency's 2005 UWMP and concluded that current and anticipated supplies are available to meet anticipated water supply needs.

CLWA, the retail water Purveyors, Los Angeles County and the City of Santa Clarita have formed the Santa Clarita Valley Water Committee. The specific purpose of the committee is to work collaboratively to ensure the progressive implementation of water use efficiency programs and ordinances in the Santa Clarita Valley. In terms of short-term water supply availability, CLWA has determined that, while current operational changes of the SWP are in effect, there are sufficient supplemental water supplies, including SWP water, to augment local groundwater and other water supplies such that overall water supplies will be sufficient to meet projected 2010 water requirements as reflected herein.

In any given year, SWP supplies may be reduced due to dry weather conditions or regulatory factors. During such an occurrence, the remaining water demands are planned to be met by a combination of alternate supplies such as returning water from CLWA's accounts in the Semitropic Groundwater Storage Program and the Rosedale-Rio Bravo Water Banking and Exchange Program, deliveries from CLWA's flexible storage account in Castaic Lake Reservoir, local groundwater pumping, short-term water exchanges, and participation in DWR dry-year water purchase programs in accordance with the 2005 Urban Water Management Plan. Following the recovery of 4,950 af in 2009, the banked excess 2002 and 2003 SWP Table A water in Semitropic represents nearly 46,000 af of recoverable water for drought water supply. In addition, the banked excess SWP Table A water in 2005 and 2006, augmented by banked water acquired through the Buena Vista/Rosedale-Rio Bravo Water Acquisition Agreement in 2005, 2006 and 2007, represent a total of 64,900 af of recoverable water for drought water supply from the Rosedale-Rio Bravo Banking and Exchange Program.

Drought periods may affect available water supplies in any single year and for a duration usually not longer than three consecutive years. It is important to note that hydrologic conditions vary from region to region throughout the state. Dry conditions in Northern California affecting SWP supply may not affect local groundwater and other supplies in Southern California, and the

reverse situation can also occur (as it did in 2002 and 2003). For this reason, CLWA and the Purveyors have emphasized developing a water supply portfolio that is diverse, especially in dry years. Diversity of supply is considered a key element of reliability, giving Valley water Purveyors the ability to draw on multiple sources of supply to ensure reliable service during dry years, as well as during normal and wet years.

1. Introduction

1.1 Background

For most residents of the Santa Clarita Valley (Valley), domestic water service is provided by four retail water Purveyors: Castaic Lake Water Agency's Santa Clarita Water Division (SCWD), Los Angeles County Waterworks District 36 (LAWWD36), Newhall County Water District (NCWD), and Valencia Water Company (VWC). Together, the Purveyors provide water to nearly 70,000 service connections. As a State Water Contractor, Castaic Lake Water Agency (CLWA) contracts for State Water Project water delivered from Castaic Lake, after which it is treated, filtered, and disinfected at two CLWA treatment plants before distribution to the Purveyors. Staff of these entities meet regularly to coordinate the supply of water in the Valley. Their respective service areas are shown in Figure 1-1.

While municipal water supply has grown to become the largest category of water use in the Valley, there remains an agricultural and other small private water demand that is predominately dependent on local groundwater for its water supply. Accordingly, ongoing agricultural water requirements and the use of local groundwater to meet those requirements are considered in analyses of water requirements and supplies such as reported herein. In addition to municipal and agricultural water uses in the Valley, water supply for a small fraction of Valley residents is provided by individual private water supply wells. The locations, construction details, annual pumping and other information about these private wells are not currently available. In the absence of detailed information about private wells and associated water use, pumping as reported herein necessarily includes an estimate of groundwater pumped from private wells; it is intended that this estimate will be refined in the future as more information about the private wells is obtained.

For more than 20 years, CLWA and the Purveyors have reviewed and reported on the availability of water supplies to meet all water requirements in the Valley. Those reports have also addressed local water resources, most notably groundwater, in the region. Past studies have assessed the condition of local groundwater aquifers, their hydrogeologic characteristics, aquifer storage capacity, operational yield and recharge rate, groundwater quality and contamination, and the ongoing conjunctive use of groundwater and imported water resources.

Other efforts have included developing drought contingency plans, coordinating emergency response procedures and implementing Valley-wide conservation programs. In 1985, the

Purveyors prepared the area's first Urban Water Management Plan (UWMP.) Information in the plan was coordinated among CLWA and the Purveyors to provide accurate, comprehensive and consistent water supply and demand information for long term planning purposes. In accordance with the California Urban Water Management Planning Act, the Valley-wide UWMP was most recently updated in 2005 to extend water demand projections through 2030, and to describe the combination of local groundwater, imported water supplies from the State Water Project, local recycled water supplies, and planned other water supplies to meet the existing and projected water demands in the Valley. The 2005 UWMP also describes the reliability of local groundwater resources and the adequacy of groundwater supplies to meet that component of overall water supply; and it also describes the impacts of perchlorate contamination on several municipal water supply wells, and the plans and ongoing work for integrated control of perchlorate migration and full restoration of perchlorate-impacted groundwater supply.

In 2009, primarily in preparation for the next update of the UWMP in 2010, an updated analysis of groundwater basin yield was completed to guide the ongoing use of groundwater and the associated distribution of pumping to maintain groundwater use at a sustainable rate while also addressing localized issues such as restoration of groundwater contamination which has impacted local groundwater supplies since 1987. The results of the updated groundwater basin analysis are summarized in this Water Report.

1.2 Purpose and Scope of the Report

The purpose of this report, which is the twelfth in a series of annual water reports that began to describe water supply conditions in 1998, is to provide current information about water requirements and available water supplies to meet those demands in the Santa Clarita Valley. CLWA and the Purveyors began preparation of this series of reports in response to a request made by the Los Angeles County Board of Supervisors in 1998. Over the last few years, this series of reports has also served as an annual summary of groundwater conditions in the Valley in fulfillment of the commitment in the Santa Clarita Valley Groundwater Management Plan, adopted in 2003, to regularly report on implementation of that Plan.

This report was prepared for Castaic Lake Water Agency, for CLWA's Santa Clarita Water Division, and for Los Angeles County Waterworks District 36, Newhall County Water District, and Valencia Water Company. It continues a format for providing information regarding water uses and the availability of water supplies on an annual basis. It is intended to be a helpful resource for use by water planners and local land use planning agencies. This report is complemented by the more detailed Urban Water Management Plan for the area, which provides

longer-term water supply planning over a 25-year period, and by a number of other technical reports, some of which are specifically referenced herein.

1.3 Santa Clarita Valley Water Purveyors

As introduced above, four retail water Purveyors provide water service to most residents of the Santa Clarita Valley. Brief summary descriptions of those four Purveyors are as follows.

Castaic Lake Water Agency Santa Clarita Water Division has a service area that includes a portion of the City of Santa Clarita and unincorporated portions of Los Angeles County in the communities of Saugus, Canyon Country, and Newhall. Water is supplied from both groundwater and CLWA turnouts to about 28,700 service connections.

Los Angeles County Waterworks District 36 has a service area that encompasses approximately 7,635 acres in the Hasley Canyon area and the unincorporated community of Val Verde. LAWWD 36 has nearly 1,400 service connections. The District has traditionally obtained its full water supply from a connection to the CLWA's Castaic Conduit and continued to do so in 2009.

Newhall County Water District's service area includes portions of the City of Santa Clarita and unincorporated portions of Los Angeles County in the communities of Newhall, Canyon Country, Valencia, and Castaic. NCWD supplies water from both groundwater and CLWA turnouts to approximately 9,600 service connections.

Valencia Water Company's service area serves nearly 30,000 service connections in a portion of the City of Santa Clarita and in the unincorporated communities of Castaic, Newhall, Saugus, Stevenson Ranch, and Valencia. VWC supplies water from both groundwater and CLWA turnouts; VWC also delivers recycled water for a small amount of non-potable use.

1.4 The Upper Santa Clara River Hydrologic Area and East Groundwater Subbasin

The Upper Santa Clara River Hydrologic Area (HA), as defined by the California Department of Water Resources (DWR), is located almost entirely in northwestern Los Angeles County. The area encompasses about 654 square miles comprised of flat valley land (about 6 percent of the total area) and hills and mountains (about 94 percent of the total area) that border the valley area. The mountains include the Santa Susana and San Gabriel Mountains to the south, and the Sierra

Pelona and Leibre-Sawmill Mountains to the north. Elevations range from about 800 feet on the valley floor to about 6,500 feet in the San Gabriel Mountains. The headwaters of the Santa Clara River are at an elevation of about 3,200 feet at the divide separating this hydrologic area from the Mojave Desert.

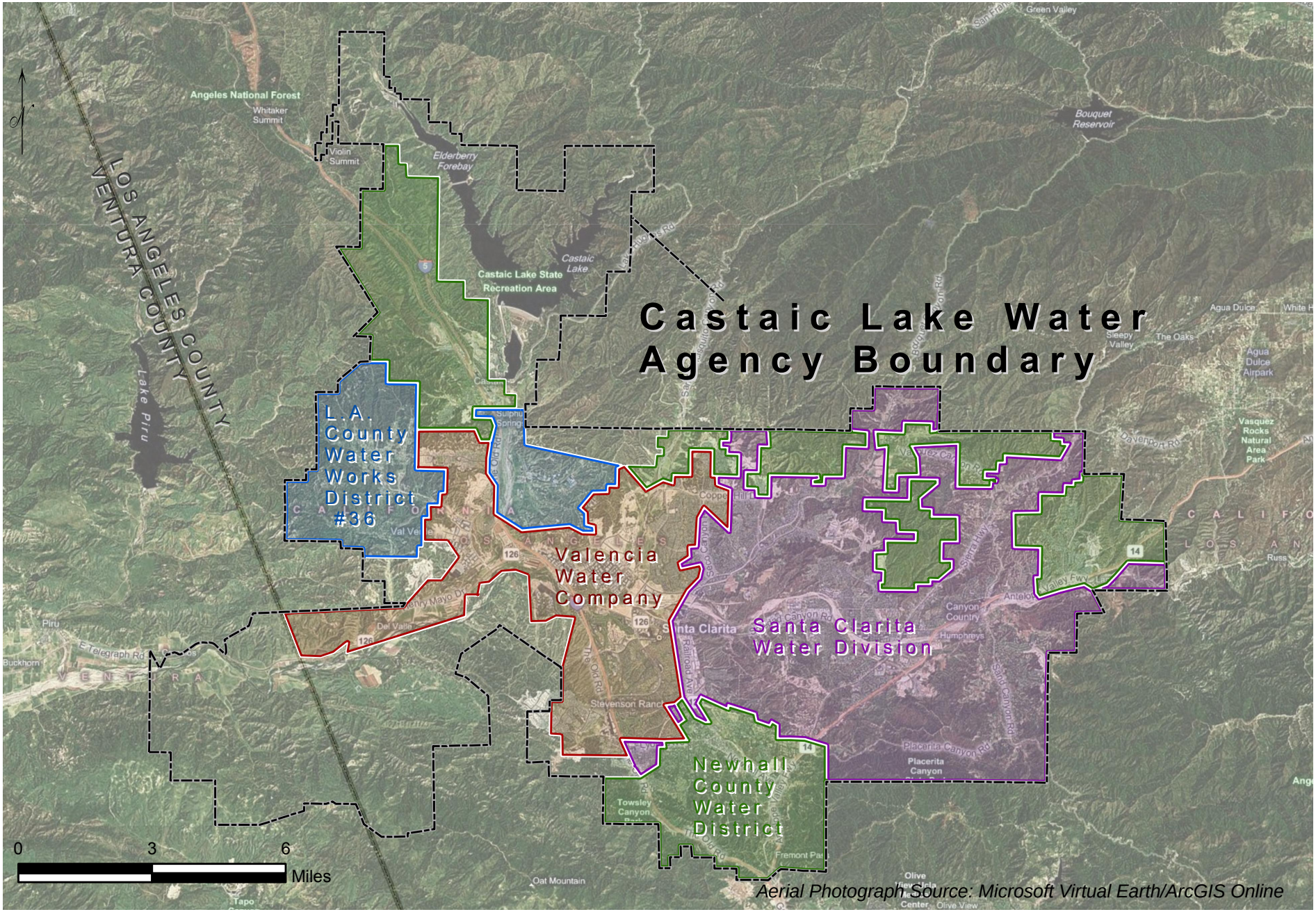
The Santa Clara River and its tributaries flow intermittently from Lang Station westward about 35 miles to Blue Cut, just west of the Los Angeles-Ventura County line, where the River is the outlet from the Upper Santa Clara River Hydrologic Area. The principal tributaries of the River in the Santa Clarita Valley are Castaic Creek, San Francisquito Creek, Bouquet Creek, and the South Fork of the Santa Clara River. In addition to tributary inflow, the Santa Clara River receives treated wastewater discharge from the Saugus and Valencia Water Reclamation Plants, which are operated by the Sanitation Districts of Los Angeles County.

The Santa Clara River Valley East Groundwater Subbasin, beneath the Santa Clarita Valley in the Upper Santa Clara River HA, is the source of essentially all local groundwater used for water supply in the Santa Clarita Valley. Below Blue Cut, the Santa Clara River continues westward through Ventura County to its mouth near Oxnard. Along that route, the River traverses all or parts of six groundwater basins in Ventura County (Piru, Fillmore, Santa Paula, Oxnard Forebay, Oxnard Plain, and Mound) as shown in Figure 1-2.

There are two primary precipitation gages in the Santa Clarita Valley, the Newhall-Soledad 32c gage and the Newhall County Water District gage (Figure 1-3). The National Climatic Data Center (NCDC) and Los Angeles County Department of Public Works (LADPW) have maintained records for the Newhall-Soledad 32c gage since 1931. Newhall County Water District has maintained records for the NCWD gage since 1979. The cumulative records from these two gages correlate very closely, with the NCWD gage recording approximately 25 percent more precipitation than the Newhall-Soledad 32c gage. This is likely due to the location of the NCWD gage, which is at the base of the mountains rimming the southern edge of the Santa Clarita Valley.

The Santa Clarita Valley is characterized as having an arid climate. Historically, intermittent periods of below-average precipitation have typically been followed by periods of above-average precipitation in a cyclical pattern, with each wetter or drier period typically lasting from one to five years. The longer-term precipitation records for the Newhall-Soledad 32c gage are illustrated in Figure 1-3. Long-term average precipitation at that gage is 17.9 inches (1931-2009). Figure 1-3 also shows the cumulative departure from mean annual precipitation. In general, periods of below-average precipitation have been longer and more moderate than

periods of above-average precipitation. Recently, the periods from 1971 to 1976, 1984 to 1991 and 1999 to 2003 have been drier than average; the periods from 1977 to 1983 and 1992 to 1996 have been wetter than average. More recently, wet conditions that began in late 2004, continued into early 2005, ultimately resulting in about 37 inches of measured precipitation, or slightly more than 200 percent of long-term average precipitation, in that year. Those significantly wet conditions contributed to substantial groundwater recharge and decreased water demand that year. Subsequently, total precipitation in 2006 and 2007 was slightly to significantly lower, 14 inches and 6 inches respectively, but water requirements in both years were still close to those projected in the 2005 UWMP, and there were no dramatic changes in groundwater conditions. With the exception of the average annual rainfall total in 2008, the dry conditions that began in 2006 have persisted through 2009. 2009 was a below-average year, with 11.6 inches of precipitation. However, water demand in 2009 was below that projected for average conditions in the 2005 UWMP, and below the short-term projection in the 2008 Water Report. Early year precipitation in 2010 was approximately 13.4 inches through April, or close to long-term average for that part of the year, but water use further decreased from last year for the same period. Combined with other water supply considerations, discussed in Chapter 4, those conditions are expected to result in 2010 water requirements being slightly lower than water use in 2009.



Aerial Photograph Source: Microsoft Virtual Earth/ArcGIS Online

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Figure 1-1
CLWA and Purveyor Service Areas

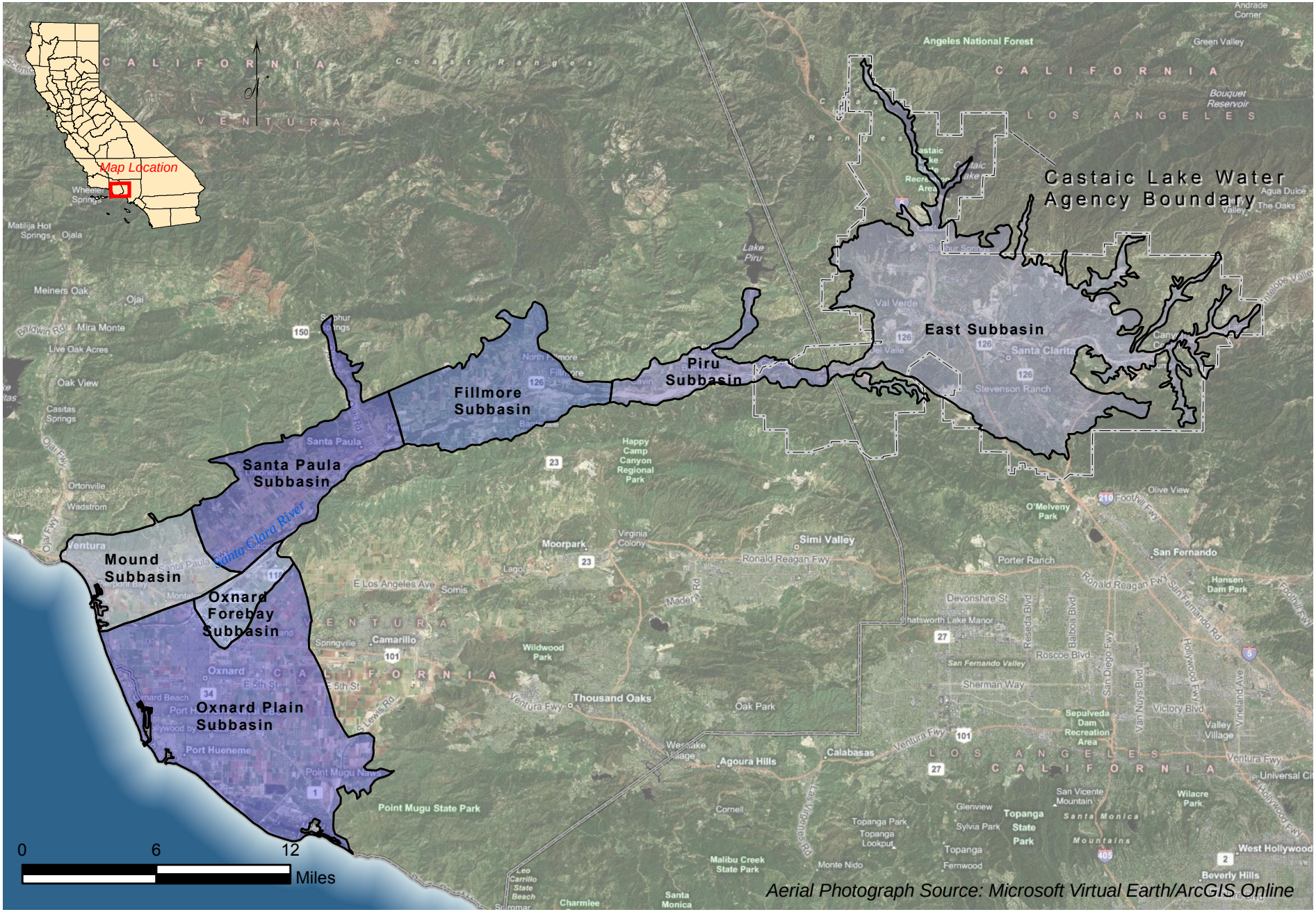

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Figure 1-2
Santa Clara River Groundwater Subbasins

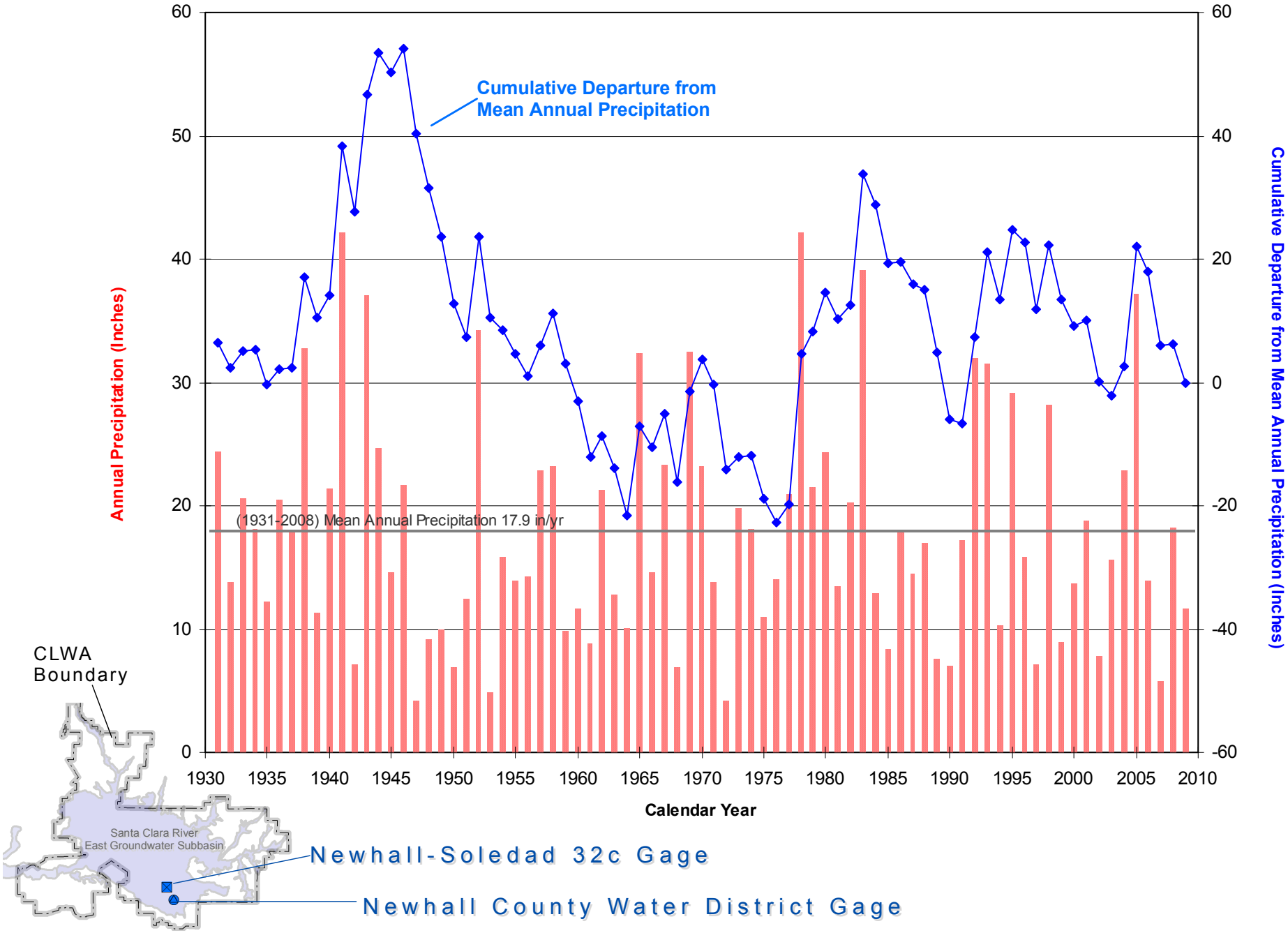

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Figure 1-3
Annual Precipitation and Cumulative Departure from Mean Annual Precipitation at Newhall-Soledad 32c Gage

2. 2009 Water Requirements and Supplies

Total water use in the Santa Clarita Valley was 86,600 af in 2009, a decrease of 4,100 af from the previous year. Of the total water demand, 70,000 af (81 percent) were for municipal use and the remaining 16,600 af (19 percent) were for agricultural and other (miscellaneous) uses, including estimated individual domestic uses. The majority of decreased water demand is attributable to a significant (8%) decrease in municipal water use from 2008. The total water demands were met by a combination of about 47,700 af from local groundwater resources (about 31,100 af for municipal supply and about 16,600 af for agricultural and other uses), about 38,600 af of SWP and other imported water, and about 300 af of recycled water.

Compared to the previous year, total water demand in the Santa Clarita Valley decreased by about 4.5 percent in 2009, and was less than the short-term projected water requirement presented in last year's Water Report. The decrease in water use in 2009 is attributed to ongoing very slow growth in the number of new service connections and continued water conservation awareness as a result of state-wide dry conditions and decreased deliveries of water from the State Water Project. Growth in each Purveyor service area was notably lower than in the preceding two years, with total additions of only about 300 new services connections in 2009, in notable contrast to the growth rate of about 1,000 connections per year over the preceding three years, and in even greater contrast to the predominant growth rate that was three times higher from the late 1990's through 2004. In addition, the Purveyors and the local community continued to be aware of the Governor's Alert in June, 2008 with regard to drought conditions and potential water supply shortages followed by the Governor's Drought Emergency Declaration in February, 2009. The widespread awareness of dry conditions throughout the state and the perceived effects on water supply availability are considered to be prime factors causing total water demand in 2009 to have continued to decline over each of the preceding two years, and to be well below the demand projections in the 2005 UWMP.

The uses of local groundwater, augmented by imported water supplies to meet municipal water requirements since 1980, when the importation of SWP water began, and also slightly augmented by the use of recycled water, are summarized in Table 2-1. Notable with regard to municipal water requirements is that, through 2009, total municipal demand (70,000 af) continues to be below (by about 11,000 af in 2009) the projections in the 2005 UWMP without conservation, and about equal to the projections in the UWMP with conservation.

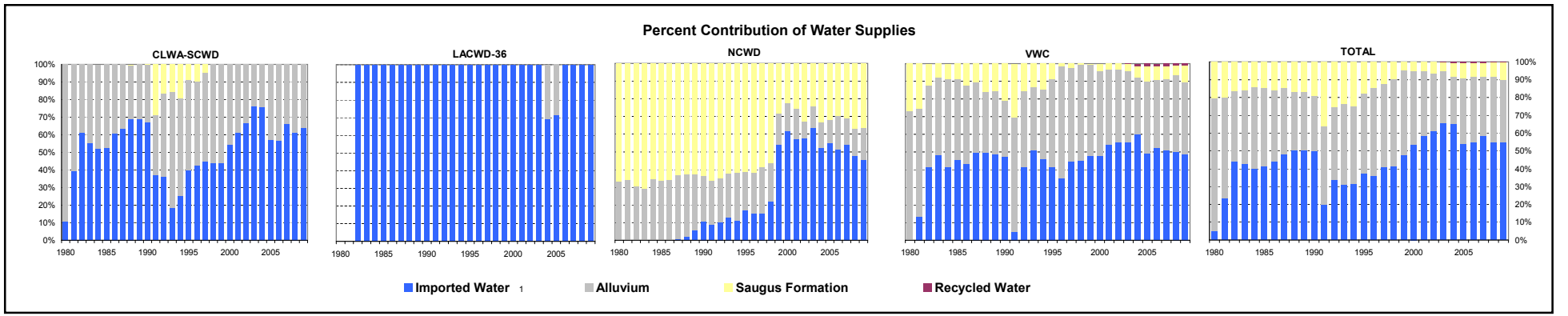
Water supply utilization for all agricultural and other non-municipal uses is summarized in Table 2-2. The category of Small Private Domestic, Irrigation and Golf Course Uses in Table 2-2 includes an estimated 500 af of small private pumping from the Alluvium.

Water supply utilization for all uses in the Santa Clarita Valley, again for the period 1980 to present, is summarized in Table 2-3. The trends in utilization of local groundwater and imported water, complemented by the recent addition of recycled water, are graphically illustrated in Figure 2-1. As can be seen by inspection of Table 2-2 and Figure 2-1, total water use in the Valley was nearly linearly increasing from the early 1980's through 2007, with some weather-related fluctuations in certain years. As discussed above, total water use has declined over the last two years, from a peak slightly above 92,000 af in 2007 to 86,600 af in 2009. Overall, the increase in total water demand since the inception of supplemental SWP importation has been from about 37,000 acre-feet in 1980 to the mid-80,000 acre-feet per year range through 2000-2005, to the short-term peak in the low-90,000 acre-feet per year range in 2006 through 2008.

The decreased demand in 2009 is comparable to the then-increasing demand in 2002. As can also be seen by inspection of Table 2-2 and Figure 2-1, most of the historical increase in water demand has been met with generally increasing importation of SWP water, most recently complemented by other imported water as discussed herein. Since the early 1990's, following a decade of decreased groundwater use during the initial period of SWP importation, total groundwater pumping has fluctuated from year to year, but has remained within a range between about 38,000 and 50,000 acre-feet per year through 2009.

Table 2-1
Water Supply Utilization by Municipal Purveyors
(Acre-Feet)

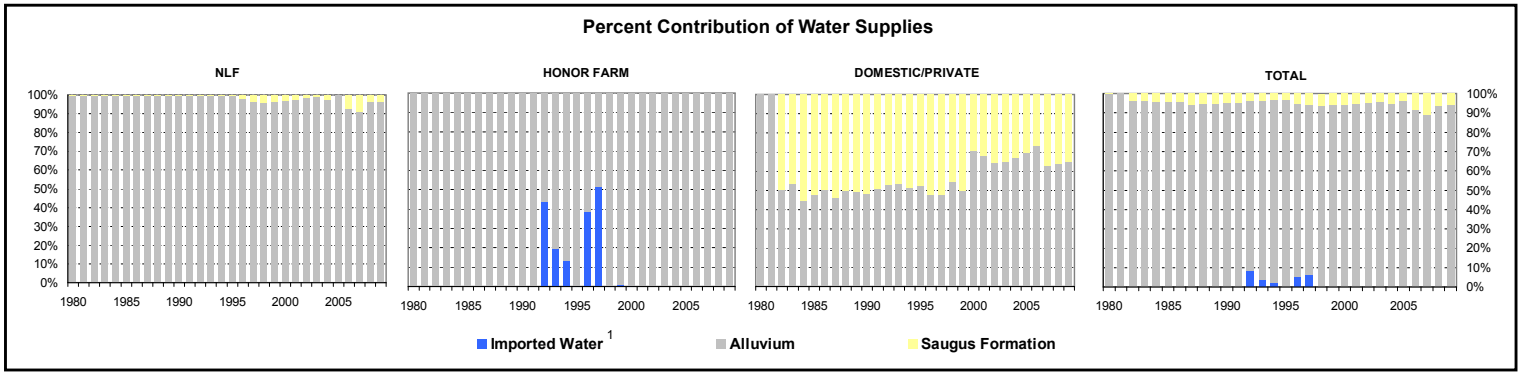
	CLWA Santa Clarita Water Division				Los Angeles County Waterworks District 36			Newhall County Water District				Valencia Water Company					All Municipal Purveyors				
Year	*Imported Water* [1]	*Alluvium*	*Saugus Formation*	**Total**	*Imported Water* [1]	*Alluvium* [2]	**Total**	*Imported Water* [1]	*Alluvium*	*Saugus Formation*	**Total**	*Imported Water* [1]	*Alluvium*	*Saugus Formation*	*Recycled Water*	**Total**	*Imported Water* [1]	*Alluvium*	*Saugus Formation*	*Recycled Water*	**Total**
1980	1,125	9,460	0	**10,585**	0	-	**0**	0	1,170	2,363	**3,533**	0	5,995	2,206	-	**8,201**	1,125	16,625	4,569	-	**22,319**
1981	4,602	7,109	0	**11,711**	0	-	**0**	0	1,350	2,621	**3,971**	1,214	5,597	2,329	-	**9,140**	5,816	14,056	4,950	-	**24,822**
1982	6,454	4,091	0	**10,545**	145	-	**145**	0	1,178	2,672	**3,850**	3,060	3,415	897	-	**7,372**	9,659	8,684	3,569	-	**21,912**
1983	5,214	4,269	0	**9,483**	207	-	**207**	0	1,147	2,787	**3,934**	3,764	3,387	611	-	**7,762**	9,185	8,803	3,398	-	**21,386**
1984	6,616	6,057	0	**12,673**	240	-	**240**	0	1,549	2,955	**4,504**	4,140	4,975	854	-	**9,969**	10,996	12,581	3,809	-	**27,386**
1985	6,910	6,242	0	**13,152**	272	-	**272**	0	1,644	3,255	**4,899**	4,641	4,633	885	-	**10,159**	11,823	12,519	4,140	-	**28,482**
1986	8,366	5,409	0	**13,775**	342	-	**342**	0	1,842	3,548	**5,390**	5,051	5,167	1,427	-	**11,645**	13,759	12,418	4,975	-	**31,152**
1987	9,712	5,582	0	**15,294**	361	-	**361**	22	2,127	3,657	**5,806**	6,190	4,921	1,305	-	**12,416**	16,285	12,630	4,962	-	**33,877**
1988	11,430	5,079	63	**16,572**	434	-	**434**	142	2,283	4,041	**6,466**	7,027	4,835	2,300	-	**14,162**	19,033	12,197	6,404	-	**37,634**
1989	12,790	5,785	0	**18,575**	457	-	**457**	428	2,367	4,688	**7,483**	7,943	5,826	2,529	-	**16,298**	21,618	13,978	7,217	-	**42,813**
1990	12,480	5,983	40	**18,503**	513	-	**513**	796	1,936	4,746	**7,478**	7,824	5,232	3,516	-	**16,572**	21,613	13,151	8,302	-	**43,066**
1991	6,158	5,593	4,781	**16,532**	435	-	**435**	675	1,864	4,994	**7,533**	700	9,951	4,642	-	**15,293**	7,968	17,408	14,417	-	**39,793**
1992	6,350	8,288	2,913	**17,551**	421	-	**421**	802	1,994	5,160	**7,956**	6,338	6,615	2,385	-	**15,338**	13,911	16,897	10,458	-	**41,266**
1993	3,429	12,016	2,901	**18,346**	465	-	**465**	1,075	1,977	5,068	**8,120**	8,424	5,815	2,182	-	**16,421**	13,393	19,808	10,151	-	**43,352**
1994	5,052	10,996	3,863	**19,911**	453	-	**453**	906	2,225	5,103	**8,234**	7,978	6,847	2,565	-	**17,390**	14,389	20,068	11,531	-	**45,988**
1995	7,955	10,217	1,726	**19,898**	477	-	**477**	1,305	1,675	4,775	**7,755**	7,259	8,698	1,586	-	**17,543**	16,996	20,590	8,087	-	**45,673**
1996	9,385	10,445	2,176	**22,006**	533	-	**533**	1,213	1,803	4,871	**7,887**	6,962	12,433	326	-	**19,721**	18,093	24,681	7,373	-	**50,147**
1997	10,120	11,268	1,068	**22,456**	785	-	**785**	1,324	2,309	5,168	**8,801**	9,919	11,696	516	-	**22,131**	22,148	25,273	6,752	-	**54,173**
1998	8,893	11,426	0	**20,319**	578	-	**578**	1,769	1,761	4,557	**8,087**	9,014	10,711	149	-	**19,874**	20,254	23,898	4,706	-	**48,858**
1999	10,772	13,741	0	**24,513**	654	-	**654**	5,050	1,676	2,622	**9,348**	10,806	11,823	106	-	**22,735**	27,282	27,240	2,728	-	**57,250**
2000	13,751	11,529	0	**25,280**	800	-	**800**	6,024	1,508	2,186	**9,718**	12,004	12,179	1,007	-	**25,190**	32,579	25,216	3,193	-	**60,988**
2001	15,648	9,896	0	**25,544**	907	-	**907**	5,452	1,641	2,432	**9,525**	13,362	10,518	835	-	**24,715**	35,369	22,055	3,267	-	**60,691**
2002	18,921	9,513	0	**28,434**	1,069	-	**1,069**	5,986	981	3,395	**10,362**	15,792	11,603	965	-	**28,360**	41,768	22,097	4,360	-	**68,225**
2003	20,668	6,424	0	**27,092**	1,175	-	**1,175**	6,572	1,266	2,513	**10,351**	16,004	11,707	1,068	50	**28,829**	44,419	19,397	3,581	50	**67,447**
2004	22,045	7,146	0	**29,191**	854	380	**1,234**	5,896	1,582	3,739	**11,217**	18,410	9,862	1,962	420	**30,654**	47,205	18,970	5,701	420	**72,296**
2005	16,513	12,408	0	**28,921**	857	343	**1,200**	5,932	1,389	3,435	**10,756**	14,732	12,228	2,513	418	**29,891**	38,034	26,368	5,948	418	**70,768**
2006	17,146	13,156	0	**30,302**	1,289	-	**1,289**	5,898	2,149	3,423	**11,470**	16,313	11,884	2,449	419	**31,065**	40,646	27,189	5,872	419	**74,126**
2007	20,669	10,686	0	**31,355**	1,406	-	**1,406**	6,478	1,806	3,691	**11,975**	16,779	13,140	2,367	470	**32,756**	45,332	25,632	6,058	470	**77,492**
2008	18,598	11,878	0	**30,476**	1,354	-	**1,354**	5,428	1,717	4,195	**11,340**	16,325	14,324	1,770	311	**32,730**	41,705	27,919	5,965	311	**75,900**
2009	17,739	10,077	0	**27,816**	1,243	-	**1,243**	4,832	1,860	3,868	**10,559**	14,732	12,459	2,836	328	**30,355**	38,546	24,396	6,704	328	**69,974**



1. Reflects State Water Project through 2006; includes imported water from State Water Project and Buena Vista WSD Agreement beginning in 2007.
2.Groundwater purchased from LA County Honor Farm.

Table 2-2
Individual Water Supply Utilization by Agricultural and Other Users
(Acre-Feet)

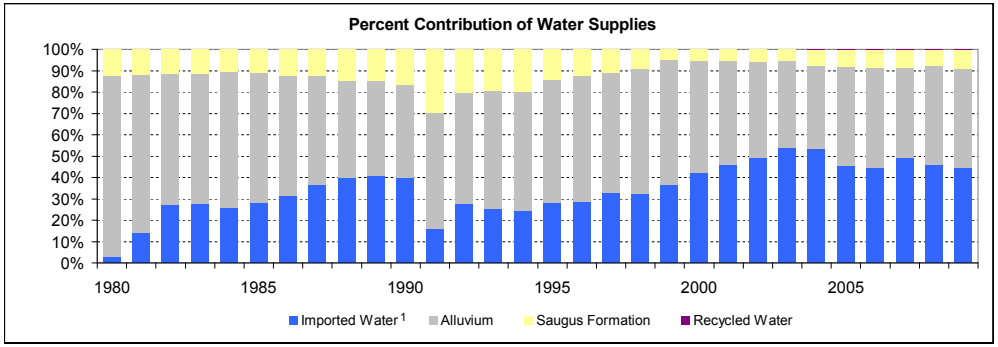
	Newhall Land and Farming			Los Angeles County Honor Farm			Small Private Domestic, Irrigation and Golf Courses Uses			All Agricultural and Other Users			
Year	*Alluvium*	*Saugus Formation*	**Total**	*Alluvium*	*Imported Water* [1]	**Total**	*Alluvium* [2]	*Saugus Formation* [3]	**Total**	*Imported Water* [1]	*Alluvium*	*Saugus Formation*	**Total**
1980	11,331	20	**11,351**	3,000	0	**3,000**	500	0	**500**	0	14,831	20	**14,851**
1981	13,237	20	**13,257**	3,000	0	**3,000**	500	0	**500**	0	16,737	20	**16,757**
1982	9,684	20	**9,704**	3,000	0	**3,000**	500	501	**1,001**	0	13,184	521	**13,705**
1983	7,983	20	**8,003**	3,000	0	**3,000**	500	434	**934**	0	11,483	454	**11,937**
1984	11,237	20	**11,257**	3,000	0	**3,000**	500	620	**1,120**	0	14,737	640	**15,377**
1985	9,328	20	**9,348**	3,000	0	**3,000**	500	555	**1,055**	0	12,828	575	**13,403**
1986	8,287	20	**8,307**	3,000	0	**3,000**	500	490	**990**	0	11,787	510	**12,297**
1987	6,512	20	**6,532**	3,000	0	**3,000**	500	579	**1,079**	0	10,012	599	**10,611**
1988	5,951	20	**5,971**	3,000	0	**3,000**	500	504	**1,004**	0	9,451	524	**9,975**
1989	6,243	20	**6,263**	3,000	0	**3,000**	500	522	**1,022**	0	9,743	542	**10,285**
1990	8,225	20	**8,245**	2,000	0	**2,000**	500	539	**1,039**	0	10,725	559	**11,284**
1991	7,039	20	**7,059**	2,240	0	**2,240**	500	480	**980**	0	9,779	500	**10,279**
1992	8,938	20	**8,958**	1,256	987	**2,243**	500	446	**946**	987	10,694	466	**12,147**
1993	8,020	20	**8,040**	1,798	443	**2,241**	500	439	**939**	443	10,318	459	**11,220**
1994	10,606	20	**10,626**	1,959	311	**2,270**	500	474	**974**	311	13,065	494	**13,870**
1995	11,174	20	**11,194**	2,200	6	**2,206**	500	453	**953**	6	13,874	473	**14,353**
1996	12,020	266	**12,286**	1,237	780	**2,017**	500	547	**1,047**	780	13,757	813	**15,350**
1997	12,826	445	**13,271**	1,000	1,067	**2,067**	500	548	**1,048**	1,067	14,326	993	**16,386**
1998	10,250	426	**10,676**	2,000	12	**2,012**	500	423	**923**	12	12,750	849	**13,611**
1999	13,824	479	**14,303**	1,842	20	**1,862**	500	509	**1,009**	20	16,166	988	**17,174**
2000	11,857	374	**12,231**	1,644	3	**1,647**	1,220	513	**1,733**	3	14,721	887	**15,611**
2001	12,661	300	**12,961**	1,604	0	**1,604**	1,224	573	**1,797**	0	15,489	873	**16,362**
2002	13,514	211	**13,725**	1,602	0	**1,602**	1,063	589	**1,652**	0	16,179	800	**16,979**
2003	10,999	122	**11,121**	2,273	0	**2,273**	931	504	**1,435**	0	14,203	626	**14,829**
2004	10,991	268	**11,259**	2,725	0	**2,725**	1,071	535	**1,606**	0	14,787	803	**15,590**
2005	8,648	6	**8,654**	2,499	0	**2,499**	1,133	499	**1,632**	0	12,280	505	**12,785**
2006	11,477	934	**12,411**	3,026	0	**3,026**	1,369	506	**1,875**	0	15,872	1,440	**17,312**
2007	9,968	971	**10,939**	2,085	0	**2,085**	1,088	656	**1,744**	0	13,141	1,627	**14,768**
2008	9,191	330	**9,521**	3,506	0	**3,506**	1,100	623	**1,723**	0	13,797	953	**14,750**
2009	11,061	379	**11,440**	3,432	0	**3,432**	1,097	595	**1,692**	0	15,590	974	**16,564**



1. *Reflects State Water Project through 2006; includes imported water from State Water Project and Buena Vista WSD Agreement beginning in 2007.*
2. *Robinson Ranch Golf Course irrigation and estimated private pumping.*
3. *Valencia Country Club and Vista Valencia Golf Course irrigation.*

Table 2-3
Total Water Supply Utilization for Municipal, Agricultural and Other Uses
(Acre-Feet)

Year	*Imported Water*[1]	*Alluvium*	*Saugus Formation*	*Recycled Water*	**Total**
1980	1,125	31,456	4,589	-	**37,170**
1981	5,816	30,793	4,970	-	**41,579**
1982	9,659	21,868	4,090	-	**35,617**
1983	9,185	20,286	3,852	-	**33,323**
1984	10,996	27,318	4,449	-	**42,763**
1985	11,823	25,347	4,715	-	**41,885**
1986	13,759	24,205	5,485	-	**43,449**
1987	16,285	22,642	5,561	-	**44,488**
1988	19,033	21,648	6,928	-	**47,609**
1989	21,618	23,721	7,759	-	**53,098**
1990	21,613	23,876	8,861	-	**54,350**
1991	7,968	27,187	14,917	-	**50,072**
1992	14,898	27,591	10,924	-	**53,413**
1993	13,836	30,126	10,610	-	**54,572**
1994	14,700	33,133	12,025	-	**59,858**
1995	17,002	34,464	8,560	-	**60,026**
1996	18,873	38,438	8,186	-	**65,497**
1997	23,215	39,599	7,745	-	**70,559**
1998	20,266	36,648	5,555	-	**62,469**
1999	27,302	43,406	3,716	-	**74,424**
2000	32,582	39,937	4,080	-	**76,599**
2001	35,369	37,544	4,140	-	**77,053**
2002	41,768	38,276	5,160	-	**85,204**
2003	44,419	33,599	4,207	50	**82,276**
2004	47,205	33,757	6,503	420	**87,885**
2005	38,034	38,648	6,453	418	**83,553**
2006	40,646	43,061	7,312	419	**91,438**
2007	45,332	38,773	7,685	470	**92,260**
2008	41,705	41,716	6,918	311	**90,650**
2009	38,546	39,986	7,678	328	**86,538**



1. Reflects State Water Project through 2006; includes imported water from State Water Project and Buena Vista WSD Agreement beginning in 2007.

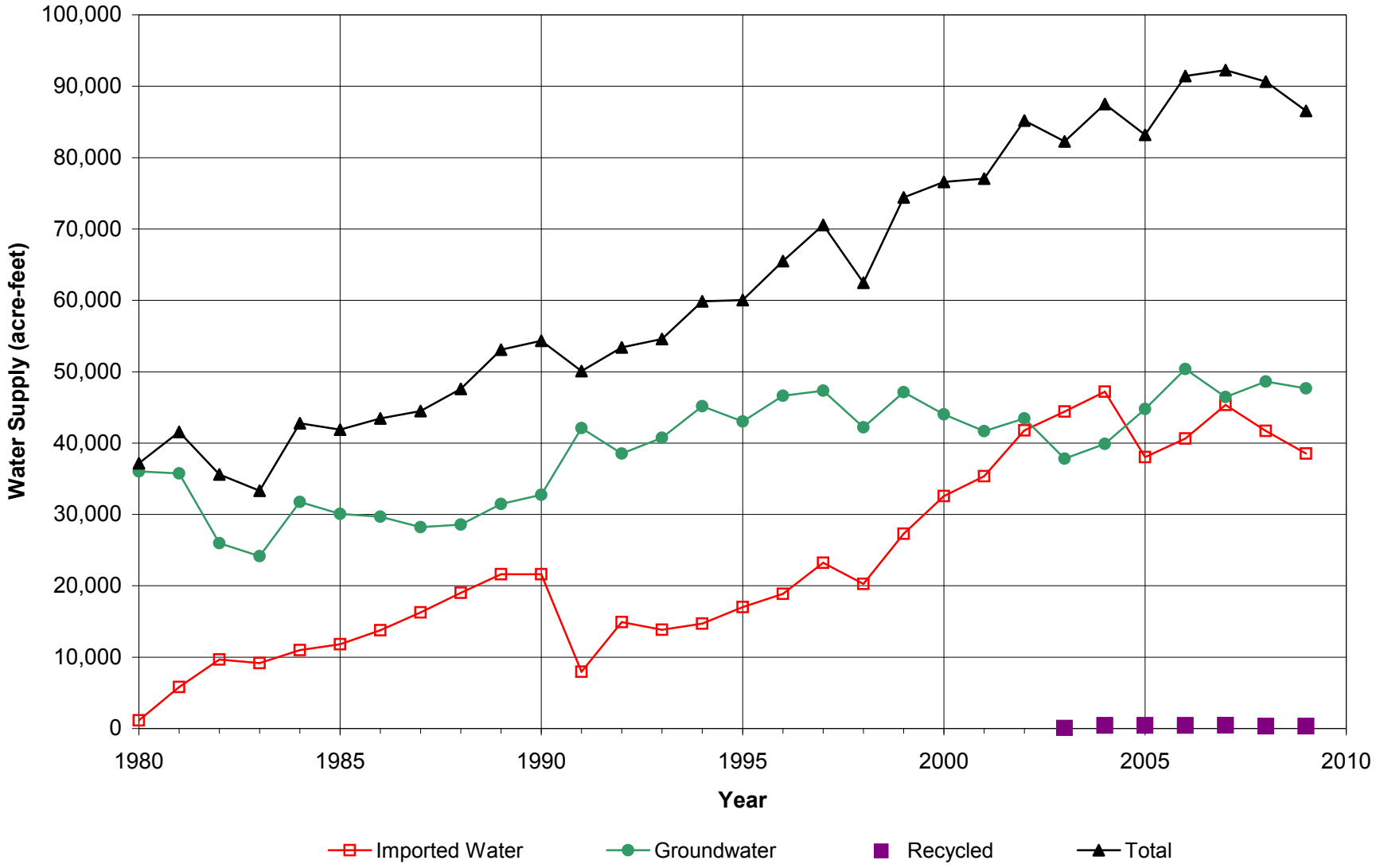


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Figure 2-1
Total Water Supply Utilization
Santa Clarita Valley

3. Water Supplies

Prior to 1980, local groundwater extracted from the Alluvium and the Saugus Formation was the sole source of water supply in the Santa Clarita Valley. Since 1980, local groundwater supplies have been supplemented with imported SWP water supplies, augmented in 2007 by acquisition of additional supplemental water from the Buena Vista Water Storage District. Those water supplies have also been slightly augmented by deliveries from CLWA's recycled water program since 2003. This section describes the groundwater resources of the Santa Clarita Valley, SWP and other imported water supplies, and CLWA's recycled water program.

3.1 Groundwater Basin Yield

The groundwater basin generally beneath the Santa Clarita Valley, identified in the State Department of Water Resources' 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 underlies the Santa Clara River and its several tributaries, and the Saugus Formation underlies practically the entire Upper Santa Clara River area. The mapped extent of the Santa Clara River Valley East Subbasin in DWR Bulletin 118 and its relationship to the extent of the CLWA service area are illustrated in Figure 3-1. The mapped Subbasin boundary approximately coincides with the outer extent of the Alluvium and Saugus Formation.

A 2001 Update Report on both the Alluvium and Saugus Formation Aquifers (Slade, 2002), which updated analyses and interpretation of hydrogeologic conditions from earlier reports (Slade, 1986 and 1988), included extensive detail on major aspects of the groundwater basin. Notable parts of the Update Report relative to groundwater supply included findings that:

- Analysis of historical groundwater levels and production indicates that there have been no conditions that would be illustrative of groundwater overdraft.

- Utilization of operational yield (as opposed to perennial yield) as a basis for managing groundwater production would be more applicable in this basin to reflect fluctuating utilization of groundwater in conjunction with imported SWP water.

- Operational yield of the Alluvium would typically be 30,000 to 40,000 afy for wet and normal rainfall years, with an expected reduction into the range of 30,000 to 35,000 afy in dry years.

- Operational yield of the Saugus Formation would typically be in the range of 7,500 to 15,000 afy on a long-term basis, with possible short-term increases during dry periods into a range of 15,000 to 25,000 afy, and to 35,000 afy if dry conditions continue.

Following on the 2001 Update Report, the groundwater component of overall water supply in the Valley derives from a groundwater operating plan to meet water requirements (municipal, agricultural and other non-municipal, and small individual domestic) while maintaining the basin in a sustainable condition (i.e., no long-term depletion of groundwater or interrelated surface water). That operating plan also addresses groundwater contamination issues in the basin, all consistent with the Groundwater Management Plan adopted in 2003. The groundwater operating plan is based on the concept that pumping can vary from year to year to generally rely on increased groundwater use in dry periods and increased recharge during locally wet periods, and to collectively assure that the groundwater basin is adequately replenished through various wet/dry cycles.

The groundwater operating plan, summarized in Table 3-1, is as follows:

Alluvium – Pumping from the Alluvial Aquifer in a given year is related to local hydrologic conditions in the eastern Santa Clara River watershed. Pumping is expected to typically range between 30,000 and 40,000 afy following normal and above-normal rainfall years. Due to hydrogeologic constraints in the eastern part of the basin, pumping is expected to be typically reduced to between 30,000 and 35,000 afy following multiple locally dry years.

Saugus Formation – Pumping from the Saugus Formation in a given year is related to the availability of other water supplies, particularly from the SWP. During average-year conditions within the SWP system, Saugus pumping is expected to typically range between 7,500 and 15,000 afy. Planned dry-year pumping from the Saugus Formation is expected to range between 15,000 and 25,000 afy during a drought year and can increase 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 is expected to typically 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 cause groundwater levels and storage volumes to recover after the higher pumping during dry years.

Table 3-1
Groundwater Operating Plan for the Santa Clarita Valley

Aquifer	Groundwater Production (af)			
	Normal Years	**Dry Year 1**	**Dry Year 2**	**Dry Year 3**
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**

In 2004, as part of analyzing the restoration of perchlorate-impacted groundwater supply in the Valley, a numerical groundwater flow model was developed and calibrated for use in analyzing the response of the groundwater basin to long-term operation at the operational yields noted above, with focus on perchlorate extraction and the control of perchlorate migration in the basin. That groundwater flow model was then utilized in 2005 to specifically analyze the sustainability of groundwater supplies in both the Alluvium and the Saugus Formation through a long-term (78 year) hydrologic period that was selected to examine groundwater basin response to variations in pumping in accordance with the operating plan. Resultant projections of groundwater levels, groundwater storage, and surface water flows showed the basin to respond in a long-term sustainable manner, with no chronic depletion of groundwater levels, storage, or stream flows. The analysis of groundwater sustainability was summarized in a Basin Yield Report (CH2M Hill and LSCE, 2005), which included the following findings:

- The groundwater basin has historically been, and continues to be, in good operating condition and not in overdraft, as indicated by historical data.

- The groundwater plan is sustainable over varying hydrologic conditions, because it is feasible to intermittently exceed a long-term average yield for one or more years without creating long-term adverse impacts to the groundwater system and the Santa Clara River.

- The groundwater operating plan for the Alluvium and the Saugus Formation can be used for long-term water supply planning purposes. In particular, although increased pumping from the Saugus Formation during dry periods can be expected to cause short-term declines in groundwater levels, it is not projected to cause permanent declines in groundwater discharges or streamflow. Saugus groundwater levels can be expected to recover to pre-drought conditions when pumping is reduced in subsequent wet to normal years.

- The strategy around which the groundwater operating 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.

- Together, 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 groundwater operating plan.

In 2008, partly in preparation for the next UWMP in 2010, and in part because of recent events that can be expected to impact the future reliability of the supplemental water supply from the State Water Project, the Purveyors initiated an updated analysis to further assess groundwater development potential and possible augmentation of the groundwater operating plan. A further consideration in conducting an updated analysis of the basin was 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 were being included for each of the individual projects in the overall LACFCD planning, and the Purveyors had interest in whether that potential could appreciably augment the yield of the basin.

The updated basin yield analysis, completed in August, 2009, concluded the following (LSCE and GSI, 2009).

- The 2008 Operating Plan, with currently envisioned pumping rates and distribution comparable to the Operating Plan described above, will not cause detrimental short- or long-term effects to the groundwater and surface water resources in the Valley and is, therefore, sustainable. Further, 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 during those periods. However, 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 indicated that this aquifer can sustain the pumping that is imbedded the 2008 Operating Plan.

- A Potential Operating Plan (Alluvial pumping between 41,500 and 47,500 afy) would result in lower Alluvial groundwater levels, failure of the basin to fully recover (during wet hydrologic cycles) from depressed storage that would occur during dry periods, and generally declining trends in groundwater levels and storage. Long-term lowering of groundwater levels would also occur in the Saugus Formation (pumping between about 16,000 and nearly 40,000 afy) with only partial water level recovery occurring in the Saugus. Thus, the Potential Operating Plan would not be sustainable over a long-term period.

- Several climate change models were examined to estimate the potential impacts on local hydrology in the Santa Clarita Valley. 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. Ultimately it was recognized that a wide range of potential global climate change produces a range of non-unique results with respect to local hydrologic conditions and associated sustainable groundwater supply. Notable in the wide range of possibilities, however, was the output that, over 20 to 25 year planning horizon of the UWMP, the range of relatively wet to relatively dry hydrologic conditions would be expected to produce sustainable groundwater conditions under the 2008 groundwater Operating Plan.

Based on the preceding conclusions, groundwater utilization continues in accordance with the 2008 Operating Plan; and the Potential Operating Plan is not being considered for implementation.

3.2 Alluvium – General

The spatial extent of the aquifers used for groundwater supply in the Valley, the Alluvium and the Saugus Formation, are illustrated in Figure 3-1. Geologic descriptions and hydrogeologic details related to both aquifers are included in several technical reports including Slade (1986, 1988 & 2002), CH2M Hill (2005) and LSCE (2005), and in the 2005 Urban Water Management Plan.

Consistent with the 2001 Update Report (Slade), the 2005 Basin Yield Report (CH2M Hill and LSCE), the 2005 UWMP, and the 2009 Updated Basin Yield Report (LSCE and GSI), the management practice of the Purveyors continues to be to rely on groundwater from the Alluvium for part of the overall municipal water supply, whereby total pumping from the Alluvium (by municipal, agricultural, and small private pumpers) is in accordance with the 2008 groundwater Operating Plan, 30,000 to 40,000 afy following wet and normal years, with possible reduction to 30,000 to 35,000 afy following multiple dry years. Such operation will maximize use of the Alluvium because of the aquifer's ability to store and produce good quality water on a sustainable basis, and because the Alluvium is capable of rapid recovery of groundwater storage in wet periods. As with many groundwater basins, it is possible to intermittently exceed a long-term average yield for one or more years without long-term adverse effects. Higher pumping for short periods may temporarily lower groundwater storage and related water levels, as has been the case in the Alluvium several times since the 1930's. However, subsequent decreases in pumping limit the amount of water level decline. Normal to wet-period recharge results in a rapid return of groundwater levels to historic highs. Historical groundwater data collected from the Alluvium over numerous hydrologic cycles continue to provide assurance that groundwater elevations, if locally lowered during dry periods, recover in subsequent average or wet years. Such water level response to rainfall is a significant characteristic of permeable, porous, alluvial aquifer systems that occur within large watersheds. In light of these historical observations, complemented by the long-term sustainability analysis using the numerical groundwater flow model, there is ongoing confidence that groundwater will continue to be a sustainable source of water supply at the rates of pumping described in the Basin Yield Report, as incorporated in the 2005 UWMP, and as described in the Updated Basin Yield Report, as expected to be incorporated in the 2010 UWMP.

Long-term adverse impacts to the Alluvium could occur if the amount of water extracted from the aquifer were to exceed the amount of water that recharges the aquifer over an extended period. However, the quantity and quality of water in the Alluvium and all significant pumping from the Alluvium are routinely monitored, and no long-term adverse impacts have ever been evident. Ultimately, the Purveyors have identified cooperative measures to be taken, if needed, to ensure sustained use of the aquifer. Such measures include but are not limited to the continuation of conjunctive use of SWP and other imported supplemental water with local groundwater, artificial recharge of the aquifer with local runoff or other surface water supplies, financial incentives discouraging extractions above a selected limit, expanded use of other water supplies such as recycled water, and expanded implementation of demand-side management, including conservation.

3.2.1 Alluvium – Historical and Current Conditions

Total pumping from the Alluvium in 2009 was about 40,000 af, a decrease of 1,750 af from the preceding year. Total Alluvium pumping was at the upper end of the groundwater Operating Plan range. Of the total Alluvial pumping in 2009, about 24,400 af (61 percent) was for municipal water supply, and the balance, about 15,600 af (39 percent), was for agriculture and other smaller uses, including individual domestic uses. In a longer-term context, there has been a change in municipal/agricultural pumping distribution since SWP deliveries began in 1980, toward a higher fraction for municipal water supply (from about 50 percent to more than 65 percent of Alluvial pumpage), which reflects the general land use changes in the area. Ultimately, on a long-term average basis since the beginning of imported water deliveries from the SWP, total Alluvial pumping has been about 32,000 afy, which is at the lower end of the range of operational yield of the Alluvium. That average has been higher over the last decade, about 38,500 afy, which remains within the range of operational yield of the Alluvium. The overall historic record of Alluvial pumping is illustrated in Figure 3-2.

Groundwater levels in various parts of the basin have historically exhibited different responses to both pumpage and climatic fluctuations. During the last 20 to 30 years, depending on location, Alluvial groundwater levels have remained nearly constant (generally toward the western end of the basin), or 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 (generally toward the eastern end of the basin). For illustration of the various groundwater level conditions in the basin, the Alluvial wells have been grouped into areas with similar groundwater level patterns, as shown in Figure 3-3. The groundwater level records have been organized into hydrograph form (groundwater elevation vs. time) as illustrated in Figures 3-4 and 3-5. Also shown on these plots is an annual marker indicating whether the year had a below-average amount of rainfall. The wells shown on these plots are representative of the respective areas, showing the range of values (highest to lowest elevation) through each area, and containing a sufficiently long-term record to illustrate trends over time.

Situated along the eastern upstream end of the Santa Clara River Channel, the ‘Mint Canyon’ area, located at the far eastern end of the groundwater basin, and the nearby ‘Above Saugus WRP’ area generally exhibit similar groundwater level responses (Figure 3-4) to hydrologic and pumping conditions. As shown in Figure 3-6, the Purveyors decreased total Alluvial pumping from the ‘Mint Canyon’ area steadily from 2000 through 2003, and correspondingly increased pumping in the ‘Below Saugus WRP’, and ‘Below Valencia WRP’ areas. In spite of a continued period of below-average precipitation from 1999 to 2003, that progressive decrease in pumping resulted in a cessation of groundwater level decline in the ‘Mint Canyon Area’. Subsequent wet

conditions in late 2004, continuing into 2005, resulted in full recovery of groundwater storage. With such high groundwater levels, pumping in the 'Mint Canyon' area was increased in 2005 and 2006, with no significant change in groundwater levels in 2005 and a slight decrease in 2006. Over the last four years, precipitation has been average to below-average. Accordingly, water levels have shown some decline, but this decline has been slowed by the reduction in pumpage in this easternmost part of the basin. Water levels remain within the historic range of levels over similar wet/dry periods. Just below the 'Mint Canyon' area, the 'Above Saugus WRP' has shown a similar decline, despite the steady rate of pumping over the last four years. Here the water levels also remain within the range of historical levels, as expected following a multi-year period without a significant wet year. These parts of the Valley have historically experienced a number of alternating wet and dry hydrologic conditions (Figure 3-4) during which groundwater level declines have been followed by returns to high or mid-range historic levels. This trend has continued over the last four years where below-average hydrologic conditions in 2009 followed three average to below-average years, and groundwater levels remain within mid-range levels.

In the 'Bouquet Canyon' area, pumping has remained relatively constant for the last ten years, and water levels have fluctuated with consecutive wet or dry years. During and since the most recent wet conditions of 2004 and 2005, water levels returned to within historic mid-range levels. During 2009, groundwater level trends either leveled off or showed some increase with the onset of precipitation at the end of the year. This groundwater level response to wet/dry years and pumping is typical for this area of the basin and, for 2009, levels have remained within the range of historical levels. When water levels are low, well yields and pumping capacities in this and other eastern areas can be impacted. The affected Purveyors typically respond by increasing use of Saugus Formation and imported (SWP) supplies, as shown in Table 2-3. The Purveyors also shift a fraction of the Alluvial pumping that would normally be supplied by the eastern areas to areas further west, where well yields and pumping capacities remain fairly constant because of smaller groundwater level fluctuations.

In the western parts and lower elevations of the Alluvium, groundwater levels respond to pumping and precipitation in a similar manner, but to an attenuated or limited extent compared to those situated in the eastern, higher elevation areas. As shown in the western group of hydrographs in Figure 3-5, groundwater level fluctuations become more subtle moving westward and lower in the Valley. The 'Below Saugus WRP' area, along the Santa Clara River immediately downstream of the Saugus Water Reclamation Plant, and the 'San Francisquito Canyon' area generally exhibit similar groundwater level trends. In this middle part of the basin, historical groundwater levels were lower in the 1950's and 60's than current levels. Groundwater levels in this area notably recovered as pumping declined through the 1960's and 1970's. They

have subsequently sustained generally high levels for much of the last 30 years, with three dry-period exceptions: mid-1970's, late 1980's to early 1990's, and the late 1990's to early 2000's. Recoveries to previous high groundwater levels followed both of the short dry-period declines in the 1970's and 1990's. More recently, groundwater levels recovered significantly in both areas, to historic highs, following a wetter-than-average year in 2004 and significantly wet 2005. Since 2005, pumping has been increasing in the 'Below Saugus WRP' area, while 'San Francisquito Canyon' area pumping approximately doubled in 2005, and has since gradually declined and leveled off over the last three years. Despite the current multi-year period of average to below-average precipitation, groundwater levels in these two areas remain in mid-range to high historical range.

The 'Castaic Valley' area is located along Castaic Creek below Castaic Lake. Below that and along the Santa Clara River, downstream of the Valencia Water Reclamation Plant, is the 'Below Valencia WRP' area, where discharges of treated effluent from the Valencia WRP to the Santa Clara River contribute to groundwater recharge. In the 'Castaic Valley' area, groundwater levels continue to remain fairly constant, with slight responses to climatic and other fluctuations, since the 1950's (Figure 3-5). Small changes in groundwater levels over the last four years are consistent with other short-term historical fluctuations. The long-term, generally constant trend remained through 2009. The 'Below Valencia WRP' area groundwater levels exhibit slight, if any, response to climatic fluctuations, and have remained fairly constant since the 1950's despite a notable increase in pumping through the 1990s that has since remained relatively steady over the last seven years, through 2009 (Figure 3-5 and 3-6).

In summary, depending on the period of available data, all the history of groundwater levels in the Alluvium shows the same general picture: recent (last 30 years) groundwater levels have exhibited historic highs; in some locations, there are intermittent dry-period declines (resulting from 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 29 years since importation of supplemental SWP water, or over the last 40 to 50 years (since the 1950's - 60's), the Alluvium shows no chronic trend toward decreasing water levels and storage, and thus shows no symptoms of water level-related overdraft. Consequently, pumping from the Alluvium has been and continues to be sustainable, well within the operational yield of that aquifer on a long-term average basis, and also within the operating yield in almost every individual year.

3.3 Saugus Formation – General

Saugus wells operated by the Purveyors are located in the southern portion of the basin, south of the Santa Clara River (Figure 3-7). Consistent with the 2001 Update Report (Slade), the 2005

Basin Yield Report (CH2M Hill and LSCE), and the 2009 Basin Yield Update Report (LSCE and GSI), the Purveyors have utilized the Saugus in accordance with the original (and the 2008) groundwater Operating Plan, in the range of 7,500 to 15,000 afy in average/normal years, with planned dry-year pumping of 15,000 to 35,000 afy for one to three consecutive dry years, when shortages to CLWA's SWP water supplies could occur. Such high pumping would be followed by periods of lower pumping (7,500 to 15,000 afy in average/normal years as noted above) in order to allow recharge to recover water levels and storage in the Saugus. Maintaining the substantial volume of water in the Saugus Formation is an important strategy to help maintain water supplies in the Santa Clarita Valley during drought periods.

3.3.1 Saugus Formation – Historical and Current Conditions

Total pumping from the Saugus in 2009 was about 7,700 af, or about 750 af more than in the preceding year. Of the total Saugus pumping in 2009, most (about 6,700 af) was for municipal water supply, and the balance (1,000 af) was for agricultural and other irrigation uses. Historically, groundwater pumping from the Saugus peaked in the early 1990's and then steadily declined through the remainder of that decade. Since then, Saugus pumping had been in the range of about 4,000 to 6,500 afy, with the increase to almost 7,700 af in 2007 and again in 2009. Over the last five years, the municipal use of Saugus water has been relatively unchanged; almost all of the relatively small fluctuations from year to year have been related to non-municipal usage. On a long-term average basis since the importation of SWP water, total pumping from the Saugus Formation has ranged between a low of about 3,700 afy (in 1999) and a high of nearly 15,000 afy (in 1991); average pumping from 1980 to present has been about 6,800 afy. These pumping rates remain well within, and generally at the lower end of the range of Operating Yield of the Saugus Formation. The overall historic record of Saugus pumping is illustrated in Figure 3-8.

Unlike the Alluvium, which has an abundance of wells with extensive water level records, the water level data for the Saugus Formation are limited by both the distribution of the wells in that Formation and the periods of water level records. The wells that do have water level records extending back to the mid-1960's indicate that groundwater levels in the Saugus Formation were highest in the mid-1980's and are currently higher than they were in the mid-1960's (Figure 3-9). Based on these data, there is no evidence of any historic or recent trend toward permanent water level or storage decline. There continue to be seasonal fluctuations in groundwater levels but the prevalent longer-term trend is one of general stability.

Consistent with the 2001 Update Report (Slade), the 2005 Basin Yield Report (CH2M Hill and LSCE), the 2005 UWMP, and the 2008 Updated Basin Yield Report (LSCE and GSI, 2009), the

Purveyors continue to maintain groundwater storage and associated water levels in the Saugus Formation so that supply is available during drought periods, when Alluvial pumping might be reduced and/or SWP or other supplemental supplies also decreased. The period of increased pumping during the early 1990's is a good example of this management strategy. Most notably, in 1991, when SWP deliveries were substantially reduced, increased pumping from the Saugus made up almost half of the decrease in SWP deliveries. The increased Saugus pumping over several consecutive dry years (1991-1994) resulted in short-term declining groundwater levels, reflecting the use of water from storage. However, groundwater levels subsequently recovered when pumping declined, reflecting recovery of groundwater storage in the Saugus Formation.

3.4 Imported Water

CLWA obtains the majority of its water supplies from the State Water Project (SWP), which is owned and operated by the California Department of Water Resources (DWR). CLWA is one of 29 contractors holding long-term SWP contracts with DWR. SWP water originates as rainfall and snowmelt in northern and central California. Runoff is stored in Lake Oroville, which is the project's largest storage facility. The water is then released from Lake Oroville down the Feather River to the Sacramento River and through the Sacramento-San Joaquin Delta. Water is diverted from the Delta into the Clifton Court Forebay, and then pumped into the 444-mile long California Aqueduct. SWP water is temporarily stored in San Luis Reservoir, which is jointly operated by DWR and the U.S. Bureau of Reclamation. Prior to delivery to CLWA, SWP supplies are stored in Castaic Lake, a terminal reservoir located at the end of the West Branch of the California Aqueduct.

CLWA's service area covers approximately 195 square miles (124,800 acres), including the City of Santa Clarita and surrounding unincorporated communities. SWP water from Castaic Lake is treated, filtered and disinfected at CLWA's Earl Schmidt Filtration Plant and Rio Vista Water Treatment Plant, which have a combined treatment capacity of 86 million gallons per day. Treated water is delivered from the treatment plants by gravity flow to each of the four Purveyors through a distribution network of pipelines and turnouts. At present, CLWA delivers water to the four Purveyors through 25 potable turnouts as schematically illustrated in Figure 3-10.

In 2009, CLWA fulfilled the following major accomplishments in order to enhance, preserve, and strengthen the quality and reliability of existing and future supplies:

- continued participation in a long-term water banking programs with Rosedale-Rio Bravo Water Storage District and the Semitropic Water Storage District. Water was not

withdrawn from the Rosedale-Rio Bravo Water Storage District, but 1,650 acre-feet was withdrawn from the Semitropic Water Storage District,

- continued implementation of the AB 3030 Groundwater Management Plan,
- continued implementation of the water conservation Best Management Practices,
- reconvened the Santa Clarita Valley Drought Committee, which has now changed its name to the Santa Clarita Valley Water Committee
- continued construction of treatment and distribution facilities for restoration of municipal well capacity impacted by perchlorate contamination,
- continued cooperative effort with the U.S. Army Corps of Engineers for characterization studies of the former Whittaker-Bermite site and in a task force effort with the City of Santa Clarita, local legislators, and state agencies to effect the cleanup and remediation of all aspects of the former Whittaker-Bermite site, including perchlorate contamination of local groundwater,
- began construction of the expansion of the Rio Vista Water Treatment Plant from 30 mgd to 60 mgd, and
- continued recycled water service.

3.4.1 State Water Project Table A Supplies

Each SWP contractor has a specified water supply amount shown in Table A of its contract that currently totals approximately 4.1 million af. The term of the CLWA contract is through 2038 and is renewable after that year. Although the SWP has not been fully completed, the SWP can deliver all 4.1 million af of Table A Amounts during certain wet years.

CLWA has a contractual Table A Amount of 95,200 af per year of water from SWP.[1] On October 30, 2008, the initial allocation for 2009 was announced as 15 percent. The allocation

[1] Of CLWA's 95,200 af annual Table A Amount, 41,000 afy was permanently transferred to CLWA in 1999 by Wheeler Ridge-Maricopa Water Storage District, a member unit of the Kern County Water Agency. CLWA's EIR prepared in connection with the 41,000 afy water transfer was challenged in Friends of the Santa Clara River v. Castaic Lake Water Agency (Los Angeles County Superior Court) ("Friends"). On appeal, the Court of Appeal held that since the 41,000 afy EIR tiered off the Monterey Agreement EIR that was later decertified, CLWA would also have to decertify its EIR as well and prepare a revised EIR. CLWA was not prevented from using any water that is part of the 41,000 afy transfer. Under the jurisdiction of the Los Angeles County Superior Court, CLWA prepared and circulated a revised Draft EIR for the transfer. CLWA approved the revised EIR in late 2004 ("2004 EIR") and lodged the EIR with the Los Angeles Superior Court. Thereafter, the case was dismissed with prejudice (i.e., permanently).

In January 2005, two new challenges to CLWA's 2004 EIR were filed in the Ventura County Superior Court by the Planning and Conservation League ("PCL") and by the California Water Impact Network ("CWIN"); these cases were consolidated and transferred to Los Angeles County Superior Court, Planning and Conservation League v. Castaic Lake Water Agency (Los Angeles County Superior Court,) ("PCL Action"). In May 2007, a final Statement of Decision was filed by the trial court in the PCL Action. It included a determination that the transfer is valid and cannot be terminated or unwound. The trial court did find one defect in the 2004 EIR, requiring Judgment to be entered against CLWA. The defect, however, did not relate to the environmental conclusions reached in the 2004 EIR. Notices of Appeal were filed by PCL and CWIN and the Agency, Kern County Water Agency, and Wheeler Ridge-Maricopa Water Storage District filed notices of cross-appeals. On December 17, 2009, the Court of Appeal issued a published opinion in which it reversed the trial court's Judgment, and found that the 41,000 afy EIR fully complied with CEQA, and remanded the matter to the trial court with directions to issue a new judgment denying PCL's and CWIN's challenges in their entirety. A petition for rehearing was filed by PCL and CWIN on January 4, 2010 but was denied on January 14, 2010. On January 26, 2010, PCL and CWIN filed a petition for review with the California Supreme Court, but the Court denied the petition on March 10, 2010.

was increased to 20 percent on March 18, 2009, and further increased to 30 percent on April 16, 2009; and then to 40 percent on May 20, 2009. The allocation was not subsequently changed. CLWA's final allocation of Table A Amount for 2009 was thus 40 percent, or 38,080 af.

In addition to its Table A Amount, CLWA has access to 4,684 af of "flexible storage" in Castaic Lake. In 2005, CLWA negotiated an agreement with the Ventura County SWP contractors to allow CLWA to utilize their flexible storage account of 1,376 af. In combination, this provides total flexible storage of 6,060 af, which is maintained in Castaic Lake for use in a future dry period or an emergency. This amount was available in 2009, but was not utilized due to other available supplies.

Also in 2005, CLWA completed an agreement to participate in a long-term water banking program with Rosedale-Rio Bravo Water Storage District in Kern County. CLWA delivered 20,000 af of its excess Table A water into storage in both 2005 and 2006. CLWA delivered another 8,200 af into that storage account in 2007 but did not contribute to or withdraw SWP water from the bank in 2008 or 2009. This long-term program will allow the storage up to 100,000 af at any one time, and will provide significant dry year reliability for the Santa Clarita Valley.

The other banking component of CLWA's imported water supply reliability program is comprised of two 10-year agreements with Semitropic Water Storage District whereby CLWA banked surplus Table A water supply in 2002 and 2003. Notable in 2009 was the first recovery of water from the 2002 account; of 4,950 af withdrawn in 2009, 1,650 af were delivered for water supply in the Valley, and the 3,300 af balance is intended to be delivered in 2010.

As delineated in Table 3-2, with the 40 percent Table A allocation and other imported water supplies, including 14,610 af of carryover from 2008, CLWA had total available supply of 67,050 af in 2009, most of which was delivered to the Purveyors (38,546 af), leaving 28,303 af of Table A Amount available for carryover to 2010.

3.4.2 Other Imported Water Supplies

In early 2007, CLWA finalized a Water Acquisition Agreement with the Buena Vista Water Storage District (Buena Vista) and the Rosedale-Rio Bravo Water Storage District (Rosedale-Rio Bravo) in Kern County. Under this Program, Buena Vista's high flow Kern River entitlements (and other acquired waters that may become available) are captured and recharged within

Table 3-2
2009 CLWA Imported Water Supply and Disposition
(acre-feet)

Supply		
Net 2008 SWP Carryover to 2009 [1]		14,610
Buena Vista/Rosedale Rio-Bravo		11,000
Yuba County Accord Water		1,658
2009 SWP Turnback Pool Water		52
Semitropic Water Banking and Exchange Program		1,650
2009 Final SWP Table A Allocation [2]		38,080
Total 2009 Imported Water Supply		**67,050**
Disposition		
Purveyor Deliveries (Total)		38,546
CLWA SCWD	*17,739*	
Valencia Water Company	*14,732*	
Newhall County Water District	*4,832*	
Los Angeles County WWD 36	*1,243*	
CLWA/DWR/Purveyor Metering[3]		201
Rosedale – Rio Bravo Water Banking and Exchange Program		0
2009 Table A Carryover to 2010[4]		28,303
Total 2009 Imported Water Disposition		**67,050**

1. Total 2009 carryover; amount used by CLWA, based on final DWR delivery accounting was 10,107 af.

2. Final 2009 allocation was 40% of contractual Table A amount of 95,200 acre-feet, which progressed as follows:

Initial allocation, October 30, 2008	15%
Allocation increase, March 18, 2009	20%
Allocation increase, April 16, 2009	30%
Final allocation, May 20, 2009	40%

3. Reflects meter reading differences.

4. Total 2009 Table A carryover to 2010.

Rosedale-Rio Bravo's service area on an ongoing basis.[2] CLWA receives 11,000 af of these supplies annually through either exchange of Buena Vista's and Rosedale-Rio Bravo's SWP supplies or through direct delivery of water to the California Aqueduct via the Cross Valley Canal.

In 2008, CLWA entered into the Yuba Accord Agreement, which allows for the purchase of water from the Yuba County Water Agency through the Department of Water Resources to 21 State Water Project contractors (including CLWA) and the San Luis and Delta-Mendota Water Authority. CLWA may purchase up to approximately 1,000 af per year and in 2009 received 1,658 af as part of the Agreement.

3.4.3 Imported Water Supply Reliability

The Department of Water Resources issued its Draft State Water Project Delivery Reliability Report 2009 in February 2010. The report is updated with new information and calculations of delivery reliability every two years and is intended to assist SWP contractors in assessing the adequacy of the SWP component of their overall supplies. The current Draft Reliability Report, with the objective of protecting endangered fish such as the Delta smelt and spring-run salmon, incorporates restrictions on SWP operations according to the Biological Opinions of the U.S. Fish and Wildlife Service and the National Marine Fishery Service issued on December 15, 2008 and June 4, 2009, respectively. It also considers the impacts on SWP delivery reliability due to climate change, sea level rise, and vulnerability of the Delta's conveyance system and structure due to floods and earthquakes. The current Draft Reliability Report projects long-term reliability of 60 percent during normal year hydrology. In 2010, CLWA staff assessed the impact of the current Reliability Report on the CLWA reliability analysis contained in the Agency's 2005 UWMP. It concluded that current and anticipated supplies are available to meet anticipated water supply needs.

Groundwater banking and conjunctive use offer significant opportunities to improve water supply reliability for CLWA. Groundwater banking is the process of storing available supplies of water in groundwater basins during wet years or when supplemental water is otherwise available. During dry periods, or when imported water supply availability is reduced, banked water can be recovered from groundwater storage to replace, or firm up, the imported water supply deliveries.

[2] A CEQA action was filed by California Water Impact Network (CWIN) in November 2006 challenging the adequacy of CLWA's EIR on the acquisition of 11,000 af from the Buena Vista Water Storage District and Rosedale-Rio Bravo Water Storage District. In November 2007, a Los Angeles Superior Court ruled in favor of CLWA on all points. In January 2008, CWIN filed a notice of appeal. The case was argued before the appellate court March 2, 2009. On April 20, 2009, the Court of Appeal issued an opinion affirming the Superior Court's judgement.

As described herein, CLWA has entered into two groundwater banking programs and now has, in aggregate, more than 110,000 af of recoverable water in banked groundwater storage outside the local groundwater basin. The first component of CLWA's overall groundwater banking program is the result of two 10-year agreements between CLWA and Semitropic Water Storage District whereby, over the terms of the two agreements, CLWA can withdraw up to 45,920 af of SWP Table A water that it stored in Semitropic to meet Valley demands when needed in dry years (45,920 af is the net recoverable balance after originally banking 24,000 af in 2002 and 32,522 af in 2003, and withdrawing 4,950 af in 2009). The second component of the program, the long-term Rosedale-Rio Bravo Water Banking and Exchange Program in Kern County, has a recoverable total of 64,900 acre-feet in storage (i.e., 75,200 af originally banked less contractual losses).

Conjunctive use is the purposeful integrated use of surface water and groundwater supplies to maximize water supply from the two sources. CLWA and the Purveyors have been conjunctively utilizing local groundwater and imported surface water since the initial importation of SWP water in 1980. The groundwater banking programs described above allow CLWA to firm up the imported water component of conjunctive use in the Valley by storing surplus SWP and other water, in wet years, in groundwater basins outside the Valley. This allows recovery and importation of that water as needed in dry years to maintain a greater overall amount of imported surface water to be used conjunctively with local groundwater, further supporting the sustainable use of local groundwater at the rates in the groundwater operating plan.

3.5 Water Quality – General

Water delivered by the Purveyors consistently meets drinking water standards set by the Environmental Protection Agency (EPA) and the California Department of Public Health (DPH). An annual Water Quality Report is provided to all Santa Clarita Valley residents who receive water from one of the four water retailers. There is detailed information in that report about the results of quality testing of the groundwater and treated SWP water supplied to the residents of the Santa Clarita Valley during 2008. Several constituents of particular local interest are discussed in more detail below.

Total Trihalomethanes

In 2002, the United States Environmental Protection Agency implemented the new Disinfectants and Disinfection Byproducts Rule. In part, this rule established a new MCL of 80 μg/l (based on an annual running average) for Total Trihalomethanes (TTHM). TTHMs are byproducts created when chlorine is used as a means for disinfection. CLWA and the Purveyors implemented an alternative method of disinfection, chloramination, in 2005 to maintain compliance with the new

rule and future regulations relating to disinfection byproducts. TTHM concentrations have remained significantly below the MCL since implementation of alternative disinfection.

Perchlorate

Perchlorate has been a water quality concern in the Valley since 1997 when it was originally detected in four wells operated by the 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 (SCWD's Stadium Well) also located near the former Whittaker-Bermite site. In early 2005, perchlorate was detected in a second Alluvial well (VWC's Well Q2) near the former Whittaker-Bermite site. In 2006, a very low concentration of perchlorate was detected in another Saugus well (NCWD's Well NC-13), near one of the originally impacted wells. However, that detection has been interpreted to not be an indication of continued perchlorate migration in a westerly direction. Subsequent monitoring well installation has been completed and a focused study of the Saugus Formation has ultimately been incorporated into the overall groundwater remediation and removal actions submitted by Whittaker-Bermite and reviewed by the State Department of Toxic Substances Control (DTSC) as discussed below.

Wells with perchlorate concentrations exceeding the then-applicable Action Level (18 µg/l) or, more recently, the then-applicable Notification Level (6 µg/l)[3] were removed from active water supply service. One of the Alluvial wells (VWC's Well Q2) was returned to active water supply service, with treatment, in late 2005 as discussed below. The other impacted wells remain out of service; two wells (VWC's Well 157 and SCWD's Stadium Well) have been sealed and replaced by new wells, and two wells (SCWD's Saugus 1 & 2 Wells) are being returned to service as described below. The 2005 UWMP specifically addressed the adequacy of groundwater supply in light of the inactivation of the impacted Alluvial and Saugus wells; and it addressed the plan and schedule for restoration of perchlorate-impacted wells, including the protection of existing non-impacted wells. As summarized in the 2005 UWMP, the inactivation of the impacted wells does not constrain the ability to meet the groundwater component of total water supply in the Valley.

In 2000, CLWA and the impacted Purveyors filed a lawsuit against Whittaker Corporation (the former owner of the contaminated property) and Santa Clarita LLC and Remediation Financial, Inc. (the owners of record at that time). The lawsuit sought to have defendants pay all necessary costs of response, removal of the contaminant, remedial actions, and any liabilities or damages associated with the contamination. An Interim Settlement and Funding Agreement was reached

[3] The Maximum Contaminant Level (MCL) for perchlorate was set at 6 µg/l by the State Department of Public Health in October 2007.

in 2003. Although that Agreement expired in January 2005, the parties, under DTSC oversight, jointly developed a plan to "pump and treat" contaminated water from two of the Purveyors' impacted wells to stop migration of the contaminant plume and to partially restore the municipal well capacity that has been impacted by perchlorate. The parties also continued negotiations intended to achieve a long term settlement to the litigation through 2006, and a final settlement was completed and executed in April 2007.

Since 2007, the impacted Purveyors (SCWD, NCWD, and VWC) and CLWA continued working toward implementation of a jointly developed plan that will combine pumping from two of the impacted wells and a water treatment process to restore the impacted pumping capacity and control the migration of contamination in the aquifer. The development and implementation of a cleanup plan for the Whittaker-Bermite site and the impacted groundwater is being coordinated among CLWA, the impacted Purveyors, the State DTSC, and U.S. Army Corps of Engineers. DTSC is the lead agency responsible for regulatory oversight of the Whittaker-Bermite site.

In February 2003, DTSC and the impacted Purveyors entered into a voluntary cleanup agreement entitled *Environmental Oversight Agreement*. Under the Agreement, DTSC is providing review and oversight of the response activities being undertaken by the Purveyors related to the detection of perchlorate in the impacted wells. Under the Agreement's Scope of Work, the impacted Purveyors prepared a Work Plan for sampling the production wells, a report on the results and findings of the production well sampling, a draft Human Health Risk Assessment, a draft Remedial Action Workplan, an evaluation of treatment technologies and an analysis showing the integrated effectiveness of a project to restore impacted pumping capacity, extract perchlorate-impacted groundwater from two Saugus wells for treatment, and control the migration of perchlorate in the Saugus Formation. Environmental review of that project was completed in 2005 with adoption of a mitigated Negative Declaration. The Final Interim Remedial Action Plan for containment and extraction of perchlorate was completed and approved by DTSC in January 2006. Design of the treatment facilities and related pipelines is complete. Construction of those facilities and pipelines to implement the pump and treat program and to also restore inactivated municipal well capacity began in November 2007 and was completed, and in operational startup, as this report was being drafted (May, 2010).

Under the direction of DTSC, Whittaker has submitted a comprehensive site-wide remediation plan for the contaminants of concern in soil and groundwater detected on the property. A Draft Remedial Action Plan for Operable Units 2 through 6 that is focused on soil remediation was submitted to DTSC in 2009. The plan contains a number of recommended technologies to remove contaminants from the soil, in addition to a proposed clean-up schedule for the site. Whittaker has also completed a Draft Operable Unit 7 Feasibility Study to identify and select

treatment technologies for both on-site and off-site groundwater. Final approval by DTSC of soil and groundwater clean-up plans is expected by the end of 2010.

As noted above, perchlorate was detected in a second Alluvial well, VWC's Well Q2, in early 2005. In response, Valencia removed the well from active service, and commissioned the preparation of an analysis and report assessing the impact of, and response to, the perchlorate contamination of that well. Valencia's response for Well Q2 was to obtain permitting for installation of wellhead treatment, followed by installation of treatment facilities and returning the well to water supply service in October 2005. After nearly two years of operation with wellhead treatment, including regular monitoring specified by the State Department of Public Health (DPH), all of which resulted in no detection of perchlorate in Well Q2, Valencia requested that DPH allow treatment to be discontinued. DPH approved that request in August 2007, and treatment was subsequently discontinued. DPH-specified monitoring for perchlorate continues at Well Q2; there has been no detection of perchlorate since discontinuation of wellhead treatment.

On the Whittaker-Bermite site, soil remediation activities in operating unit subareas started in 2005. Groundwater "pump and treat" operations in the Northern Alluvium, which also started in 2005, continued through 2009. Expanded pumping, intended to effect perchlorate containment as well as to treat 'hot spots' in the Northern Alluvium, became operational in October 2007. Also on the Whittaker-Bermite site, remediation work in the Saugus Formation is underway. Additional objectives of this project include the reduction of further transport of contaminants to regional groundwater and reduction of the size of the contaminant mass in deep/perched zones.

Hardness

In 2008, the Valencia Water Company began a demonstration project delivering pre-softened groundwater from one of its wells to approximately 420 residents located in the Copperhill Community of Valencia. Hard water is the primary complaint from Valencia customers and it is estimated that more than 50 percent have installed individual water softening units at their homes. In addition to having high operating costs, many of these units are designed to discharge a brine (salt) solution to the sanitary sewer system that is eventually discharged to the Santa Clara River, or is part of the recycled water supply. The environmental impact of such discharges was the subject of a major Chloride Total Maximum Daily Load investigation which concluded with a commitment by the Purveyors to achieve surface water quality goals for in-stream discharge from the basin. Valencia's project is aimed at improving the quality of water for its customers to eliminate the need for home softening devices and to achieve the environmental benefits of reduced chloride discharge to the river.

The demonstration project utilizes softening technology that removes calcium and produces small calcium carbonate pellets which can be reused in a variety of industries. The demonstration project has now been operated for over a year and provides the water company with customer feedback and technical/financial information to assess potential future expansion of treatment to other well sites.

3.5.1 Groundwater Quality – Alluvium

Groundwater quality is, of course, a key factor in assessing the Alluvial aquifer as a municipal and agricultural water supply. Groundwater quality details and long-term conditions, examined by integration of individual records from several wells completed in the same aquifer materials and in close proximity to each other, have been discussed in previous annual Water Reports and in the 2005 UWMP. There were some changes in groundwater quality in 2009 that reflect fluctuations, trends, or other groundwater quality conditions as illustrated in Figures 3-11 and 3-12. These graphs show historical specific conductance values for representative wells in the Valley with the California Department of Public Health Secondary Maximum Levels included for reference. Most of the trends show a significant lowering of the specific conductance values by half following the wet years of 2004-2005. Since then, those trends have returned to 2004 levels but do not exceed historical levels. In summary, those conditions include: no long-term overall trend and, most notably, no long-term decline in Alluvial groundwater quality; a general groundwater quality "gradient" from east to west, with lowest dissolved mineral content to the east, increasing in a westerly direction; and periodic fluctuations in some parts of the basin, where groundwater quality has inversely varied with precipitation and stream flow. Those variations are typically characterized by increased mineral concentrations through dry periods of lower stream flow and lower groundwater recharge, such as is currently occurring, followed by lower mineral concentrations through wetter periods of higher stream flow and higher groundwater recharge.

The presence of long-term consistent water quality patterns, although intermittently affected by wet and dry cycles, supports the conclusion that the Alluvial aquifer remains a viable ongoing water supply source in terms of groundwater quality.

3.5.2 Groundwater Quality – Saugus Formation

As discussed above for the Alluvium, groundwater quality is a key factor in also assessing the Saugus Formation as a municipal and agricultural water supply. As with groundwater level data, 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. However, integration

of individual records from several wells has been used to examine general water quality trends. Based on those records, water quality in the Saugus Formation has not historically exhibited the precipitation-related fluctuations seen in the Alluvium. Based on available data over the last 50 years, groundwater quality in the Saugus has exhibited a slight overall increase in dissolved mineral content as illustrated in Figure 3-13. More recently, several wells within the Saugus Formation have exhibited an additional increase in dissolved mineral content, similar to short-term changes in the Alluvium, possibly as a result of recharge to the Saugus Formation from the Alluvium. Since 2005, however, these levels have been steadily dropping or remaining constant. Dissolved mineral concentrations in the Saugus Formation remain below the Secondary (aesthetic) Upper Maximum Contaminant Level. Groundwater quality within the Saugus will continue to be monitored to ensure that degradation to the long-term viability of the Saugus as a component of overall water supply does not occur.

3.5.3 Imported Water Quality

CLWA operates two water treatment plants, the Earl Schmidt Filtration Plant located near Castaic Lake and the Rio Vista Water Treatment Plant located in Saugus. CLWA produces water that meets drinking water standards set by the U.S. EPA and DPH. SWP water has different aesthetic characteristics than groundwater with lower dissolved mineral concentrations (total dissolved solids) of approximately 250 to 360 mg/l, and lower hardness (as calcium carbonate) of about 105 to 135 mg/l.

Historically, the State Water Project (SWP) delivered only surface water from the Sacramento-San Joaquin River Delta. However, CLWA and other SWP users, in anticipation of drought, many years ago began “water banking” programs where SWP water could be stored or exchanged during wet years and withdrawn in dry years. The last three years have seen severe state-wide drought. As a result, water has been withdrawn from the water banking programs and pumped into the SWP system. During the period of 2008 through 2010, a greater portion of water in the SWP has been this “pumped-in” water. The “pumped-in” water has met all water quality standards established by DWR under its anti-degradation policy for the SWP.

3.6 Recycled Water

Recycled water is available from two water reclamation plants operated by the Sanitation Districts of Los Angeles County. In 1993, CLWA prepared a draft Reclaimed Water System Master Plan that outlined a multi-phase program to deliver recycled water in the Valley. CLWA previously completed environmental review on the construction of Phase I of the project, which will ultimately deliver 1,700 afy of recycled water. Deliveries of recycled water began in 2003

for irrigation water supply at a golf course and in roadway median strips. In 2009, recycled water deliveries were 328 af, generally consistent with recycled water deliveries that have ranged between 311 and 470 afy over the past six years.

Surveys conducted by CLWA indicate an interest for recycled water by existing water users as well as by future development as recycled water becomes available. In 2002, CLWA produced an updated Draft Recycled Water Master Plan. Overall, the program is expected to ultimately recycle up to 17,400 af of treated (tertiary) wastewater suitable for reuse on golf courses, landscaping and other non-potable uses, as set forth in the UWMP.

In 2007, CLWA completed California Environmental Quality Act (CEQA) analysis of the Recycled Water Master Plan (2002). This analysis consisted of a Program Environmental Impact Report (PEIR) covering the various options for a recycled water system as outlined in the Master Plan. The PEIR was certified by the CLWA Board in March 2007.

CLWA is preparing the design of the second phase of the Recycled Water Master Plan that will take water from the Saugus Water Reclamation plant and distribute it to identified users to the north, across the Santa Clara River and then to the west and the east, which will include service to Santa Clarita Central Park. There is also a new phase of the of the recycled water system in design that would extend the existing system southward from the intersection of Magic Mountain Parkway and the Old Road to the intersection of Orchard Village Road and Lyons Avenue, serving large irrigation customers along its proposed alignment. Collectively, these phases will have design capacity to increase recycled water deliveries by about 1,500 afy.

3.7 Santa Clara River

The Memorandum of Understanding (MOU) between the Santa Clarita Valley Purveyors and the United Water Conservation District, which manages surface and groundwater resources in seven groundwater basins in the Lower Santa Clara River Valley Area, was a significant accomplishment when it was prepared and executed in 2001. The MOU initiated a collaborative and integrated approach to data collection; database management; groundwater flow modeling; assessment of groundwater basin conditions, including determination of basin yield amounts; and preparation and presentation of reports, including continued annual reports such as this one for current planning and consideration of development proposals, and also including more technically detailed reports on geologic and hydrologic aspects of the overall stream-aquifer system. Meetings of the MOU participants have continued, and integration of the Upper (Santa Clarita Valley) and Lower (United WCD) Santa Clara River databases has been accomplished. As discussed above, a numerical groundwater flow model of the entire Santa Clarita groundwater

basin was developed and calibrated in 2002-2004. Subsequent to its initial use in 2004 for assessing the effectiveness of various operating scenarios to restore pumping capacity impacted by perchlorate contamination (by pumping and treating groundwater for water supply while simultaneously controlling the migration of contaminated groundwater), the model was used in 2005 for evaluation of basin yield under varying management actions and hydrologic conditions. The results completed the determination of sustainable operating yield values for both the Alluvium and the Saugus Formation, which were incorporated in the 2005 UWMP. The updated analysis of basin yield, completed in 2009, indicates that the 2008 Operating Plan will maintain river flows at higher levels than occurred prior to urbanization of the Valley.

On occasion, issues have been raised about whether use and management of groundwater in the Santa Clarita Valley have adversely impacted surface water flows into Ventura County. Part of the groundwater modeling work has addressed the surface water flow question as well as groundwater levels and storage. While the sustainability of groundwater has logically derived primarily from projected long-term stability of groundwater levels and storage, it has also derived in part from modeled simulations of surface water flows and the lack of streamflow depletion by groundwater pumping. In addition, the long-term history of groundwater levels in the western and central part of the basin, as illustrated in Figures 3-4 and 3-5, supports the modeled analysis and suggests that groundwater has not been lowered in such a way as to induce infiltration from the river and thus impact surface water flows.

Historical annual stream discharge in the Santa Clara River, into and out of the Santa Clarita Valley, is shown on Figure 3-14. The upstream gage at Lang Station was reinstated in 2002 and shows a wide range of average annual inflow over the last seven years. The downstream gage was moved in 1996 to its present location near Piru, about two miles downriver from the former County Line Gage. The combined record (1953-2009) of these two downstream gages indicates an annual stream discharge of about 47,000 afy. These data gaged near the County line show notably higher flows from the Santa Clarita Valley into the uppermost downstream basin, the Piru Basin, over the last 30 to 35 years.

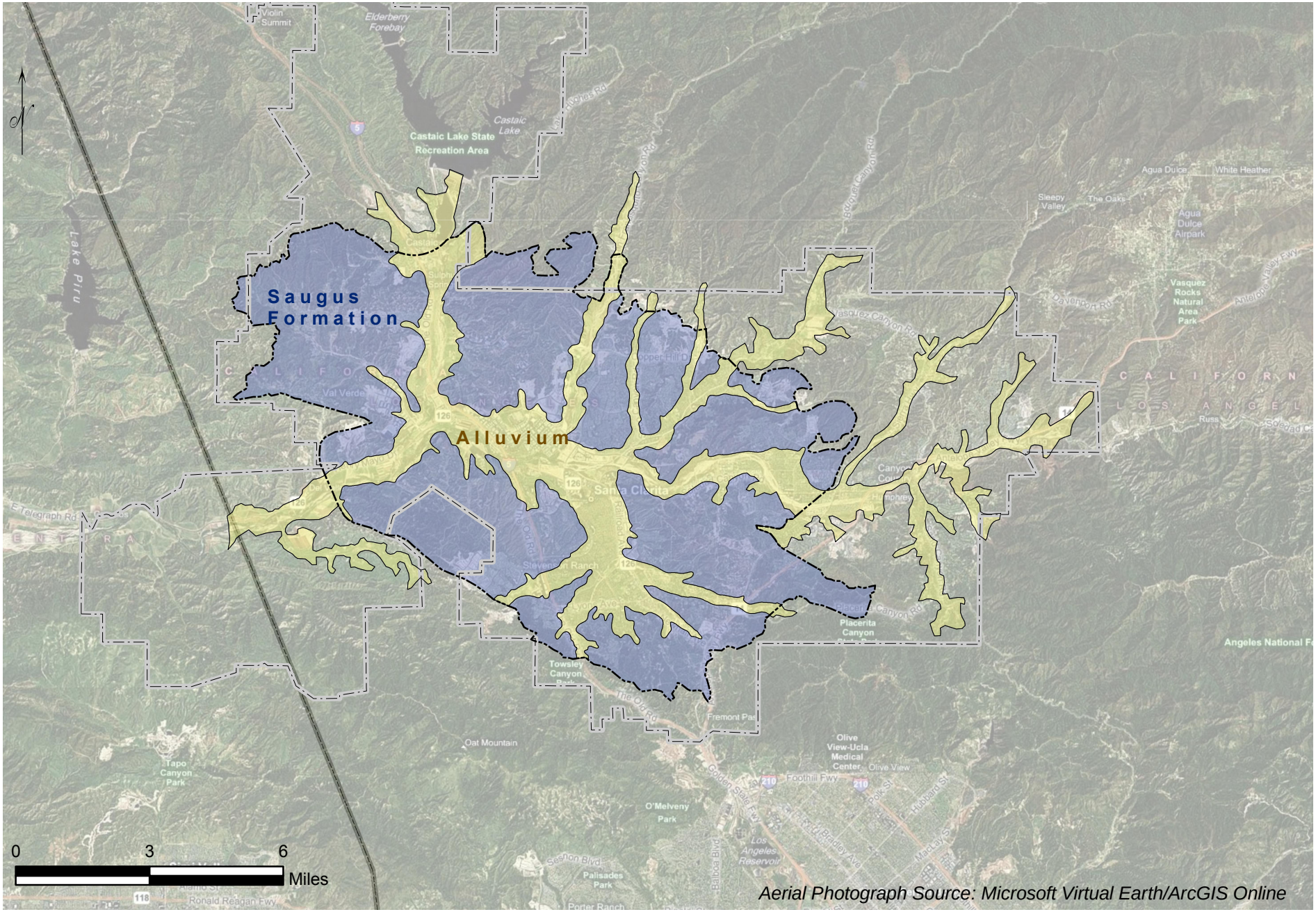

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Figure 3-1
Alluvium and Saugus Formation
Santa Clara River Valley, East Groundwater Subbasin

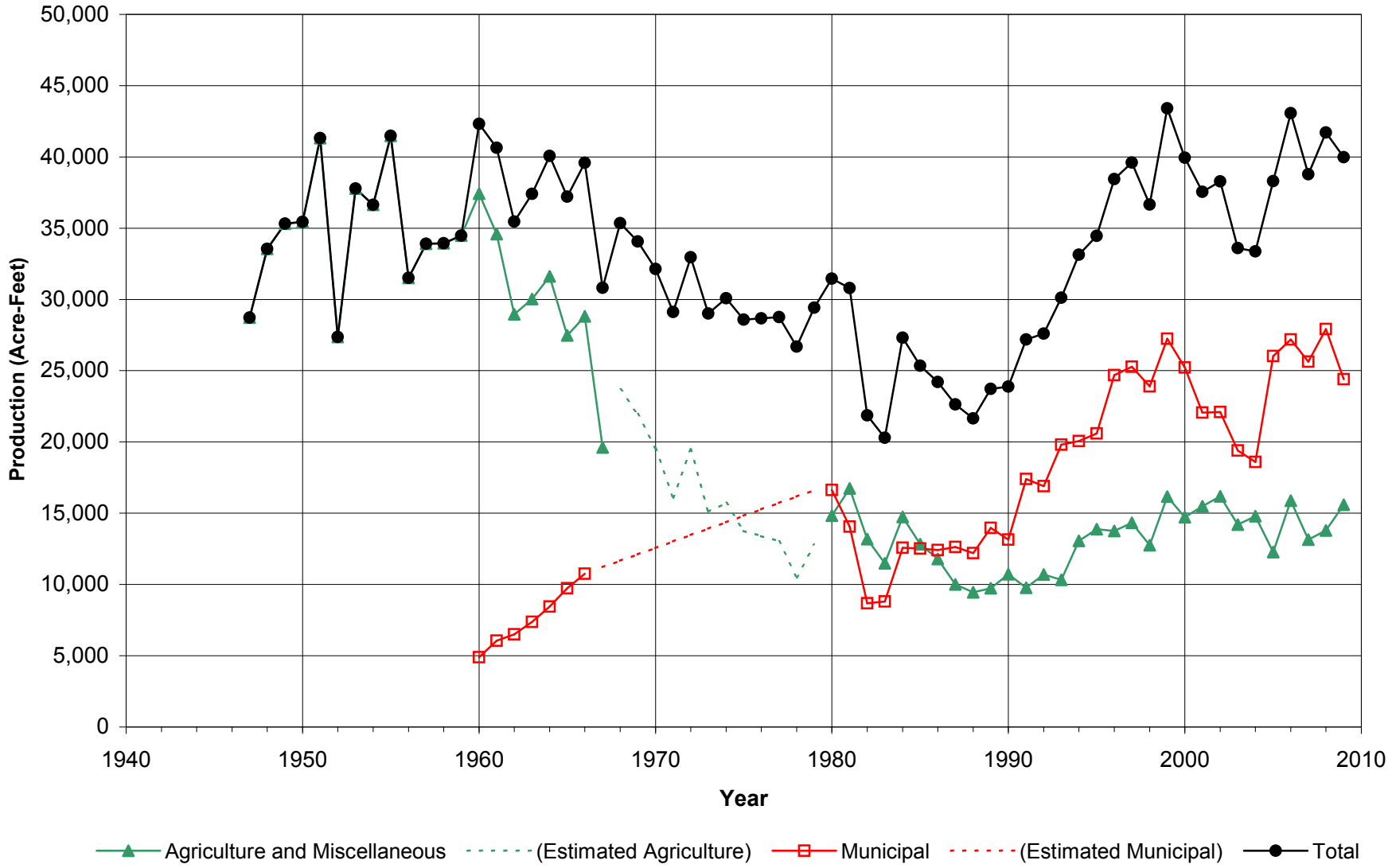

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Figure 3-2
Groundwater Production - Alluvium
Santa Clara River Valley, East Groundwater Subbasin

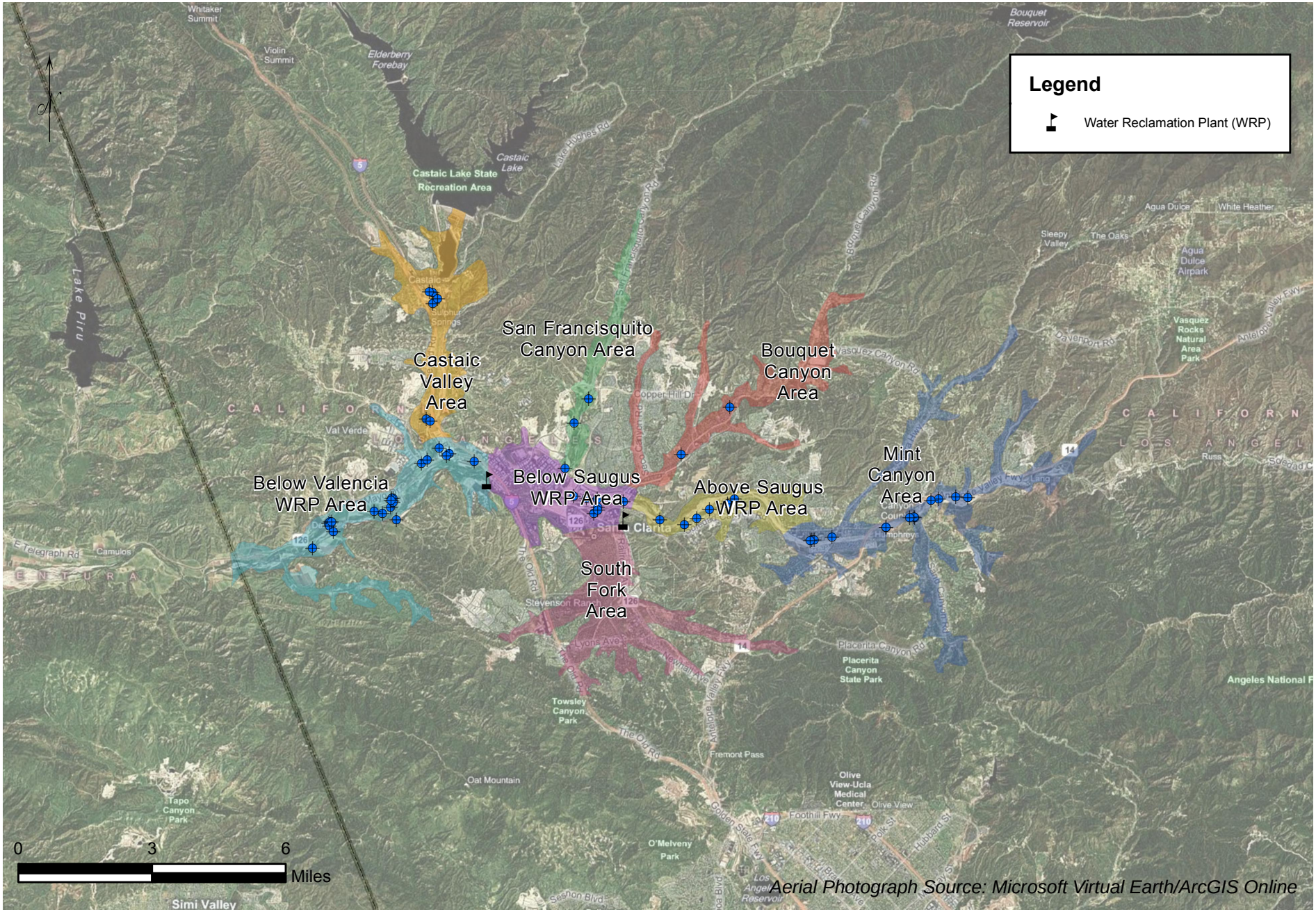

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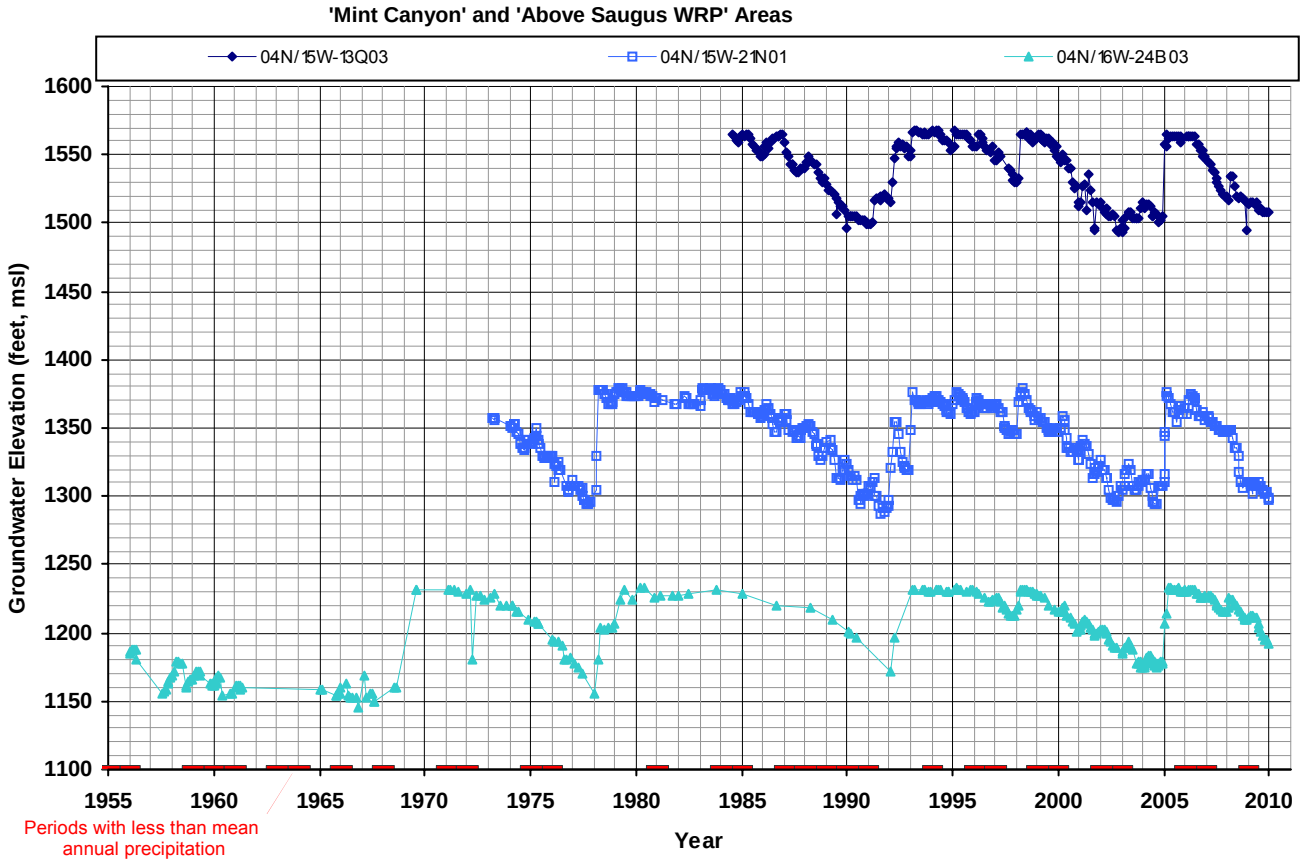
Figure 3-3
Alluvial Well Locations By Area
Santa Clara River Valley, East Groundwater Subbasin



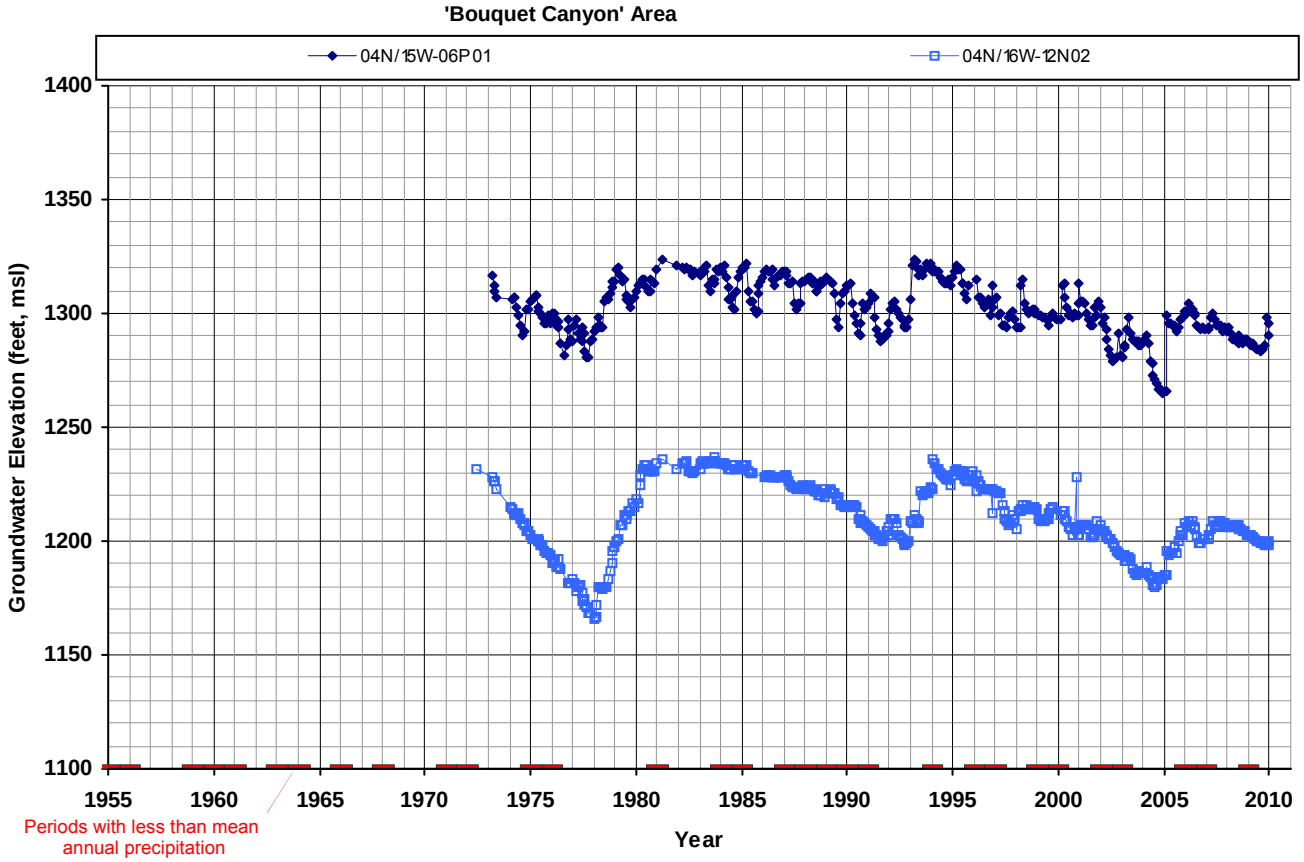


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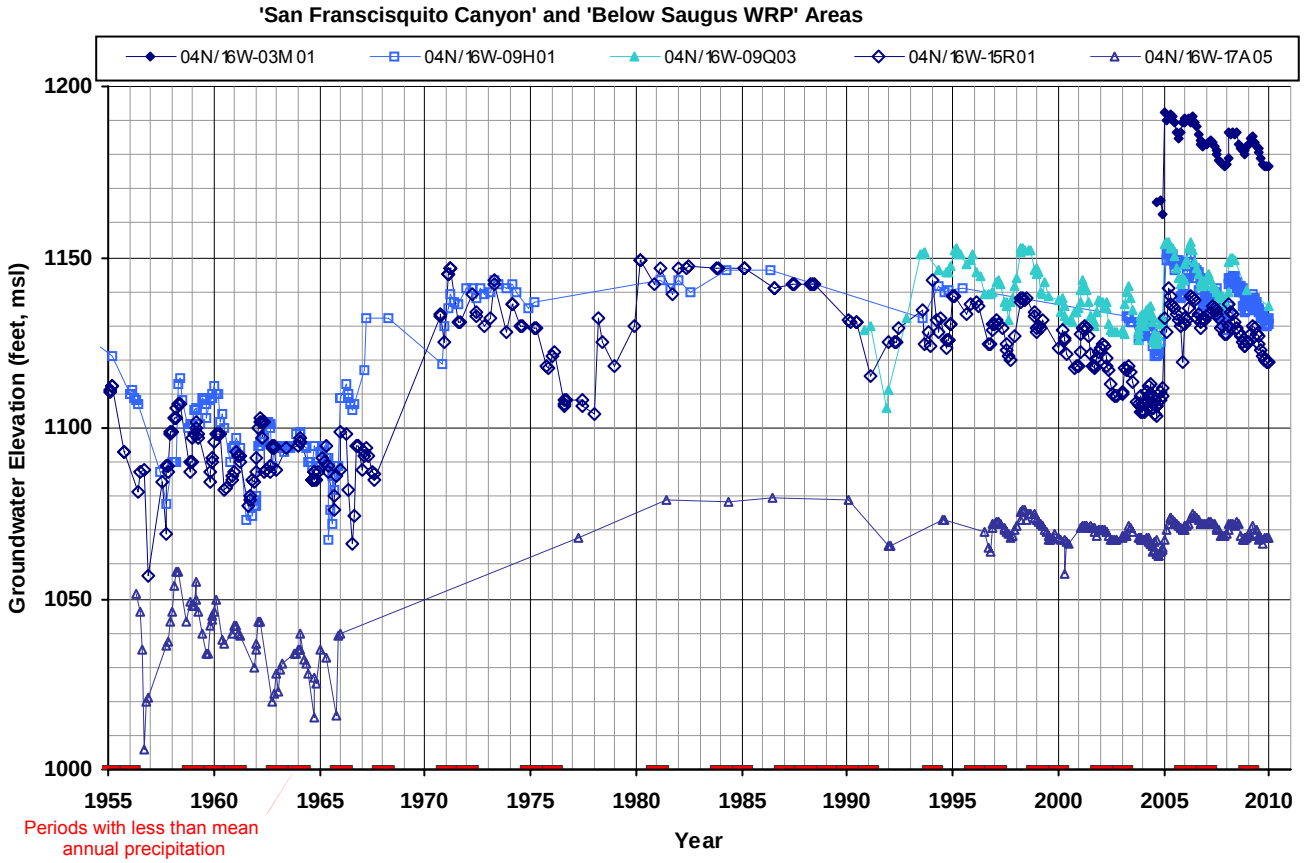
Figure 3-4
Groundwater Elevations in Eastern Santa Clarita Valley Alluvial Wells



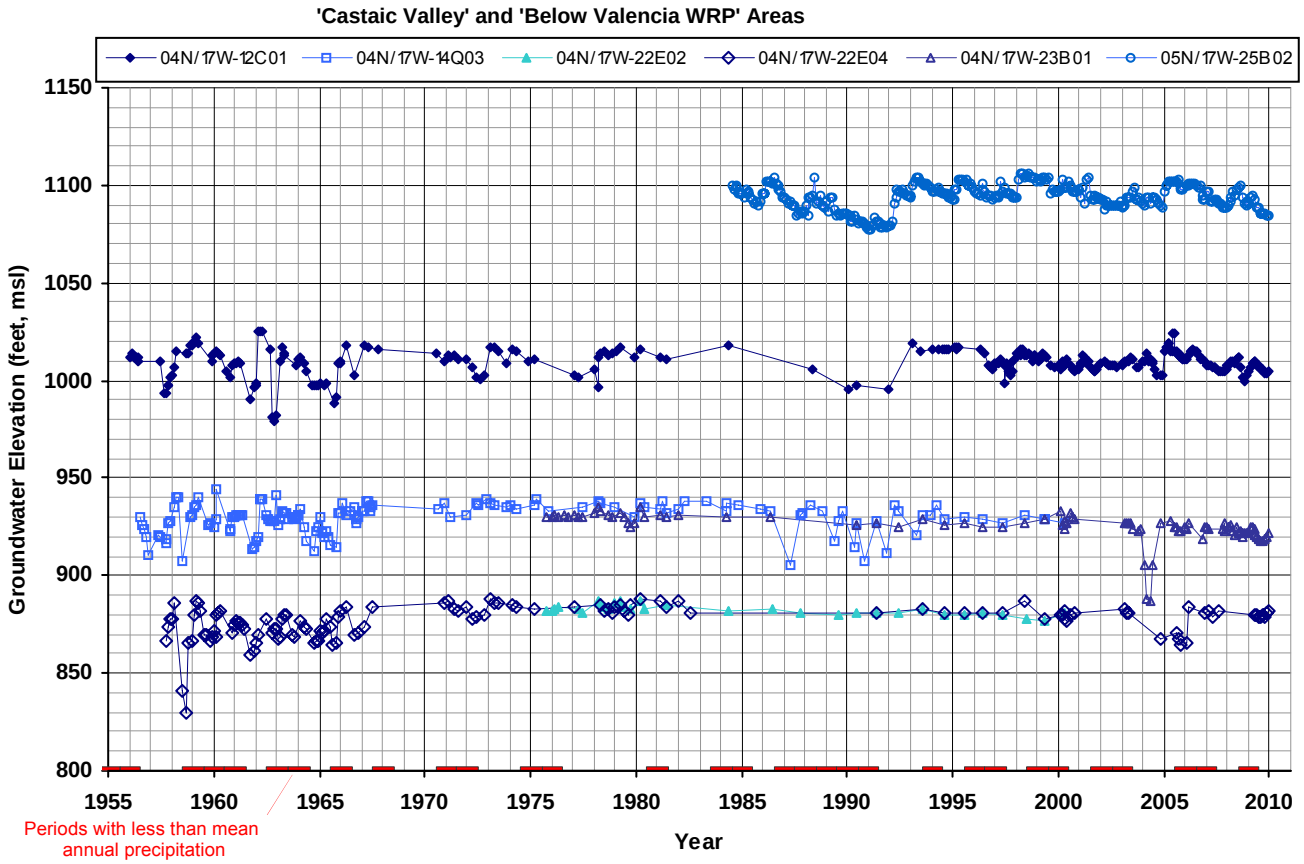


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Figure 3-5
Groundwater Elevations in Western Santa Clarita Valley Alluvial Wells

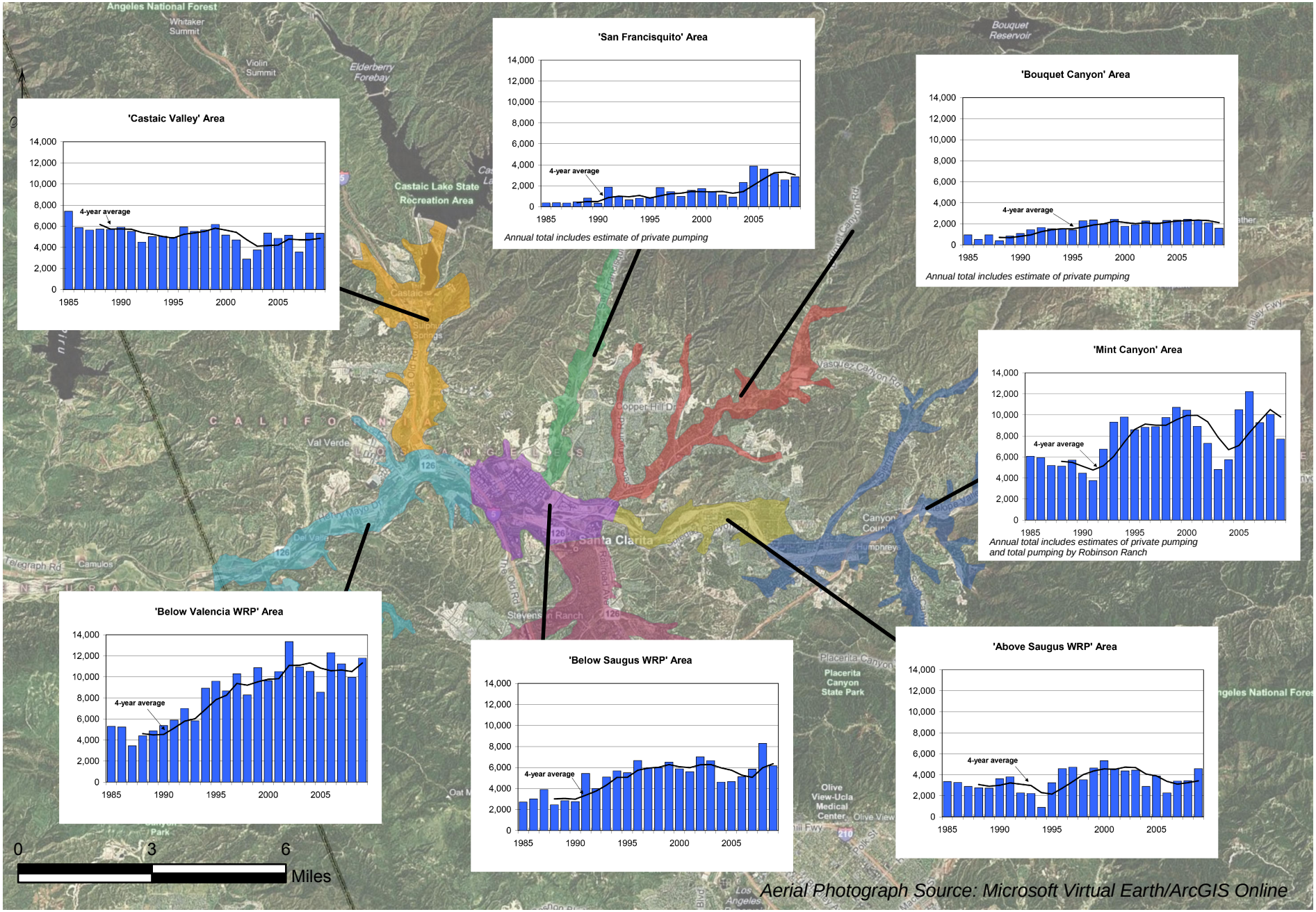

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Figure 3-6
Annual Groundwater Production from Alluvium by Area (Acre-feet)
Santa Clara River Valley, East Groundwater Subbasin

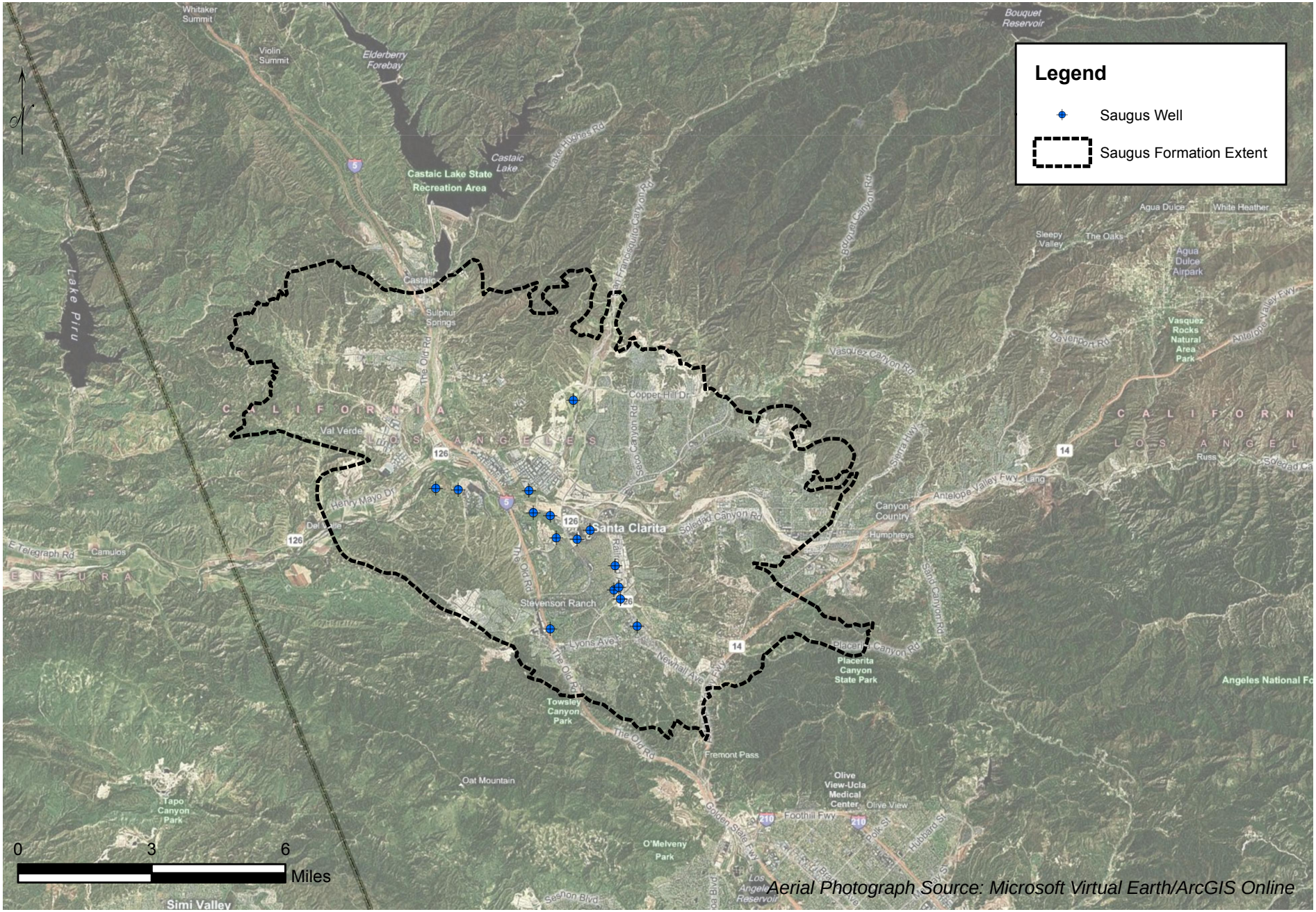

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Figure 3-7
Saugus Well Locations
Santa Clara River Valley, East Groundwater Subbasin

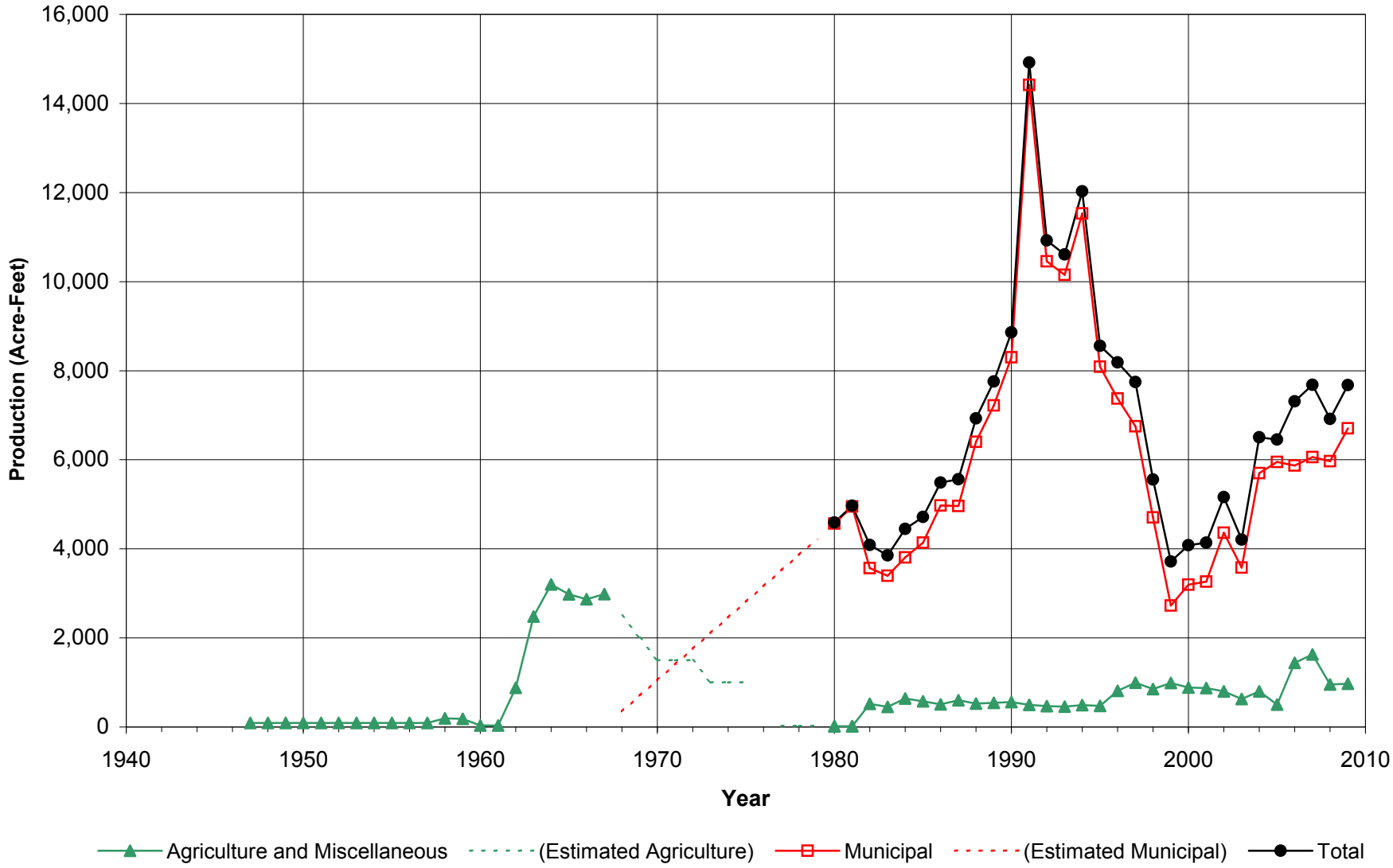

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Figure 3-8
Groundwater Production - Saugus Formation
Santa Clara River Valley, East Groundwater Subbasin

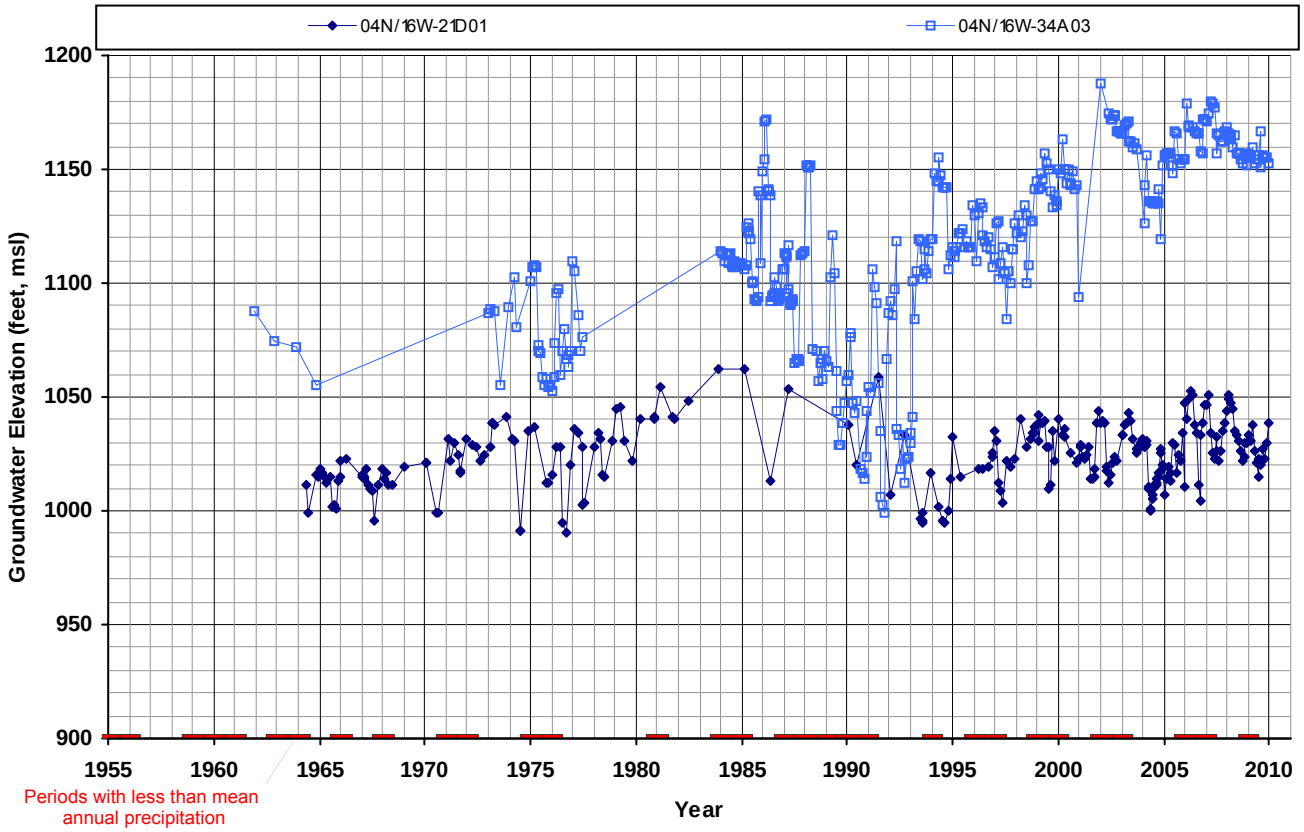

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Figure 3-9
Groundwater Elevations in Saugus Wells

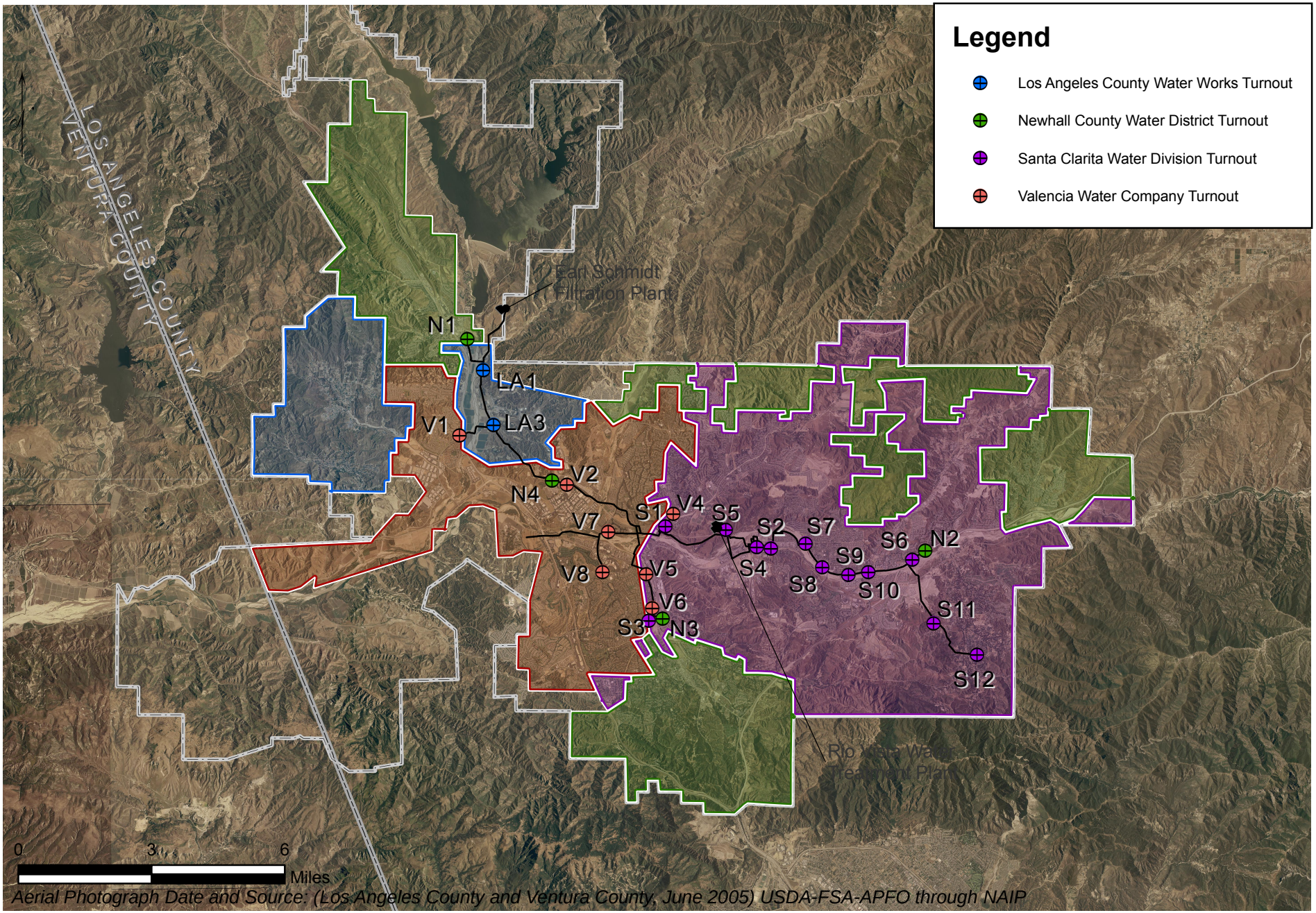

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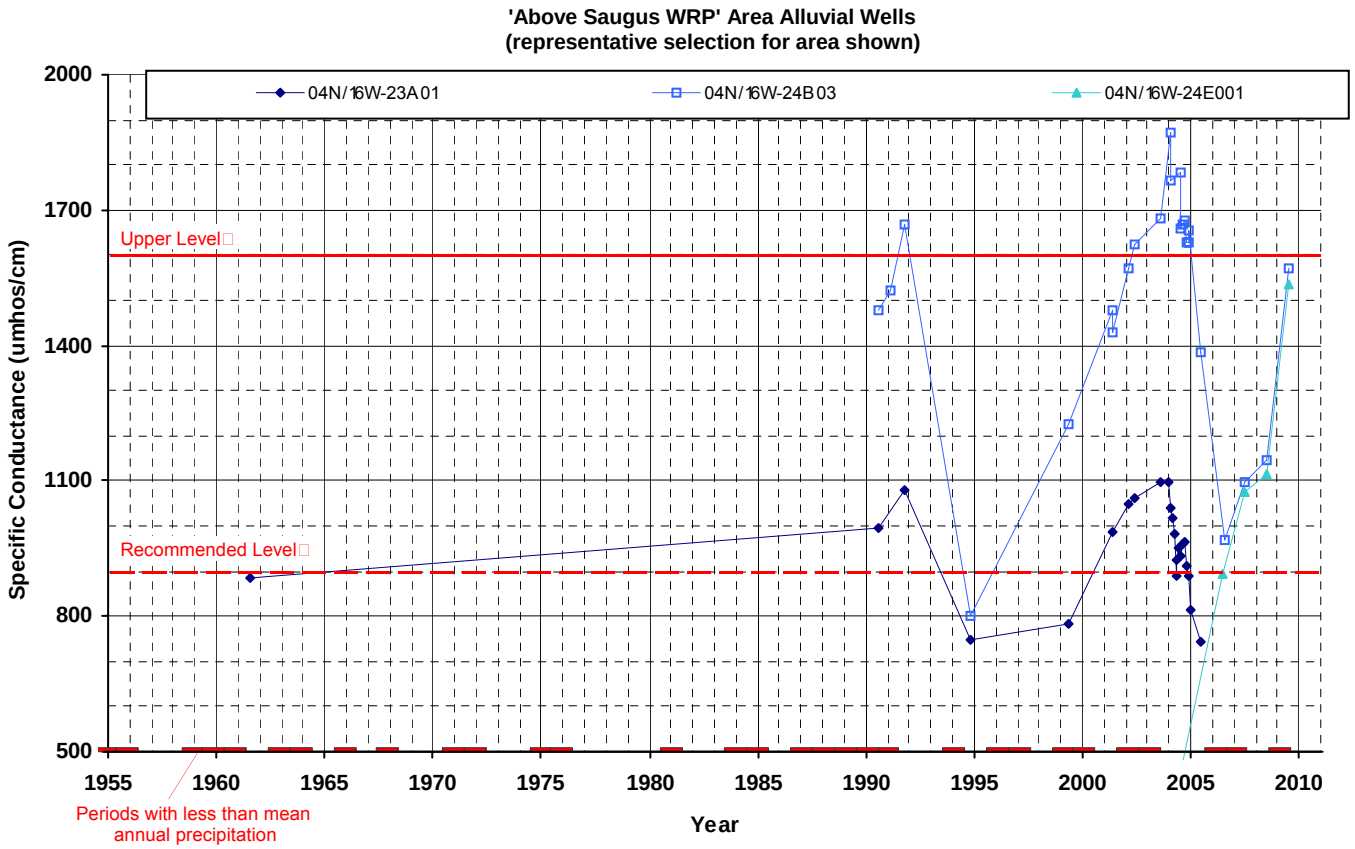
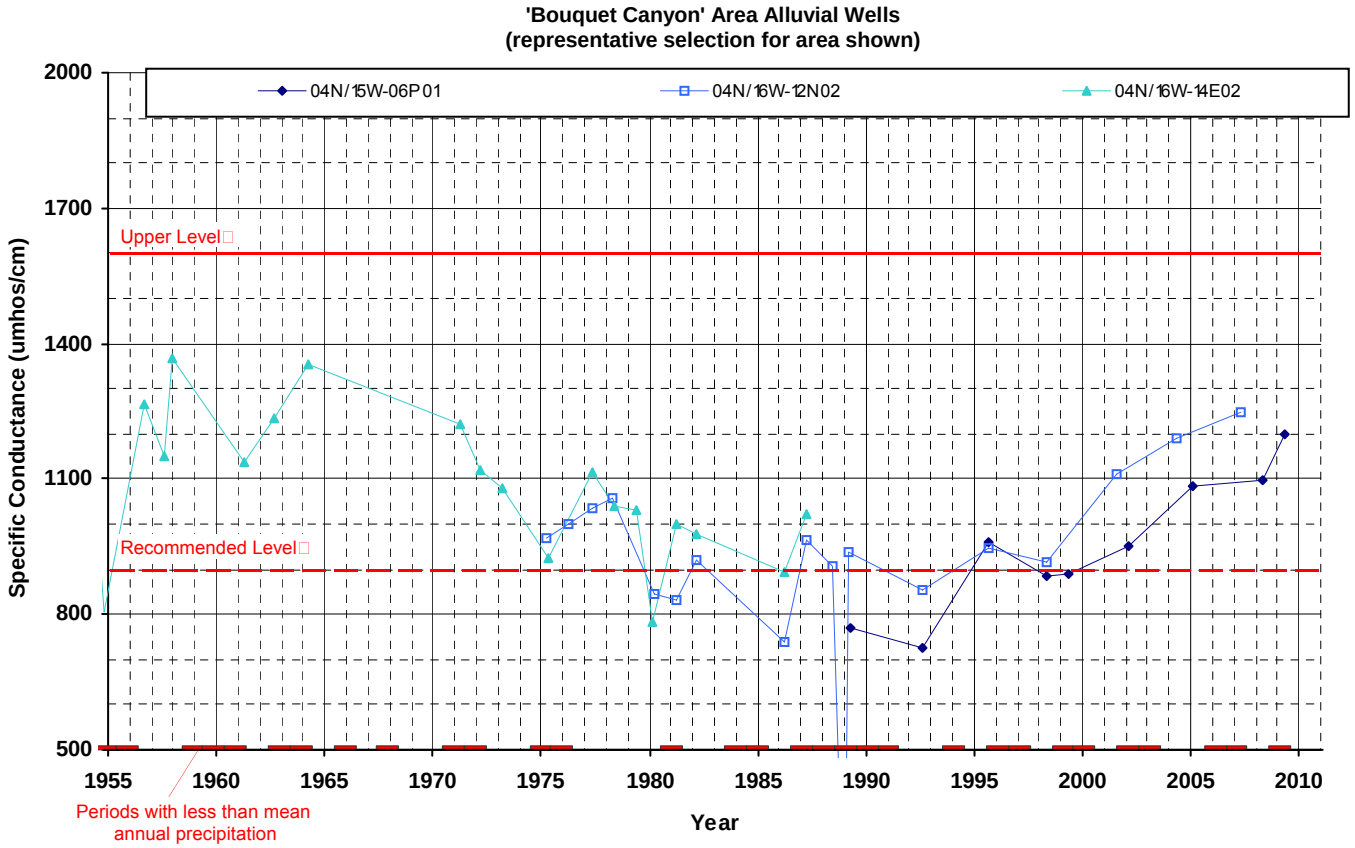
Figure 3-10
Treated Water Distribution System
Castaic Lake Water Agency





California Department of Public Health Secondary Maximum Contaminant Level

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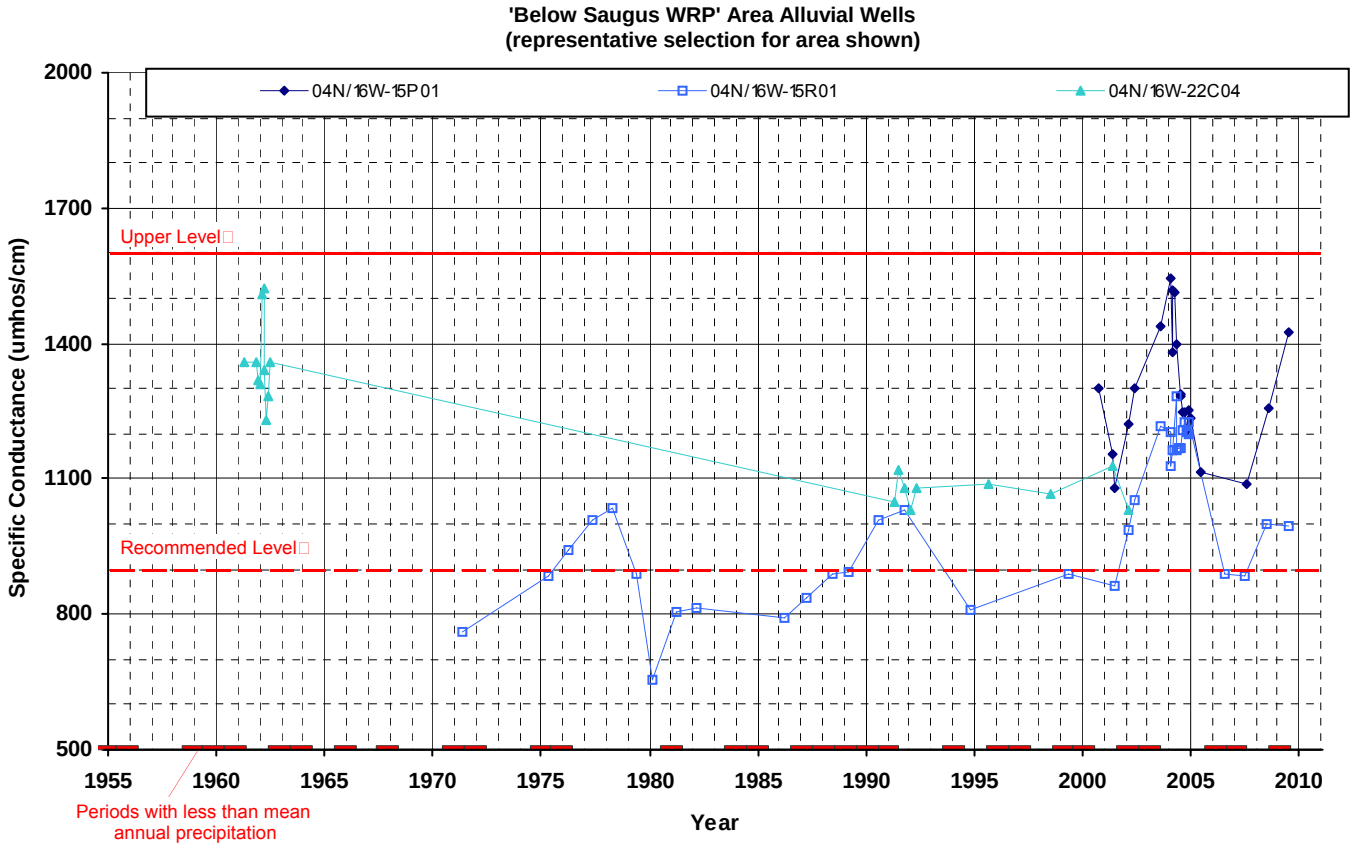
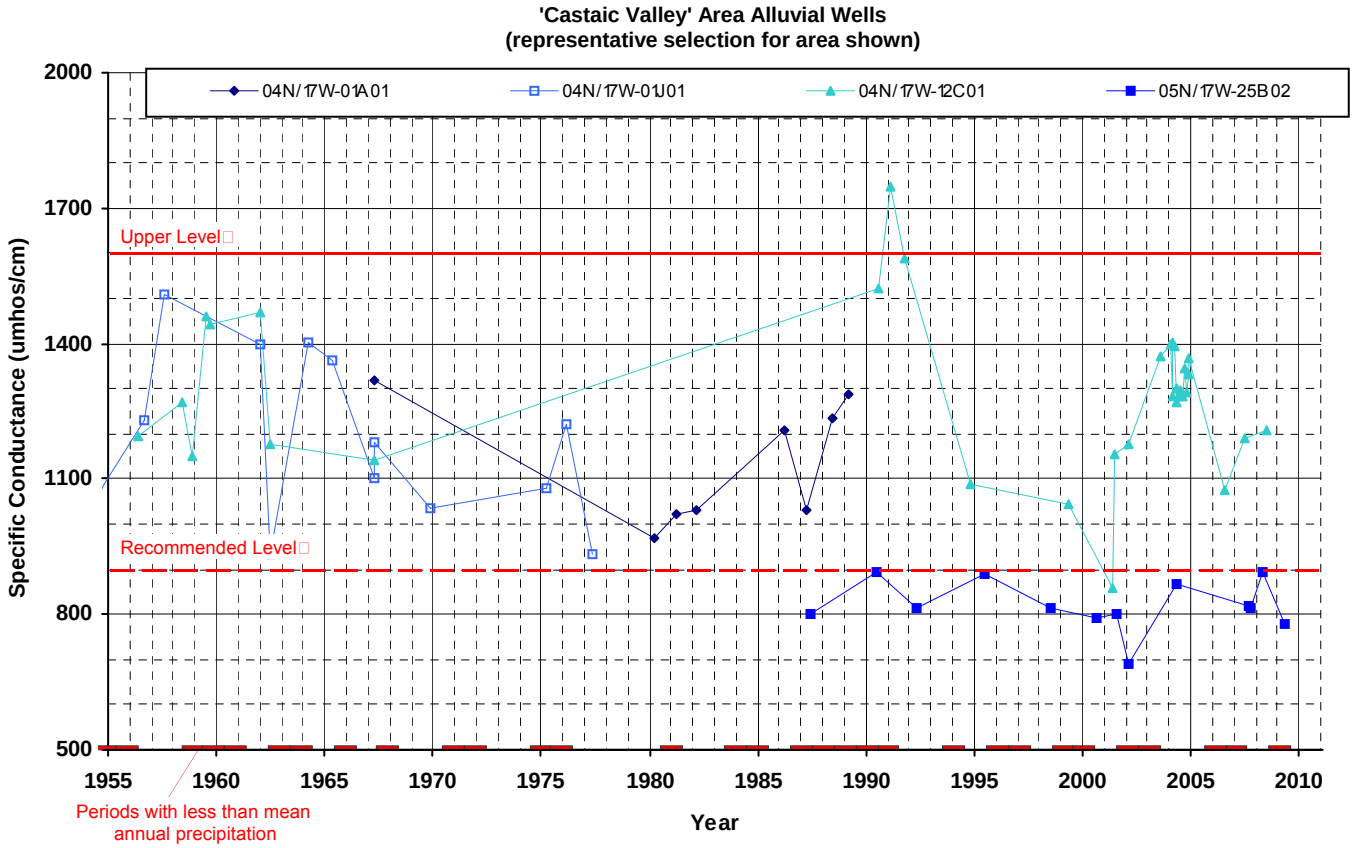
Figure 3-11
Groundwater Quality in Eastern Santa Clarita Valley Alluvial Wells





California Department of Public Health Secondary Maximum Contaminant Level

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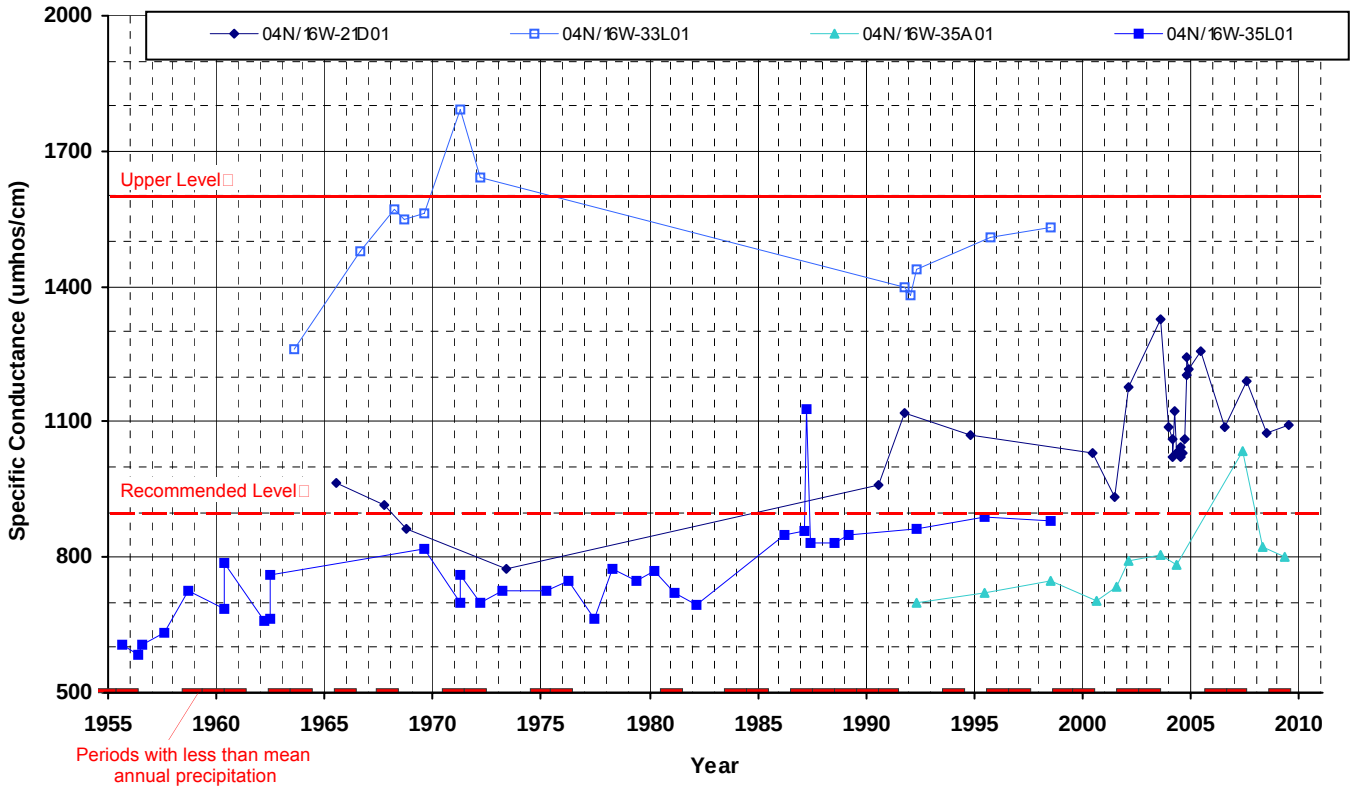
Figure 3-12
Groundwater Quality in Western Santa Clarita Valley Alluvial Wells



California Department of Public Health Secondary Maximum Contaminant Level

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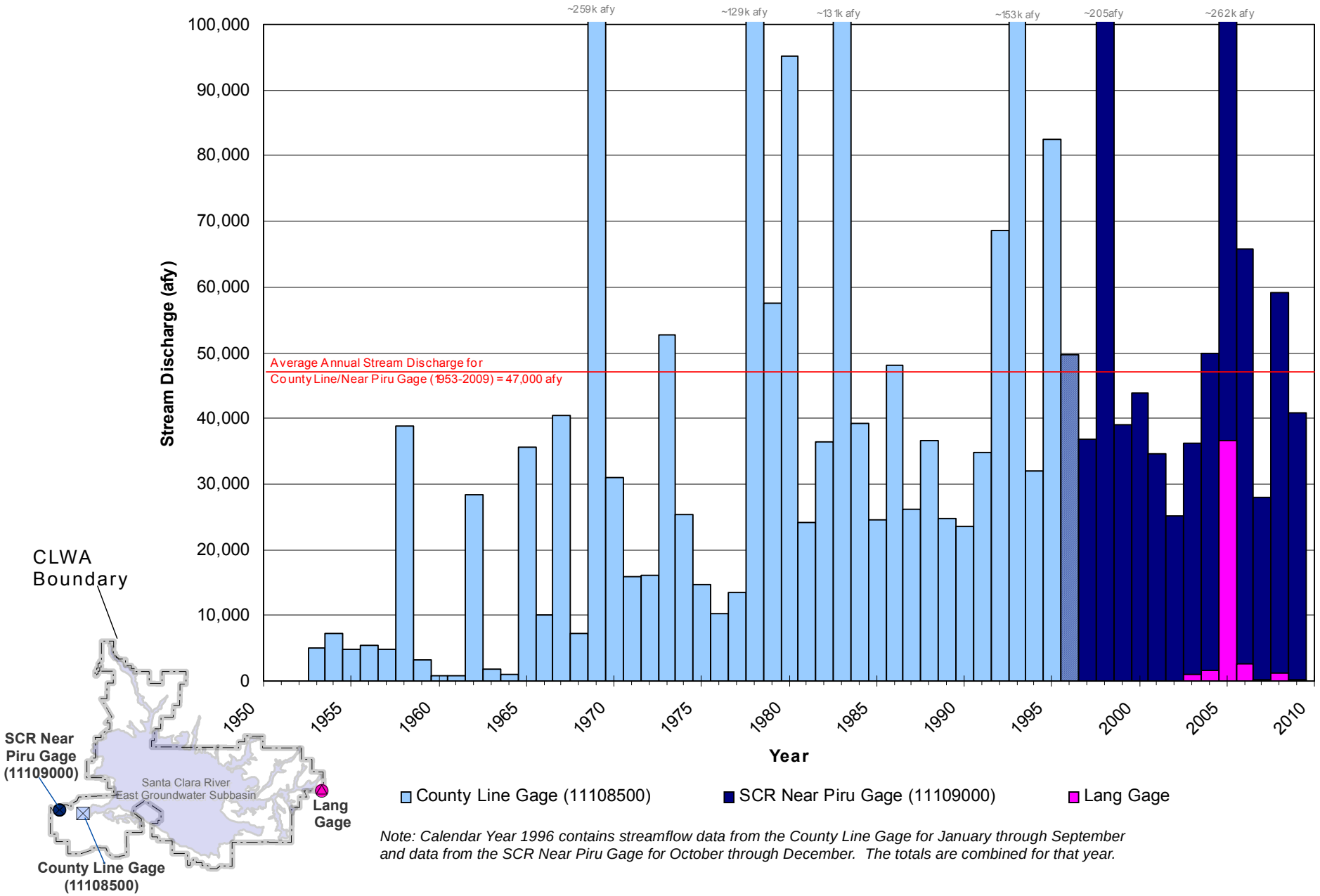
Figure 3-13
Groundwater Quality in Saugus Wells



Note: Calendar Year 1996 contains streamflow data from the County Line Gage for January through September and data from the SCR Near Piru Gage for October through December. The totals are combined for that year.

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Figure 3-14
Annual Stream Discharge
Santa Clara River

4. Summary of 2009 Water Supply and 2010 Outlook

As discussed in the preceding chapters, total water demands in the Santa Clarita Valley were 86,600 af in 2009. This represented a decrease of 4,100 af, or about 4.5 percent, from total demand in 2008 and continues a declining trend in total water demand over the last two years. Of the total demand in 2009, nearly 70,000 af were for municipal water supply, and the balance (16,600 af) was for agricultural and other uses, including estimated individual domestic uses. As detailed in Chapter 2, the total demand in 2009 was met by a combination of local groundwater, SWP and other imported water, and a small amount of recycled water.

The water demand in 2009 was notably lower than the average projection in the 2005 UWMP, (97,900 af), and also lower than the short-term projected demand that was estimated in the 2008 Water Report (91,000 af). For illustration, historical water use from 1980 through 2008 is plotted in Figure 4-1; also shown with that historical record are the projected total water demands in the 2005 UWMP through 2030. As discussed in the 2005 UWMP, year-to-year fluctuations in historical water demand have ranged from about ten percent below to about nine percent above the average or "normal" projection that would describe the long-term historical trend in the Valley's total water demand. The primary factor causing the year-to-year fluctuations is weather. In the short term, wetter years have typically resulted in decreased water demand, and drier years have typically resulted in higher water demand. Extended drier periods, however, have resulted in decreases in demand due to conservation and water shortage awareness. The decline in water demand toward the end of the 1987-92 drought is a good example of such reduced demand. A good recent example of wet-year effects on water demand was 2005, where extremely wet conditions resulted in total water requirements about six percent below the average projection in the 2005 UWMP.

Adding to the types of demand fluctuations described in the 2005 UWMP are the recently-observed effects of broad economic conditions on growth. As reflected by the numbers of service connections in each Purveyor service area, growth in 2009 further slowed, with addition of a total of only about 300 new service connections, in contrast to about 1,000 new connections in each of the preceding two years, and in notable contrast to the predominant growth rate nearly three times higher from the late 1990's through 2004. In addition, the Purveyors were informed by, and have conveyed to the local community, the Governor's Alert in June, 2008 regarding drought conditions and potential water supply shortages, and the Governor's subsequent Drought Emergency Declaration in February, 2009. The widespread awareness of dry conditions throughout the state, aggressive conservation messaging, and the decrease in local growth are

prime factors causing total water demand in 2009 to be notably less than each of the preceding two years, and well below the earlier estimated demand in the 2005 UWMP.

The preceding factors are expected to have a continuing effect in 2010, resulting in estimated total water demand that is again lower than last year. Total municipal water requirements in the first quarter of 2010 were about 16 percent lower than in 2009; that trend continued through April, at the end of which total municipal water requirements were about 19 percent lower than through the first four months of 2009. If municipal demand through the balance of the year tracks average or below average use over the same period through the last two years, and with agricultural and other water requirements comparable to previous years, total water demand in 2010 will be around 82,000 to 84,000 af. That range continues to be substantially below the 100,000 af demand projected for 2010 in the 2005 UWMP.

It is expected that both municipal and agricultural water demands in 2010 will continue to be met with a mix of water supplies as in previous years, notably local groundwater and imported SWP and other supplemental water, complemented by recycled water that will continue to supply a small fraction of total water demand.

On May 20, 2010, the final allocation of water from the SWP in 2010 was announced to be 45 percent; for CLWA, that equates to 42,840 af of its total Table A Amount, of 95,200 af. Combined with local groundwater from the two aquifer systems (48,000 af), total Flexible Storage Account water (6,060 af), net carryover SWP water from 2008 and 2009 (28,303 af), annual acquisition from Buena Vista Water/Rosedale-Rio Bravo Water Storage Districts (11,000 af), unused water previously withdrawn from the Semitropic Groundwater Storage Bank (3,300 af), and recycled water (500 af), the total available water supplies for 2010 are about 140,000 af. Consequently, CLWA and the Purveyors anticipate having more than adequate supplies to meet all water demands in 2010. Projected 2010 water supplies and demand are summarized in Table 4-1.

In August, 2007, a federal court ruled that certain operational changes were required of the SWP in order to protect the endangered Delta smelt. The court order resulted in the preparation of a new Biological Opinion (BO) requiring DWR to implement mitigation requirements with resultant impacts on SWP water supply reliability. Since then, DWR has prepared two updates to its 2005 Reliability Report, which is issued biennially to assist SWP contractors in assessing the adequacy of the SWP component of their overall supplies under varying hydrologic scenarios, e.g. normal and dry years. The current Draft SWP Delivery Reliability Report 2009 was issued in February, 2010. With the objective of protecting endangered fish such as the Delta

Table 4-1
2010 Water Supply and Demand
(acre-feet)

Projected 2010 Demand [1]		**82,000-84,000**
Available 2010 Water Supplies		
Local Groundwater		48,000
Alluvium [2]	*39,000*	
Saugus Formation [3]	*9,000*	
Imported Water		91,503
Table A Amount [4]	*42,840*	
Net Carryover from 2009 [5]	*28,303*	
Buena Vista/Rosedale-Rio Bravo[6]	*11,000*	
Flexible Storage Account (CLWA) [7]	*4,684*	
Flexible Storage Account (Ventura County) [7]	*1,376*	
Yuba Accord[8]	*0*	
Recovery of Banked Water		
Unused Semitropic 2002 Account withdrawal in 2009	*3,300*	
Recycled Water		500
Total Available 2010 Supplies		**140,003**
Additional Dry Year Supplies [9]		
Semitropic Groundwater Storage Bank		45,920
2002 Account[10]	*16,650*	
2003 Account[10]	*29,270*	
Rosedale-Rio Bravo Water Banking and Exchange Program		64,898
2005 and 2006 Buena Vista/Rosedale-Rio Bravo Water Acquisition Agreement[11]	*22,000*	
2005 Banking of Table A[12]	*17,800*	
2006 Banking of Table A[12]	*17,800*	
2007 Rosedale Rio-Bravo Banking[12]	*7,298*	
Total Additional Dry Year Supplies		**110,818**

1. Decreased from 2005 UWMP projections to reflect recent early 2010 actual water use, recent three-year trend, and economy-driven decrease in growth.

2. The Alluvium represents 30,000 – 40,000 afy of available supply under local wet-normal conditions, and 30,000 – 35,000 afy under local dry conditions. Available supply in 2010 is shown to be upper-range for average/wet conditions based on actual Alluvium conditions.

3. The Saugus Formation represents 7,500 – 15,000 afy of available water supply under non-drought conditions, and up to 35,000 afy under increasingly dry conditions. Available supply in 2010 is shown to be below mid-range for average/wet conditions, but above recent Saugus pumping in anticipation of perchlorate containment and cleanup pumping in the second half of 2010.

4. CLWA's SWP Table A amount is 95,200 af. The initial 2010 allocation was 15 percent (14,820 af). On March 17, 2010, the allocation was increased to 20 percent (19,040 af). On April 15, 2010 the allocation

was increased to 30 percent (28,560 af). On May 4, 2010 the allocation was increased to 40 percent (38,080 af). On May 20, 2010 the final allocation was increased to 45 percent (42,840 af).

5. Net amount available to CLWA in 2010; total carryover was 28,303 af.

6. 2010 annual supply from Buena Vista / Rosedale-Rio Bravo Water Acquisition Agreement.

7. CLWA can directly utilize up to 4,684 af of storage capacity in Castaic Lake. By agreement in 2005, CLWA can also utilize 1,376 af of Ventura County SWP contractors' flexible storage capacity in Castaic Lake.

8. Up to 850 af of non-SWP water supply is available to CLWA in critically dry years as a result of agreements among DWR, Yuba County Water Agency, and the U.S. Bureau of Reclamation regarding settlement of water rights issues on the Lower Yuba River (Yuba Accord). CLWA opted to not take any Yuba water in 2010.

9. Does not include other reliability measures available to CLWA and the retail water Purveyors. These measures include short-term exchanges, participation in DWR's dry-year water purchase programs, local dry-year supply programs and other future groundwater storage programs.

10. Net recoverable water after banking 24,000 af and 32,522 af in 2002 and 2003, respectively and recovering 4,950 af in 2009.

11. Water stored in Rosedale-Rio Bravo Water Banking and Exchange Program pursuant to the Buena Vista/Rosedale-Rio Bravo Water Acquisition Agreement.

12. Net recoverable water after banking 20,000 af in both 2005 and 2006, and banking 8,200 af in 2007.

smelt and spring-run salmon, the Draft incorporates restrictions on SWP operations according to the Biological Opinions of the U.S. Fish and Wildlife Service and the National Marine Fishery Service issued on December 15, 2008 and June 4, 2009, respectively. It also considers the impacts on SWP delivery reliability due to climate change, sea level rise, and vulnerability of the Delta's conveyance system and structure due to floods and earthquakes. The current Draft Reliability Report projects long-term reliability of 60 percent during normal year hydrology. CLWA staff has assessed the impact of the current Reliability Report on the CLWA reliability analysis contained in the Agency's 2005 UWMP and concluded that current and anticipated supplies are available to meet anticipated water supply needs. However, the preceding discussion of SWP supply should be considered by noting that, while the SWP Reliability Report represents a reasonable scenario with respect to long term reliability, recent reductions in supply reduce the difference between available supply and demand in the future, thereby making the CLWA service area more subject to shortages in certain dry years. Accordingly, the reduction in SWP supply reinforces the need to continue diligent efforts to conserve potable water and increase the use of recycled water, both to meet the goals in the 2005 UWMP and to maximize utilization of potable water supplies.

As discussed in Chapter 5, CLWA and the retail water purveyors have worked with Los Angeles County and the City of Santa Clarita in preparing a water conservation ordinance and the enforcement mechanisms to aggressively implement water conservation in the CLWA service area. In terms of short-term water supply availability, however, CLWA and the Purveyors have determined that, while current operational changes of the SWP are in effect, there are sufficient supplemental water supplies, including SWP water, to augment local groundwater and other water supplies such that overall water supplies will be sufficient to meet projected water requirements, as reflected herein, without the need for mandatory rationing though the summer of 2010. CLWA, the retail water Purveyors, Los Angeles County and the City of Santa Clarita have formed the Santa Clarita Valley Water Committee. The specific purpose of the committee is to work collaboratively to ensure the progressive implementation of water use efficiency programs and ordinances in the Santa Clarita Valley.

In addition to the regular and previously banked water supplies described above to meet projected demand in 2010, a residual of nearly 46,000 af of recoverable water remains stored in the Semitropic Groundwater Storage Bank in Kern County. Nearly 64,900 af of recoverable water are also stored in the long-term Rosedale-Rio Bravo Water Banking and Exchange Program, also in Kern County. After recovery of 4,950 af of banked water in 2009, 1,650 af of which were used in 2009 and 3,300 af of which are intended to be used in 2010, remaining recoverable water in all the Kern County storage banks slightly exceeds 110,000 af. That

component of overall water supply is separately reflected in Table 4-1 because it is intended for future dry-year supply and will not be used for 2010 water supply.

CLWA and the Purveyors have implemented a number of projects that are part of an overall program to provide facilities needed to firm up imported water supplies during times of drought. These involve water conservation, surface and groundwater storage, water transfers and exchanges, water recycling, additional short-term pumping from the Saugus Formation, and increasing CLWA's imported supply. This overall strategy is designed to meet increasing water demands while assuring a reasonable degree of supply reliability.

Part of the overall water supply strategy is to provide a blend of groundwater and imported water to area residents to ensure consistent quality and reliability of service. The actual blend of imported water and groundwater in any given year and location in the Valley is an operational decision and varies over time due to source availability and operational capacity of Purveyor and CLWA facilities. The goal is to conjunctively use the available water resources so that the overall reliability of water supply is maximized while utilizing local groundwater at a sustainable rate.

For long-term planning purposes, water supplies and facilities are added on an incremental basis and ahead of need. It would be economically unsound to immediately, or in the short term, acquire all the facilities and water supplies needed for the next twenty to thirty years. This would unfairly burden existing customers with costs that should be borne by future customers. There are numerous ongoing efforts to produce an adequate and reliable supply of good quality water for Valley residents. Water consumers expect that their needs will continue to be met with a high degree of reliability and quality of service. To that end, CLWA's and the Purveyors' stated reliability goal is to deliver a reliable and high quality water supply for their customers, even during dry periods. Based on conservative water supply and demand assumptions contained in the 2005 UWMP for a planning horizon over the next 25 years, in combination with conservation of non-essential demand during certain dry years, CLWA and the Purveyors believe implementing their water plan will successfully achieve this goal.

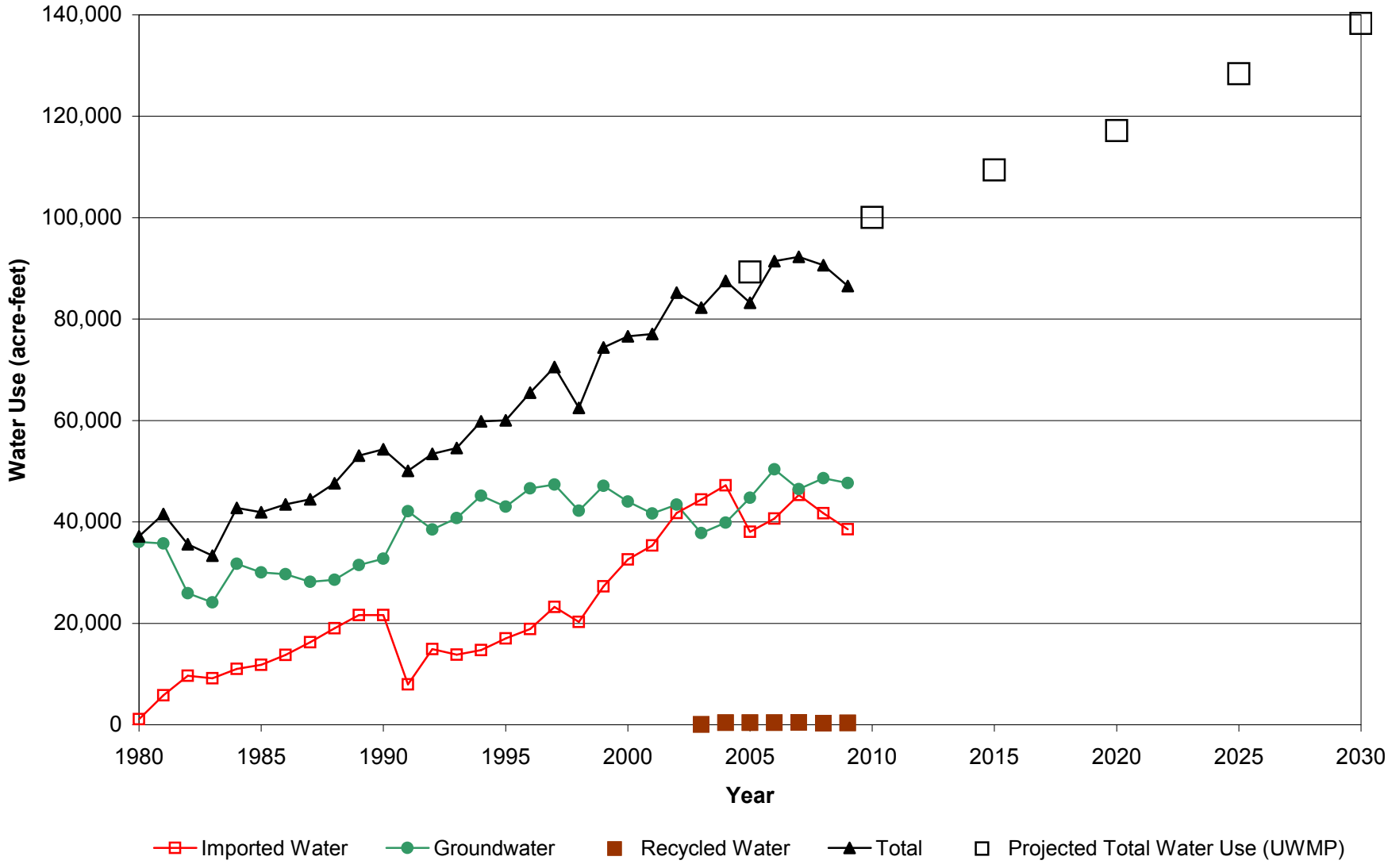

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Figure 4-1
Historical and Projected Water Use
Santa Clarita Valley

5. Water Conservation

The California Urban Water Conservation Council (CUWCC) was formed in 1991 through the Memorandum of Understanding (MOU) Regarding Urban Water Conservation in California. The urban water conservation Best Management Practices (BMPs) included in the MOU are intended to reduce California's long-term urban water demands. While the BMPs are currently implemented by the MOU signatories on a voluntary basis, they are specified as part of the Demand Management Measures section of the Urban Water Management Planning Act. Water conservation can achieve a number of goals, such as:

- meeting legal mandates
- reducing average annual potable water demands
- reducing sewer flows
- reducing demands during peak seasons
- meeting drought restrictions
- reducing carbon footprint, waste water flows and urban runoff.

CLWA signed the urban MOU in 2001 on behalf of its wholesale service area, and pledged to implement several BMPs at a wholesale support level (listed below). NCWD signed the MOU in 2002 and VWC signed the MOU in 2006, both on behalf of their respective retail service areas. As separate MOU signatories and in their respective roles as retailers, NCWD and VWC are committed to implementing all BMPs that are feasible and applicable in their service areas. Efforts are made to coordinate with CLWA and the other Purveyors wherever possible to maximize efficiency and ensure the cost effectiveness of NCWD's and VWC's conservation program.

In coordination with the Purveyors, CLWA has been implementing the following BMPs (which pertain to wholesalers) for several years (some prior to signing the MOU in 2001):

BMP 3	System Water Audits, Leak Detection and Repair
BMP 7	Public Information Programs
BMP 8	School Education Programs
BMP 10	Wholesale Agency Programs
BMP 12	Water Conservation Coordinator

CLWA and the Purveyors have been implementing these BMPs valley-wide. Since 2001,

CLWA has also instituted implementation of BMP 2 (Residential Plumbing Retrofits) and BMP 14 (Residential Ultra Low Flush Toilet (ULFT) and High Efficiency Toilet (HET) Replacement Programs) on behalf of the Purveyors.

In addition to these efforts, in September 2006 CLWA installed a weather station at its headquarters adjacent to the Rio Vista Water Treatment Plant. This station became part a network of over 120 automated weather stations in the state of California that make up the California Irrigation Management Information System (CIMIS). The Department of Water Resources (DWR) manages the system which has a primary purpose of making available to the public, free of charge, information useful in estimating crop water use for irrigation scheduling.

NCWD, SCWD and VWC have initiated implementation of the remaining BMPs that are specific to retail water suppliers:

BMP 1	Water survey programs for single-family residential and multi-family residential customers
BMP 2	Residential plumbing retrofits (including Weather Based Irrigation Controllers)
BMP 3	System water audits, leak detection and repair
BMP 4	Metering with commodity rates for all new connections and retrofit of existing connections
BMP 5	Large landscape conservation programs and incentives
BMP 6	High-efficiency clothes washing machine financial incentive programs
BMP 7	Public Information Programs
BMP 8	School Education Programs
BMP 9	Conservation programs for commercial, industrial, and institutional (CII) accounts
BMP 11	Conservation pricing
BMP 12	Conservation coordinator
BMP 13	Water waste prohibition
BMP 14	Residential High Efficiency Toilet (HET) Replacement Program

Reports to the CUWCC on BMP implementation by CLWA and the Purveyors were included in the 2005 UWMP and have been reported annually to the CUWCC since 2007.

Additional savings are occurring Valley-wide due to state interior plumbing code requirements that have been in effect since 1992, as well as due to changes in lot size and reduction in exterior square footage of new housing and commercial developments. The City of Santa Clarita and

County of Los Angeles have also taken a more active conservation role and have begun implementing water efficient devices and practices on the properties they own and manage. All of these efforts have begun to impact overall demand in the Valley, as can be seen in the significant decline in total water demand over the last two years and extending into early 2010. The Valley's water suppliers continue to monitor water demand trends through time to assess those factors that are accounting for the reduction, and to attempt to quantify them.

Most recently with regard to water conservation, CLWA and the retail water Purveyors entered into an MOU in 2007 to prepare a Santa Clarita Valley Water Use Efficiency Strategic Plan (the Plan). The purpose of the plan is to prepare a comprehensive long-term conservation plan for the Santa Clarita Valley by adopting objectives, policies and programs designed to promote proven and cost effective conservation practices. The Plan provides a detailed study of existing residential and commercial water use and recommends programs designed to reduce the overall Valley-Wide water demand by 10 percent by 2030. The programs are designed to provide Valley residents with the tools and education to use water more efficiently. The six programs identified in the Plan are:

- High Efficiency Toilet Rebate Program
- CII Audits & Customized Incentive Program
- Large Landscape Audits & Customized Incentive Program
- Landscape Contractor Certification and Weather Based Irrigation Controller Program
- High Efficiency Washer Rebate Program
- Public Information and Education Programs

In addition to the six programs designed for existing customers, the Plan also identifies three other key factors that will help reduce the valley's overall water demand; passive conservation, inflation, and new more water-efficient building ordinances.

Finally, the Plan includes an Appendix with more aggressive water use efficiency measures designed to meet a potential 20 percent reduction in water use by 2020. This includes funding more active conservation programs, retrofit on resale legislation, water rate reform, water budget based rates, and a more aggressive recycled water program.

Implementation of the majority of the programs identified in the Plan are beginning in 2010 through funding by CLWA on behalf of all the Purveyors.

In addition to this effort, the water Purveyors are working with City and County agencies to develop a landscape irrigation ordinance for the Santa Clarita Valley. This ordinance will focus primarily on new construction aimed at reducing overall water demands by requiring efficient landscape design and delivery systems. Implementation of the ordinance is expected in 2010, depending on review and adoption by the City and County.

Finally, in 2008, Governor Schwarzenegger issued a proclamation for all Californians to reduce their per capita water consumption by 20 percent by the year 2020. In November 2009, the Governor and California's legislature reached an historic agreement over ensuring long term water supply reliability for California, as well as restoring and protecting the Sacramento-San Joaquin Delta and other ecologically sensitive areas. The agreement is comprised of four policy bills and an $11.4 billion bond measure. One of the policy bills (SB 7X7) identifies reporting criteria and guidelines for water utilities to track and measure progress toward achieving the 20 percent per capita demand reduction goal. Water utilities are required to implement strategies and report progress in their Urban Water Management Plans. In 2010, DWR is expected to provide guidance and criteria for implementing the provisions of this new law; that guidance is expected to provide clarification regarding individual (per-capita) and broader (Valley-wide) conservation goals, which will be utilized in the preparation of the 2010 update of the UWMP for the Santa Clarita Valley.

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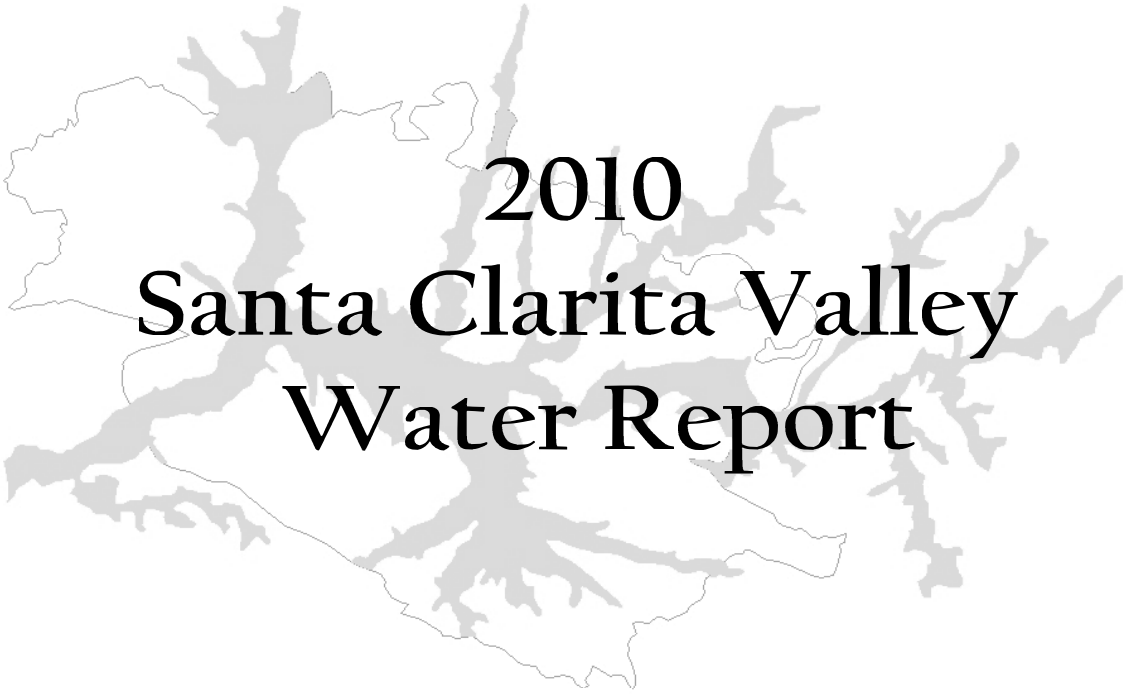

2010
Santa Clarita Valley
Water Report

Castaic Lake Water Agency (CLWA)
CLWA Santa Clarita Water Division
Los Angeles County Waterworks District 36
Newhall County Water District
Valencia Water Company

June 2011

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2010 Santa Clarita Valley Water Report

prepared for:

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Executive Summary

This annual report, which is the thirteenth in a series that began to describe water supply conditions in 1998, provides current information about the water requirements and water supplies of the Santa Clarita Valley. The report was prepared for the imported water wholesaler, Castaic Lake Water Agency (CLWA), and for the four local retail water Purveyors that serve the Valley: CLWA Santa Clarita Water Division, Los Angeles County Waterworks District 36, Newhall County Water District, and Valencia Water Company. These entities and representatives from the City of Santa Clarita and the County of Los Angeles Department of Regional Planning meet as required as the Santa Clarita Valley Water Committee to coordinate the management of imported water with local groundwater and recycled water to meet water requirements in the Valley.

This report provides information about local groundwater resources, State Water Project (SWP) a . The report reviews the sufficiency and reliability of supplies in the context of existing water demand, with focus on actual conditions in 2010, and it provides a short-term outlook of water supply and demand for 2011.

ES.1 2010 Water Requirements and Supplies

In 2010, total water requirements in the Santa Clarita Valley were about 80,200 acre-feet (af), of which about 64,100 af (80 percent) were for municipal use and the remainder (16,100 af) was for agricultural and other (miscellaneous) uses, including individual domestic uses. Total demand in 2010 was about 7.4 percent lower than in 2009, less than what was estimated in the 2009 Water Report, and water requirements in 2010 were also lower than the average projection in the 2005 Urban Water Management Plan (UWMP) (but closer to the projection in the 2005 UWMP with conservation). The majority of decreased water demand is attributable to a significant (8%) decrease in municipal water use from 2009. Total water requirements in 2010 were met by a combination of about 49,300 af from local groundwater resources (about 33,200 af for municipal and about 16,100 af for agricultural and other uses), about 30,600 af of SWP and other imported water, and about 300 af of recycled water.

Of the 49,300 af of total groundwater pumping in the Valley in 2010, about 41,200 af were pumped from the Alluvium and about 8,100 af were pumped from the underlying, deeper Saugus Formation. Alluvial pumping represented about a 1,200 af increase from 2009, and Saugus pumping was slightly higher than in 2009, by about 400 af. Neither pumping volume resulted in

any notable overall change in groundwater conditions (water levels, water quality, etc.) in either aquifer system. Imported water deliveries to the Purveyors decreased by about 8,000 af from the previous year. Water uses and supplies in 2010 are summarized in the following Table ES-1.

Table ES-1
Santa Clarita Valley
Summary of 2010 Water Supplies and Uses
(acre-feet)

Municipal		
SWP and other Imported		30,578
Groundwater (Total)		33,152
Alluvium	*25,984*	
Saugus	*7,168*	
Recycled Water		336
Subtotal		**64,066**
Agriculture/Miscellaneous		
SWP and other Imported		-
Groundwater (Total)		16,099
Alluvium	*15,175*	
Saugus	*924*	
Subtotal		**16,099**
Total		***80,165***

In accordance with the California Urban Water Management Planning Act, the Valley-wide UWMP was updated and recently adopted to extend projected water demands through 2050, and to describe the combination of local groundwater, imported water supplies from the State Water Project and other sources, local recycled water supplies, and other water supplies planned to meet those projected water demands in the Valley. The 2010 UWMP describes the reliability of local groundwater resources and the adequacy of groundwater supplies to meet groundwater demand. The 2010 UWMP also describes the recently completed work for integrated control of perchlorate migration and restoration of perchlorate-impacted groundwater supply.

Notable details about each component of water supply in the Valley, and about the water supply outlook for 2011, include the following.

ES.2 Alluvial Aquifer

Based on an updated evaluation of groundwater basin yield, completed in 2009, the groundwater operating plan in the 2010 UWMP includes Alluvial pumping in the range of 30,000 to 40,000 acre-feet per year (afy) following average/normal years, and slightly reduced pumping (30,000 to 35,000 afy) following dry years. Pumping from the Alluvium in 2010 was 41,200 af, which is slightly above the upper end of the operating plan range for the Alluvium but had no adverse effects on groundwater levels and storage in the basin. On average, pumping from the Alluvium has been about 32,600 afy since supplemental imported water became available in 1980. That average rate remains near the lower end of the range of operational yield.

On a long-term basis, continuing through 2010, there is no evidence of any historic or recent trend toward permanent water level or storage decline. In general, throughout a large part of the basin, Alluvial groundwater levels have generally remained near historic highs during the last 30 years. Above-average precipitation in late 2004 and 2005 resulted in significant water level recovery in the eastern part of the basin, and through the recent multi-year dry period (2006-2009), water level declines have leveled off and remained within their historic range, continuing the overall trend of fluctuating groundwater levels within a generally constant range over the last 30 years. These ongoing data indicate that the Alluvium remains in good operating condition and can continue to support pumping in the operating range included in the 2010 UWMP, or slightly higher, without adverse results (e.g., long-term water level decline or degradation of groundwater quality.)

Based on an integration of water quality records from multiple wells completed in the Alluvium, there have been historical fluctuations in groundwater quality, typically associated with variations in precipitation and streamflow. However, like groundwater levels, there has been no long-term trend toward groundwater quality degradation; groundwater produced from the Alluvial aquifer remains a viable municipal and agricultural water supply.

In 2002, as part of ongoing monitoring of wells for perchlorate contamination, perchlorate was detected in one Alluvial well (the SCWD Stadium Well) located near the former Whittaker-Bermite facility. The detected concentration was slightly below the then-applicable Notification Level for perchlorate (6 µg/l, which was subsequently established as the Maximum Contaminant Level for perchlorate in October 2007), and the well has now been replaced to restore that component of municipal water supply that was impacted by perchlorate. In early 2005, perchlorate was detected in a second Alluvial well, VWC's Well Q2. After an interim period of wellhead treatment, that well has now been returned to regular water supply service. All other

Alluvial wells operated by the Purveyors continue to be used for municipal water supply service; those wells near the Whittaker-Bermite property are sampled in accordance with drinking water regulations and perchlorate has not been detected. The 2005 UWMP specifically addressed the adequacy of groundwater supply in light of the inactivation of the impacted Alluvial wells; and it addressed the plan and schedule for restoration of perchlorate-impacted wells, including the protection of existing non-impacted wells. As summarized in the 2010 UWMP, the replacement and reactivation of the formerly impacted wells now adds to the overall ability to meet the groundwater component of total water supply in the Valley.

The ongoing characterization and plan for control and cleanup of perchlorate in the Valley has focused on the Saugus Formation. In addition, however, on-site cleanup and control activities that began in 2006, and continued through 2010, include continuation of soil cleanup on the Whittaker-Bermite site, and continuation of pumping and treatment in the Northern Alluvium on the Whittaker-Bermite site. Expanded pumping and treatment, intended to effect perchlorate containment in the Northern Alluvium, became operational in October 2007. Under the direction of the State Department of Toxic Substances Control (DTSC), Whittaker has submitted a comprehensive site-wide remediation plan for the contaminants of concern in soil and groundwater detected on the site. A Draft Remedial Action Plan for Operable Units 2 through 6, focused on soil remediation, was submitted to DTSC in 2009. In January, 2011, Whittaker also completed a Draft Feasibility Study for Operable Unit 7 to identify and select treatment technologies for both on-site and off-site groundwater. DTSC approved the Remedial Action Plan for contaminated soils in Operable Units 2 through 6 on December 6, 2010 and Preparation of the Remedial Design documents is underway. Field implementation of the soil remediation is expected to begin in fall 2011.

ES.3 Saugus Formation

The groundwater operating plan in the 2010 UWMP includes pumping from the Saugus in the range of 7,500 to 15,000 afy in average/normal years; it also includes planned dry-year pumping from the Saugus of 21,000 to 35,000 afy for one to three consecutive dry years. As with the operation plan for the Alluvium, the ranges of Saugus pumping are based on the updated evaluation of groundwater basin yield, completed in 2009, which found those ranges of pumping to be sustainable on a long-term basis.

Pumping from the Saugus Formation was about 8,100 af in 2010; on average, Saugus pumping has been slightly more than 6,800 afy since 1980. Both rates remain near the lower end of the ranges included in the groundwater operating plans and in the UWMP. As a result of long-term

relatively low pumping from the Saugus Formation, groundwater levels in that aquifer have remained generally constant to slightly increasing over the last 40 to 45 years; those trends continued in 2010.

In 1997, ammonium perchlorate was discovered in four wells (Saugus 1, Saugus 2, V157, and NC-11) completed in the Saugus Formation in the vicinity of the former Whittaker-Bermite facility located generally toward the east, on the south side of the basin. In 2006, a very low level of perchlorate was detected in another Saugus municipal well (NC-13). And in 2010, it was detected further downgradient in a sixth Saugus well (V201). To date, one of the impacted wells has been destroyed and replaced, three have remained in or been returned to service with treatment as required, one remains out of service with its capacity replaced by an alternate source, and the most recently impacted well remains out of service with plans in development for restoration or replacement. As part of regular operation, those wells that remain in service are sampled in accordance with drinking water regulations. At these wells, perchlorate has either not been detected or wellhead treatment is in place for the removal of perchlorate. All other Saugus wells owned and operated by the Purveyors remain available for municipal water supply service.

Work toward the ultimate remediation of perchlorate contamination, including the restoration of impacted groundwater supply continued to progress in 2010, with focus on construction of facilities to implement a jointly developed plan to "pump and treat" contaminated water from two of the originally impacted wells to stop migration of the contaminant plume, and to deliver treated water for municipal supply to partially replace impacted well capacity. Environmental review of the project was completed with adoption of a Mitigated Negative Declaration in September 2005. The Final Interim Remedial Action Plan was completed and approved by DTSC in January 2006. Construction of facilities and pipelines necessary to implement the pump and treat program and to also restore inactivated well capacity began in November 2007. Construction was completed in May, 2010, DPH issued an amendment to CLWA's Operating Permit in December, 2010, and two of the originally impacted Saugus wells (Saugus 1 and 2) were placed back in service in January, 2011. Through this reactivation, Castaic Lake Water Agency's Saugus Perchlorate Treatment Facility (SPTF) is now online and numerous monitoring tests are performed each week in order to ensure the safety of the water leaving the plant. The Purveyors continue to have sufficient pumping capacity to meet the planned normal range of Saugus pumping as described in the 2010 UWMP.

ES.4 Imported Water

Historically comprised of only its SWP Table A Amount, CLWA's imported water supplies now consist of a combination of SWP water and water acquired from the Buena Vista Water Storage District in Kern County. CLWA's contractual Table A Amount is 95,200 af of water from the SWP. Under the 2007 Water Acquisition Agreement with the Buena Vista Water Storage District (Buena Vista) a -Rio Bravo Water Storage District (Rosedale-Rio Bravo), Buena Vista's high flow Kern River entitlements (a) a -Rio Bravo's service area on an ongoing basis. CLWA will receive 11,000 af of these supplies annually through either exchange of Buena Vista's and Rosedale-Rio Bravo's SWP supplies or through direct delivery of water to the California Aqueduct via the Cross Valley Canal.

CLWA's final allocation of SWP water for 2010 was 50 percent of its Table A Amount, or 47,600 af. The total available imported water supply in 2010 was 90,498 af, comprised of the 47,600 af of Table A supply, 11,000 af purchased from Buena Vista/Rosedale Rio Bravo, 28,303 af of 2008 and 2009 carryover delivered in 2010, 3,300 af delivered from the Semitropic Water Banking and Exchange Program, and 295 af from the 2010 SWP Turnback Pool. CLWA deliveries to the Purveyors were 30,578 af. Following disposition of available water supplies in 2010, carryover of 3,712 af from 2010 is available for 2011 water supply. Water banking in 2010 included 32,256 af of water delivered to the Rosedale-Rio Bravo Water Banking and Exchange Program.

CLWA has two groundwater banking agreements with the Semitropic Water Storage District in Kern County. In accordance with those amended agreements, over a twenty-year period (u), CLWA could withdraw up to 50,870 af of its Table A water that was stored in 2002 and 2003 to meet future Valley demands when needed. Following the withdrawal of 4,950 af in 2009 (1,650 af utilized in 2009 and 3,300 af utilized in 2010), that balance is 45,920 af. In addition to the banking in Semitropic, CLWA finalized an agreement with the Rosedale-Rio Bravo Water Storage District in 2005 and can now bank up to 100,000 afy of surplus Table A Amount in that District's Water Banking and Exchange Program. In addition to 20,000 af previously banked in both 2005 and 2006, CLWA banked 8,200 af of water in 2007, and 32,256 af of water in 2010. In accordance with the provisions of that agreement, CLWA can withdraw up to a total of 72,513 af of that water, at a rate up to 20,000 afy, to meet Valley water demands when needed. Additionally, as part of the Buena Vista Water Acquisition Agreement, CLWA is entitled to 22,000 af of water that was stored in the Rosedale Rio-Bravo Water Banking and Exchange Program in 2005 and 2006 on CLWA's behalf. As of 2011, CLWA maintains a

recoverable total of 94,500 af in the Rosedale Rio-Bravo Water Banking and Exchange Program.

Since SWP water deliveries are subject to reduction when dry conditions occur in Northern California, the 2010 UWMP includes programs, like the Semitropic and Rosedale-Rio Bravo programs, for enhancing water supply reliability during such occurrences. A capital improvement program funded by CLWA has been established to provide facilities and additional water supplies needed to firm up SWP water supplies during times of drought.

ES.5 Recycled Water

Recycled water service was initiated in July 2003 in accordance with CLWA's Draft Reclaimed Water System Master Plan (2002). The amount of recycled water used for irrigation purposes, at a golf course and in roadway median strips, was approximately 336 af in 2010. CLWA and the Purveyors completed programmatic CEQA analysis in early 2007 for full implementation of the recycled water system as outlined in the Master Plan. CLWA and the Purveyors are preparing the design of the second phase of the Recycled Water Master Plan (Phase IIA) that will take water from the Saugus Water Reclamation plant and distribute it to identified users to the north, across the Santa Clara River and then to the west and the east, which will include service to Santa Clarita Central Park. A (Phase IIC) is in design to extend the system southward from the intersection of Valencia Boulevard and the Old Road, south along Rockwell Canyon Road to the intersection of Orchard Village Road and Lyons Avenue, serving large irrigation customers along its proposed alignment. Collectively, these phases will have design capacity to increase recycled water deliveries by about 1,500 afy.

ES.6 2011 Water Supply Outlook

In 2011, total water demands are expected to be about 82,000 af, slightly more than actual water use last year, and consistent with the water demand projections in the 2010 UWMP. It is expected that water demands in 2011 will continue to be met with a generally similar mix of water supplies comprised of local groundwater, supplemental SWP and other imported water, and recycled water.

Announced on April 20, 2011, the latest allocation of water from the SWP in 2011 is 80 percent of CLWA's Table A Amount, or 76,160 af. Combined with local groundwater from the two aquifer systems (50,000 af), total Flexible Storage Account (6,060 af), net carryover of SWP Table A allocation from 2010 used in 2011 (3,712 af), annual acquisition through the Buena Vista Water/Rosedale Rio-Bravo Water Acquisition Agreement (11,000 af), and recycled water

(500 af), the total available water supplies for 2011 are nearly 150,000 af. As a result, CLWA and the Purveyors anticipate having more than adequate supplies to meet all water demands in 2011.

In A

(BO) requiring DWR to implement mitigation requirements with resultant impacts on SWP water supply reliability. The current SWP Delivery Reliability Report 2009, finalized in August, 2010, incorporates restrictions on SWP operations according to the Biological Opinions of the U.S. Fish and Wildlife Service and the National Marine Fishery Service issued on December 15, 2008 and June 4, 2009, respectively. However, in December 2010, a federal judge overruled most of the 2008 federal biological opinion and invalidated several of the criteria that reduced SWP's water supply. The effects of this reversal are still not completely known, but will probably result in some relief from SWP pumping restrictions in the long term. The current SWP Delivery Reliability Report 2009 also considers the impacts on SWP delivery reliability due to climate change, sea level rise, and vulnerability of the Delta's conveyance system and structure due to floods and earthquakes. With these factors, the Reliability Report projects long-term reliability of 60 percent during normal year hydrology. CLWA staff has assessed the impact of the current Reliability Report on the CLWA reliability analysis contained in the Agency's 2005 UWMP and concluded in the 2010 UWMP that current and anticipated supplies are available to meet anticipated water supply needs through the year 2050.

CLWA, the retail water Purveyors, Los Angeles County and the City of Santa Clarita have formed the Santa Clarita Valley Water Committee. The specific purpose of the Committee is to work collaboratively to ensure the progressive implementation of water use efficiency programs and manage the conjunctive use of the water supplies in the Santa Clarita Valley. In terms of short-term water supply availability, the Committee has determined that, while current operational changes of the SWP are in effect, there are sufficient supplemental water supplies, including SWP water, to augment local groundwater and other water supplies such that overall water supplies will be sufficient to meet projected 2011 water requirements as reflected herein.

In a

-Rio Bravo Water Banking and Exchange Program, deliveries from CLWA's flexible storage account in Castaic Lake Reservoir,

local groundwater pumping, short-term water exchanges, and participation in DWR dry-year water purchase programs. Following the recovery of 4,950 af (with delivery of 1,650 af in 2009 and delivery of 3,300 in 2010), the banked excess 2002 and 2003 SWP Table A water in Semitropic represents nearly 46,000 af of recoverable water for drought water supply. In addition, the banked excess SWP Table A water in 2005 and 2006, augmented by banked water acquired through the Buena Vista/Rosedale-Rio Bravo Water Acquisition Agreement in 2005, 2006, 2007 and 2010, represent a total of more than 94,500 af of recoverable water for drought water supply from the Rosedale-Rio Bravo Banking and Exchange Program.

Drought periods may affect available water supplies in any single year and for a duration usually not longer than three consecutive years. It is important to note that hydrologic conditions vary from region to region throughout the state. Dry conditions in Northern California affecting SWP supply may not affect local groundwater and other supplies in Southern California, and the reverse situation can also occur (as it did in 2002 and 2003). For this reason, CLWA and the Purveyors have emphasized developing a water supply portfolio that is diverse, especially in dry years. Diversity of supply is considered a key element of reliability, giving Valley water Purveyors the ability to draw on multiple sources of supply to ensure reliable service during dry years, as well as during normal and wet years.

1. Introduction

1.1 Background

For most residents of the Santa Clarita Valley (Valley), domestic water service is provided by four retail water Purveyors: Castaic Lake Water Agency's Santa Clarita Water Division (SCWD), Los Angeles County Waterworks District 36 (LAWWD36), Newhall County Water District (NCWD), and Valencia Water Company (VWC). Together, the Purveyors provide water to about 70,000 service connections. As a State Water Contractor, Castaic Lake Water Agency (CLWA) contracts for State Water Project water delivered from Castaic Lake, after which it is treated, filtered, and disinfected at two CLWA treatment plants before distribution to the Purveyors. Staff of these entities meet regularly to coordinate the supply of water in the Valley. Their respective service areas are shown in Figure 1-1.

While municipal water supply has grown to become the largest category of water use in the Valley, there remains an agricultural and other small private water demand that is dependent on local groundwater for its water supply. Accordingly, ongoing agricultural water requirements and the use of local groundwater to meet those requirements are considered in analyses of water requirements and supplies as reported herein. Also, in addition to municipal and agricultural water uses in the Valley, water supply for a small fraction of Valley residents is provided by individual private water supply wells. The locations, construction details, annual pumping and other information about these private wells are not currently available. In the absence of detailed information about private wells and associated water use, pumping as reported herein necessarily includes an estimate of groundwater pumped from private wells; it is intended that this estimate will be refined in the future as more information about the private wells is obtained.

For more than 25 years, CLWA and the Purveyors have reviewed and reported on the availability of water supplies to meet all water requirements in the Valley. Those reports have also addressed local water resources, most notably groundwater, in the region. Past studies have assessed the condition of local groundwater aquifers, their hydrogeologic characteristics, aquifer storage capacity, operational yield and recharge rate, groundwater quality and contamination, and the ongoing conjunctive use of groundwater and imported water resources.

Other efforts have included developing drought contingency plans, coordinating emergency response procedures and implementing Valley-wide conservation programs. In 1985, the Purveyors prepared the area's first Urban Water Management Plan (UWMP.) Information in the

plan was coordinated among CLWA and the Purveyors to provide accurate, comprehensive and consistent water supply and demand information for long term planning purposes. In accordance with the California Urban Water Management Planning Act, the Valley-wide UWMP has been updated to extend water demand projections through 2050, and to describe the combination of local groundwater, imported water supplies from the State Water Project, local recycled water supplies, and planned other water supplies to meet the existing and projected water demands in the Valley. The 2010 UWMP describes the reliability of local groundwater resources and the adequacy of groundwater supplies to meet that component of overall water supply; and it also describes the mitigation of perchlorate contamination which had impacted several municipal water supply wells, and the implementation of integrated control of perchlorate migration and full restoration of perchlorate-impacted groundwater supply.

In 2009, primarily in preparation for the update of the UWMP in 2010, an updated analysis of groundwater basin yield was completed to guide the ongoing use of groundwater and the associated distribution of pumping to maintain groundwater use at a sustainable rate while also addressing localized issues such as restoration of groundwater contamination which has impacted local groundwater supplies since 1987. The results of the updated groundwater basin analysis are summarized in this Water Report.

1.2 Purpose and Scope of the Report

The purpose of this report, which is the thirteenth in a series of annual water reports that began to describe water supply conditions in 1998, is to provide current information about water requirements and available water supplies to meet those demands in the Santa Clarita Valley. CLWA and the Purveyors began preparation of this series of reports in response to a request made by the Los Angeles County Board of Supervisors in 1998. Over the last few years, this series of reports has also served as an annual summary of groundwater conditions in the Valley in fulfillment of the commitment in the Santa Clarita Valley Groundwater Management Plan, adopted in 2003, to regularly report on implementation of that Plan.

This report was prepared for Castaic Lake Water Agency, for CLWA's Santa Clarita Water Division, and for Los Angeles County Waterworks District 36, Newhall County Water District, and Valencia Water Company. It continues a format for providing information regarding water uses and the availability of water supplies on an annual basis. It is intended to be a helpful resource for use by water planners and local land use planning agencies. This report is complemented by the more detailed Urban Water Management Plan for the area, which provides

longer-term water supply planning over a 40-year period, and by a number of other technical reports, some of which are specifically referenced herein.

1.3 Santa Clarita Valley Water Purveyors

As introduced above, four retail water Purveyors provide water service to most residents of the Santa Clarita Valley. Brief summary descriptions of those four Purveyors are as follows.

Castaic Lake Water Agency Santa Clarita Water Division has a service area that includes a portion of the City of Santa Clarita and unincorporated portions of Los Angeles County in the communities of Saugus, Canyon Country, and Newhall. Water is supplied from both groundwater and CLWA turnouts to about 28,900 service connections.

Los Angeles County Waterworks District 36 has a service area that encompasses approximately 7,635 acres in the Hasley Canyon area and the unincorporated community of Val Verde. LAWWD 36 has nearly 1,400 service connections. The District has traditionally obtained its full water supply from a connection to the CLWA's Castaic Conduit and continued to do so in 2010.

Newhall County Water District's service area includes portions of the City of Santa Clarita and unincorporated portions of Los Angeles County in the communities of Newhall, Canyon Country, Valencia, and Castaic. NCWD supplies water from both groundwater and CLWA turnouts to more than 9,600 service connections.

Valencia Water Company's service area serves nearly 30,100 service connections in a portion of the City of Santa Clarita and in the unincorporated communities of Castaic, Newhall, Saugus, Stevenson Ranch, and Valencia. VWC supplies water from both groundwater and CLWA turnouts; VWC also delivers recycled water for a small amount of non-potable use.

1.4 The Upper Santa Clara River Hydrologic Area and East Groundwater Subbasin

The Upper Santa Clara River Hydrologic Area (HA), as defined by the California Department of Water Resources (DWR), is located almost entirely in northwestern Los Angeles County. The area encompasses about 654 square miles comprised of flat valley land (about 6 percent of the total area) a (a) that border the valley area. The mountains include the Santa Susana and San Gabriel Mountains to the south, and the Sierra

Pelona and Leibre-Sawmill Mountains to the north. Elevations range from about 800 feet on the valley floor to about 6,500 feet in the San Gabriel Mountains. The headwaters of the Santa Clara River are at an elevation of about 3,200 feet at the divide separating this hydrologic area from the Mojave Desert.

The Santa Clara River and its tributaries flow intermittently from Lang Station westward about 35 miles to Blue Cut, just west of the Los Angeles-Ventura County line, where the River is the outlet from the Upper Santa Clara River Hydrologic Area. The principal tributaries of the River in the Santa Clarita Valley are Castaic Creek, San Francisquito Creek, Bouquet Creek, and the South Fork of the Santa Clara River. In addition to tributary inflow, the Santa Clara River receives treated wastewater discharge from the Saugus and Valencia Water Reclamation Plants, which are operated by the Santa Clarita Valley Sanitation District.

The Santa Clara River Valley East Groundwater Subbasin, beneath the Santa Clarita Valley in the Upper Santa Clara River HA, is the source of essentially all local groundwater used for water supply in the Santa Clarita Valley. Below Blue Cut, the Santa Clara River continues westward through Ventura County to its mouth near Oxnard. Along that route, the River traverses all or parts of six groundwater basins in Ventura County (Piru, Fillmore, Santa Paula, Oxnard Forebay, Oxnard Plain, and Mound) as shown in Figure 1-2.

There are two primary precipitation gages in the Santa Clarita Valley, the Newhall-Soledad 32c gage and the Newhall County Water District gage (Figure 1-3). The National Climatic Data Center (NCDC) a (LADPW) have maintained records for the Newhall-Soledad 32c gage since 1931. Newhall County Water District has maintained records for the NCWD gage since 1979. The cumulative records from these two gages correlate very closely, with the NCWD gage historically recording approximately 25 percent more precipitation than the Newhall-Soledad 32c gage. Recently, since 2006, this relationship has been slightly different, with the NCWD gage recording approximately 40% more precipitation than the Newhall-Soledad 32c gage. The cause of this change may be due to different equipment or practices at one of the gages, and will be investigated further, but the overall offset is likely due to the location of the NCWD gage, which is at the base of the mountains rimming the southern edge of the Santa Clarita Valley.

A third gage was established in December, 2006 near the Rio Vista Treatment Plant near the main Santa Clara River channel and on the north side of the Valley (inset map on Figure 1-3). This gage is managed through the CIMIS program by the Department of Water Resources, under the name #204 Santa Clarita. These data correlate well with the nearby precipitation gages in the

Valley over the period of 2008 into 2010, and they are intended to be incorporated in future monitoring and reporting on the Valley. Comparison of overlapping records indicate that this station records about 30% less precipitation than is measured at Newhall-Soledad, and about half of what is measured at the NCWD gage.

The Santa Clarita Valley is characterized as having an arid climate. Historically, intermittent periods of below-average precipitation have typically been followed by periods of above-average precipitation in a cyclical pattern, with each wetter or drier period typically lasting from one to five years. The longer-term precipitation records for the Newhall-Soledad 32c gage are illustrated in Figure 1-3. Long-term average precipitation at that gage is 17.8 inches (1931-2010). Figure 1-3 also shows the cumulative departure from mean annual precipitation. In general, periods of below-average precipitation have been longer and more moderate than periods of above-average precipitation. Recently, the periods from 1971 to 1976, 1984 to 1991 and 1999 to 2003 have been drier than average; the periods from 1977 to 1983, 1992 to 1996, and 2004 to 2005 have been wetter than average. More recently, with the exception of the average annual rainfall total in 2008, the dry conditions that began in 2006, persisted through 2009. 2010 was an above average year (125% of normal) with 24.3 inches of precipitation. It is notable, that almost half of that amount came in the last quarter of the year, with 8.6 inches in December. Despite the overall drier-than-a

-term projection in the 2009 Water Report. Early year precipitation in 2011 was approximately 11.6 inches through March, or close to long-term average for that part of the year, but water use was slightly higher than last year for the same period. Combined with other water supply considerations, discussed in Chapter 4, those conditions are expected to result in 2011 water requirements being slightly higher than water use in 2010.

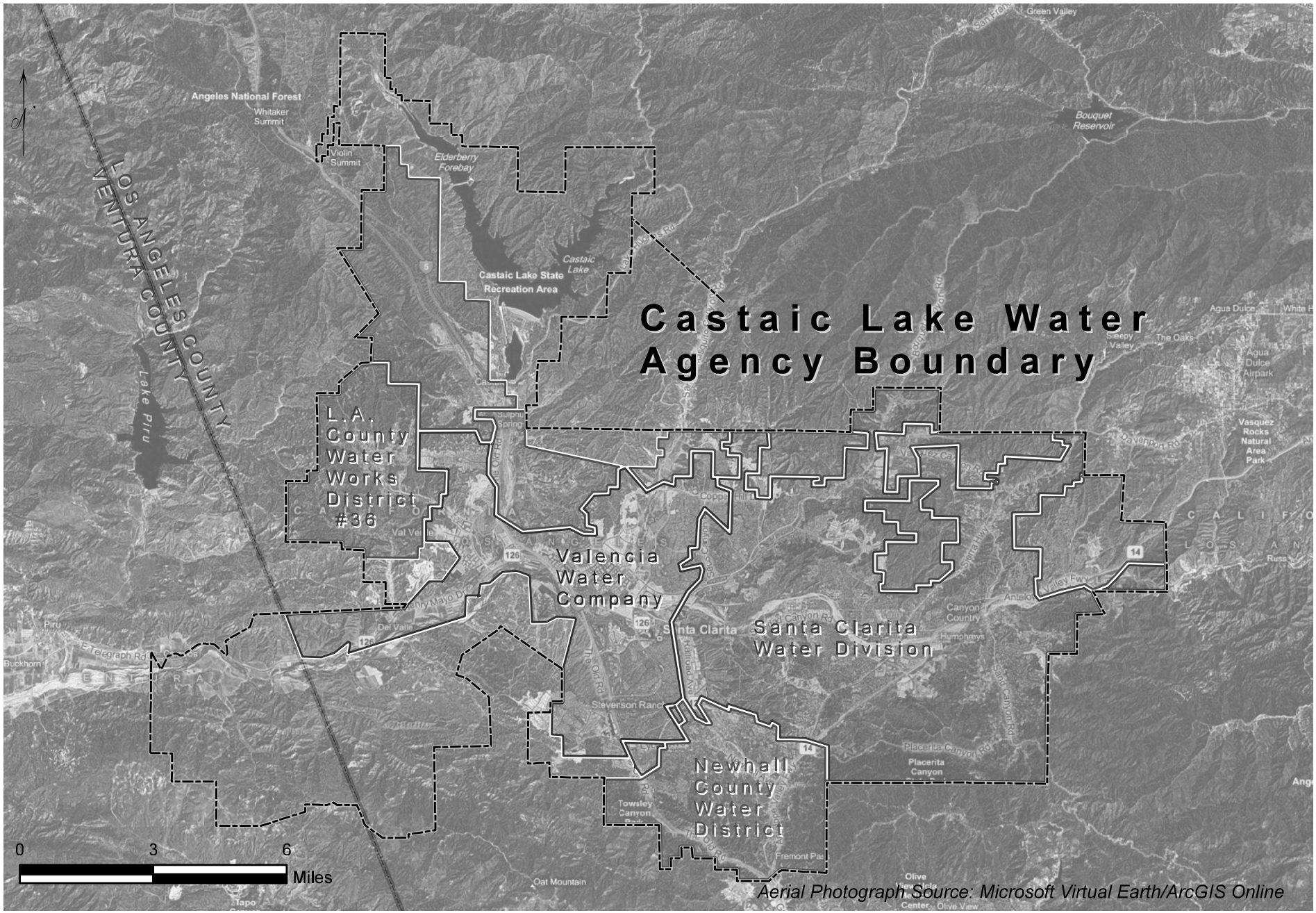

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Figure 1-1
CLWA and Purveyor Service Areas

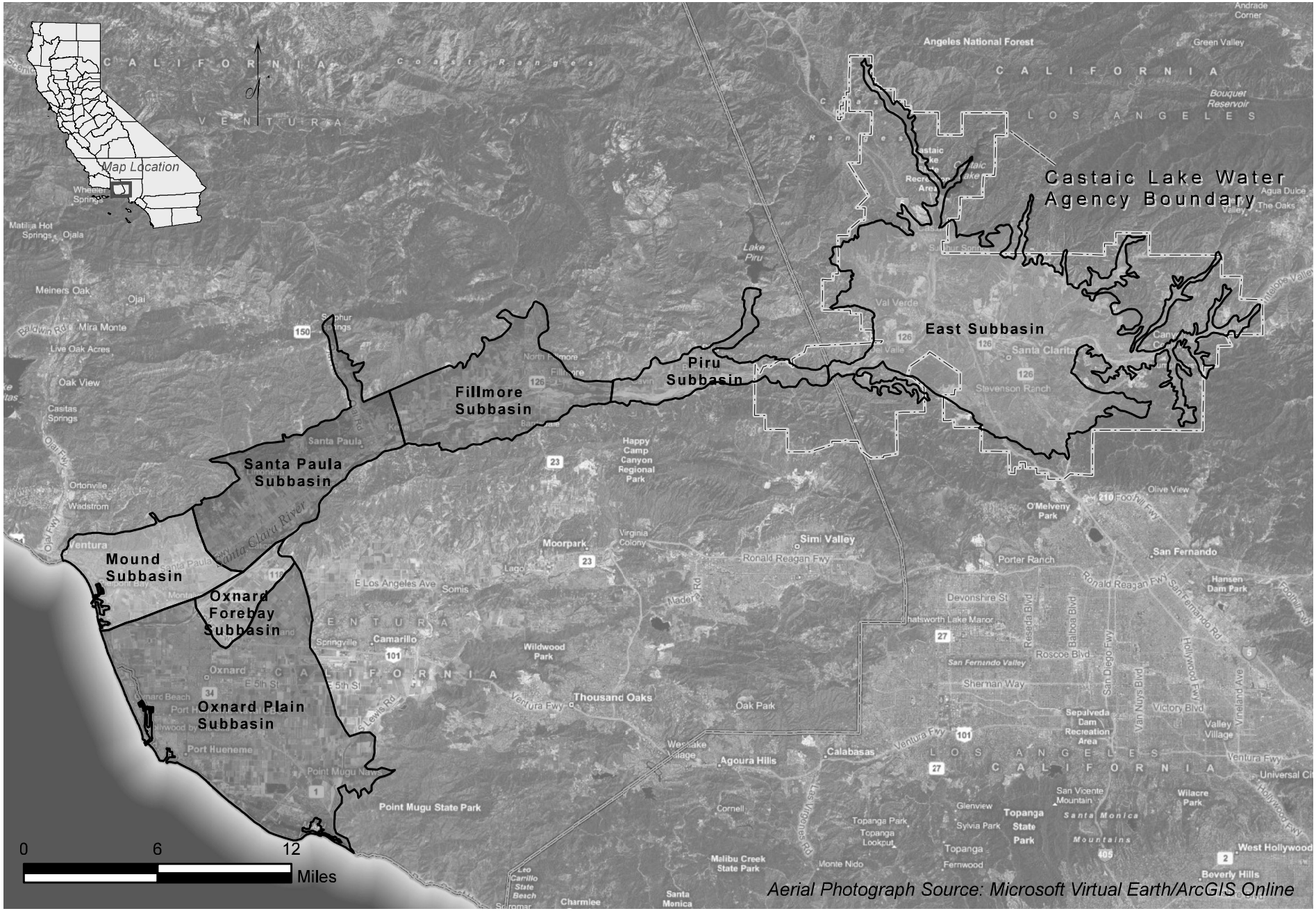

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Figure 1-2
Santa Clara River Groundwater Subbasins

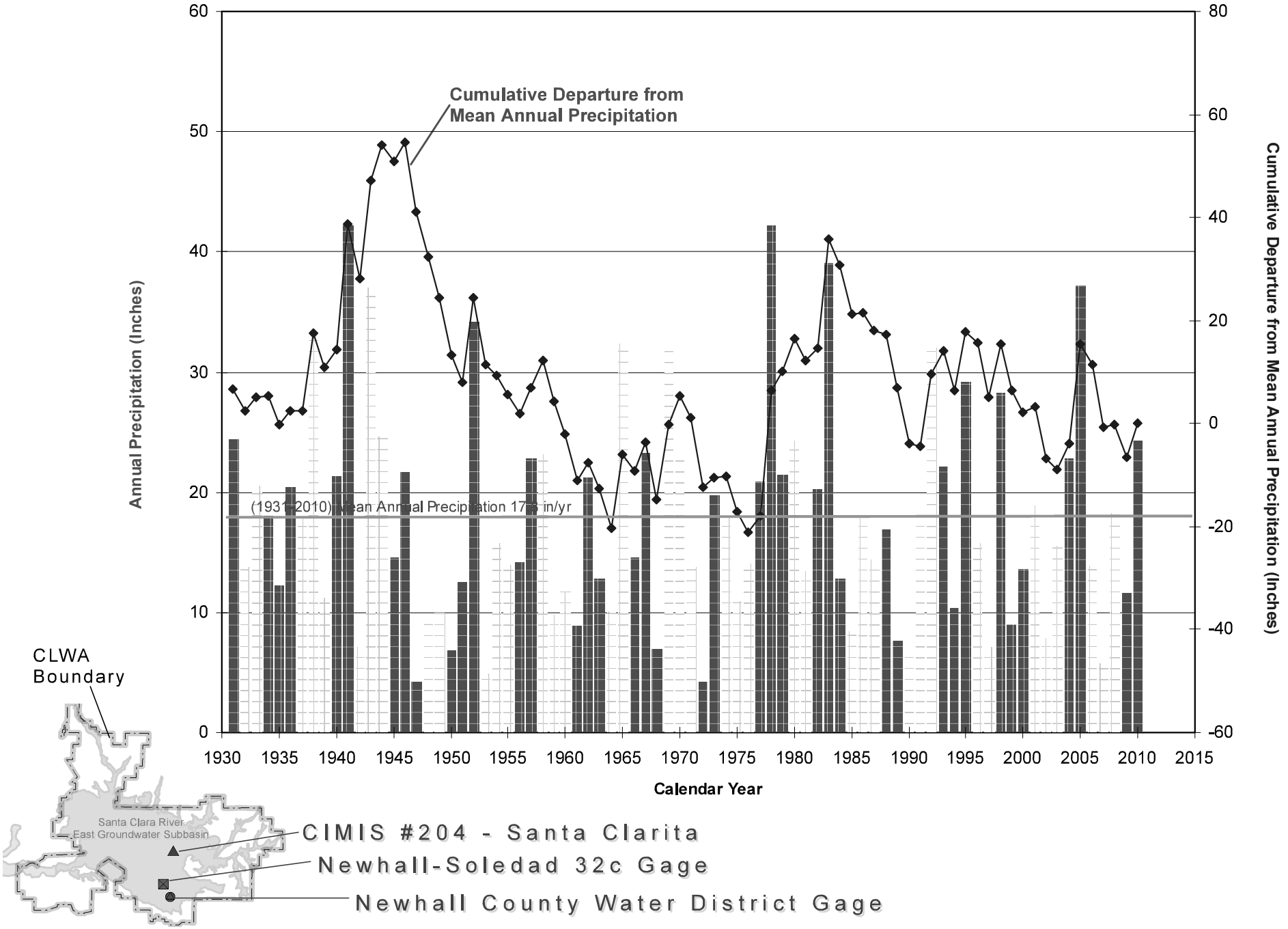

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Figure 1-3
Annual Precipitation and Cumulative Departure from Mean Annual Precipitation at Newhall-Soledad 32c Gage

2. 2010 Water Requirements and Supplies

Total water use in the Santa Clarita Valley was 80,200 af in 2010, a decrease of 6,400 af from the previous year. Of the total water demand, 64,100 af (80 percent) were for municipal use and the remaining 16,100 af (20 percent) were for agricultural and other (miscellaneous) uses, including estimated individual domestic uses. The majority of decreased water demand is attributable to a significant (8%) decrease in municipal water use from 2009. The total water demands were met by a combination of about 49,300 af from local groundwater resources (about 33,200 af for municipal supply and about 16,100 af for agricultural and other uses), about 30,600 af of SWP and other imported water, and about 300 af of recycled water.

Compared to the previous year, total water demand in the Santa Clarita Valley decreased by about 7.4 percent in 2010, and was less than the short-term projected water requirement estimated in last year's Water Report. The decrease in water use in 2010 is attributed to ongoing very slow growth in the number of new service connections and continued water conservation awareness as a result of state-wide dry conditions. Growth over the last two years in each Purveyor service area was notably lower than in the preceding four-year period, with total additions of only about 400 new services connections in 2010, in notable contrast to the growth rate of about 1,000 connections per year between 2005 to 2008, and in even greater contrast to the predominant growth rate that was three times higher from the late 1990's through 2004. In addition, the Purveyors and the local community continued to be aware of the Governor's Alert in June, 2008 with regard to drought conditions and potential water supply shortages followed by the Governor's Drought Emergency Declaration in February, 2009. The widespread awareness of dry conditions throughout the state and the perceived effects on water supply availability are considered to be prime factors causing total water demand in 2010 to have continued to decline over each of the preceding three years, and to be well below the demand projections in the 2005 UWMP.

The uses of local groundwater, augmented by imported water supplies to meet municipal water requirements since 1980, when the importation of SWP water began, and also slightly augmented by the use of recycled water, are summarized in Table 2-1. Notable with regard to municipal water requirements is that, through 2010, total municipal demand (64,100 af) continues to be below (by about 20,000 af in 2010) the projections in the 2005 UWMP without conservation, and about equal to the projections in the UWMP with conservation.

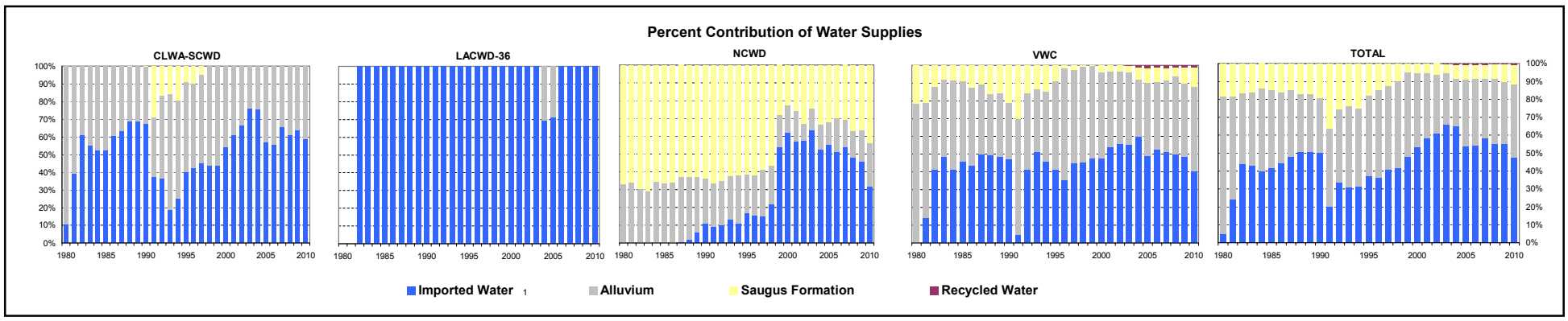
Water supply utilization for all agricultural and other non-municipal uses is summarized in Table 2-2. The category of Small Private Domestic, Irrigation and Golf Course Uses in Table 2-2 includes an estimated 500 af of small individual private pumping from the Alluvium.

Water supply utilization for all uses in the Santa Clarita Valley, again for the period 1980 to present, is summarized in Table 2-3. The trends in utilization of local groundwater and imported water, complemented by the recent addition of recycled water, are graphically illustrated in Figure 2-1. As can be seen by inspection of Table 2-2 and Figure 2-1, total water use in the Valley was nearly linearly increasing from the early 1980's through 2007, with some weather-related fluctuations in certain years. As discussed above, total water use has progressively declined over the last three years, from a peak slightly above 92,000 af in 2007 to 80,200 af in 2010. The decreased demand in 2010 is the lowest in nearly a decade (since 2001). Overall, the increase in total water demand since the inception of supplemental SWP importation has been from about 37,000 acre-feet in 1980 to the mid-80,000 acre-feet per year range through 2000-2005, to the short-term peak in the low-90,000 acre-feet per year range in 2006 through 2008, and back to the mid to low-80,000 af per year range over the last couple of years.

As can also be seen by inspection of Table 2-2 and Figure 2-1, most of the historical increase in water demand has been met with generally increasing importation of SWP water, most recently complemented by other imported water as discussed herein. The recent decrease in water demand has been met with a generally consistent amount of local groundwater and a decreased use of imported water. Since the early 1990's, following a decade of generally decreased groundwater use during the initial period of SWP importation, total groundwater pumping has fluctuated from year to year, but has remained within a range between about 38,000 and 50,000 acre-feet per year through 2010.

Table 2-1
Water Supply Utilization by Municipal Purveyors
(Acre-Feet)

	CLWA Santa Clarita Water Division				Los Angeles County Waterworks District 36			Newhall County Water District				Valencia Water Company					All Municipal Purveyors				
Year	*Imported Water* [1]	*Alluvium*	*Saugus Formation*	**Total**	*Imported Water* [1]	*Alluvium* [2]	**Total**	*Imported Water* [1]	*Alluvium*	*Saugus Formation*	**Total**	*Imported Water* [1]	*Alluvium*	*Saugus Formation*	*Recycled Water*	**Total**	*Imported Water* [1]	*Alluvium*	*Saugus Formation*	*Recycled Water*	**Total**
1980	1,126	9,467	0	**10,593**	0	-	**0**	0	1,170	2,363	**3,533**	0	5,995	1,644	-	**7,639**	1,126	16,632	4,007	-	**21,765**
1981	4,603	7,106	0	**11,709**	0	-	**0**	0	1,350	2,621	**3,971**	1,214	5,597	1,808	-	**8,619**	5,817	14,053	4,429	-	**24,299**
1982	6,454	4,091	0	**10,545**	145	-	**145**	0	1,178	2,672	**3,850**	3,060	3,415	897	-	**7,372**	9,659	8,684	3,569	-	**21,912**
1983	5,214	4,269	0	**9,483**	207	-	**207**	0	1,147	2,787	**3,934**	3,764	3,387	611	-	**7,762**	9,185	8,803	3,398	-	**21,386**
1984	6,616	6,057	0	**12,673**	240	-	**240**	0	1,549	2,955	**4,504**	4,140	4,975	854	-	**9,969**	10,996	12,581	3,809	-	**27,386**
1985	6,910	6,242	0	**13,152**	272	-	**272**	0	1,644	3,255	**4,899**	4,641	4,633	885	-	**10,159**	11,823	12,519	4,140	-	**28,482**
1986	8,366	5,409	0	**13,775**	342	-	**342**	0	1,842	3,548	**5,390**	5,051	5,167	1,427	-	**11,645**	13,759	12,418	4,975	-	**31,152**
1987	9,712	5,582	0	**15,294**	361	-	**361**	22	2,127	3,657	**5,806**	6,190	4,921	1,305	-	**12,416**	16,285	12,630	4,962	-	**33,877**
1988	11,430	5,079	63	**16,572**	434	-	**434**	142	2,283	4,041	**6,466**	7,027	4,835	2,300	-	**14,162**	19,033	12,197	6,404	-	**37,634**
1989	12,790	5,785	0	**18,575**	457	-	**457**	428	2,367	4,688	**7,483**	7,943	5,826	2,529	-	**16,298**	21,618	13,978	7,217	-	**42,813**
1990	12,480	5,983	40	**18,503**	513	-	**513**	796	1,936	4,746	**7,478**	7,824	5,232	3,516	-	**16,572**	21,613	13,151	8,302	-	**43,066**
1991	6,158	5,593	4,781	**16,532**	435	-	**435**	675	1,864	4,994	**7,533**	700	9,951	4,642	-	**15,293**	7,968	17,408	14,417	-	**39,793**
1992	6,350	8,288	2,913	**17,551**	421	-	**421**	802	1,994	5,160	**7,956**	6,338	6,615	2,385	-	**15,338**	13,911	16,897	10,458	-	**41,266**
1993	3,429	12,016	2,901	**18,346**	465	-	**465**	1,075	1,977	5,068	**8,120**	8,424	5,815	2,182	-	**16,421**	13,393	19,808	10,151	-	**43,352**
1994	5,052	10,996	3,863	**19,911**	453	-	**453**	906	2,225	5,103	**8,234**	7,978	6,847	2,565	-	**17,390**	14,389	20,068	11,531	-	**45,988**
1995	7,955	10,217	1,726	**19,898**	477	-	**477**	1,305	1,675	4,775	**7,755**	7,259	8,698	1,586	-	**17,543**	16,996	20,590	8,087	-	**45,673**
1996	9,385	10,445	2,176	**22,006**	533	-	**533**	1,213	1,803	4,871	**7,887**	6,962	12,433	326	-	**19,721**	18,093	24,681	7,373	-	**50,147**
1997	10,120	11,268	1,068	**22,456**	785	-	**785**	1,324	2,309	5,168	**8,801**	9,919	11,696	516	-	**22,131**	22,148	25,273	6,752	-	**54,173**
1998	8,893	11,426	0	**20,319**	578	-	**578**	1,769	1,761	4,557	**8,087**	9,014	10,711	149	-	**19,874**	20,254	23,898	4,706	-	**48,858**
1999	10,772	13,741	0	**24,513**	654	-	**654**	5,050	1,676	2,622	**9,348**	10,806	11,823	106	-	**22,735**	27,282	27,240	2,728	-	**57,250**
2000	13,751	11,529	0	**25,280**	800	-	**800**	6,024	1,508	2,186	**9,718**	12,004	12,179	1,007	-	**25,190**	32,579	25,216	3,193	-	**60,988**
2001	15,648	9,941	0	**25,589**	907	-	**907**	5,452	1,641	2,432	**9,525**	13,362	10,518	835	-	**24,715**	35,369	22,100	3,267	-	**60,736**
2002	18,916	9,513	0	**28,429**	1,069	-	**1,069**	5,986	981	3,395	**10,362**	15,792	11,603	965	-	**28,360**	41,763	22,097	4,360	-	**68,220**
2003	20,665	6,424	0	**27,089**	1,175	-	**1,175**	6,572	1,266	2,513	**10,351**	16,004	11,707	1,068	50	**28,829**	44,416	19,397	3,581	50	**67,444**
2004	22,045	7,146	0	**29,191**	854	380	**1,234**	5,896	1,582	3,739	**11,217**	18,410	9,862	1,962	420	**30,654**	47,205	18,970	5,701	420	**72,296**
2005	16,476	12,408	0	**28,884**	857	343	**1,200**	5,932	1,389	3,435	**10,756**	14,732	12,228	2,513	418	**29,891**	37,997	26,368	5,948	418	**70,731**
2006	16,548	13,156	0	**29,704**	1,289	-	**1,289**	5,898	2,149	3,423	**11,470**	16,313	11,884	2,449	419	**31,065**	40,048	27,189	5,872	419	**73,528**
2007	20,488	10,686	0	**31,174**	1,406	-	**1,406**	6,478	1,806	3,691	**11,975**	16,779	13,140	2,367	470	**32,756**	45,151	25,632	6,058	470	**77,311**
2008	18,598	11,878	0	**30,476**	1,354	-	**1,354**	5,428	1,717	4,195	**11,340**	16,325	14,324	1,770	311	**32,730**	41,705	27,919	5,965	311	**75,900**
2009	17,739	10,077	0	**27,816**	1,243	-	**1,243**	4,832	1,860	3,868	**10,559**	14,732	12,459	2,836	328	**30,355**	38,546	24,396	6,704	328	**69,974**
2010	15,188	10,607	0	**25,795**	1,141	-	**1,141**	3,035	2,323	4,173	**9,531**	11,214	13,054	2,995	336	**27,599**	30,578	25,984	7,168	336	**64,066**



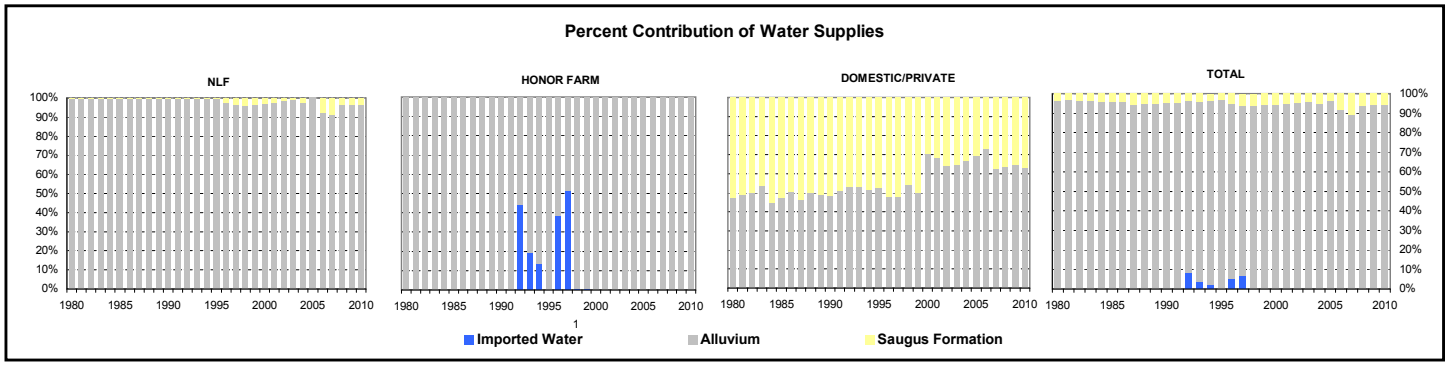
1. Reflects State Water Project through 2006; includes imported water from State Water Project and Buena Vista WSD Agreement beginning in 2007.

2.Groundwater purchased from LA County Honor Farm.

Note: Water use for SCWD was adjusted in the 2010 Water Report for 1980, 1981, 2001, 2002, 2003, 2005, 2006, and 2007 to reflect the correct amount; the annual totals were changed in Tables 2-1 and 2-3 by +8 af, -2 af, +45 af, -5 af, -3 af, -37 af, -598 af, and -181 af, respectively.
The Saugus Formation use was adjusted in the 2010 Water Report for 1980 and 1981 to shift 562 af and 521 af, respectively, from VWC municipal use shown in Table 2-1 to irrigation and golf course use shown in Table 2-2; the annual totals in Table 2-3 do not change.

Table 2-2
Individual Water Supply Utilization by Agricultural and Other Users
(Acre-Feet)

	Newhall Land and Farming			Los Angeles County Honor Farm			Small Private Domestic, Irrigation and Golf Courses Uses			All Agricultural and Other Users			
Year	*Alluvium*	*Saugus Formation*	**Total**	*Alluvium*	*Imported Water* [1]	**Total**	*Alluvium* [2]	*Saugus Formation* [3]	**Total**	*Imported Water* [1]	*Alluvium*	*Saugus Formation*	**Total**
1980	11,331	20	**11,351**	3,000	0	**3,000**	500	562	**1,062**	0	14,831	582	**15,413**
1981	13,237	20	**13,257**	3,000	0	**3,000**	500	521	**1,021**	0	16,737	541	**17,278**
1982	9,684	20	**9,704**	3,000	0	**3,000**	500	501	**1,001**	0	13,184	521	**13,705**
1983	7,983	20	**8,003**	3,000	0	**3,000**	500	434	**934**	0	11,483	454	**11,937**
1984	11,237	20	**11,257**	3,000	0	**3,000**	500	620	**1,120**	0	14,737	640	**15,377**
1985	9,328	20	**9,348**	3,000	0	**3,000**	500	555	**1,055**	0	12,828	575	**13,403**
1986	8,287	20	**8,307**	3,000	0	**3,000**	500	490	**990**	0	11,787	510	**12,297**
1987	6,512	20	**6,532**	3,000	0	**3,000**	500	579	**1,079**	0	10,012	599	**10,611**
1988	5,951	20	**5,971**	3,000	0	**3,000**	500	504	**1,004**	0	9,451	524	**9,975**
1989	6,243	20	**6,263**	3,000	0	**3,000**	500	522	**1,022**	0	9,743	542	**10,285**
1990	8,225	20	**8,245**	2,000	0	**2,000**	500	539	**1,039**	0	10,725	559	**11,284**
1991	7,039	20	**7,059**	2,240	0	**2,240**	500	480	**980**	0	9,779	500	**10,279**
1992	8,938	20	**8,958**	1,256	987	**2,243**	500	446	**946**	987	10,694	466	**12,147**
1993	8,020	20	**8,040**	1,798	443	**2,241**	500	439	**939**	443	10,318	459	**11,220**
1994	10,606	20	**10,626**	1,959	311	**2,270**	500	474	**974**	311	13,065	494	**13,870**
1995	11,174	20	**11,194**	2,200	6	**2,206**	500	453	**953**	6	13,874	473	**14,353**
1996	12,020	266	**12,286**	1,237	780	**2,017**	500	547	**1,047**	780	13,757	813	**15,350**
1997	12,826	445	**13,271**	1,000	1,067	**2,067**	500	548	**1,048**	1,067	14,326	993	**16,386**
1998	10,250	426	**10,676**	2,000	12	**2,012**	500	423	**923**	12	12,750	849	**13,611**
1999	13,824	479	**14,303**	1,842	20	**1,862**	500	509	**1,009**	20	16,166	988	**17,174**
2000	11,857	374	**12,231**	1,644	3	**1,647**	1,220	513	**1,733**	3	14,721	887	**15,611**
2001	12,661	300	**12,961**	1,604	0	**1,604**	1,224	573	**1,797**	0	15,489	873	**16,362**
2002	13,514	211	**13,725**	1,602	0	**1,602**	1,063	589	**1,652**	0	16,179	800	**16,979**
2003	10,999	122	**11,121**	2,273	0	**2,273**	931	504	**1,435**	0	14,203	626	**14,829**
2004	10,991	268	**11,259**	2,725	0	**2,725**	1,071	535	**1,606**	0	14,787	803	**15,590**
2005	8,648	6	**8,654**	2,499	0	**2,499**	1,133	499	**1,632**	0	12,280	505	**12,785**
2006	11,477	934	**12,411**	3,026	0	**3,026**	1,369	506	**1,875**	0	15,872	1,440	**17,312**
2007	9,968	971	**10,939**	2,085	0	**2,085**	1,088	656	**1,744**	0	13,141	1,627	**14,768**
2008	9,191	330	**9,521**	3,506	0	**3,506**	1,100	623	**1,723**	0	13,797	953	**14,750**
2009	11,061	379	**11,440**	3,432	0	**3,432**	1,097	595	**1,692**	0	15,590	974	**16,564**
2010	10,772	366	**11,138**	3,446	0	**3,446**	957	558	**1,515**	0	15,175	924	**16,099**

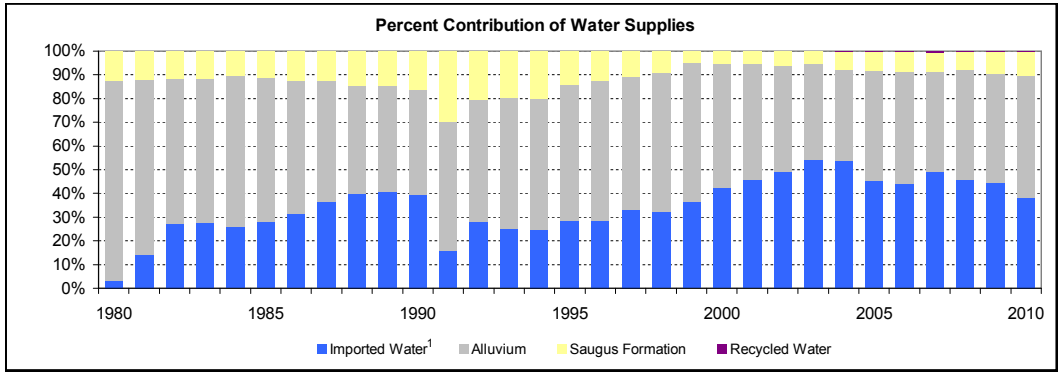


1. *Reflects State Water Project through 2006; includes imported water from State Water Project and Buena Vista WSD Agreement beginning in 2007.*
2. *Robinson Ranch Golf Course irrigation and estimated private pumping.*
3. *Valencia Country Club and Vista Valencia Golf Course irrigation.*

Note: The Saugus Formation use was adjusted in the 2010 Water Report for 1980 and 1981 to shift 562 af and 521 af, respectively, from VWC municipal use shown in Table 2-1 to irrigation and golf course use shown in Table 2-2; the annual totals in Table 2-3 do not change.

Table 2-3
Total Water Supply Utilization for Municipal, Agricultural and Other Uses
(Acre-Feet)

Year	*Imported Water*[1]	*Alluvium*	*Saugus Formation*	*Recycled Water*	**Total**
1980	1,126	31,463	4,589	-	**37,178**
1981	5,817	30,790	4,970	-	**41,577**
1982	9,659	21,868	4,090	-	**35,617**
1983	9,185	20,286	3,852	-	**33,323**
1984	10,996	27,318	4,449	-	**42,763**
1985	11,823	25,347	4,715	-	**41,885**
1986	13,759	24,205	5,485	-	**43,449**
1987	16,285	22,642	5,561	-	**44,488**
1988	19,033	21,648	6,928	-	**47,609**
1989	21,618	23,721	7,759	-	**53,098**
1990	21,613	23,876	8,861	-	**54,350**
1991	7,968	27,187	14,917	-	**50,072**
1992	14,898	27,591	10,924	-	**53,413**
1993	13,836	30,126	10,610	-	**54,572**
1994	14,700	33,133	12,025	-	**59,858**
1995	17,002	34,464	8,560	-	**60,026**
1996	18,873	38,438	8,186	-	**65,497**
1997	23,215	39,599	7,745	-	**70,559**
1998	20,266	36,648	5,555	-	**62,469**
1999	27,302	43,406	3,716	-	**74,424**
2000	32,582	39,937	4,080	-	**76,599**
2001	35,369	37,589	4,140	-	**77,098**
2002	41,763	38,276	5,160	-	**85,199**
2003	44,416	33,599	4,207	50	**82,273**
2004	47,205	33,757	6,503	420	**87,885**
2005	37,997	38,648	6,453	418	**83,516**
2006	40,048	43,061	7,312	419	**90,840**
2007	45,151	38,773	7,685	470	**92,079**
2008	41,705	41,716	6,918	311	**90,650**
2009	38,546	39,986	7,678	328	**86,538**
2010	30,578	41,159	8,092	336	**80,165**



1. Reflects State Water Project through 2006; includes imported water from State Water Project and Buena Vista WSD Agreement beginning in 2007.

Note: Water use for SCWD was adjusted in the 2010 Water Report for 1980, 1981, 2001, 2002, 2003, 2005, 2006, and 2007 to reflect the correct amount; the annual totals were changed in Tables 2-1 and 2-3 by +8 af, -2 af, +45 af, -5 af, -3 af, -37 af, -598 af, and -181 af, respectively.

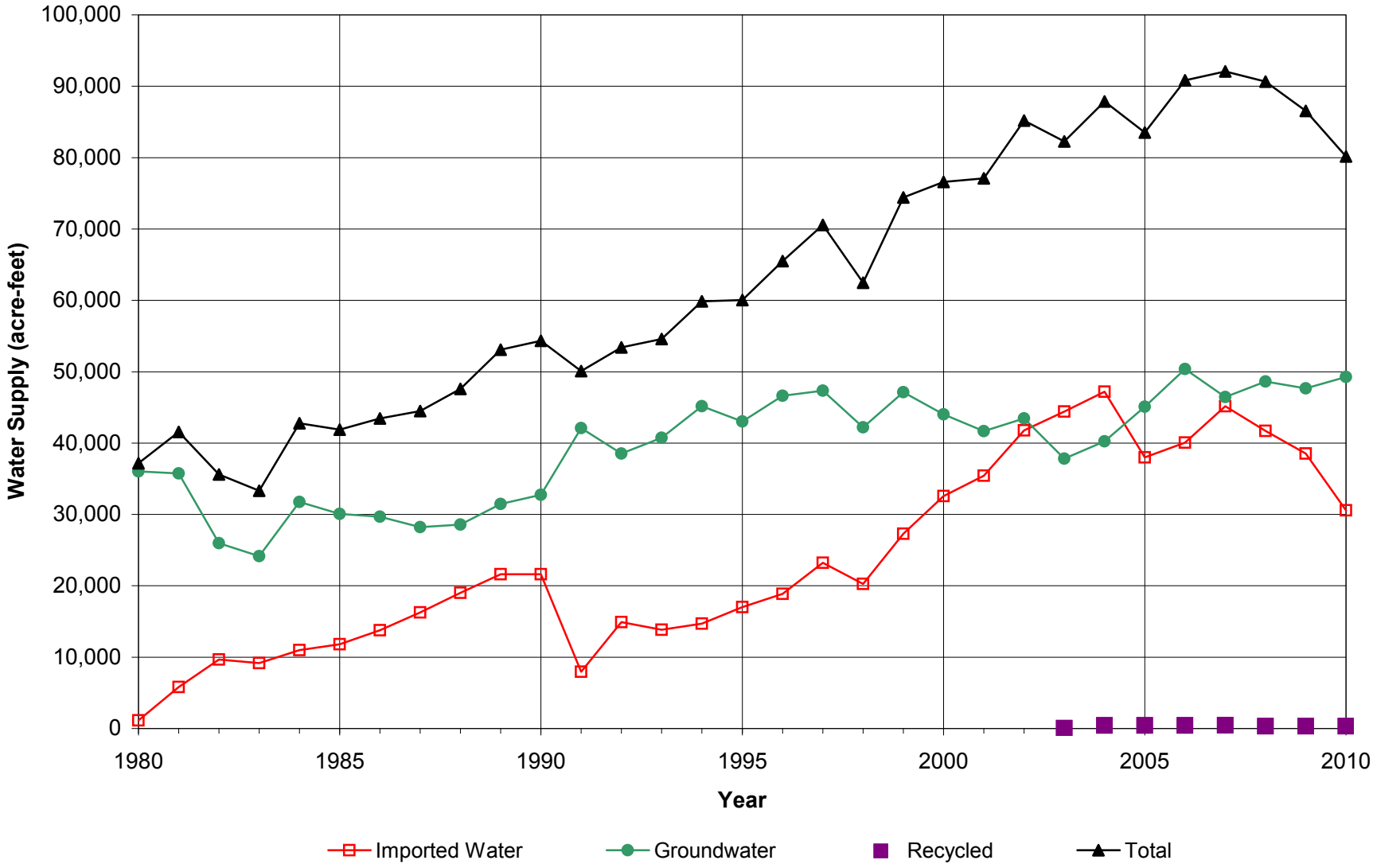


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Figure 2-1
Total Water Supply Utilization
Santa Clarita Valley

3. Water Supplies

Prior to 1980, local groundwater extracted from the Alluvium and the Saugus Formation was the sole source of water supply in the Santa Clarita Valley. Since 1980, local groundwater supplies have been supplemented with imported SWP water supplies, augmented in 2007 by acquisition of additional supplemental water from the Buena Vista Water Storage District. Those water supplies have also been slightly augmented by deliveries from CLWA's recycled water program since 2003. This section describes the groundwater resources of the Santa Clarita Valley, SWP and other imported water supplies, and the recycled water program in the Valley.

3.1 Groundwater Basin Yield

The groundwater basin generally beneath the Santa Clarita Valley, identified in the State Department of Water Resources' 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 underlies the Santa Clara River and its several tributaries, and the Saugus Formation underlies practically the entire Upper Santa Clara River area. The mapped extent of the Santa Clara River Valley East Subbasin in DWR Bulletin 118 and its relationship to the extent of the CLWA service area are illustrated in Figure 3-1. The mapped Subbasin boundary approximately coincides with the outer extent of the Alluvium and Saugus Formation.

A 2001 Update Report on both the Alluvium and Saugus Formation Aquifers (Slade, 2002), which updated analyses and interpretation of hydrogeologic conditions from earlier reports (Slade, 1986 and 1988), included extensive detail on major aspects of the groundwater basin. Notable parts of the Update Report relative to groundwater supply included findings that:

- Analysis of historical groundwater levels and production indicates that there have been no conditions that would be illustrative of groundwater overdraft.

- Utilization of operational yield (as opposed to perennial yield) as a basis for managing groundwater production would be more applicable in this basin to reflect fluctuating utilization of groundwater in conjunction with imported SWP water.

- Operational yield of the Alluvium would typically be 30,000 to 40,000 afy for wet and normal rainfall years, with an expected reduction into the range of 30,000 to 35,000 afy in dry years.

- Operational yield of the Saugus Formation would typically be in the range of 7,500 to 15,000 afy on a long-term basis, with possible short-term increases during dry periods into a range of 15,000 to 25,000 afy, and to 35,000 afy if dry conditions continue.

Following on the 2001 Update Report (Slade, 2002), the groundwater component of overall water supply in the Valley derives from a groundwater operating plan to meet water requirements (municipal, agricultural and other non-m) while maintaining the basin in a sustainable condition (i.e., no long-term depletion of groundwater or interrelated surface water). That operating plan also addresses groundwater contamination issues in the basin, all consistent with the Groundwater Management Plan adopted in 2003. The groundwater operating plan is based on the concept that pumping can vary from year to year to generally rely on increased groundwater use in dry periods and increased recharge during locally wet periods, and to collectively assure that the groundwater basin is adequately replenished through various wet/dry cycles.

The groundwater operating plan, summarized in Table 3-1, is as follows:

Alluvium – Pumping from the Alluvial Aquifer in a given year is related to local hydrologic conditions in the eastern Santa Clara River watershed. Pumping is expected to typically range between 30,000 and 40,000 afy following normal and above-normal rainfall years. Due to hydrogeologic constraints in the eastern part of the basin, pumping is expected to be typically reduced to between 30,000 and 35,000 afy following multiple locally dry years.

Saugus Formation – Pumping from the Saugus Formation in a given year is related to the availability of other water supplies, particularly from the SWP. During average-year conditions within the SWP system, Saugus pumping is expected to typically range between 7,500 and 15,000 afy. Planned dry-year pumping from the Saugus Formation is expected to range between 15,000 and 25,000 afy during a drought year and can increase 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 is expected to typically be followed by periods of reduced (a -year) pumping, at rates between 7,500 and 15,000 afy, to enhance the effectiveness of natural recharge processes that would cause groundwater levels and storage volumes to recover after the higher pumping during dry years.

Table 3-1
Groundwater Operating Plan for the Santa Clarita Valley

Aquifer	Groundwater Production (af)			
	Normal Years	**Dry Year 1**	**Dry Year 2**	**Dry Year 3**
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**

In 2004, as part of analyzing the restoration of perchlorate-impacted groundwater supply in the Valley, a numerical groundwater flow model was developed and calibrated for use in analyzing the response of the groundwater basin to long-term operation at the operational yields noted above, with focus on perchlorate extraction and the control of perchlorate migration in the basin. That groundwater flow model was then utilized in 2005 to specifically analyze the sustainability of groundwater supplies in both the Alluvium and the Saugus Formation through a long-term (78 year) hydrologic period that was selected to examine groundwater basin response to variations in pumping in accordance with the operating plan. Resultant projections of groundwater levels, groundwater storage, and surface water flows showed the basin to respond in a long-term sustainable manner, with no chronic depletion of groundwater levels, storage, or stream flows. The analysis of groundwater sustainability was summarized in a Basin Yield Report (CH2M Hill and LSCE, 2005), which included the following findings:

- The groundwater basin has historically been, and continues to be, in good operating condition and not in overdraft, as indicated by historical data.

- The groundwater plan is sustainable over varying hydrologic conditions, because it is feasible to intermittently exceed a long-term average yield for one or more years without creating long-term adverse impacts to the groundwater system and the Santa Clara River.

- The groundwater operating plan for the Alluvium and the Saugus Formation can be used for long-term water supply planning purposes. In particular, although increased pumping from the Saugus Formation during dry periods can be expected to cause short-term declines in groundwater levels, it is not projected to cause permanent declines in groundwater discharges or streamflow. Saugus groundwater levels can be expected to recover to pre-drought conditions when pumping is reduced in subsequent wet to normal years.

- The strategy around which the groundwater operating plan was designed (m
-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.

- Together, 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 groundwater operating plan.

In 2008, partly in preparation for the 2010 Urban Water Management Plan, and in part because of recent events that can be expected to impact the future reliability of the supplemental water supply from the State Water Project, the Purveyors initiated an updated analysis to further assess groundwater development potential and possible augmentation of the groundwater operating plan. A further consideration in conducting an updated analysis of the basin was 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) was planning a number of small flood control projects in the Santa Clarita Valley; estimated amounts of conservation/groundwater recharge potential were being included for each of the individual projects in the overall LACFCD planning, and the Purveyors had interest in whether that potential could appreciably augment the yield of the basin.

The updated basin yield analysis, completed in August, 2009, concluded the following (LSCE and GSI, 2009):

- The 2008 Operating Plan, with currently envisioned pumping rates and distribution comparable to the Operating Plan described above, will not cause detrimental short- or long-term effects to the groundwater and surface water resources in the Valley and is, therefore, sustainable. Further, 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 during those periods. However, 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 indicated that it can sustain the pumping that is embedded the 2008 Operating Plan.

- A Potential Operating Plan (Alluvial pumping between 41,500 and 47,500 afy) would result in lower Alluvial groundwater levels, failure of the basin to fully recover (during wet hydrologic cycles) from depressed storage that would occur during dry periods, and generally declining trends in groundwater levels and storage. Long-term lowering of groundwater levels would also occur in the Saugus Formation (pumping between about 16,000 and nearly 40,000 afy) with only partial water level recovery occurring in the Saugus. Thus, the Potential Operating Plan would not be sustainable over a long-term period.

- Several climate change models were examined to estimate the potential impacts on local hydrology in the Santa Clarita Valley. 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. Ultimately it was recognized that a wide range of potential global climate change produces a range of non-unique results with respect to local hydrologic conditions and associated sustainable groundwater supply. Notable in the wide range of possibilities, however, was the output that, over a 20 to 25 year planning horizon of the 2005 UWMP, the range of relatively wet to relatively dry hydrologic conditions would be expected to produce sustainable groundwater conditions under the 2008 Groundwater Operating Plan.

Based on the preceding conclusions, groundwater utilization continues in accordance with the 2008 Operating Plan; and the Potential Operating Plan is not being considered for implementation.

3.2 Alluvium – General

The spatial extent of the aquifers used for groundwater supply in the Valley, the Alluvium and the Saugus Formation, are illustrated in Figure 3-1. Geologic descriptions and hydrogeologic details related to both aquifers are included in several technical reports including Slade (1986, 1988 & 2002), CH2M Hill (2005) a (2005), the 2005 UWMP and the 2010 UWMP.

Consistent with the 2001 Update Report (Slade), the 2005 Basin Yield Report (CH2M Hill and LSCE), the 2005 UWMP, the 2009 Updated Basin Yield Report (LSCE and GSI), a

UWMP, the management practice of the Purveyors continues to be to rely on groundwater from the Alluvium for part of the overall municipal water supply, whereby total pumping from the Alluvium (by municipal, agricultural, and small private pumpers) is in accordance with the 2008 groundwater Operating Plan, 30,000 to 40,000 afy following wet and normal years, with possible reduction to 30,000 to 35,000 afy following multiple dry years. Such operation will maximize use of the Alluvium because of the aquifer's ability to store and produce good quality water on a sustainable basis, and because the Alluvium is capable of rapid recovery of groundwater storage in wet periods. As with many groundwater basins, it is possible to intermittently exceed a long-term average yield for one or more years without long-term adverse effects. Higher pumping for short periods may temporarily lower groundwater storage and related water levels, as has been the case in the Alluvium several times since the 1930's. However, subsequent decreases in pumping limit the amount of water level decline. Normal to wet-period recharge results in a rapid return of groundwater levels to historic highs. Historical groundwater data collected from the Alluvium over numerous hydrologic cycles continue to provide assurance that groundwater elevations, if locally lowered during dry periods, recover in subsequent average or wet years. Such water level response to rainfall is a significant characteristic of permeable, porous, alluvial aquifer systems that occur within large watersheds. In light of these historical observations, complemented by the long-term sustainability analysis using the numerical groundwater flow model, there is ongoing confidence that groundwater will continue to be a sustainable source of water supply at the rates of pumping described in the Basin Yield Report, as incorporated in the 2005 UWMP, and as described in the 2009 Updated Basin Yield Report, and incorporated in the 2010 UWMP.

Long-term adverse impacts to the Alluvium could occur if the amount of water extracted from the aquifer were to exceed the amount of water that recharges the aquifer over an extended period. However, the quantity and quality of water in the Alluvium and all significant pumping from the Alluvium are routinely monitored, and no long-term adverse impacts have ever been evident. Ultimately, the Purveyors have identified cooperative measures to be taken, if needed, to ensure sustained use of the aquifer. Such measures include but are not limited to the continuation of conjunctive use of SWP and other imported supplemental water with local groundwater, artificial recharge of the aquifer with local runoff or other surface water supplies, financial incentives discouraging extractions above a selected limit, expanded use of other water supplies such as recycled water, and expanded implementation of demand-side management, including conservation.

3.2.1 Alluvium – Historical and Current Conditions

Total pumping from the Alluvium in 2010 was about 41,200 af, an increase of 1,200 af from the preceding year. Total Alluvium pumping was slightly above the upper end of the groundwater Operating Plan range. However, as discussed in the balance of this section, groundwater level response to that amount of pumping has remained consistent with historically observed conditions, with no negative changes that might indicate pumping in excess of a sustainable amount; overall, the combination of 2010 pumping and groundwater level response suggest that the Operating Plan range does not reflect absolute groundwater pumping limits. Of the total Alluvial pumping in 2010, about 26,000 af (63 percent) was for municipal water supply, and the balance, about 15,200 af (37 percent), was for agriculture and other smaller uses, including individual domestic uses. In a longer-term context, there has been a change in municipal/agricultural pumping distribution since SWP deliveries began in 1980, toward a higher fraction for municipal water supply (from about 50 percent to more than 65 percent of Alluvial pumpage), which reflects the general land use changes in the area. Ultimately, on a long-term average basis since the beginning of imported water deliveries from the SWP, total Alluvial pumping has been about 32,600 afy, which is at the lower end of the range of operational yield of the Alluvium. That average has been higher over the last decade, about 38,700 afy, which remains within the range of operational yield of the Alluvium. The overall historic record of Alluvial pumping is illustrated in Figure 3-2.

Groundwater levels in various parts of the basin have historically exhibited different responses to both pumpage and climatic fluctuations. During the last 20 to 30 years, depending on location, Alluvial groundwater levels have remained nearly constant (generally toward the western end of the basin), or 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 (generally toward the eastern end of the basin). For illustration of the various groundwater level conditions in the basin, the Alluvial wells have been grouped into areas with similar groundwater level patterns, as shown in Figure 3-3. The groundwater level records have been organized into hydrograph form (groundwater elevation vs. time) as illustrated in Figures 3-4 and 3-5. Also shown on these plots is an annual marker indicating whether the year had a below-average amount of rainfall. The wells shown on these plots are representative of the respective areas, showing the range of values (highest to lowest elevation) through each area, and containing a sufficiently long-term record to illustrate trends over time.

Situated along the upstream end of the Santa Clara River Channel, the 'Mint Canyon' area, located at the far eastern end of the groundwater basin, and the nearby 'Above Saugus WRP' area generally exhibit similar groundwater level responses (Figure 3-4) to hydrologic and

pumping conditions. These parts of the Valley have historically experienced a number of alternating wet and dry hydrologic conditions during which groundwater level declines have been followed by returns to high or mid-range historic levels. When water levels are low, well yields and pumping capacities in this and other eastern areas can be impacted. The affected Purveyors typically respond by increasing use of Saugus Formation and imported (SWP) supplies, as shown in Table 2-3. The Purveyors also shift a fraction of the Alluvial pumping that would normally be supplied by the eastern areas to areas further west, where well yields and pumping capacities remain fairly constant because of smaller groundwater level fluctuations. Recent wet and dry periods illustrate the groundwater level response to managed Alluvial pumping. The five-year period of 1999-2003 saw water level declines on the order of 50 to 60 feet; pumping was gradually reduced by 50 percent over that period and water levels stopped declining. Subsequent wet conditions in late 2004, continuing into 2005, resulted in full recovery of groundwater storage. With such high groundwater levels, higher pumping was resumed in the 'Mint Canyon' area in 2005 and 2006 and has again been gradually decreased through the recent dry period. As shown in Figure 3-6, the Purveyors decreased total Alluvial pumping from the 'Mint Canyon' area from 12,000 afy in 2006 to 7,000 afy in 2010, and correspondingly increased pumping in the western areas of the Valley over the drier-than-
a

. While the pumping trends are similar to the 'Mint Canyon' area, pumping here has been less by about half. The long-term average of pumping as shown in Figure 3-6 is about 3,500 afy, and the pumping response to hydrologic cycles follows the upstream area by a couple of years. Here the water levels also remain within the range of historical levels, as expected with managed pumping rates and a single wet year in 2010, following a multi-year dry period.

In the 'Bouquet Canyon' area, pumping has remained relatively constant for the last ten years at about 1,700 afy, and water levels have fluctuated with consecutive wet or dry years. During and since the most recent wet conditions of 2004 and 2005, water levels returned to within historic mid-range levels. This groundwater level response to wet/dry years and pumping is typical for this area of the basin and, in 2010, levels remained within their historic range.

In the western parts and lower elevations of the Alluvium, groundwater levels respond to pumping and precipitation in a similar manner, but to an attenuated or limited extent compared to those situated in the eastern, higher elevation areas. As shown in the western group of hydrographs in Figure 3-5, groundwater level fluctuations become more subtle moving westward

and lower in the Valley. The 'Below Saugus WRP' area, along the Santa Clara River immediately downstream of the Saugus Water Reclamation Plant, and the 'San Francisquito Canyon' area generally exhibit similar groundwater level trends. In this middle part of the basin, historical groundwater levels were lower in the 1950's and 60's than current levels. Groundwater levels in this area notably recovered as pumping declined through the 1960's and 1970's. They have subsequently sustained generally high levels for much of the last 30 years, with three dry-period exceptions: mid-1970's, late 1980's to early 1990's, and the late 1990's to early 2000's. Recoveries to previous high groundwater levels followed both of the short dry-period declines in the 1970's and 1990's. More recently, groundwater levels recovered significantly in both areas, to historic highs, following a wetter-t -average year in 2004 and significantly wet 2005. With the exception of a couple of years, pumping has been generally constant at about 6,000 afy since the mid 1990's in the 'Below Saugus WRP' area. In t

-term average of 1,500 afy. In 2010, the single wet year after a multi-year period of below-average precipitation, groundwater levels in these two areas remain in mid-range to high historical range.

The 'Castaic Valley' area is located along Castaic Creek below Castaic Lake. Below that and along the Santa Clara River, downstream of the Valencia Water Reclamation Plant, is the 'Below Valencia WRP' area, where discharges of treated effluent from the Valencia WRP to the Santa Clara River contribute to groundwater recharge. In the 'Castaic Valley' area, groundwater levels continue to remain fairly constant, with slight responses to climatic and other fluctuations, since the 1950's (Figure 3-5). In the 'Castaic Valley' area, pumping has remained relatively constant over the last 25 years at about 5,200 afy, with a recent slight downward trend. Small changes in groundwater levels over the last five years are consistent with other short-term historical fluctuations around the Valley, but in the long-term, a generally constant trend remained through 2010. In the 'Below Valencia WRP' area, pumping notably increased through the 1990's but has since remained relatively stable over the last seven years, at about 12,000 afy (Figure 3-6). Despite the higher pumping rate, groundwater levels in this area exhibit slight, if any, response to either pumping or climatic fluctuations, and have remained fairly constant since the 1950's through 2010 (Figure 3-5).

In summary, depending on the period of available data, all the history of groundwater levels in the Alluvium shows the same general picture: recent (last 30 years) groundwater levels have exhibited historic highs; in some locations, there are intermittent dry-period declines (resulting from use of some groundwater from storage) followed by wet-period recoveries (a). On a long-term basis, whether over the last 30 years since importation of supplemental SWP water, or over the last 40 to 50 years (since the 1950's - 60's), the Alluvium shows no chronic trend toward decreasing water levels and storage, and thus shows

no symptoms of water level-related overdraft. Consequently, pumping from the Alluvium has been and continues to be sustainable, well within the operational yield of that aquifer on a long-term average basis, and also within the operating yield in almost every individual year.

3.3 Saugus Formation – General

Saugus wells operated by the Purveyors are located in the southern portion of the basin, south of the Santa Clara River (Figure 3-7). Consistent with the 2001 Update Report (Slade), the 2005 Basin Yield Report (CH2M Hill and LSCE), and the 2009 Updated Basin Yield Report (LSCE and GSI), the Purveyors have utilized the Saugus in accordance with the original (and the 2008) groundwater Operating Plan, in the range of 7,500 to 15,000 afy in average/normal years, with planned dry-year pumping of 15,000 to 35,000 afy for one to three consecutive dry years, when shortages to CLWA's SWP water supplies could occur. Such high pumping would be followed by periods of lower pumping (7,500 to 15,000 afy in average/normal years as noted above) in order to allow recharge to recover water levels and storage in the Saugus. Maintaining the substantial volume of water in the Saugus Formation remains an important strategy to help maintain water supplies in the Santa Clarita Valley during drought periods.

3.3.1 Saugus Formation – Historical and Current Conditions

Total pumping from the Saugus in 2010 was about 8,100 af, or about 400 af more than in the preceding year. Of the total Saugus pumping in 2010, most (a) was for municipal water supply, and the balance (900 af) was for agricultural and other irrigation uses. Historically, groundwater pumping from the Saugus peaked in the early 1990's and then steadily declined through the remainder of that decade. Since then, Saugus pumping has been in the range of about 4,000 to 8,000 afy, with the recent 5-year average at about 7,500 af per year. Most of the increase has been over the last two years, as the municipal use of Saugus water over the previous five-year period (2004-2008) had been relatively constant. On a long-term basis since the importation of SWP water, total pumping from the Saugus Formation has ranged between a low of about 3,700 afy (in 1999) and a high of nearly 15,000 afy (in 1991); average pumping from 1980 to present has been slightly more than 6,800 afy. These pumping rates remain well within, and generally at the lower end of the range of Operating Yield of the Saugus Formation. The overall historic record of Saugus pumping is illustrated in Figure 3-8.

Unlike the Alluvium, which has an abundance of wells with extensive water level records, the water level data for the Saugus Formation are limited by both the distribution of the wells in that Formation and the periods of water level records. The wells that do have water level records extending back to the mid-1960's indicate that groundwater levels in the Saugus Formation were

highest in the mid-1980's and are currently higher than they were in the mid-1960's (Figure 3-9). Based on these data, there is no evidence of any historic or recent trend toward permanent water level or storage decline. There continue to be seasonal fluctuations in groundwater levels but the prevalent longer-term trend is one of general stability.

Consistent with the 2001 Update Report (Slade), the 2005 Basin Yield Report (CH2M Hill and LSCE), the 2005 UWMP, the 2009 Updated Basin Yield Report (LSCE and GSI, 2009), and the 2010 UWMP, the Purveyors continue to maintain groundwater storage and associated water levels in the Saugus Formation so that supply is available during drought periods, when Alluvial pumping might be reduced and/or SWP or other supplemental supplies also decreased. The period of increased pumping during the early 1990's is a good example of this management strategy. Most notably, in 1991, when SWP deliveries were substantially reduced, increased pumping from the Saugus made up almost half of the decrease in SWP deliveries. The increased Saugus pumping over several consecutive dry years (1991-1994) resulted in short-term declining groundwater levels, reflecting the use of water from storage. However, groundwater levels subsequently recovered when pumping declined, reflecting recovery of groundwater storage in the Saugus Formation.

3.4 Imported Water

CLWA obtains the majority of its water supplies from the State Water Project (SWP), which is owned and operated by the California Department of Water Resources (DWR). CLWA is one of 29 contractors holding long-term SWP contracts with DWR. SWP water originates as rainfall and snowmelt in northern and central California. Runoff is stored in Lake Oroville, which is the project's largest storage facility. The water is then released from Lake Oroville down the Feather River to the Sacramento River and through the Sacramento-San Joaquin Delta. Water is diverted from the Delta into the Clifton Court Forebay, and then pumped into the 444-mile long California Aqueduct. SWP water is temporarily stored in San Luis Reservoir, which is jointly operated by DWR and the U.S. Bureau of Reclamation. Prior to delivery to CLWA, SWP supplies are stored in Castaic Lake, a terminal reservoir located at the end of the West Branch of the California Aqueduct.

CLWA's service area covers approximately 195 square miles (124,800 acres), including the City of Santa Clarita and surrounding unincorporated communities. SWP water from Castaic Lake is treated, filtered and disinfected at CLWA's Earl Schmidt Filtration Plant and Rio Vista Water Treatment Plant, which have a combined treatment capacity of 86 million gallons per day. Treated water is delivered from the treatment plants by gravity flow to each of the four Purveyors through a distribution network of pipelines and turnouts. At present, CLWA delivers

water to the four Purveyors through 26 potable turnouts as schematically illustrated in Figure 3-10.

In 2010, CLWA fulfilled the following major accomplishments in order to enhance, preserve, and strengthen the quality and reliability of existing and future supplies:

- coordinated preparation of the 2010 Urban Water Management Plan
- continued participation in a long-term water banking programs with Rosedale-Rio Bravo Water Storage District and the Semitropic Water Storage District. 32,256 af of water were delivered to the Rosedale-Rio Bravo Water Storage District, and 3,300 acre-feet were delivered to the purveyors after withdrawal from the Semitropic Water Storage District,
- continued implementation of the AB 3030 Groundwater Management Plan,
- continued implementation of the water conservation Best Management Practices, including measures in the Santa Clarita Valley Water Use Efficiency Plan
- continued participation in the Santa Clarita Valley Water Committee
- completed construction, and placed into operation, treatment and distribution facilities for restoration of a portion of municipal well capacity impacted by perchlorate contamination,
- continued cooperative effort with the U.S. Army Corps of Engineers for characterization studies of the former Whittaker-Bermite site and in a task force effort with the City of Santa Clarita, local legislators, and state agencies to effect the cleanup and remediation of all aspects of the former Whittaker-Bermite site, including perchlorate contamination of local groundwater,
- continued construction of the expansion of the Rio Vista Water Treatment Plant from 30 mgd to 60 mgd, and
- continued recycled water service.

3.4.1 State Water Project Table A Supplies

Each SWP contractor has a specified water supply amount shown in Table A of its contract that currently totals approximately 4.1 million af. The term of the CLWA contract is through 2038 and is renewable after that year. Although the SWP has not been fully completed, the SWP can deliver nearly all 4.1 million af of Table A Amounts during certain wet years.

CLWA has a contractual Table A Amount of 95,200 af per year of water from SWP.[1] On November 30, 2009, the initial allocation for 2010 was announced as 5 percent. The allocation was increased to 20 percent on March 30, 2010, to 30 percent on April 22, 2010, to 40 percent on May 3, 2010, to 45 percent on May 20, 2010, and finally to 50 percent on June 22, 2010. The allocation was not subsequently changed. CLWA's final allocation of Table A Amount for 2010 was thus 50 percent, or 47,600 af.

In addition to its Table A Amount, CLWA has access to 4,684 af of "flexible storage" in Castaic Lake. In 2005, CLWA negotiated an agreement with the Ventura County SWP contractors to allow CLWA to utilize their flexible storage account of 1,376 af. In combination, this provides total flexible storage of 6,060 af, which is maintained in Castaic Lake for use in a future dry period or an emergency. This amount was available in 2010, but was not utilized due to other available supplies.

Also in 2005, CLWA completed an agreement to participate in a long-term water banking program with Rosedale-Rio Bravo Water Storage District in Kern County. CLWA delivered 20,000 af of its excess Table A water into storage in both 2005 and 2006. CLWA delivered another 8,200 af into that storage account in 2007 and contributed 32,256 af of SWP and Buena Vista-Rosedale Rio Bravo water to the bank in 2010. This long-term program will allow the storage up to 100,000 af at any one time, and will provide significant dry year reliability for the Santa Clarita Valley.

The other banking component of CLWA's imported water supply reliability program is comprised of two agreements with Semitropic Water Storage District whereby CLWA banked surplus Table A water supply in 2002 and 2003. Notable in 2009 was the first recovery of water

[1] Of CLWA's 95,200 af annual Table A Amount, 41,000 afy was permanently transferred to CLWA in 1999 by Wheeler Ridge-Maricopa Water Storage District, a member unit of the Kern County Water Agency. CLWA's EIR prepared in connection with the 41,000 afy water transfer was challenged in Friends of the Santa Clara River v. Castaic Lake Water Agency (Los Angeles County Superior Court) ("Friends"). On appeal, the Court of Appeal held that since the 41,000 afy EIR tiered off the Monterey Agreement EIR that was later decertified, CLWA would also have to decertify its EIR as well and prepare a revised EIR. CLWA was not prevented from using any water that is part of the 41,000 afy transfer. Under the jurisdiction of the Los Angeles County Superior Court, CLWA prepared and circulated a revised Draft EIR for the transfer. CLWA approved the revised EIR in late 2004 ("2004 EIR IR with the Los Angeles Superior Court. Thereafter, the case was dismissed with prejudice (i.e., permanently).

In January 2005, two new challenges to CLWA's 2004 EIR were filed in the Ventura County Superior Court by the Planning and Conservation League ("PCL") and by the California Water Impact Network ("CWIN"); these cases were consolidated and transferred to Los Angeles County Superior Court, Planning and Conservation League v. Castaic Lake Water Agency (Los Angeles County Superior Court,) ("PCL Action"). In May 2007, a final Statement of Decision was filed by the trial court in the PCL Action. It included a determination that the transfer is valid and cannot be terminated or unwound. The trial court did find one defect in the 2004 EIR, requiring Judgment to be entered against CLWA. The defect, however, did not relate to the environmental conclusions reached in the 2004 EIR. Notices of Appeal were filed by PCL and CWIN and the Agency, Kern County Water Agency, and Wheeler Ridge-Maricopa Water Storage District filed notices of cross-appeals. On December 17, 2009, the Court of Appeal issued a published opinion in which it reversed the trial court's Judgment, and found that the 41,000 afy EIR fully complied with CEQA, and remanded the matter to the trial court with directions to issue a new judgment denying PCL's and CWIN's challenges in their entirety. A petition for rehearing was filed by PCL and CWIN on January 4, 2010 but was denied on January 14, 2010. On January 26, 2010, PCL and CWIN filed a petition for review with the California Supreme Court, but the Court denied the petition on March 10, 2010.

from the 2002 account; of 4,950 af withdrawn in 2009, 1,650 af was delivered for water supply in the Valley in 2009, and the 3,300 af balance was delivered in 2010.

As delineated in Table 3-2, with the 50 percent Table A allocation and other imported water supplies, including 28,303 af of carryover from 2008 and 2009, CLWA had total available supply of 90,498 af in 2010, the largest part of which was delivered to the Rosedale-Rio Bravo Water Banking Program (32,256 af) a (30,578 af), leaving 26,186 af of Table A Amount available for carryover to 2011. As summarized in Chapter 4, CLWA was able to use 3,712 af of the total available 2010 carryover before the SWP system reservoirs went into a 'spill' mode due to wet hydrologic conditions.

3.4.2 Other Imported Water Supplies

In early 2007, CLWA finalized a Water Acquisition Agreement with the Buena Vista Water Storage District (Buena Vista) a -Rio Bravo Water Storage District (Rosedale-Rio Bravo) in Kern County. Under this Program, Buena Vista's high flow Kern River entitlements (a) a -Rio Bravo's service area on an ongoing basis. CLWA receives 11,000 af of these supplies annually through either exchange of Buena Vista's and Rosedale-Rio Bravo's SWP supplies or through direct delivery of water to the California Aqueduct via the Cross Valley Canal.

In 2008, CLWA entered into the Yuba Accord Agreement, which allows for the purchase of water from the Yuba County Water Agency through the Department of Water Resources to 21 State Water Project contractors (including CLWA) and the San Luis and Delta-Mendota Water Authority. Up to 850 of non-SWP supply is available to CLWA in critically dry years. Under certain hydrologic conditions, additional water may be available to CLWA from this program. CLWA chose not to purchase any water from this source in 2010.

3.4.3 Imported Water Supply Reliability

The current SWP Delivery Reliability Report 2009, issued in August, 2010, incorporates restrictions on SWP operations according to the Biological Opinions of the U.S. Fish and Wildlife Service and the National Marine Fishery Service issued on December 15, 2008 and June 4, 2009, respectively. However, in December 2010, a federal judge overruled most of the 2008 federal biological opinion and invalidated several of the criteria that reduced SWP's water supply. The effects of this reversal are still not completely known, but will probably result in some relief from SWP pumping restrictions in the long term. The current SWP Delivery

Table 3-2
2010 CLWA Imported Water Supply and Disposition
(acre-feet)

Supply		
Net 2008 and 2009 SWP Carryover to 2010 [1]		28,303
Buena Vista/Rosedale Rio-Bravo		11,000
Yuba County Accord Water		0
2010 SWP Turnback Pool Water		295
Semitropic Water Banking and Exchange Program		3,300
2010 Final SWP Table A Allocation [2]		47,600
Total 2010 Imported Water Supply		**90,498**
Disposition		
Purveyor Deliveries (Total)		30,578
CLWA SCWD	*15,188*	
Valencia Water Company	*11,214*	
Newhall County Water District	*3,035*	
Los Angeles County WWD 36	*1,141*	
Deliveries to Devil's Den		768
CLWA/DWR/Purveyor Metering[3]		710
Rosedale – Rio Bravo Water Banking and Exchange Program		32,256
2010 Table A Carryover to 2011[4]		26,186
Total 2010 Imported Water Disposition		**90,498**

1. Total 2008 and 2009 carryover to 2010; amount used by CLWA, based on final DWR delivery accounting was 28,303 af.

2. Final 2010 allocation was 50% of contractual Table A amount of 95,200 acre-feet, which progressed as follows:

Initial allocation, November 30, 2009	5%
Allocation increase, February 23, 2010	15%
Allocation increase, March 30, 2010	20%
Allocation increase, April 22, 2010	30%
Allocation increase, May 3, 2010	40%
Allocation increase, May 20, 2010	45%
Final allocation, June 22, 2010	50%

3. Reflects meter reading differences.

4. Total 2010 Table A carryover to 2011.

Reliability Report 2009 also considers the impacts on SWP delivery reliability due to climate change, sea level rise, and vulnerability of the Delta's conveyance system and structure due to floods and earthquakes. With these factors, the Reliability Report projects long-term reliability of 60 percent during normal year hydrology. CLWA staff has assessed the impact of the current Reliability Report on the CLWA water supply and concluded in the 2010 UWMP that current and anticipated supplies are available to meet anticipated water supply needs through the year 2050.

Groundwater banking and conjunctive use offer significant opportunities to improve water supply reliability for CLWA. Groundwater banking is the process of storing available supplies of water in groundwater basins during wet years or when supplemental water is otherwise available. During dry periods, or when imported water supply availability is reduced, banked water can be recovered from groundwater storage to replace, or firm up, the imported water supply deliveries.

As described herein, CLWA has entered into two groundwater banking programs and now has, in aggregate, more than 140,000 af of recoverable water in banked groundwater storage outside the local groundwater basin. The first component of CLWA's overall groundwater banking program is the result of two 10-year agreements between CLWA and Semitropic Water Storage District whereby, over the terms of the two agreements, CLWA can withdraw up to 45,920 af of SWP Table A water that it stored in Semitropic to meet Valley demands when needed in dry years (45,920 af is the net recoverable balance after originally banking 24,000 af in 2002 and 32,522 af in 2003, and withdrawing 4,950 af in 2009 for delivery in 2009 and 2010). In April, 2011, Semitropic and CLWA extended the original agreements by 10 years to 2022/2023. The second component of the program, the long-term Rosedale-Rio Bravo Water Banking and Exchange Program in Kern County, has a recoverable total of 94,513 acre-feet in storage (including 32,256 af delivered in 2010, less contractual losses).

Conjunctive use is the purposeful integrated use of surface water and groundwater supplies to maximize water supply from the two sources. CLWA and the Purveyors have been conjunctively utilizing local groundwater and imported surface water since the initial importation of SWP water in 1980. The groundwater banking programs described above allow CLWA to firm up the imported water component of conjunctive use in the Valley by storing surplus SWP and other water, in wet years, in groundwater basins outside the Valley. This allows recovery and importation of that water as needed in dry years to maintain a greater overall amount of imported surface water to be used conjunctively with local groundwater, further supporting the sustainable use of local groundwater at the rates in the groundwater operating plan.

3.5 Water Quality – General

Water delivered by the Purveyors consistently meets drinking water standards set by the Environmental Protection Agency (EPA) and the California Department of Public Health (DPH). An annual Water Quality Report is provided to all Santa Clarita Valley residents who receive water from one of the four water retailers. There is detailed information in that report about the results of quality testing of the groundwater and treated SWP water supplied to the residents of the Santa Clarita Valley during 2010. Several constituents of particular local interest are discussed in more detail below.

Total Trihalomethanes

In 2002, the United States Environmental Protection Agency implemented the new Disinfectants and Disinfection Byproducts Rule. In part, this rule established a new Maximum Contaminant Level (MCL) of 80 µg/l (based on an annual running average) for Total Trihalomethanes (TTHM). TTHMs are byproducts created when chlorine is used as a means for disinfection. CLWA and the Purveyors implemented an alternative method of disinfection, chloramination, in 2005 to maintain compliance with the new rule and future regulations relating to disinfection byproducts. TTHM concentrations have remained significantly below the MCL since implementation of alternative disinfection.

Perchlorate

Perchlorate has been a water quality concern in the Valley since 1997 when it was originally detected in four wells operated by the 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 (SCWD's Stadium Well) also located near the former Whittaker-Bermite site. In early 2005, perchlorate was detected in a second Alluvial well (VWC's Well Q2) near the former Whittaker-Bermite site. In 2006, a very low concentration of perchlorate was detected to be present below the Detection for Reporting Limit (<4.0 µg/l) in another Saugus well (NCWD's Well NC-13), near one of the originally impacted wells. Most recently, in August 2010, perchlorate was detected further downgradient in an eighth well, Valencia's Saugus Well 201. While the initial detection was below the MCL, the well was immediately taken out of active supply service. VWC is currently pursuing restoration alternatives. Other monitoring has been completed and a focused study of the Saugus Formation has ultimately been incorporated into the overall groundwater remediation and removal actions submitted by Whittaker-Bermite and reviewed by the State Department of Toxic Substances Control (DTSC) as discussed below.

Perchlorate is a regulated chemical in drinking water. In October, 2007, DPH established a MCL for perchlorate of 6 µg/l. Prior to that, wells with perchlorate concentrations exceeding the then-applicable Action Level (18 µg/l) or, subsequently, the then-a (6 µg/l) were removed from active water supply service. One of the Alluvial wells (VWC's Well Q2) was returned to active water supply service, with treatment, in late 2005 as discussed below. Saugus Well NC-13 has remained in service with regular sampling per DPH requirements and no subsequent detections of perchlorate. NC-11 has remained out of service with its capacity replaced by other sources through a SWP turnout. Two wells (VWC's Well 157 and SCWD's Stadium Well) have been sealed and replaced by new wells, and two wells (SCWD's Saugus 1 & 2 Wells) have recently been returned to service as described below. The 2005 UWMP specifically addressed the adequacy of groundwater supply in light of the inactivation of the impacted Alluvial and Saugus wells; and it addressed the plan and schedule for restoration of perchlorate-impacted wells, including the protection of existing non-impacted wells. As now summarized in the 2010 UWMP, the replacement and reactivation of the impacted wells, augmented by planned and funded replacement wells, adds to the overall ability to meet the groundwater component of total water supply in the Valley. As noted above, Well V201 was taken out of service in August, 2010. Initial plans for restoration are expected to involve some combination of methodologies already employed at other previously impacted wells, installation of wellhead treatment and/or well replacement.

In 2000, CLWA and the impacted Purveyors filed a lawsuit against Whittaker Corporation (the former owner of the contaminated property) a
Inc. (the owners of record at that time). The lawsuit sought to have defendants pay all necessary costs of response, removal of the contaminant, remedial actions, and any liabilities or damages associated with the contamination. An Interim Settlement and Funding Agreement was reached in 2003. Although that Agreement expired in January 2005, the parties, under DTSC oversight, jointly developed a plan to "pump and treat" contaminated water from two of the Purveyors' impacted wells to stop migration of the contaminant plume and to partially restore the municipal well capacity that has been impacted by perchlorate. The parties also continued negotiations intended to achieve a long term settlement to the litigation through 2006, and a final settlement was completed and executed in April 2007.

Since 2007, the impacted Purveyors (SCWD, NCWD, and VWC) a

-Bermite site and the impacted groundwater is being coordinated

among CLWA, the impacted Purveyors, the State DTSC, and U.S. A

-Bermite site.

In February 2003, DTSC and the impacted Purveyors entered into a voluntary cleanup agreement entitled *Environmental Oversight Agreement*. Under the Agreement, DTSC is providing review and oversight of the response activities being undertaken by the Purveyors related to the detection of perchlorate in the impacted wells. Under the Agreement's Scope of Work, the impacted Purveyors prepared a Work Plan for sampling the production wells, a report on the results and findings of the production well sampling, a draft Human Health Risk Assessment, a draft Remedial Action Workplan, an evaluation of treatment technologies and an analysis showing the integrated effectiveness of a project to restore impacted pumping capacity, extract perchlorate-impacted groundwater from two Saugus wells for treatment, and control the migration of perchlorate in the Saugus Formation. Environmental review of that project was completed in 2005 with adoption of a mitigated Negative Declaration. The Final Interim Remedial Action Plan for containment and extraction of perchlorate was completed and approved by DTSC in January, 2006. Design of the treatment facilities and related pipelines is complete. Construction of those facilities and pipelines to implement the pump and treat program and to also restore inactivated municipal well capacity began in November, 2007 and was completed May, 2010. Water from Saugus 1 and Saugus 2 was initially treated and discharged into the Santa Clara River. DPH issued an amendment to CLWA's Operating Permit in December, 2010, and the wells were placed back in service on January 25, 2011.

Under the direction of DTSC, Whittaker has submitted a comprehensive site-wide remediation plan for the contaminants of concern in soil and groundwater detected on the property. A Draft Remedial Action Plan for Operable Units 2 through 6 that is focused on soil remediation was submitted to DTSC in 2009. The plan contains a number of recommended technologies to remove contaminants from the soil, in addition to a proposed clean-up schedule for the site. Whittaker has also completed a Draft Operable Unit 7 Feasibility Study to identify and select treatment technologies for both on-site and off-site groundwater. The work plan for Pilot Remediation of Saugus Aquifer Containment and Remediation was approved by DTSC on December 31, 2008 and the plan is currently being implemented. DTSC approved the Remedial Action Plan for contaminated soils in Operable Units 2 through 6 on December 6, 2010 and Preparation of the Remedial Design documents is underway. Field implementation of the soil remediation is expected to begin in fall 2011.

As noted above, perchlorate was detected in a second Alluvial well, VWC's Well Q2, in early 2005. In response, Valencia removed the well from active service, and commissioned the preparation of an analysis and report assessing the impact of, and response to, the perchlorate

contamination of that well. Valencia's response for Well Q2 was to obtain permitting for installation of wellhead treatment, followed by installation of treatment facilities and returning the well to water supply service in October 2005. After nearly two years of operation with wellhead treatment, including regular monitoring specified by DPH, all of which resulted in no detection of perchlorate in Well Q2, Valencia requested that DPH allow treatment to be discontinued. DPH approved that request in August 2007, and treatment was subsequently discontinued. DPH-specified monitoring for perchlorate continues at Well Q2; there has been no detection of perchlorate at this well since discontinuation of wellhead treatment.

On January 25, 2011, Castaic Lake Water Agency's Saugus Perchlorate Treatment Facility (SPTF) came on line. Numerous monitoring tests are performed each week in order to ensure the safety of the water leaving the plant. Samples are collected weekly at the Saugus 1 and Saugus 2 wells, influent water point, effluent water point and lead and lag vessels as well as several other distribution locations. The samples are analyzed for many pollutants, including chlorate, perchlorate, chloride, nitrate, nitrite and sulfate. In addition samples are analyzed for microbiological growth, radiological and volatile organic compounds. Castaic Lake Water Agency is also conducting initial monitoring to complete California DPH permit requirements.

On the Whittaker-Bermite site, soil remediation activities in operating unit subareas started in 2005. Groundwater "pump and treat" operations in the Northern Alluvium, which also started in 2005, continued through 2010. Expanded pumping, intended to effect perchlorate containment as well as to treat 'hot spots' in the Northern Alluvium, became operational in October, 2007. Also on the Whittaker-Bermite site, remediation work in the Saugus Formation is underway. Additional objectives of this project include the reduction of further transport of contaminants to regional groundwater and reduction of the size of the contaminant mass in deep/perched zones.

Hardness

In 2008, the Valencia Water Company began a demonstration project delivering pre-softened groundwater from one of its wells to approximately 420 residents located in the Copperhill Community of Valencia. Hard water is the primary complaint from Valencia customers and it is estimated that more than 50 percent have installed individual water softening units at their homes. In addition to having high operating costs, many of these units are designed to discharge a brine (salt) solution to the sanitary sewer system that is eventually discharged to the Santa Clara River, or is part of the recycled water supply. The environmental impact of such discharges was the subject of a major Chloride Total Maximum Daily Load investigation which concluded with a commitment by the Purveyors to achieve surface water quality goals for in-stream discharge from the basin. Valencia's project is aimed at improving the quality of water

for its customers to eliminate the need for home softening devices and to achieve the environmental benefits of reduced chloride discharge to the river.

The demonstration project utilizes softening technology that removes calcium and produces small calcium carbonate pellets which can be reused in a variety of industries. The demonstration project has now been operated for over two years and provides the water company with customer feedback and technical/financial information to assess potential future expansion of treatment to other well sites.

3.5.1 Groundwater Quality – Alluvium

Groundwater quality is, of course, a key factor in assessing the Alluvial aquifer as a municipal and agricultural water supply. Groundwater quality details and long-term conditions, examined by integration of individual records from several wells completed in the same aquifer materials and in close proximity to each other, have been discussed in previous annual Water Reports and in the 2010 UWMP. There were some changes in groundwater quality in 2010 that reflect fluctuations, trends, or other groundwater quality conditions as illustrated in Figures 3-11 and 3-12. These graphs show historical specific conductance values for representative wells in the Valley ('Above Saugus WRP', 'Below Saugus WRP', 'Bouquet Canyon', and 'Castaic Valley' areas) with the California Department of Public Health Secondary Maximum Levels included for reference. By 2007-2008, some of the trends show a significant lowering of the specific conductance values by half following the wet years of 2004-2005. Since 2007-2008, most of those trends have returned to about 2004 levels. In summary, water quality in the Alluvium exhibits: no long-term overall trends and, most notably, no decline in Alluvial groundwater quality that exceeds historical conditions; and periodic fluctuations in some parts of the basin, where groundwater quality has inversely varied with precipitation and stream flow. Those variations are typically characterized by increased mineral concentrations through dry periods of lower stream flow and lower groundwater recharge, such as is currently occurring, followed by lower mineral concentrations through wetter periods of higher stream flow and higher groundwater recharge.

The presence of long-term consistent water quality patterns, although intermittently affected by wet and dry cycles, supports the conclusion that the Alluvial aquifer remains a viable ongoing water supply source in terms of groundwater quality.

3.5.2 Groundwater Quality – Saugus Formation

As discussed above for the Alluvium, groundwater quality is a key factor in also assessing the Saugus Formation as a municipal and agricultural water supply. As with groundwater level data, 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. However, integration of individual records from several wells has been used to examine general water quality trends. Based on those records, water quality in the Saugus Formation has not historically exhibited the precipitation-related fluctuations seen in the Alluvium. Based on available data over the last 50 years, groundwater quality in the Saugus has exhibited a slight overall increase in dissolved mineral content as illustrated in Figure 3-13. More recently, several wells within the Saugus Formation have exhibited an additional increase in dissolved mineral content, similar to short-term changes in the Alluvium, possibly as a result of recharge to the Saugus Formation from the Alluvium. Since 2005, however, these levels have been steadily dropping or remaining constant. Dissolved mineral concentrations in the Saugus Formation remain below the Secondary (aesthetic) Upper Maximum Contaminant Level. Groundwater quality within the Saugus will continue to be monitored to ensure that degradation to the long-term viability of the Saugus as a component of overall water supply does not occur.

3.5.3 Imported Water Quality

CLWA operates two surface water treatment plants, the Earl Schmidt Filtration Plant located near Castaic Lake and the Rio Vista Water Treatment Plant located in Saugus. CLWA produces water that meets drinking water standards set by the U.S. EPA and DPH. SWP water has different aesthetic characteristics than groundwater with lower dissolved mineral concentrations (total dissolved solids) of approximately 250 to 360 mg/l, and lower hardness (as calcium carbonate) of about 105 to 135 mg/l.

Historically, the State Water Project (SWP) delivered only surface water from the Sacramento-San Joaquin River Delta. However, CLWA and other SWP users, in anticipation of drought, many years ago began "water banking" programs where SWP water could be stored or exchanged during wet years and withdrawn in dry years. The last four years have seen state-wide drought. As a result, water has been withdrawn from the water banking programs and pumped into the SWP system. During the period of 2008 through 2010, a greater portion of water in the SWP has been this "pumped-in" water. The "pumped-in" water has met all water quality standards established by DWR under its anti-degradation policy for the SWP.

3.6 Recycled Water

Recycled water is available from two water reclamation plants operated by the Santa Clarita Valley Sanitation District. In 1993, CLWA prepared a draft Reclaimed Water System Master Plan that outlined a multi-phase program to deliver recycled water in the Valley. CLWA previously completed environmental review on the construction of Phase I of the project, which will ultimately deliver 1,700 afy of recycled water. Deliveries of recycled water began in 2003 for irrigation water supply at a golf course and in roadway median strips. In 2010, recycled water deliveries were 336 af, generally consistent with recycled water deliveries that have ranged between about 300 and nearly 500 afy over the past eight years.

Surveys conducted by CLWA indicate an interest for recycled water by existing water users as well as by future development as recycled water becomes available. In 2002, CLWA produced an updated Draft Recycled Water Master Plan. Overall, the program is expected to ultimately recycle up to 17,400 af of treated (tertiary) wastewater suitable for reuse on golf courses, landscaping and other non-potable uses, as set forth in the UWMP. This is in addition to an expected recycled water use of approximately 5,400 af per year in the Newhall Ranch Specific Plan development.

In 2007, CLWA and the Purveyors completed California Environmental Quality Act (CEQA) a (2002). This analysis consisted of a Program Environmental Impact Report (PEIR) covering the various options for a recycled water system as outlined in the Master Plan. The PEIR was certified by the CLWA Board in March 2007.

CLWA and the Purveyors are preparing the design of the second phase of the Recycled Water Master Plan (Phase IIA) that will take water from the Saugus Water Reclamation plant and distribute it to identified users to the north, across the Santa Clara River and then to the west and the east, which will include service to Santa Clarita Central Park. The environmental documentation for this phase is nearly complete. There is also a new phase of the of the recycled water system (Phase IIC) in design that would extend the existing system southward from the intersection of Valencia Boulevard and the Old Road, south along Rockwell Canyon Road to the intersection of Orchard Village Road and Lyons Avenue, serving large irrigation customers along its proposed alignment. Collectively, these phases will have design capacity to increase recycled water deliveries by about 1,500 afy.

3.7 Santa Clara River

The Memorandum of Understanding (MOU) between the Santa Clarita Valley Purveyors and the United Water Conservation District, which manages surface and groundwater resources in seven groundwater basins in the Lower Santa Clara River Valley Area, was a significant accomplishment when it was prepared and executed in 2001. The MOU initiated a collaborative and integrated approach to data collection; database management; groundwater flow modeling; assessment of groundwater basin conditions, including determination of basin yield amounts; and preparation and presentation of reports, including continued annual reports such as this one for current planning and consideration of development proposals, and also including more technically detailed reports on geologic and hydrologic aspects of the overall stream-aquifer system. Meetings of the MOU participants have continued, and coordination of the Upper (Santa Clarita Valley) and Lower (United WCD) Santa Clara River databases has been accomplished. As discussed above, a numerical groundwater flow model of the entire Santa Clarita groundwater basin was developed and calibrated in 2002-2004. Subsequent to its initial use in 2004 for assessing the effectiveness of various operating scenarios to restore pumping capacity impacted by perchlorate contamination (by pumping and treating groundwater for water supply while simultaneously controlling the migration of contaminated groundwater), the model was used in 2005 for evaluation of basin yield under varying management actions and hydrologic conditions. The results completed the determination of sustainable operating yield values for both the Alluvium and the Saugus Formation, which were incorporated in the 2005 UWMP. The updated analysis of basin yield, completed in 2009, indicates that the 2008 Operating Plan will maintain river flows at higher levels than occurred prior to urbanization of the Valley; the resultant operating yield values for both the Alluvium and the Saugus Formation are now incorporated in the 2010 UWMP.

On occasion, issues have been raised about whether use and management of groundwater in the Santa Clarita Valley have adversely impacted surface water flows into Ventura County. Part of the groundwater modeling work has addressed the surface water flow question as well as groundwater levels and storage. While the sustainability of groundwater has logically derived primarily from projected long-term stability of groundwater levels and storage, it has also derived in part from modeled simulations of surface water flows and the lack of streamflow depletion by groundwater pumping. In addition, the long-term history of groundwater levels in the western and central part of the basin, as illustrated in Figures 3-4 and 3-5, supports the modeled analysis and suggests that groundwater has not been lowered in such a way as to induce infiltration from the river and thus impact surface water flows.

Historical annual stream discharge in the Santa Clara River, into and out of the Santa Clarita Valley, is shown on Figure 3-14. The upstream gage at Lang Station was reinstated in 2002 and shows a wide range of average annual inflow over the last seven years. The downstream gage was moved in 1996 to its present location near Piru, about two miles downriver from the former County Line Gage. The combined record (1953-2010) of these two downstream gages indicates an annual stream discharge of about 47,000 afy. These data gaged near the County line show notably higher flows from the Santa Clarita Valley into the uppermost downstream basin, the Piru Basin, over the last 35 to 40 years.

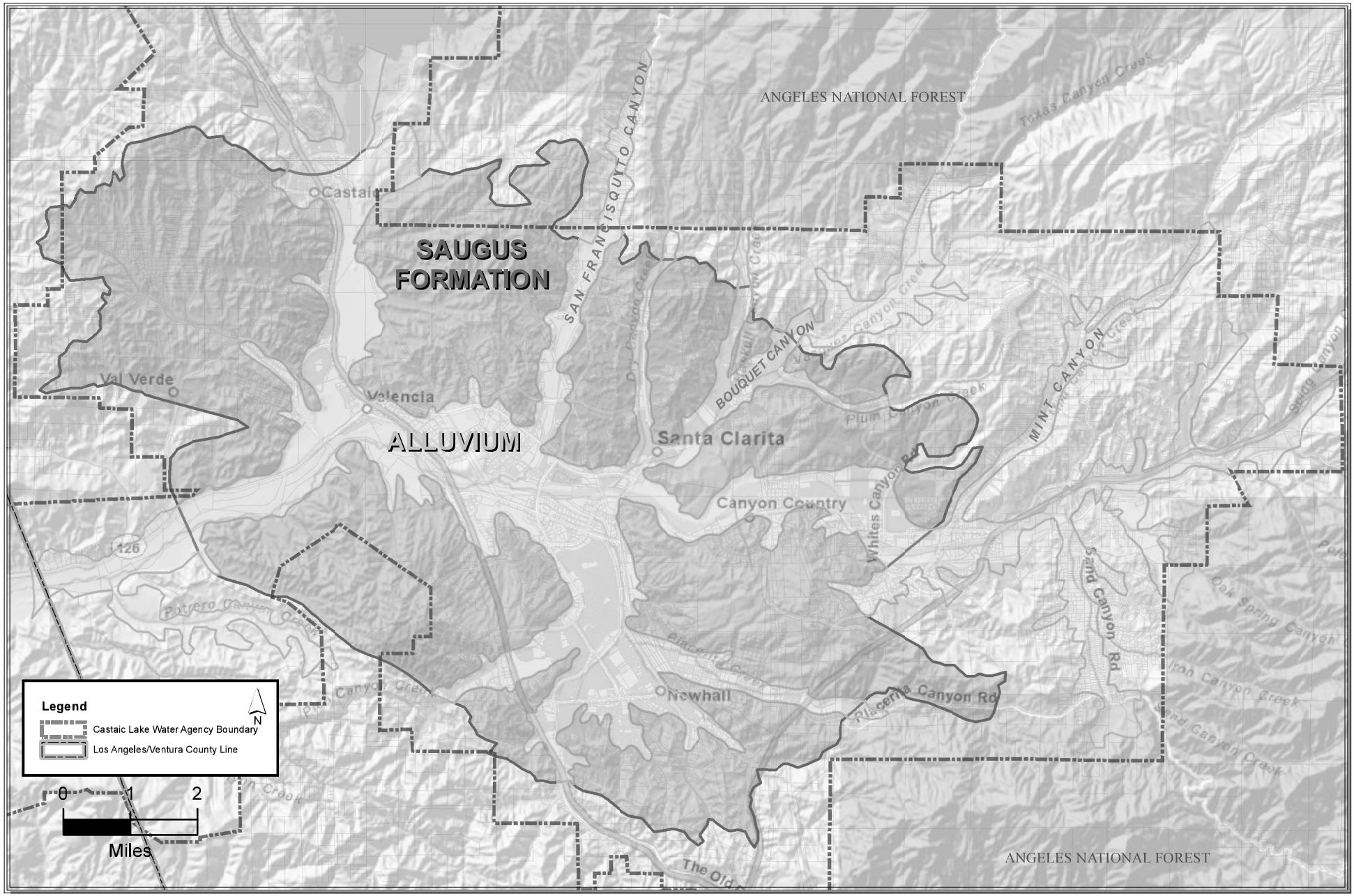

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Figure 3-1
Santa Clara River Valley, East Groundwater Subbasin

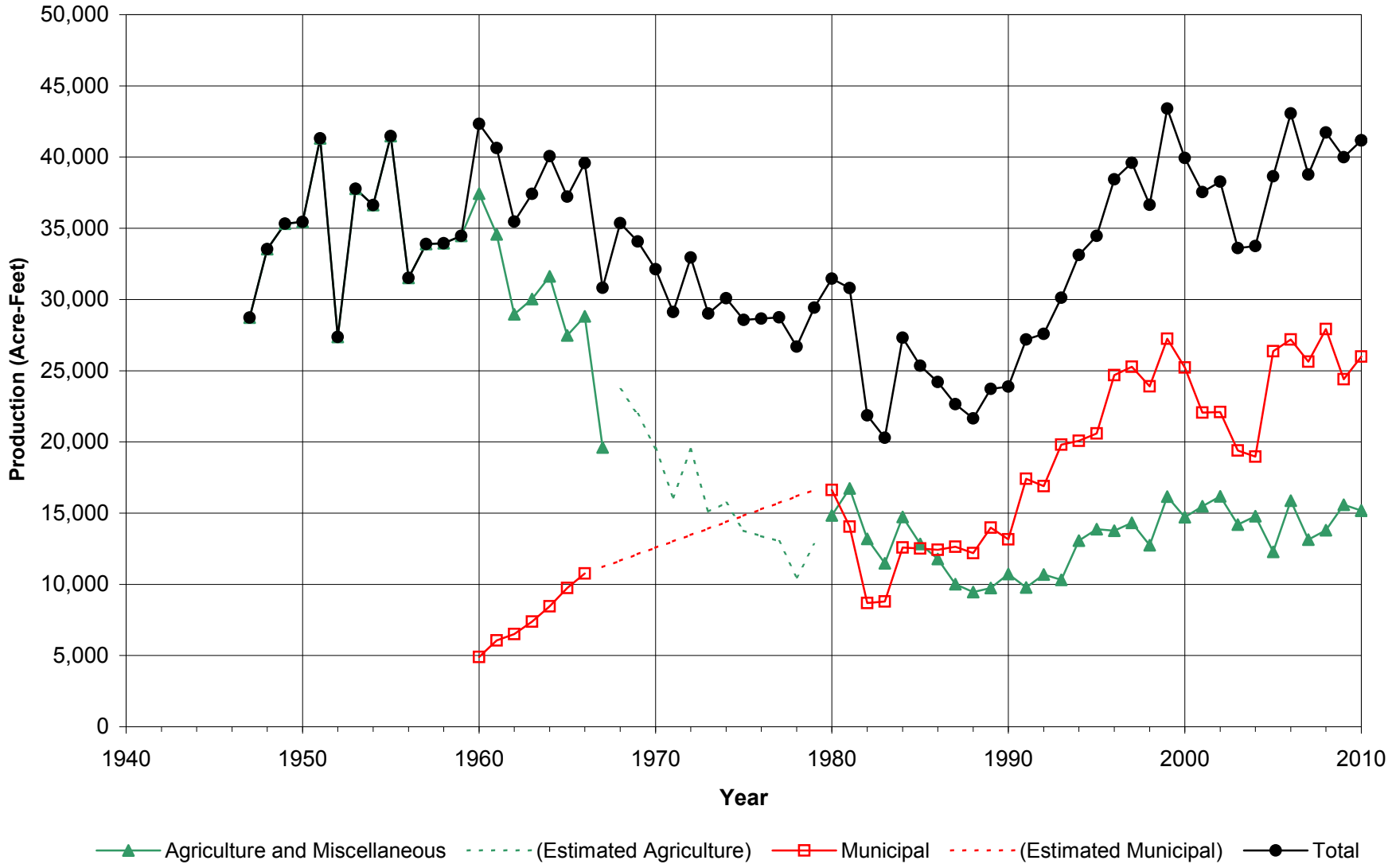

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Figure 3-2
Groundwater Production - Alluvium
Santa Clara River Valley, East Groundwater Subbasin

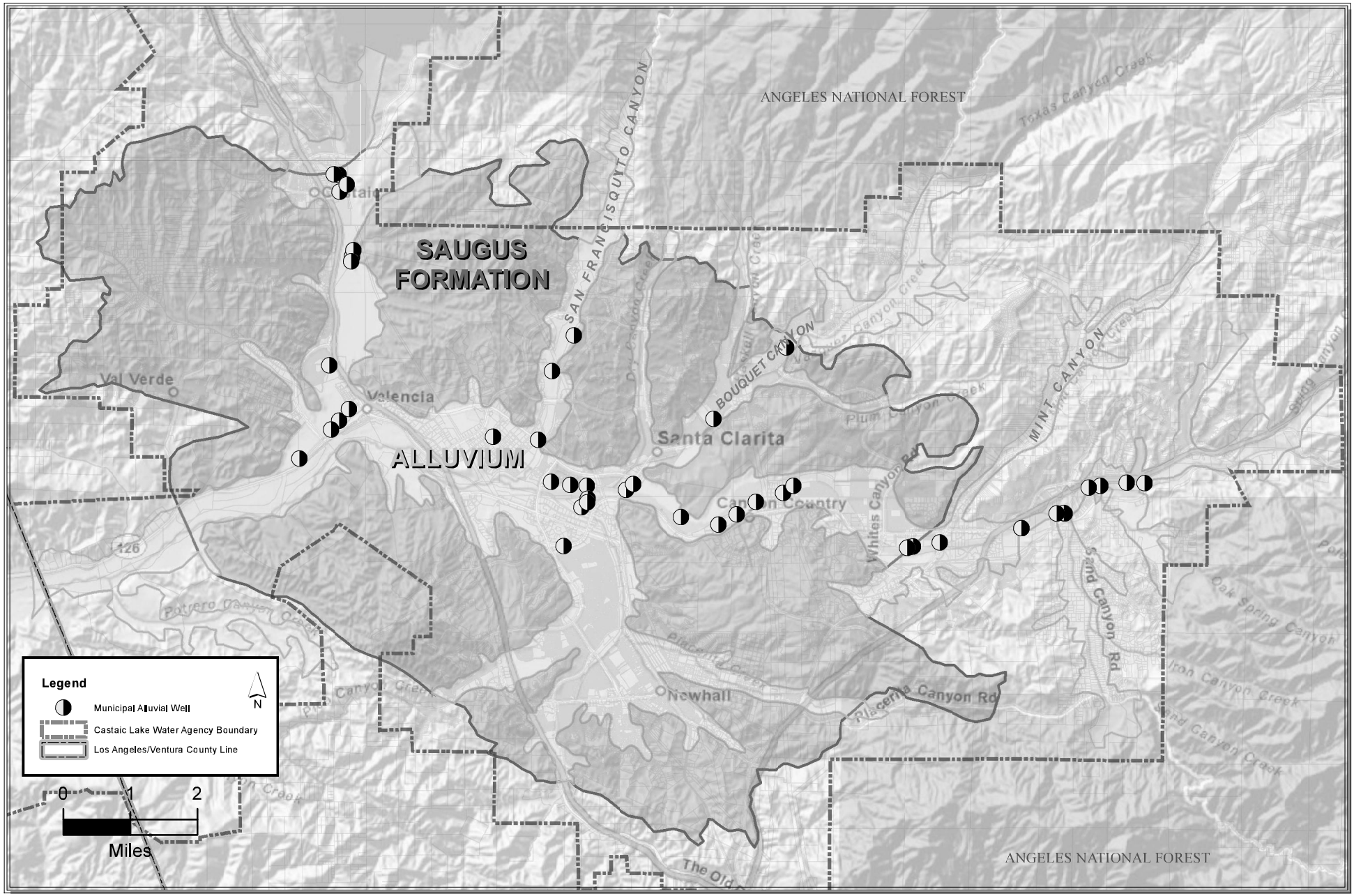

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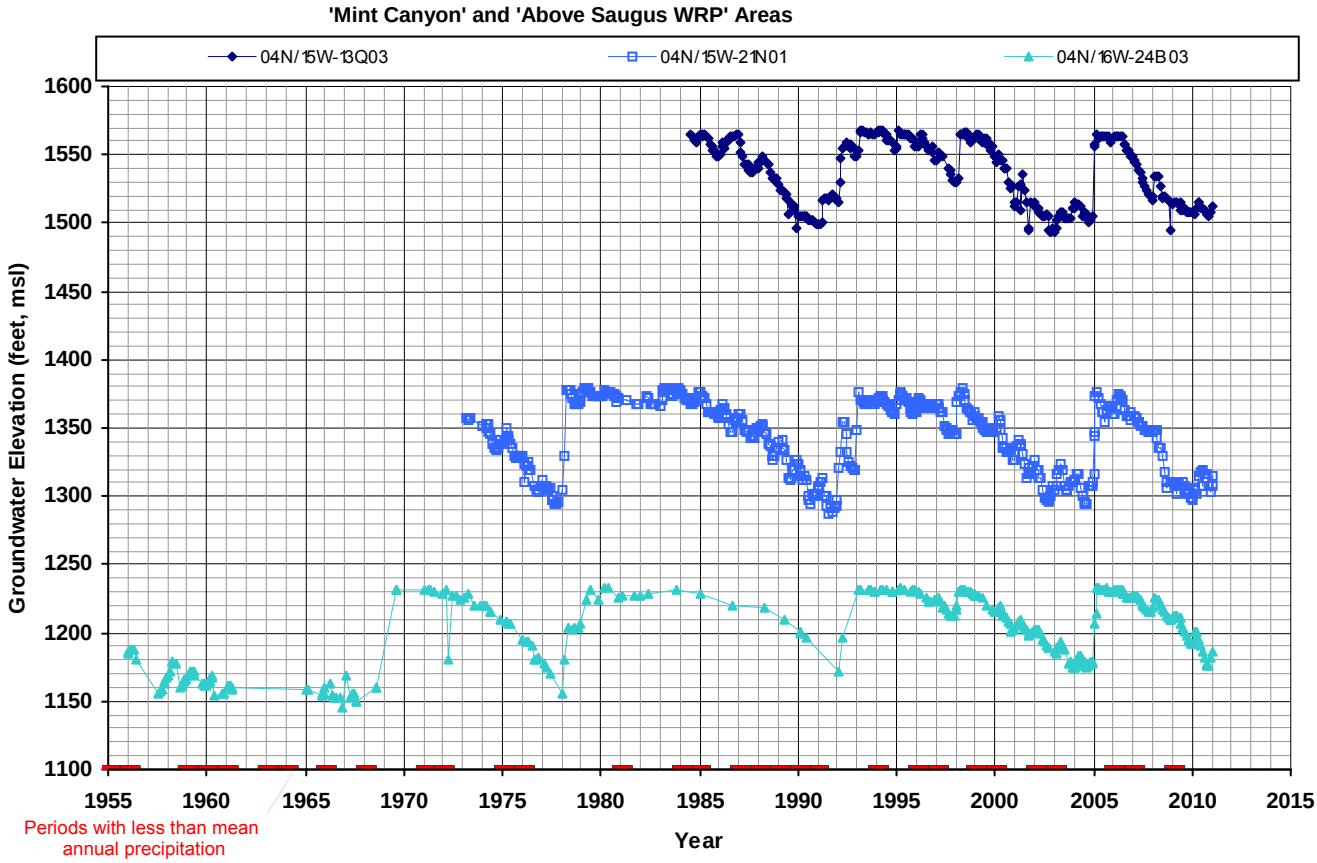
Figure 3-3
Municipal Alluvial Well Locations
Santa Clara River Valley, East Groundwater Subbasin



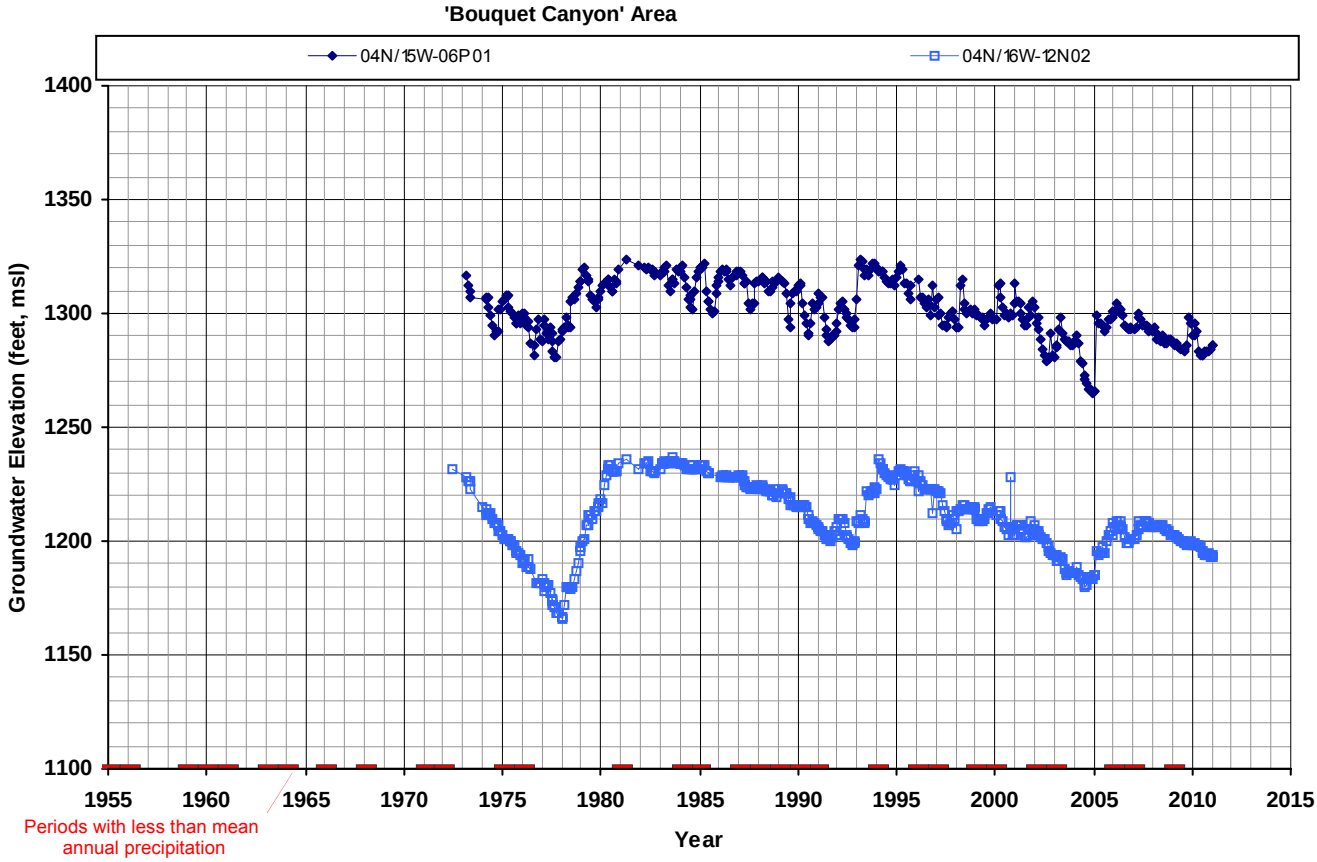


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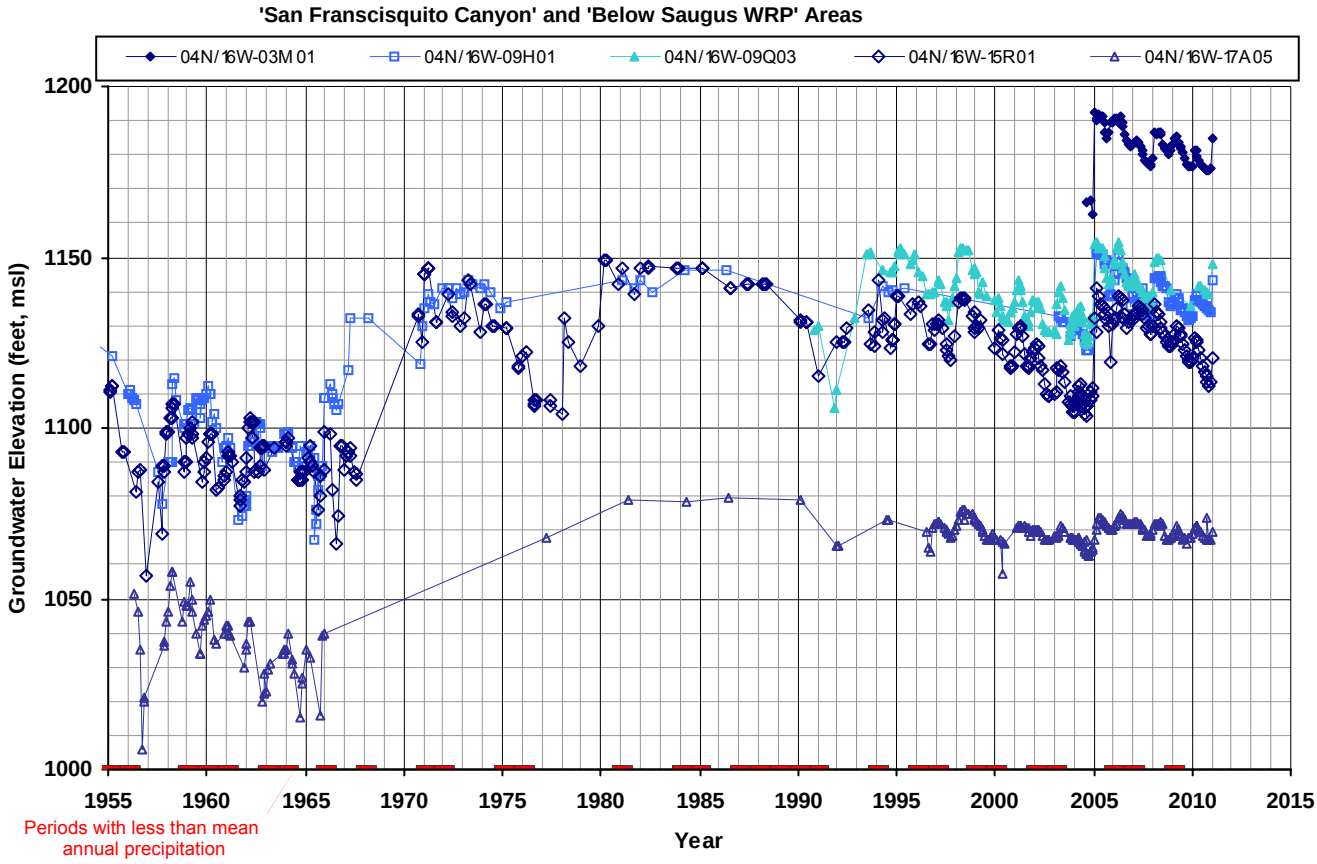
Figure 3-4
Groundwater Elevations in Eastern Santa Clarita Valley Alluvial Wells



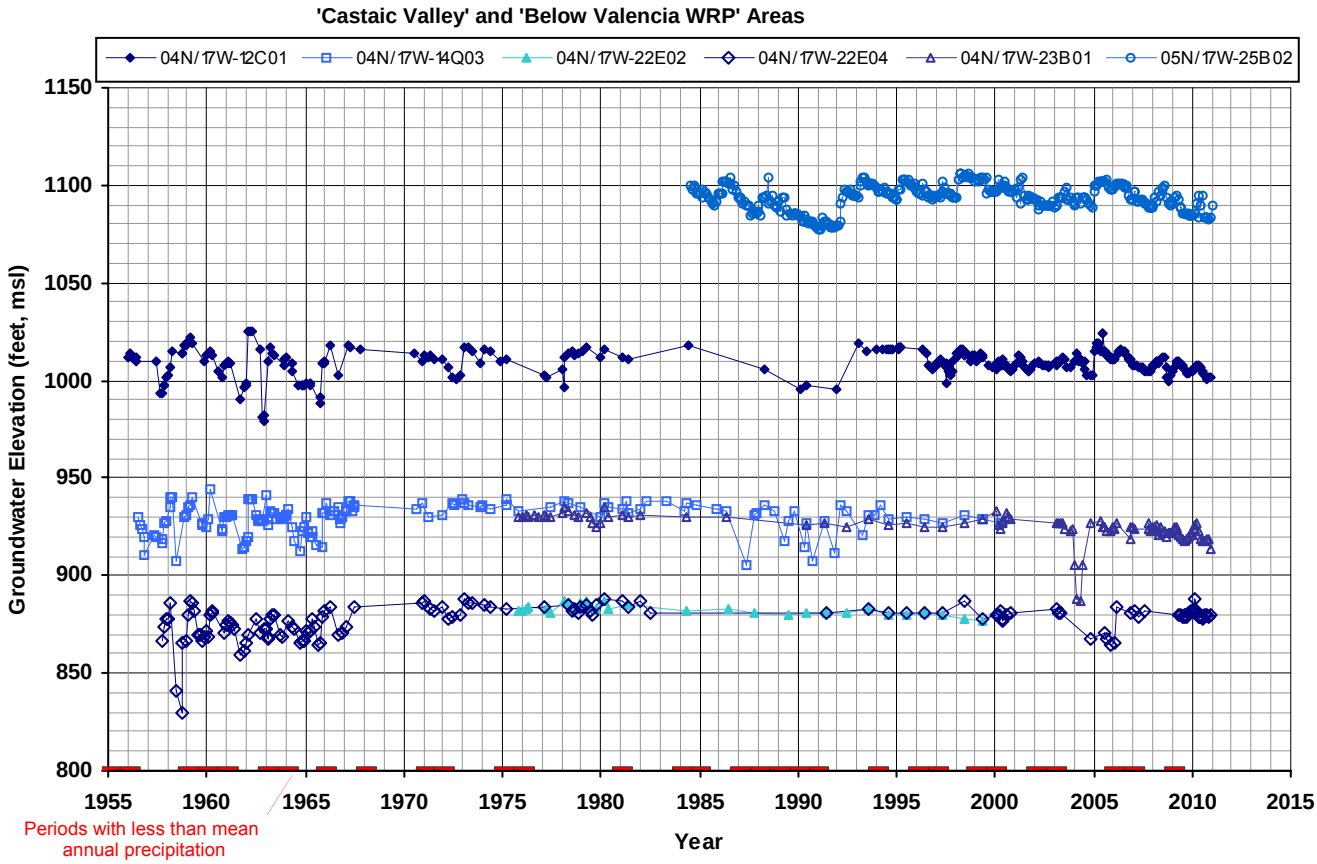


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Figure 3-5
Groundwater Elevations in Western Santa Clarita Valley Alluvial Wells

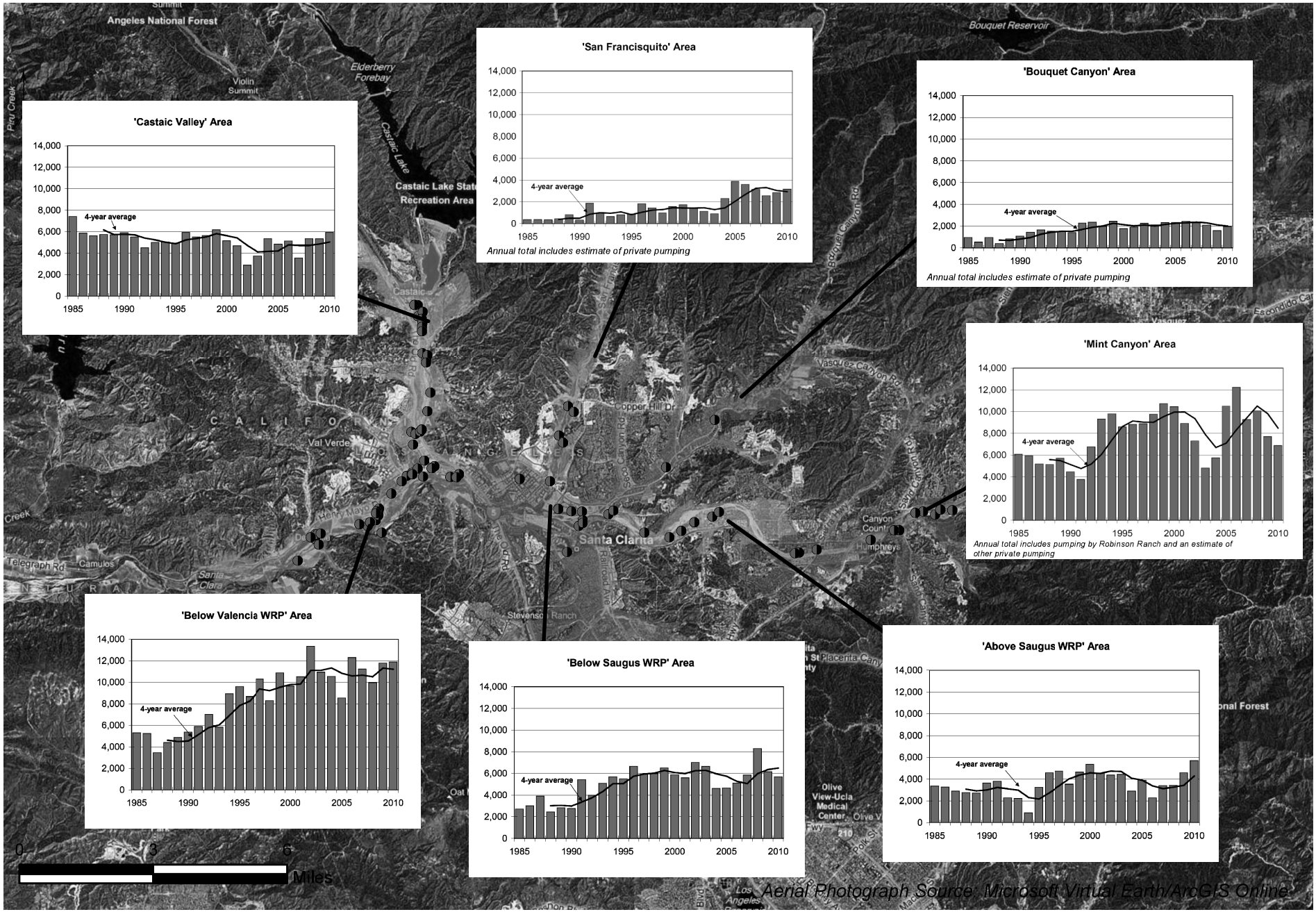

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Figure 3-6
Annual Groundwater Production from Alluvium by Area (Acre-feet)
Santa Clara River Valley, East Groundwater Subbasin

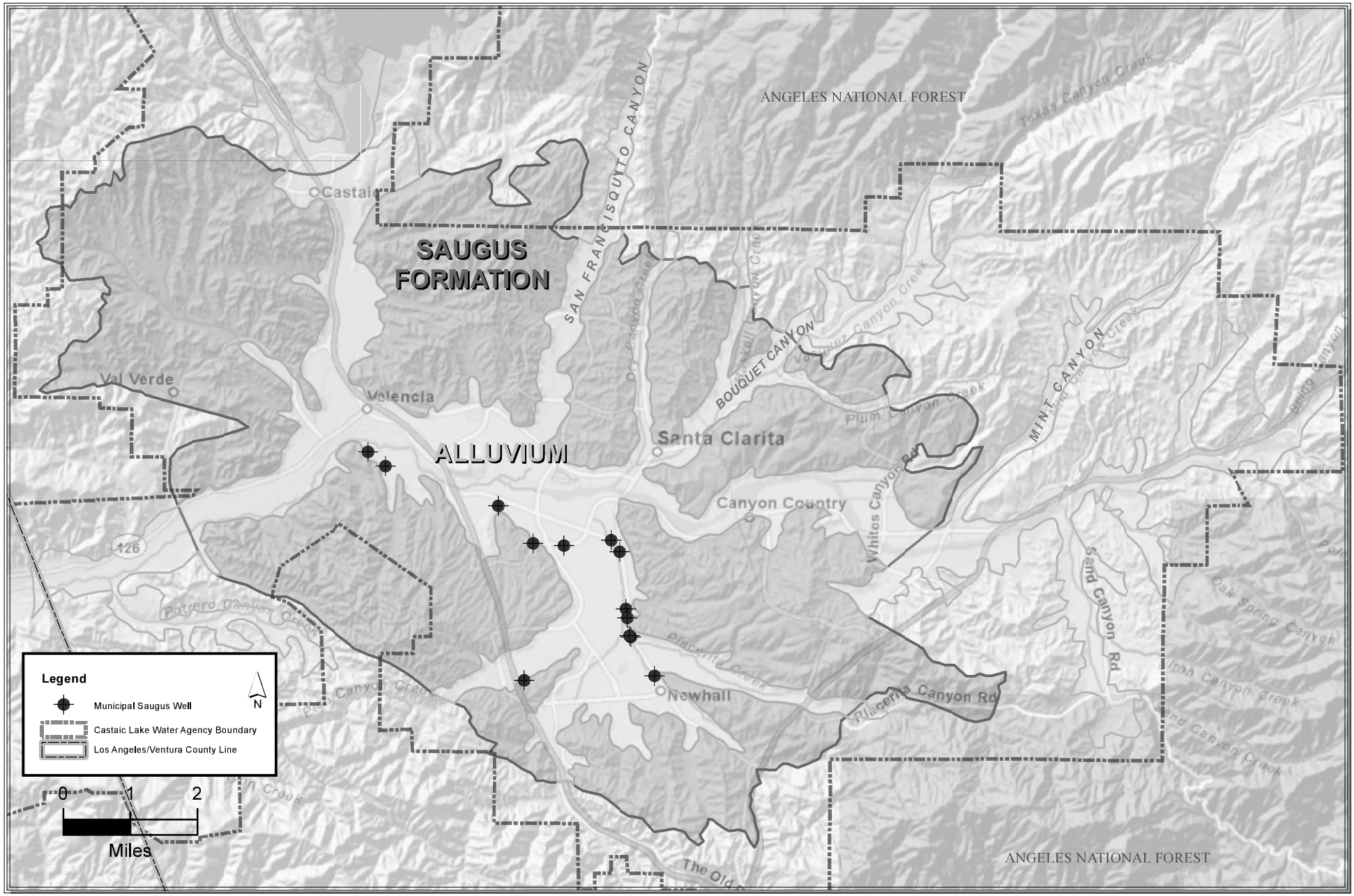

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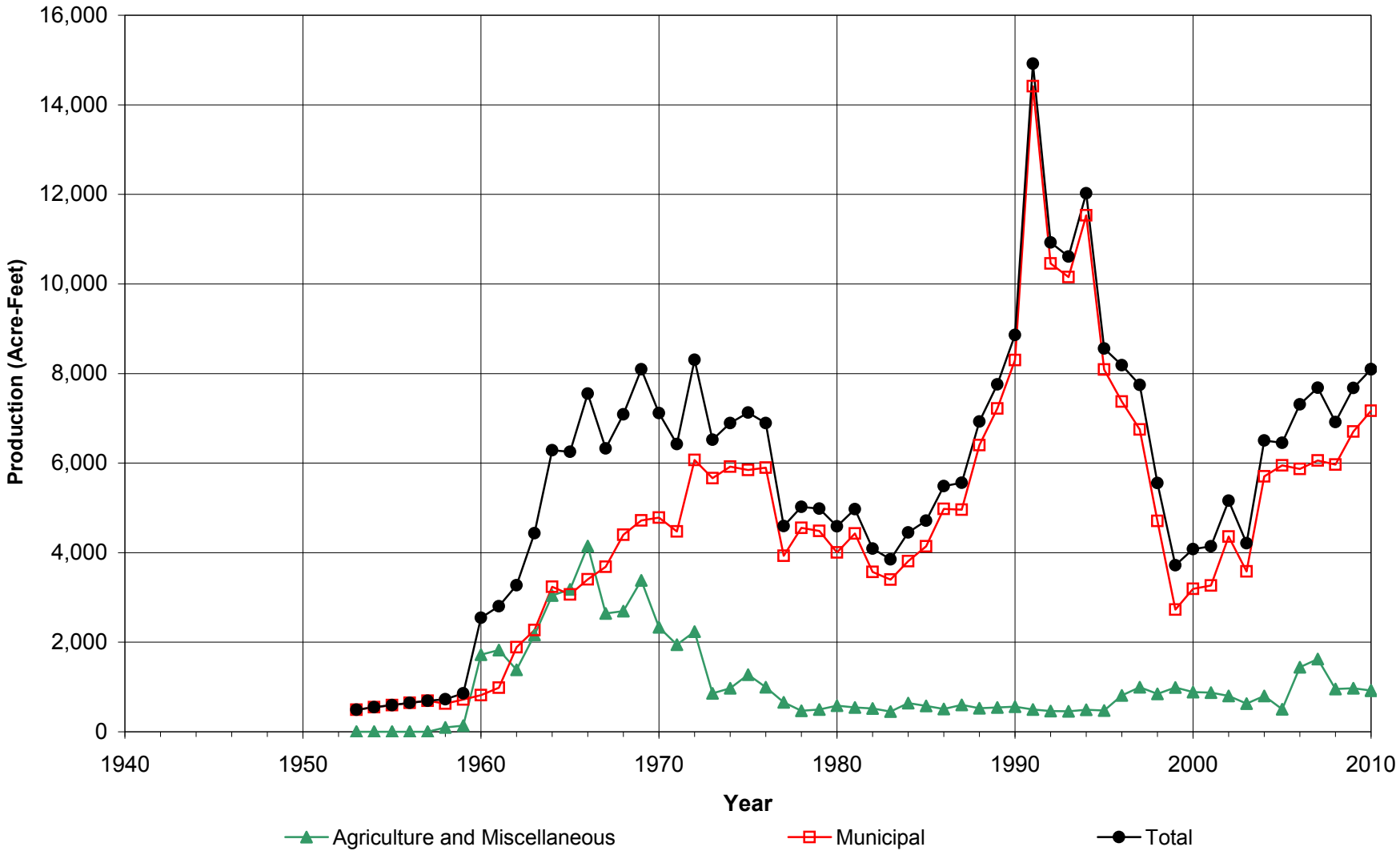
Figure 3-7
Saugus Well Locations
Santa Clara River Valley, East Groundwater Subbasin



Note: Historical pumping for 1953-1979 was adjusted for the 2010 Water Report to incorporate the amounts reported by Slade (1988) and as verified with the water purveyors.

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Figure 3-8
Groundwater Production - Saugus Formation
Santa Clara River Valley, East Groundwater Subbasin

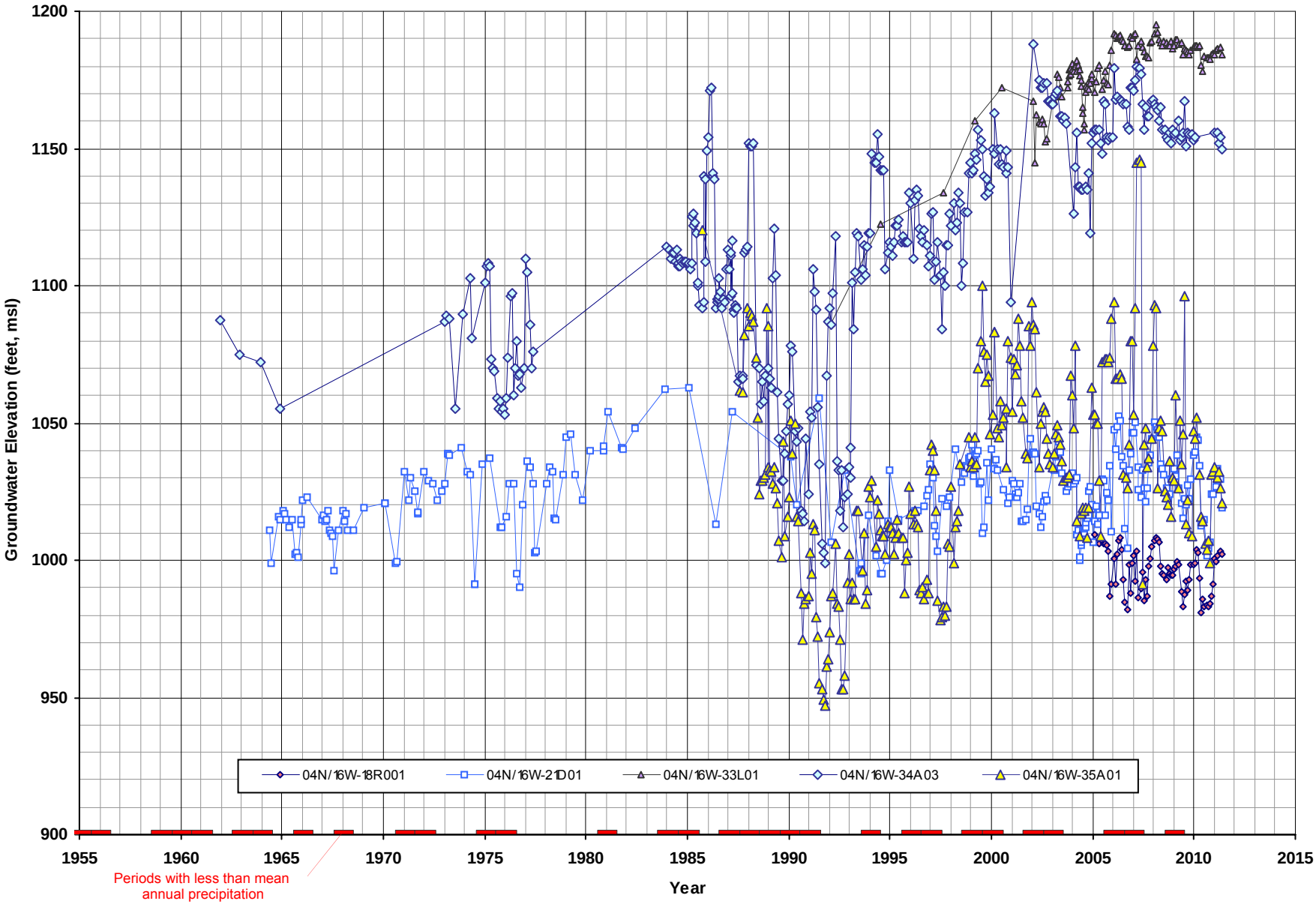

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Figure 3-9
Groundwater Elevations in Saugus Wells

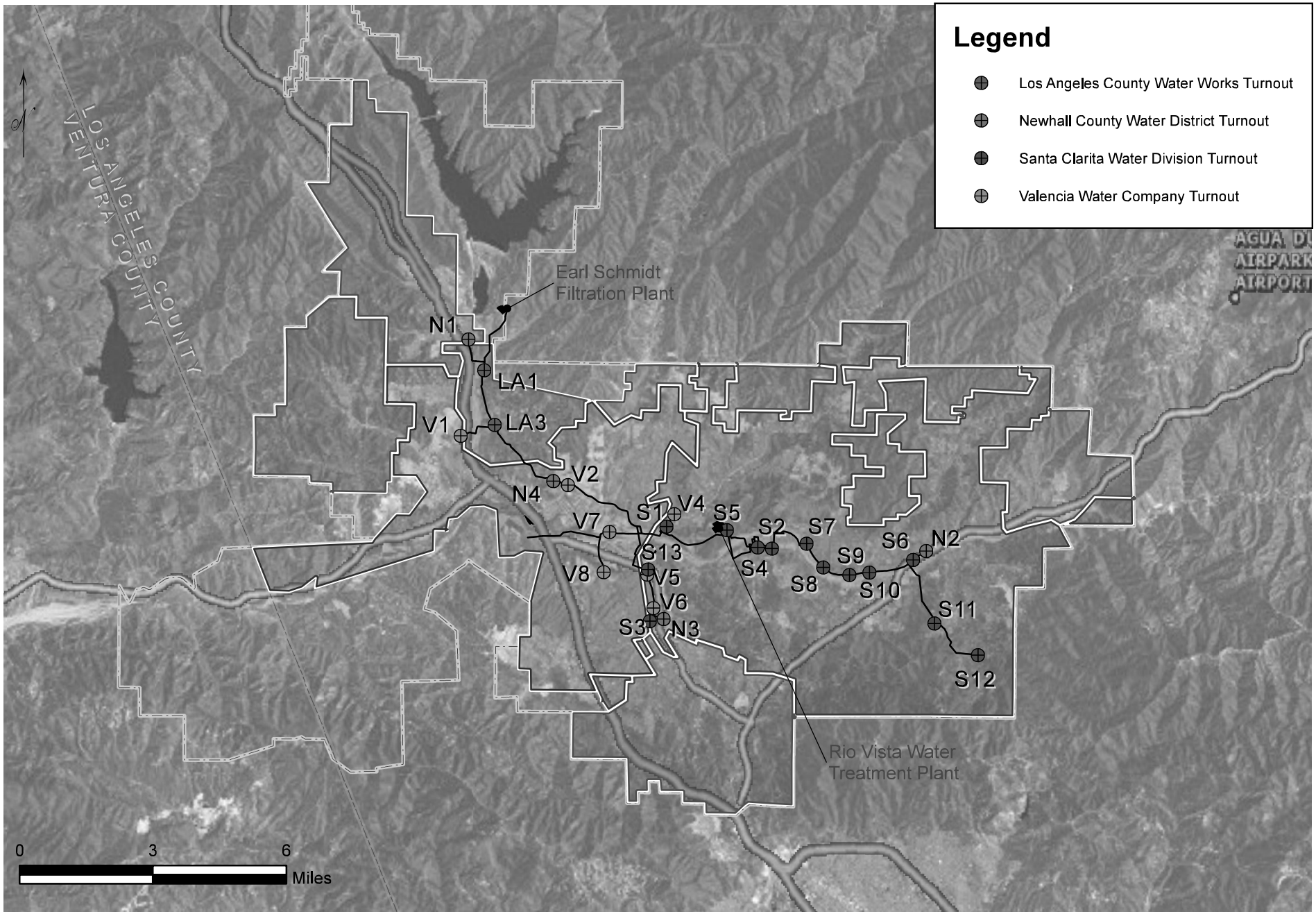

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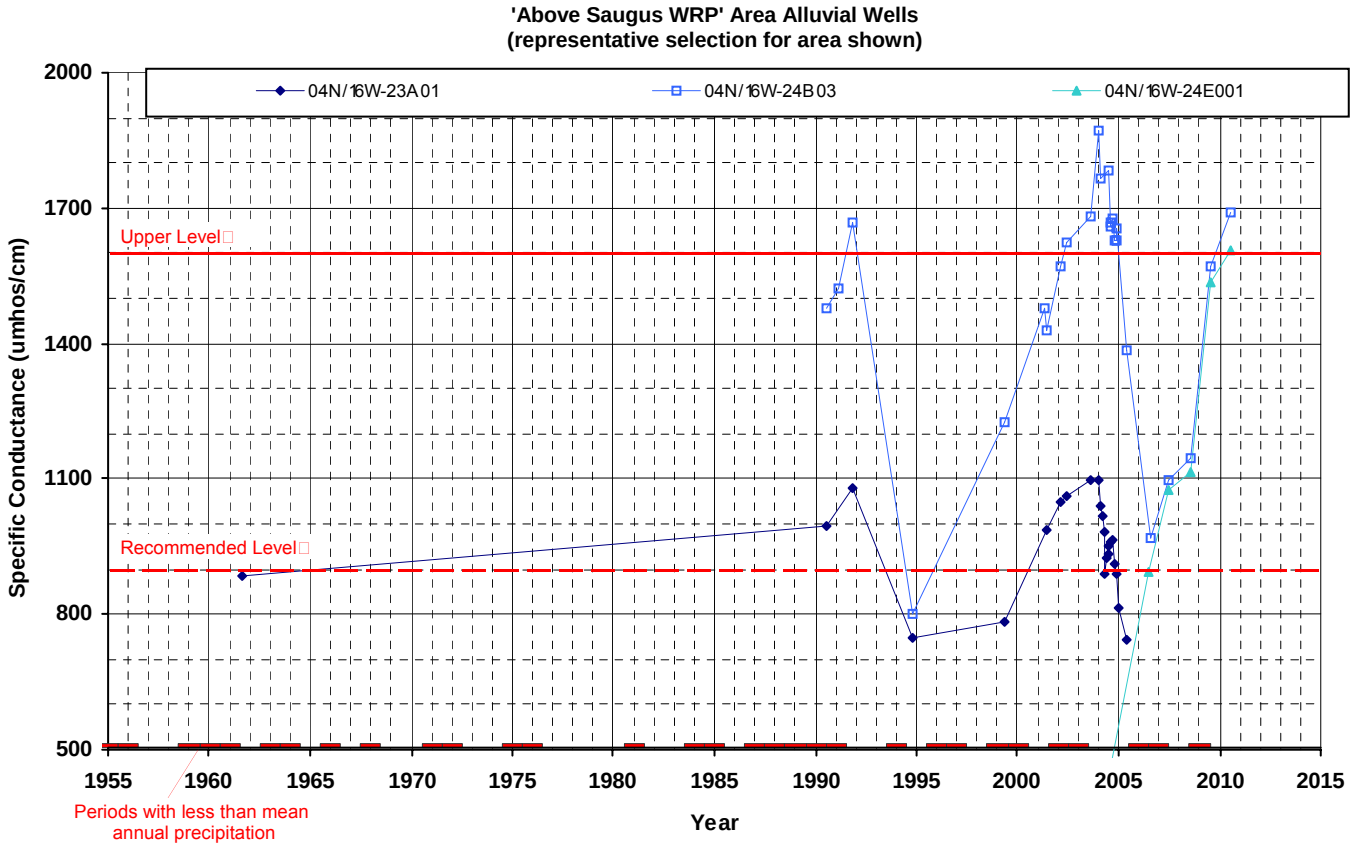
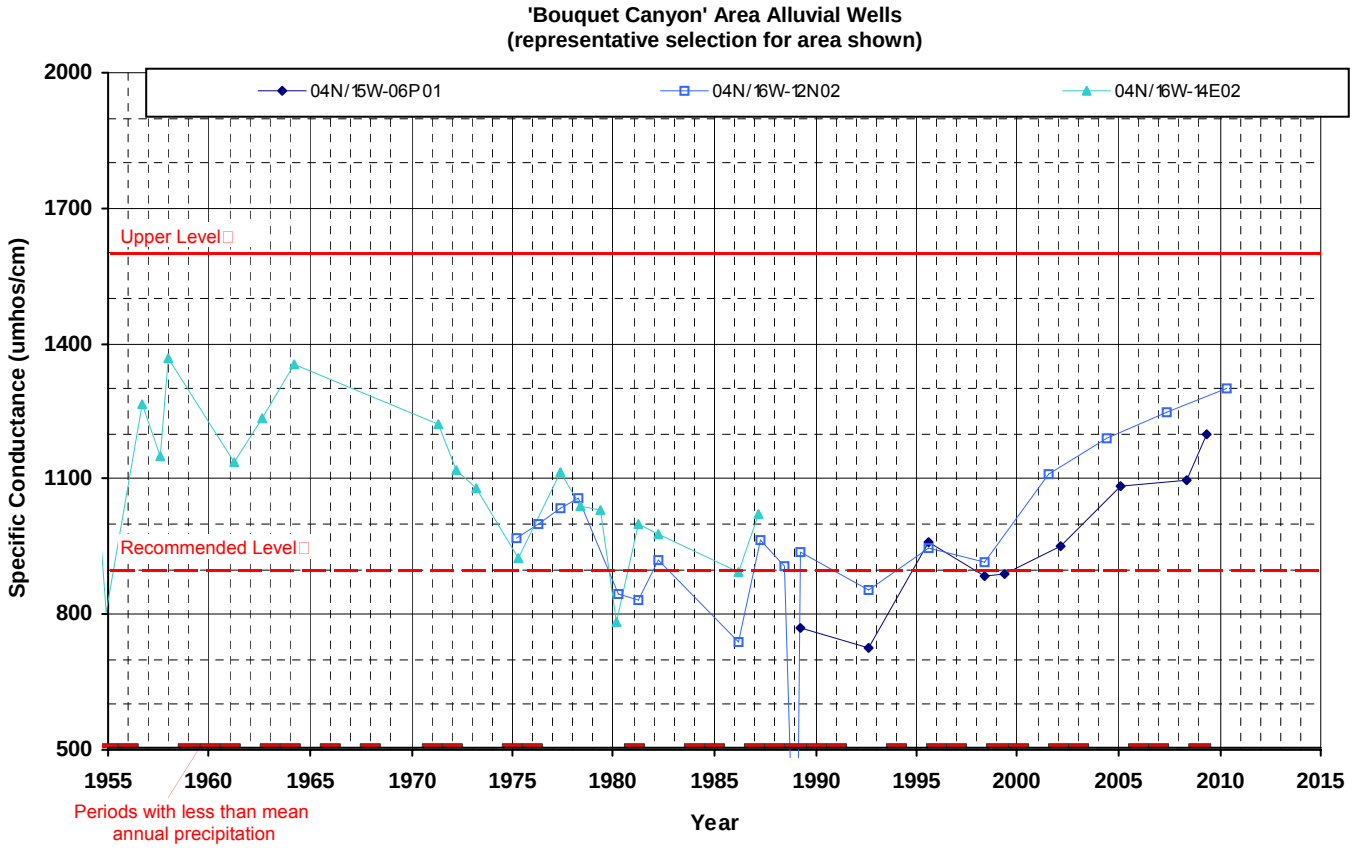
Figure 3-10
Treated Water Distribution System
Castaic Lake Water Agency





California Department of Public Health Secondary Maximum Contaminant Level

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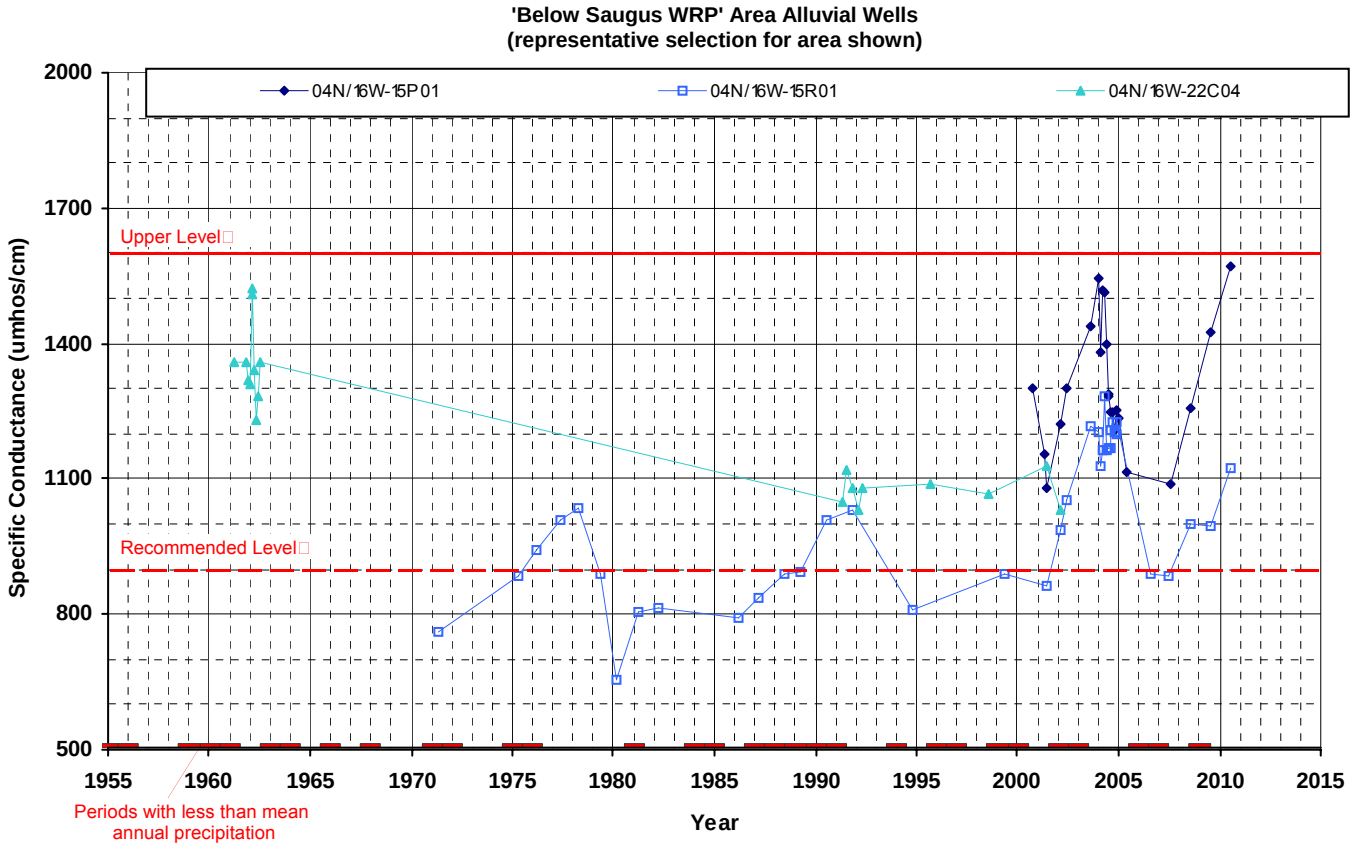
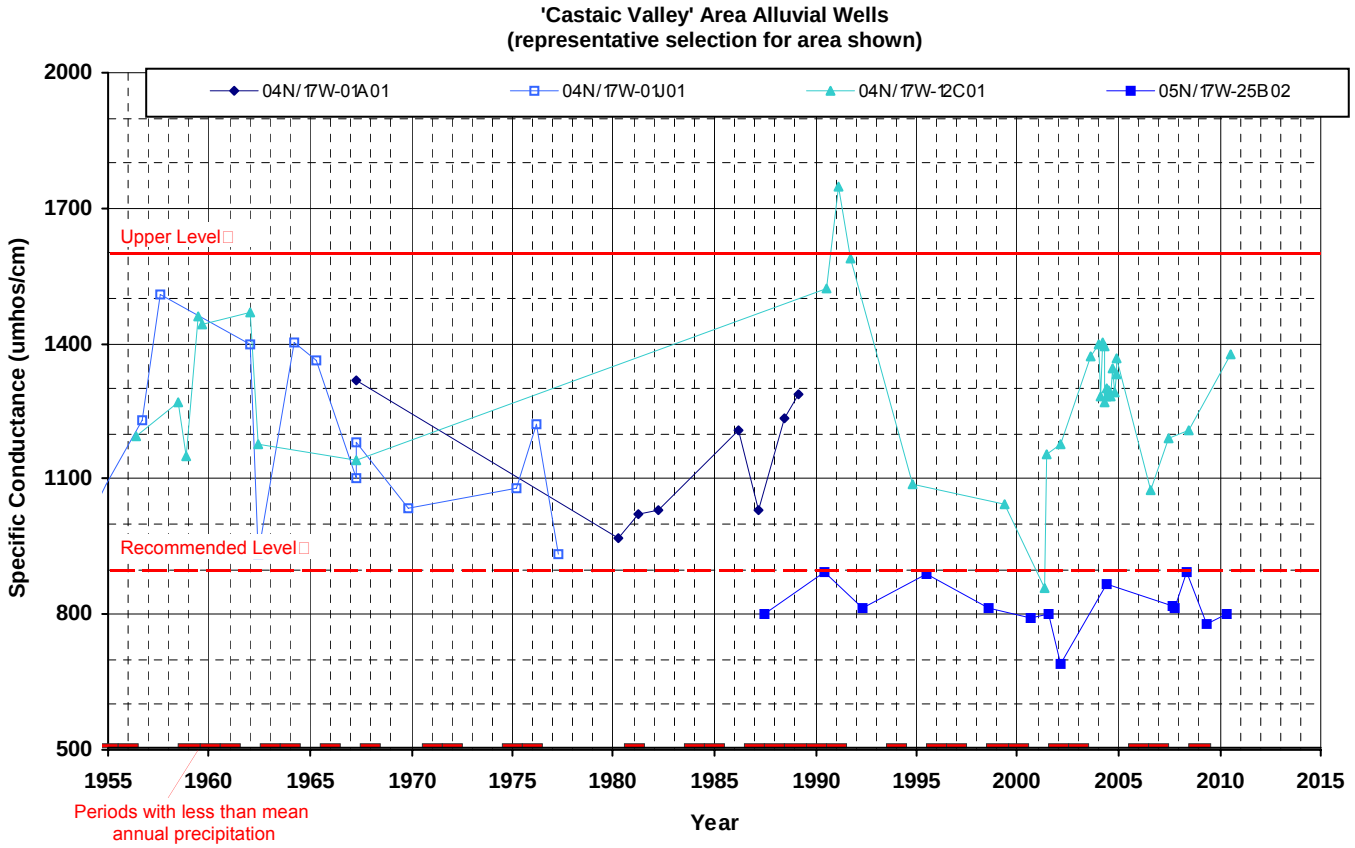
Figure 3-11
Groundwater Quality in Eastern Santa Clarita Valley Alluvial Wells





California Department of Public Health Secondary Maximum Contaminant Level

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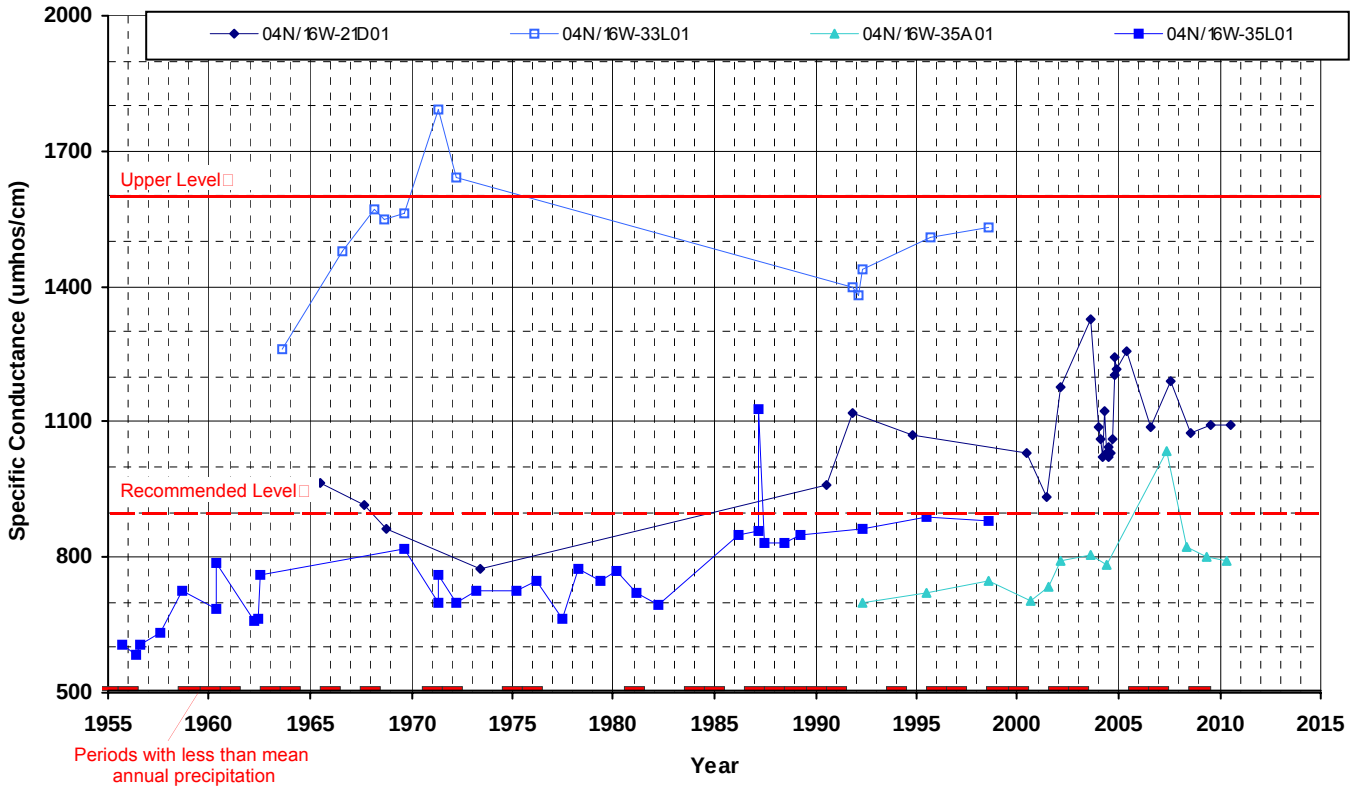
Figure 3-12
Groundwater Quality in Western Santa Clarita Valley Alluvial Wells



California Department of Public Health Secondary Maximum Contaminant Level

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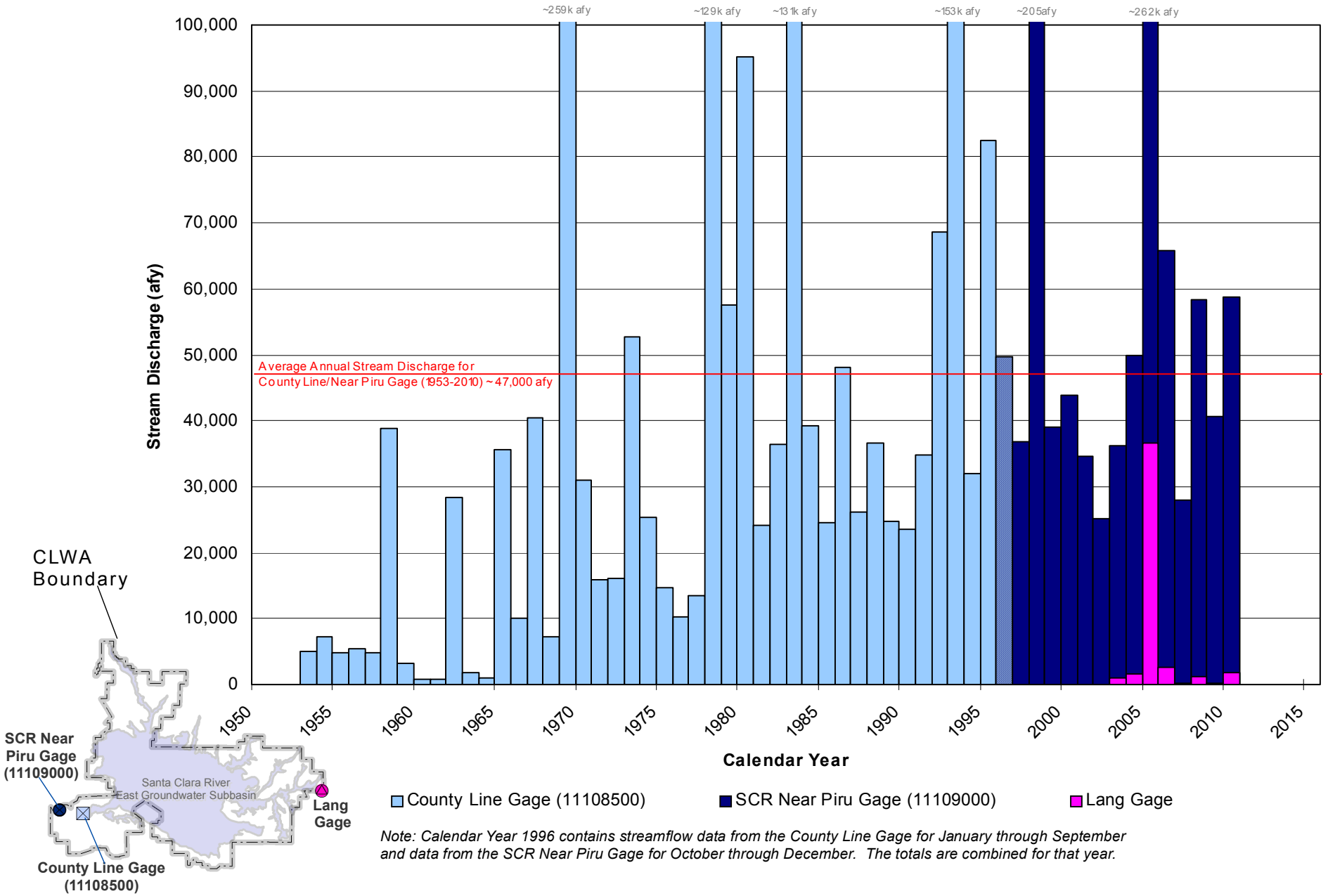
Figure 3-13
Groundwater Quality in Saugus Wells



Note: Calendar Year 1996 contains streamflow data from the County Line Gage for January through September and data from the SCR Near Piru Gage for October through December. The totals are combined for that year.

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Figure 3-14
Annual Stream Discharge
Santa Clara River

4. Summary of 2010 Water Supply and 2011 Outlook

As discussed in the preceding chapters, total water demands in the Santa Clarita Valley were 80,200 af in 2010. This represented a decrease of 6,400 af, or about 7.4 percent, from total demand in 2009 and continues a declining trend in total water demand over the last three years. Of the total demand in 2010, nearly 64,100 af were for municipal water supply, and the balance (16,100 af) was for agricultural and other uses, including estimated individual domestic uses. As detailed in Chapter 2, the total demand in 2010 was met by a combination of local groundwater, SWP and other imported water, and a small amount of recycled water.

The water demand in 2010 was notably lower than the average projection in the 2005 UWMP, (100,050 af), and also lower than the short-term projected demand that was estimated in the 2009 Water Report (82,000-84,000 af). For illustration, historical water use from 1980 through 2010 is plotted in Figure 4-1; also shown with that historical record are the currently projected municipal and agricultural water demands in the 2010 UWMP through 2050. The primary factor causing year-to-year fluctuations in water demands has been weather. In the short term, wetter years have typically resulted in decreased water demand, and drier years have typically resulted in higher water demand. Extended drier periods, however, have resulted in decreases in demand due to conservation and water shortage awareness. The decline in water demand toward the end of the 1987-92 drought is a good example of such reduced demand. Similarly, over the recent multi-year dry period (2006-2009), total water demands progressively declined from historical high in 2007 to the lowest in nearly a decade in 2010.

Adding to these types of demand fluctuations are the recently-observed effects of broad economic conditions. As reflected by the numbers of service connections in each Purveyor service area, growth in 2010 remained low, with addition of a total of only about 400 new service connections, in contrast to about 1,000 new connections each year between 2005 and 2008, and in notable contrast to the predominant growth rate nearly three times higher from the late 1990's through 2004. In addition, the Purveyors were informed by, and have conveyed to the local community, the Governor's Alert in June, 2008 regarding drought conditions and potential water supply shortages, and the Governor's subsequent Drought Emergency Declaration in February, 2009. The widespread awareness of dry conditions throughout the state, aggressive conservation messaging, and the decrease in local growth are prime factors causing total water demand in 2010 to be notably less than each of the preceding four years, and lower than all years since 2001.

The preceding factors are expected to have some continuing effect in 2011, resulting in estimated total water demand that will not continue to decline, but is expected to be only slightly higher than last year. Total municipal water requirements in the first quarter of 2011 were about 10 percent higher than the same period in 2010. Recognizing those early-year conditions, and consistent with the most recent demand projections in the 2010 UWMP, total water demand in 2011 is estimated to be about 82,000 af.

It is expected that both municipal and agricultural water demands in 2011 will continue to be met with a mix of water supplies as in previous years, notably local groundwater and imported SWP and other supplemental water, complemented by recycled water that will continue to supply a small fraction of total water demand.

On April 20, 2011, the allocation of water from the SWP in 2011 was announced to be 80 percent; for CLWA, that equates to 76,160 af of its total Table A Amount of 95,200 af. Combined with local groundwater from the two aquifer systems (50,000 af), total Flexible Storage Account water (6,060 af), net carryover SWP water from 2010 (3,712 af), annual acquisition from Buena Vista Water/R -Rio Bravo Water Storage Districts (11,000 af), and recycled water (500 af), the total available water supplies for 2011 are almost 150,000 af. Consequently, CLWA and the Purveyors anticipate having more than adequate supplies to meet all water demands in 2011. Projected 2011 water supplies and demand are summarized in Table 4-1.

In August, 2007, a federal court ruled that certain operational changes were required of the SWP in order to protect the endangered Delta smelt. With the objective of protecting endangered fish such as the Delta smelt and spring-run salmon, the court order resulted in the preparation of a new Biological Opinion (BO) requiring DWR to implement mitigation requirements with resultant impacts on SWP water supply reliability. The current SWP Delivery Reliability Report 2009, issued in August, 2010, incorporates restrictions on SWP operations according to the Biological Opinions of the U.S. Fish and Wildlife Service and the National Marine Fishery Service issued on December 15, 2008 and June 4, 2009, respectively. However, in December 2010, a federal judge overruled most of the 2008 federal biological opinion and invalidated several of the criteria that reduced SWP's water supply. The effects of this reversal are still not completely known, but will probably result in some relief from SWP pumping restrictions in the long term. The current SWP Delivery Reliability Report 2009 also considers the impacts on SWP delivery reliability due to climate change, sea level rise, and vulnerability of the Delta's conveyance system and structure due to floods and earthquakes. With these factors, the Reliability Report projects long-term reliability of 60 percent during normal year hydrology.

Table 4-1
2011 Water Supply and Demand
(acre-feet)

Projected 2011 Demand [1]		**82,000**
Available 2011 Water Supplies		
Local Groundwater		50,000
Alluvium [2]	*38,500*	
Saugus Formation [3]	*11,500*	
Imported Water		96,932
Table A Amount [4]	*76,160*	
Net Carryover from 2010 [5]	*3,712*	
Buena Vista/Rosedale-Rio Bravo[6]	*11,000*	
Flexible Storage Account (CLWA) [7]	*4,684*	
Flexible Storage Account (Ventura County) [7]	*1,376*	
Yuba Accord[8]	*0*	
Recycled Water		500
Total Available 2011 Supplies		**147,432**
Additional Dry Year Supplies [9]		
Semitropic Groundwater Storage Bank		45,920
2002 Account[10]	*16,650*	
2003 Account[10]	*29,270*	
Rosedale-Rio Bravo Water Banking and Exchange Program		94,513
2005 and 2006 Buena Vista/Rosedale-Rio Bravo Water Acquisition Agreement[11]	*22,000*	
2005 Banking of Table A[12]	*17,800*	
2006 Banking of Table A[12]	*17,800*	
2007 Rosedale Rio-Bravo Banking[12]	*7,298*	
2010 Rosedale Rio-Bravo Banking[13]	*29,615*	
Total Additional Dry Year Supplies		**140,433**

1. Linear interpolation from actual 2010 demand to projected 2015 demand in draft 2010 UWMP.

2. The Alluvium represents 30,000 – 40,000 afy of available supply under local wet-normal conditions, and 30,000 – 35,000 afy under local dry conditions. Available supply in 2011 is shown to be normal year sustainable production in Updated Basin Yield Analysis, August 2009.

3. The Saugus Formation represents 7,500 – 15,000 afy of available water supply under non-drought conditions, and up to 35,000 afy under increasingly dry conditions. Available supply in 2011 is shown to be normal year sustainable production in Updated Basin Yield Analysis, August 2009.

4. CLWA's SWP Table A amount is 95,200 af. The initial 2011 allocation was 25 percent (23,800 af). On December 16, 2010 the allocation was increased to 50 percent (47,600 af), On January 20, 2011 the allocation was increased to 60 percent (57,120 af). On March 15, 2011 the allocation was increased to 70 percent (66,640 af). On April 20, 2011 the allocation was increased to 80 percent (76,160 af).

5. Of the 26,186 af of total available 2010 carryover, all but 3,712 af was returned to the SWP as the system reservoirs went in a 'spill' mode due to a hydrological wet year in 2010/2011 and the carryover water in storage needed to be reassigned.

6. 2011 annual supply from Buena Vista / Rosedale-Rio Bravo Water Acquisition Agreement.

7. CLWA can directly utilize up to 4,684 af of storage capacity in Castaic Lake. By agreement in 2005, CLWA can also utilize 1,376 af of Ventura County SWP contractors' flexible storage capacity in Castaic Lake.

8. Up to 850 af of non-SWP water supply is available to CLWA in critically dry years as a result of agreements among DWR, Yuba County Water Agency, and the U.S. Bureau of Reclamation regarding settlement of water rights issues on the Lower Yuba River (Yuba Accord). CLWA opted to not take any Yuba water in 2011.

9. Does not include other reliability measures available to CLWA and the retail water Purveyors. These measures include short-term exchanges, participation in DWR's dry-year water purchase programs, local dry-year supply programs and other future groundwater storage programs.

10. Net recoverable water after banking 24,000 af and 32,522 af in 2002 and 2003, respectively and recovering 4,950 af in 2009.

11. Water stored in Rosedale-Rio Bravo Water Banking and Exchange Program pursuant to the Buena Vista/Rosedale-R

CLWA staff has assessed the impact of the current Reliability Report on the CLWA reliability analysis contained in the Agency's 2005 UWMP and concluded in the 2010 UWMP that current and anticipated supplies are available to meet anticipated water supply needs through the year 2050. The preceding discussion of SWP supply should be considered by noting that, while the SWP Reliability Report represents a reasonable scenario with respect to long term reliability, recent reductions in supply reduce the difference between available supply and demand in the future, thereby making the CLWA service area more subject to shortages in certain dry years. Accordingly, the reduction in SWP supply reinforces the need to continue diligent efforts to conserve potable water and increase the use of recycled water to maximize utilization of potable water supplies.

As discussed in Chapter 5, CLWA and the retail water purveyors have worked with Los Angeles County and the City of Santa Clarita to aggressively implement water conservation in the CLWA service area. In terms of short-term water supply availability, however, CLWA and the Purveyors have determined that, while current operational changes of the SWP are in effect, there are sufficient supplemental water supplies, including SWP water, to augment local groundwater and other water supplies such that overall water supplies will be sufficient to meet projected water requirements. CLWA, the retail water Purveyors, Los Angeles County and the City of Santa Clarita have formed the Santa Clarita Valley Water Committee (formerly convened as the Santa Clarita Drought Committee). The specific purpose of the committee is to work collaboratively to manage the conjunctive use of the Valley's water supplies and ensure the progressive implementation of water use efficiency programs in the Santa Clarita Valley.

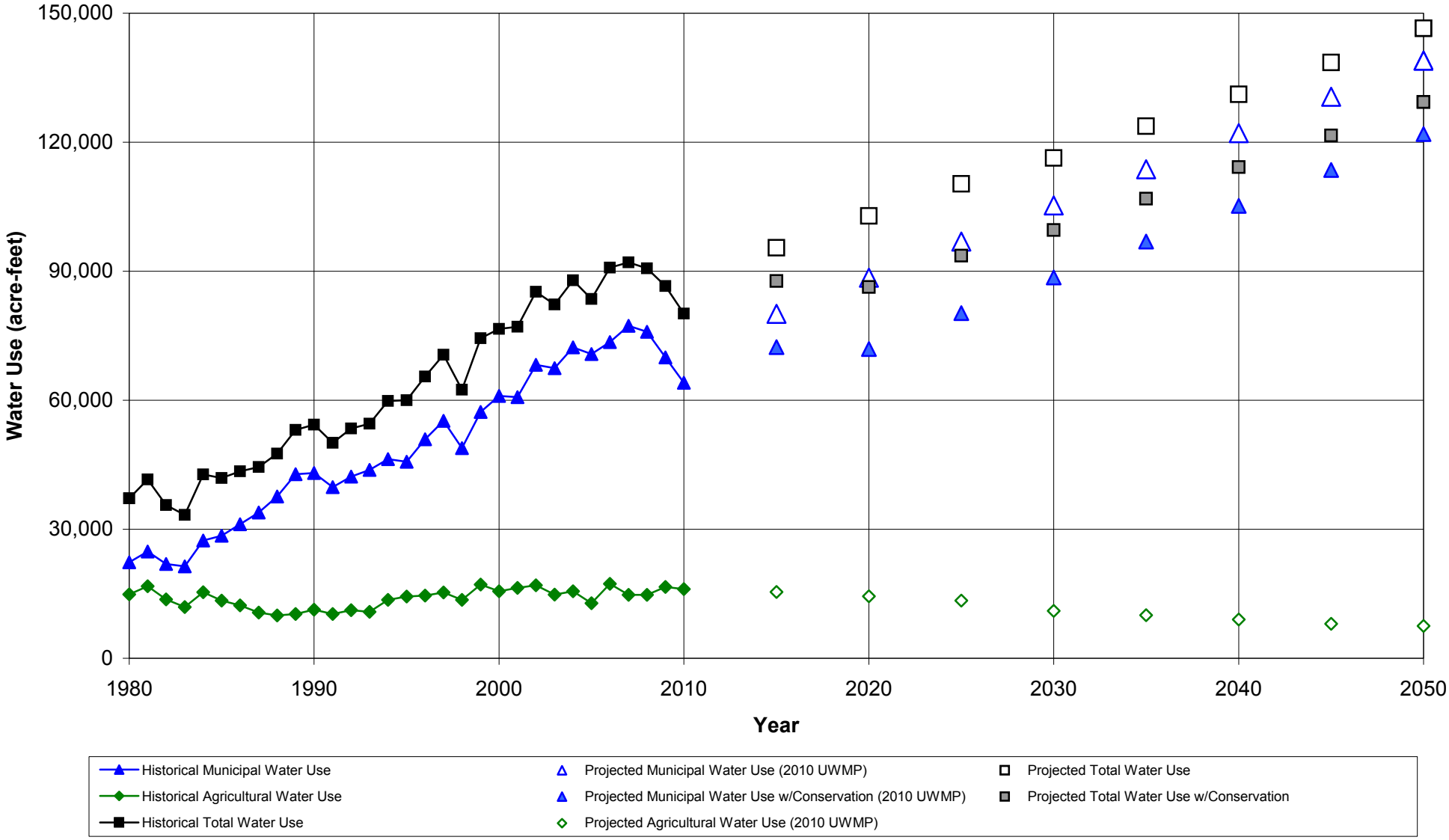
In addition to the regular and previously banked water supplies described above to meet projected demand in 2011, a residual of nearly 46,000 af of recoverable water remains stored in the Semitropic Groundwater Storage Bank in Kern County. Nearly 95,000 af of recoverable water are also stored in the long-term Rosedale-Rio Bravo Water Banking and Exchange Program, also in Kern County. After recovery of 4,950 af of banked water from Semitropic in 2009, 1,650 af of which were used in 2009 and 3,300 af of which were used in 2010, remaining recoverable water in all the Kern County storage banks is slightly more than 140,000 af. That component of overall water supply is separately reflected in Table 4-1 because it is intended for future dry-year supply and will not be used for 2011 water supply.

CLWA and the Purveyors have implemented a number of projects that are part of an overall program to provide facilities needed to firm up imported water supplies during times of drought. These involve water conservation, surface and groundwater storage, water transfers and exchanges, water recycling, additional short-term pumping from the Saugus Formation, and

increasing CLWA's imported supply. This overall strategy is designed to meet increasing water demands while assuring a reasonable degree of supply reliability.

Part of the overall water supply strategy is to provide a blend of groundwater and imported water to area residents to ensure consistent quality and reliability of service. The actual blend of imported water and groundwater in any given year and location in the Valley is an operational decision and varies over time due to source availability and operational capacity of Purveyor and CLWA facilities. The goal is to conjunctively use the available water resources so that the overall reliability of water supply is maximized while utilizing local groundwater at a sustainable rate.

For long-term planning purposes, water supplies and facilities are added on an incremental basis and ahead of need. It would be economically unsound to immediately, or in the short term, acquire all the facilities and water supplies needed for the next twenty to thirty years. This would unfairly burden existing customers with costs that should be borne by future customers. There are numerous ongoing efforts to produce an adequate and reliable supply of good quality water for Valley residents. Water consumers expect that their needs will continue to be met with a high degree of reliability and quality of service. To that end, CLWA's and the Purveyors' stated reliability goal is to deliver a reliable and high quality water supply for their customers, even during dry periods. Based on conservative water supply and demand assumptions contained in the 2010 UWMP for a planning horizon over the next 40 years, in combination with conservation of non-essential demand during certain dry years, CLWA and the Purveyors believe implementing their water plan will successfully achieve this goal.



LUHDORFF & SCALMANINI
CONSULTING ENGINEERS

Figure 4-1
Historical and Projected Water Use
Santa Clarita Valley

5. Water Conservation

The California Urban Water Conservation Council (CUWCC) was formed in 1991 through the Memorandum of Understanding (MOU) R

(BMPs) included in the MOU are intended to reduce California's long-term urban water demands. While the BMPs are currently implemented by the MOU signatories on a voluntary basis, they are specified as part of the Demand Management Measures section of the Urban Water Management Planning Act. Water conservation can achieve a number of goals, such as:

- meeting legal mandates
- reducing average annual potable water demands
- reducing sewer flows
- reducing demands during peak seasons
- meeting drought restrictions
- reducing carbon footprint, waste water flows and urban runoff.

CLWA signed the urban MOU in 2001 on behalf of its wholesale service area, and pledged to implement several BMPs at a wholesale support level (listed below). NCWD signed the MOU in 2002 and VWC signed the MOU in 2006, both on behalf of their respective retail service areas. As separate MOU signatories and in their respective roles as retailers, NCWD and VWC are committed to implementing all BMPs that are feasible and applicable in their service areas. Efforts are made to coordinate with CLWA and the other Purveyors wherever possible to maximize efficiency and ensure the cost effectiveness of NCWD's and VWC's conservation program.

In coordination with the Purveyors, CLWA has been implementing the following BMPs (which pertain to wholesalers) for several years (some prior to signing the MOU in 2001) on a Valley-wide scale:

Foundational BMPs:
BMP 1 Utility Operation Programs
BMP 2 Education Programs

Programmatic BMPs:
BMP 3 Residential
BMP 4 Commercial, Industrial and Institutional
BMP 5 Landscape

In addition to these efforts, as discussed in Chapter 1, CLWA installed a weather station at its headquarters adjacent to the Rio Vista Water Treatment Plant in 2006 to augment precipitation records and provide a local reference for irrigation water management. This station became part a network of over 120 automated weather stations in the state of California that make up the California Irrigation Management Information System (CIMIS). The Department of Water Resources (DWR) m

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Additional savings are occurring Valley-wide due to state interior plumbing code requirements that have been in effect since 1992, as well as due to changes in lot size and reduction in exterior square footage of new housing and commercial developments. The City of Santa Clarita and County of Los Angeles have also taken a more active conservation role and have begun implementing water efficient devices and practices on the properties they own and manage. All of these efforts have begun to impact overall demand in the Valley, as can be seen in the significant decline in total water demand over the last three years. The Valley's water suppliers continue to monitor water demand trends through time to assess those factors that are accounting for the reduction, and to attempt to quantify them.

More recently with regard to water conservation, CLWA and the retail water Purveyors entered into an MOU in 2007 to prepare a Santa Clarita Valley Water Use Efficiency Strategic Plan (the Plan). The purpose of the plan is to prepare a comprehensive long-term conservation plan for the Santa Clarita Valley by adopting objectives, policies and programs designed to promote proven and cost effective conservation practices. The Plan provides a detailed study of existing residential and commercial water use and recommends programs designed to reduce the overall Valley-Wide water demand by 10 percent by 2030. The programs are designed to provide Valley residents with the tools and education to use water more efficiently. The six programs identified in the Plan are:

- High Efficiency Toilet Rebate Program
- CII Audits & Customized Incentive Program
- Large Landscape Audits & Customized Incentive Program
- Landscape Contractor Certification and Weather Based Irrigation Controller Program
- High Efficiency Washer Rebate Program
- Public Information and Education Programs

In addition to the six programs designed for existing customers, the Plan also identifies three other key factors that will help reduce the valley's overall water demand: passive conservation, inflation, and new more water-efficient building ordinances.

Finally, the Plan includes an Appendix with more aggressive water use efficiency measures designed to meet a potential 20 percent reduction in water use. This includes funding more active conservation programs, retrofit on resale legislation, water rate reform, water budget based rates, and a more aggressive recycled water program. Implementation of the majority of the programs identified in the Plan began in 2010 through funding by CLWA on behalf of all the Purveyors.

In addition to this effort, the water Purveyors worked with City and County agencies to implement the new State Model Efficient Landscape ordinance for the Santa Clarita Valley. This ordinance focused primarily on new construction aimed at reducing overall water demands by requiring efficient landscape design and delivery systems. Implementation of the ordinances occurred in 2010.

Finally, in 2008, Governor Schwarzenegger issued a proclamation for all Californians to reduce their per capita water consumption by 20 percent by the year 2020. In November 2009, the Governor and California's legislature reached an historic agreement ensuring long-term water supply reliability for California, as well as restoring and protecting the Sacramento-San Joaquin Delta and other ecologically sensitive areas. The agreement is comprised of four policy bills and an $11.4 billion bond measure. One of the policy bills (SBx7-7) identifies reporting criteria and guidelines for water utilities to track and measure progress toward achieving the 20 percent per capita demand reduction goal. Water utilities are required to implement strategies and report progress in their Urban Water Management Plans. In 2010, DWR provided guidance and criteria for implementing the provisions of this new law; that guidance provided clarification regarding individual (per-capita) a (Valley-wide) conservation goals, which was utilized in the preparation of the 2010 update of the UWMP for the Santa Clarita Valley.

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2010 Urban Water Management Plan

Final

Prepared for:

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List of Abbreviations and Acronyms

The following abbreviations and acronyms are used in this report.

AB	Assembly Bill
ACOE	U.S. Army Corps of Engineers
Act	California Urban Water Management Planning Act
AF	acre-feet
AFY	acre-feet per year
Agency	Castaic Lake Water Agency
APA	Administrative Procedure Act
AWRM	Alternative Water Resources Management Program
AWWARF	American Water Works Association Research Foundation
Basin	Santa Clara River Valley Groundwater Basin, East Subbasin
BDCP	Bay Delta Conservation Plan
BMPs	Best Management Practices
BO	Biological Opinion
BVWSD	Buena Vista Water Storage District
CCF	One Hundred Cubic Feet

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CCR	Consumer Confidence Report
CEQA	California Environmental Quality Act
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CESA	California Endangered Species Act
CLWA	Castaic Lake Water Agency
CUWCC	California Urban Water Conservation Council
CVP	Central Valley Project
DBP	Disinfection by-products
D/DBP	Disinfectants and Disinfectant By-Products
Delta	Sacramento-San Joaquin Delta
DFG	California Department of Fish and Game
DHS	California Department of Health Services
District	Los Angeles County Waterworks District No. 36
DMM	Demand Management Measure
DOF	Department of Finance
DPH	Department of Public Health
DTSC	Department of Toxic Substances Control
DWR	California Department of Water Resources
EC	Electrical conductivity
Edison	Southern California Edison
EIR	Environmental Impact Report
EPA	Environmental Protection Agency
ESA	Endangered Species Act
ETo	evapotranspiration
FWS	United States Fish and Wildlife Service
GPCD	gallons per capita per day
gpd	gallons per day
gpm	gallons per minute
GSWI	groundwater and surface water interaction model
GWMP	Groundwater Management Plan
HAA5	Haloacetic Acids
KCWA	Kern County Water Agency
LACDRP	Los Angeles County Department of Regional Planning
LACSD	Sanitation Districts of Los Angeles County
LACWWD 36	Los Angeles County Waterworks District No. 36

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M&I	Municipal and Industrial
MCL	Maximum contaminant level
Metropolitan	Metropolitan Water District of Southern California
MAF	million acre-feet
mgd	million gallons per day
mg/L	milligrams per liter
MOU	Memorandum of Understanding Regarding Water Conservation in California
MWD	Metropolitan Water District of Southern California
NCWD	Newhall County Water District
NEPA	National Environmental Protection Act
NMFS	National Marine Fisheries Service
NPDES	National Pollutant Discharge Elimination System
OVOV	One Valley One Vision
Plan	Urban Water Management Plan 2010
PPHH	persons-per-household
PUC	California Public Utilities Commission
Purveyor	Supplier of drinking water at the retail level (also retailer and retail purveyor)
RAP	Remedial Action Plan
RO	Reverse Osmosis
RRB	Rosedale-Rio Bravo
RRBWSD	Rosedale-Rio Bravo Water Storage District
RPA	Reasonable and Prudent Alternative
RTP	Regional Transportation Plan
RWQCB	Regional Water Quality Control Board
SCAG	Southern California Association of Governments
SCLLC	Santa Clarita LLC
SCOPE	Santa Clarita Organization for Planning the Environment
SCVSD	Santa Clarita Valley Sanitation District
SCWD	Santa Clarita Water Division
SRWS	self-regenerating water-softeners
Semitropic	Semitropic Water Storage District
SSO	site specific objective
SOC	Synthetic organic compounds
SWP	State Water Project
Suppliers	CLWA and purveyors collectively

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SWRCB	State Water Resources Control Board
TDS	Total Dissolved Solids
TMDL	Total Maximum Daily Load
THM	Trihomethanes
TTHM	Total Trihalomethanes
TOC	Total Organic Carbon
umhos/cm	Micromhos per centimeter
USCR	Upper Santa Clara River
UWMP	Urban Water Management Plan
Valley	Santa Clarita Valley
VOC	Volatile organic compounds
VWC	Valencia Water Company
WTP	Wastewater Treatment Plant
WRP	Water Reclamation Plant
WQOs	Water Quality Objectives

RESOLUTION NO. 2809

RESOLUTION OF THE CASTAIC LAKE WATER AGENCY BOARD OF DIRECTORS ADOPTING THE 2010 URBAN WATER MANAGEMENT PLAN

WHEREAS, the California Urban Water Management Planning Act, Water Code Section 10610, et seq. (the Act) mandates that every urban water supplier providing water for municipal purposes to more than 3,000 customers or supplying more than 3,000 acre feet of water annually, prepare and adopt an updated urban water management plan (UWMP) at least once every five years on or before December 31, in years ending five and zero; and

WHEREAS, the Castaic Lake Water Agency (CLWA), which includes the CLWA Santa Clarita Water Division (SCWD), is an urban water supplier for purposes of the Act, and in 2005 approved and adopted its most recent UWMP and submitted its 2005 UWMP to the California Department of Water Resources (DWR); and

WHEREAS, the Water Conservation Act of 2009, Water Code Section 10608 et seq. (SBX7-7), extended the time by which urban retail water suppliers must adopt 2010 UWMPs to July 1, 2011 to permit coordination between urban wholesale water suppliers and urban retail water suppliers and, among other things, established requirements for urban retail water suppliers to prepare urban water use targets in accordance with the goals of SBX7-7 to reduce statewide daily per capita water use by 15 percent by the year 2015 and 20 percent by the year 2020; and

WHEREAS, the SCWD is an "urban retail water supplier" for purposes of SBX7-7 because it directly provides potable municipal water to more than 3,000 end users; and

WHEREAS, Section 10620(d)(1) of the Act encourages urban water suppliers to satisfy the requirements of the Act by participation in area wide urban water management planning where those plans will reduce preparation costs and contribute to the achievement of conservation and efficient water use; and

WHEREAS, CLWA, in cooperation with SCWD, Newhall County Water District (NCWD) and the Valencia Water Company (VWC), prepared a document labeled "Public Review Draft 2010 Urban Water Management Plan" for the CLWA service area (Draft 2010 UWMP), upon which Los Angeles County Waterworks District No. 36 (LACWWD #36) participated as a cooperating agency; and

WHEREAS, in accordance with applicable law, including the requirements of the Act and of SBX7-7, CLWA has prepared the Draft 2010 UWMP and has undertaken certain agency coordination, public notice, public involvement and outreach, public comment, and other procedures in relation to the Draft 2010 UWMP; and

WHEREAS, as authorized by Section 10620(e) of the Act, CLWA has prepared its Draft 2010 UWMP with its own staff, with the assistance of consulting professionals and in cooperation with other governmental agencies, and has utilized and relied upon industry standards and the expertise of industry professionals in preparing its Draft 2010 UWMP, and has, in part, utilized and relied upon the DWR Guidebook to Assist Urban Water Suppliers to Prepare a 2010 Urban Water Management Plan (March 2011) and the DWR Methodologies for Calculating Baseline and Compliance Urban Per Capita Water Use (For the Consistent Implementation of the Water Conservation Act of 2009) (February 2011) in preparing its Draft 2010 UWMP; and

WHEREAS, CLWA began its public outreach and community involvement in the preparation of the Draft 2010 UWMP in May 2010, with its first scheduled community workshop, followed by five more community workshops and three public hearings; and

WHEREAS, pursuant to Section 10621(b) of the Act, on March 3, 2011, CLWA notified the City of Santa Clarita and the Counties of Ventura and Los Angeles that it would be preparing its 2010 UWMP, and that it would be releasing the Draft 2010 UWMP in April 2011, and subsequently met with, consulted with and obtained comments from the City of Santa Clarita, the United Water Conservation District and the County of Los Angeles; and

WHEREAS, in accordance with applicable law, including Water Code Sections 10608.26 and 10642, and Government Code Section 6066, CLWA made its Draft 2010 UWMP available for public inspection, and provided notice of the time and place of each joint public hearing on the Draft UWMP; and

WHEREAS, on March 23, 2011, CLWA and NCWD held a joint public hearing, properly noticed pursuant to Section 10642 of the Act and Government Code Section 6066, at which time CLWA's Board of Directors reviewed draft sections and tables for inclusion in the Draft 2010 UWMP, and, as part of that review, considered a presentation regarding the Draft 2010 UWMP by its staff and consultants, and oral and written public comments; and

WHEREAS, on May 18, 2011, CLWA and NCWD held a second joint public hearing, properly noticed pursuant to Section 10642 of the Act and Government Code Section 6066, at which time CLWA's Board of Directors considered further oral and written public comments, and responses to those comments by its staff and consultants, which included a presentation of the changes that had been made in the Public Review Draft 2010 UWMP; and

WHEREAS, on June 15, 2011, CLWA circulated to each of the members of its Board of Directors a Final Draft 2010 UWMP; and

WHEREAS, on June 22, 2011, CLWA and NCWD held a properly noticed joint public meeting and public hearing to consider adoption of the Final Draft 2010 UWMP, at which time CLWA's Board of Directors considered further oral and written public comments, and responses to those comments by its staff and consultants, which included a presentation of the changes that had been made in the Final Draft 2010 UWMP, and reviewed and considered adoption of the Final Draft 2010 UWMP; and

WHEREAS, pursuant to Water Code Section 10620(d)(2), CLWA coordinated the preparation of its Draft 2010 UWMP and Final Draft 2010 UWMP with other appropriate agencies in the area, including other water suppliers that share a common source, water management agencies and relevant public agencies, to the extent practicable; and

WHEREAS, pursuant to Water Code Section 10620(f), CLWA describes in the Draft 2010 UWMP and in the Draft Final 2010 UWMP water management tools and options used by CLWA that will maximize resources and minimize the need to import water from other regions; and

WHEREAS, pursuant to Water Code Section 10641, CLWA consulted with and obtained comments from those public agencies or persons with special expertise with respect to demand management methods and techniques; and

WHEREAS, CLWA has encouraged the active involvement of diverse social, cultural and economic elements of the population within the Agency's service area with regard to the preparation of the Draft UWMP and Final Draft UWMP, allowed input by members of the public and any other interested party regarding all aspects of the Draft 2010 UWMP and Final Draft 2010 UWMP, allowed community input regarding SCWD's implementation plan for complying with SBX7-7, considered the economic impacts of the SCWD's implementation plan for complying with SBX7-7 and adopted Method 1 under Water Code Section 10608.20(b) for determining its urban water use targets; and

WHEREAS, to assure public participation in the process, CLWA has exceeded the requirements of the Act, by holding more than one public hearing; and

WHEREAS, the CLWA Board of Directors has considered the public and Board comments made at the three public hearings, as well as all written public comments on the Draft 2010 UWMP and the Final Draft 2010 UWMP distributed to the Board of Directors; and

WHEREAS, the CLWA Board of Directors has carefully reviewed the Final Draft 2010 UWMP, any errata, revisions and modifications made at the hearing; and

WHEREAS, the CLWA Board of Directors has carefully reviewed and considered the purposes and requirements of the Act and SBX7-7, the contents of the Final Draft 2010 UWMP, any errata, revisions and modifications made at the hearing, the documentation contained in the administrative record in support of the Final Draft 2010 UWMP, and all public and agency input received with regard to the Final Draft 2010 UWMP, and has determined that the factual analyses and conclusions set forth in the 2010 UWMP are supported by substantial evidence.

NOW THEREFORE, BE IT RESOLVED that this Board of Directors of Castaic Lake Water Agency does hereby adopt Method 1 under Water Code Section 10608.20(b) for determining its urban water use targets, and the Final Draft 2010 UWMP attached hereto as Exhibit "A" and incorporated herein by this reference, including any errata, revisions and modifications made at the hearing, is hereby approved and adopted as CLWA's 2010 Urban Water Management Plan, and filed with the Secretary of the Board; and

RESOLVED FURTHER that the General Manager of the Agency is hereby authorized and directed to include a copy of this Resolution in the Agency's 2010 Urban Water Management Plan and, in accordance with Water Code Section 10644(a), to file the 2010 Urban Water Management Plan with the California Department of Water Resources, the California State Library, and any city or county within which the Agency provides water supplies within thirty (30) days of this adoption date; and

RESOLVED FURTHER that in accordance with Water Code Section 10645, the General Manager is hereby authorized and directed to make the 2010 Urban Water Management Plan available for public review during normal business hours at CLWA's administrative offices at 27234 Bouquet Canyon Road, Santa Clarita, CA, not later than thirty (30) days after filing a copy thereof with the California Department of Water Resources; and

RESOLVED FURTHER that in accordance with Water Code Section 10635(b), the General Manager is hereby authorized and directed to provide that portion of the 2010 Urban Water Management Plan prepared pursuant to Water Code Section 10635(a) to any city or county within which the Agency provides water supplies not later than sixty (60) days after filing a copy thereof with the California Department of Water Resources; and

RESOLVED FURTHER in accordance with the Urban Water Management Planning Act and SBX7-7, including, but not limited to, the Agency's Water Conservation Programs and its Water Shortage Contingency Plan, the General Manager is hereby authorized and directed to implement the components of the 2010 Urban Water Management Plan; and

RESOLVED FURTHER that the General Manager is authorized and directed to recommend to the Board of Directors additional steps necessary or appropriate to effectively carry out the implementation of the 2010 Urban Water Management Plan, the Urban Water Management Planning Act and SBX7-7.

Vice President

I, the undersigned, hereby certify I am the duly appointed and acting Secretary of the Castaic Lake Water Agency and at a regular meeting of the Board of Directors of said Agency held on Wednesday, June 22, 2011, the foregoing Resolution No. 2809 was duly and regularly adopted by said Board, and that said resolution has not been rescinded or amended since the date of its adoption, and it is now in full force and effect.

DATED: June 22, 2011

April Jacobs, Secretary

EXHIBIT "A"

FINAL DRAFT 2010 UWMP
(Attached hereto)

RESOLUTION NO. 2011-10

RESOLUTION OF THE BOARD OF DIRECTORS OF NEWHALL COUNTY WATER DISTRICT ADOPTING ITS 2010 URBAN WATER MANAGEMENT PLAN

WHEREAS, the California Urban Water Management Planning Act, Water Code Section 10610, et seq. (the Act) mandates that every urban water supplier providing water for municipal purposes to more than 3,000 customers or supplying more than 3,000 acre feet of water annually, prepare and adopt an updated urban water management plan (UWMP) at least once every five years on or before December 31, in years ending five and zero; and

WHEREAS, the Newhall County Water District (NCWD) is an urban water supplier for purposes of the Act, and in 2005 approved and adopted its most recent UWMP and submitted its 2005 UWMP to the California Department of Water Resources (DWR); and

WHEREAS, the Water Conservation Act of 2009, Water Code section 10608 et seq. (SBX7-7), extended the time by which urban retail water suppliers must adopt 2010 UWMPs to July 1, 2011 and, among other things, established requirements for urban retail water suppliers to prepare urban water use targets in accordance with the goals of SBX7-7 to reduce statewide daily per capita water use by 15 percent by the year 2015 and 20 percent by the year 2020; and

WHEREAS, SBX7-7 was amended in 2010, extending the time by which urban water wholesale suppliers must adopt 2010 UWMPs to July 1, 2011, to permit coordination between urban wholesale water suppliers and urban retail water suppliers; and

WHEREAS, section 10620(d)(1) of the Act encourages urban water suppliers to satisfy the requirements of the Act by participation in area wide urban water management planning where those plans will reduce preparation costs and contribute to the achievement of conservation and efficient water use; and

WHEREAS, NCWD, Castaic Lake Water Agency (CLWA), Santa Clarita Water Division (SCWD) and the Valencia Water Company (VWC) collectively referred to as the Water Suppliers, prepared a document labeled "Public Review Draft 2010 Urban Water Management Plan" (Draft 2010 UWMP), upon which Los Angeles County Waterworks District No. 36 (LACWWD #36) participated as a cooperating agency; and

WHEREAS, in accordance with applicable law, including the requirements of the Act and of SBX7-7, the Water Suppliers have prepared the Draft 2010 UWMP and have undertaken certain agency coordination, public notice, public involvement and outreach, public comment, and other procedures in relation to the Draft 2010 UWMP; and

WHEREAS, as authorized by Section 10620(e) of the Act, the Water Suppliers have prepared the Draft 2010 UWMP with their own staff, with the assistance of consulting professionals and in cooperation with other governmental agencies, and have utilized and relied upon industry standards and the expertise of industry professionals in preparing the Draft 2010 UWMP, and have, in part, utilized and relied upon the DWR Guidebook to Assist Urban Water Suppliers to Prepare a 2010 Urban Water Management Plan (March 2011) and the DWR Methodologies for Calculating Baseline and Compliance Urban Per Capita Water Use (For the

Consistent Implementation of the Water Conservation Act of 2009) (February 2011) in preparing the Draft 2010 UWMP; and

WHEREAS, the Water Suppliers began public outreach and community involvement in the preparation of the Draft 2010 UWMP in May 2010, with the first scheduled community workshop, followed by five more community workshops and three public hearings; and

WHEREAS, pursuant to Section 10621(b) of the Act, on March 3, 2011, the Water Suppliers notified the City of Santa Clarita and the Counties of Ventura and Los Angeles that they would be preparing the 2010 UWMP, and that they would be releasing the Draft 2010 UWMP in April 2011; and, in addition the Water Suppliers subsequently met with, consulted with and obtained comments on the 2010 UWMP from the City of Santa Clarita, the United Water Conservation District and the County of Los Angeles; and

WHEREAS, in accordance with applicable law, including Water Code sections 10608.26 and 10642, and Government Code section 6066, the Water Suppliers made the Draft 2010 UWMP available for public inspection, and published notice of the time and place of each joint public hearing on the Draft UWMP; and

WHEREAS, on March 23, 2011, NCWD and CLWA held a joint public hearing, properly noticed pursuant to Section 10642 of the Act and Government Code section 6066, at which time NCWD's Board of Directors reviewed draft sections and tables for inclusion in the Draft 2010 UWMP, and, as part of that review, considered a presentation regarding the Draft 2010 UWMP by staff and consultants, and oral and written public comments; and

WHEREAS, on May 18, 2011, NCWD and CLWA held a second joint public hearing, properly noticed pursuant to Section 10642 of the Act and Government Code section 6066, at which time NCWD's Board considered further oral and written public comments, and responses to those comments by staff and consultants, which included a presentation of the changes that had been made in the Public Review Draft 2010 UWMP; and

WHEREAS, on June 15, 2011, NCWD circulated to each of the members of its Board of Directors a Final Draft 2010 UWMP; and

WHEREAS, on June 22, 2011, CLWA and NCWD held a properly noticed joint public meeting and public hearing to consider adoption of the Final Draft 2010 UWMP, at which time NCWD's Board of Directors considered further oral and written public comments, and responses to those comments by staff and consultants, which included a presentation of the changes that had been made in the Final Draft 2010 UWMP and reviewed and considered adoption of the Final Draft 2010 UWMP; and

WHEREAS, pursuant to Water Code Section 10620(d)(2), the Water Suppliers coordinated the preparation of the Draft 2010 UWMP and Final Draft 2010 UWMP with other appropriate agencies in the area, including other water suppliers that share a common source, water management agencies and relevant public agencies, to the extent practicable; and

WHEREAS, pursuant to Water Code Section 10620(f), the Water Suppliers describe in the Draft 2010 UWMP and in the Draft Final 2010 UWMP water management tools and options used by the Water Suppliers which will maximize resources and minimize the need to import water from other regions; and

WHEREAS, pursuant to Water Code Section 10641, the Water Suppliers consulted with and obtained comments from those public agencies or persons with special expertise with respect to demand management methods and techniques; and

WHEREAS, the Water Suppliers have encouraged the active involvement of diverse social, cultural and economic elements of the population within NCWD's service areas and surrounding communities, with regard to the preparation of the Draft UWMP and Final Draft UWMP, allowed input by members of the public and any other interested party regarding all aspects of the Draft 2010 UWMP and Final Draft 2010 UWMP, allowed community input regarding NCWD's implementation plan for complying with SBX7-7, considered the economic impacts of NCWD's implementation plan for complying with SBX7-7 and adopted Method 1 under Water Code section 10608.20(b) for determining its urban water use targets; and

WHEREAS, to assure public participation in the process, the Water Suppliers have exceeded the requirements of the Act, by holding more than one public hearing; and

WHEREAS, the NCWD Board of Directors has considered the public and Board comments made at the three public hearings, as well as all written public comments on the Draft 2010 UWMP and the Final Draft 2010 UWMP distributed to the Board of Directors; and

WHEREAS, the NCWD Board of Directors has carefully reviewed and considered the purposes and requirements of the Act and SBX7-7, the contents of the Final Draft 2010 UWMP, any errata, revisions and modifications made at the hearing, the documentation contained in the administrative record in support of the Final Draft 2010 UWMP, and all public and agency input received with regard to the Final Draft 2010 UWMP, and has determined that the factual analyses and conclusions set forth in the 2010 UWMP are supported by substantial evidence.

NOW THEREFORE, BE IT RESOLVED that the Board of Directors of Newhall County Water District do hereby adopt Method 1 under Water Code section 10608.20(b) for determining its urban water use targets, and the Final Draft 2010 UWMP attached hereto as Exhibit "A" and incorporated herein by this reference, including any errata, revisions and modifications made at the hearing, is hereby approved and adopted as NCWD's 2010 Urban Water Management Plan, and ordered filed with the Secretary of the Board; and

RESOLVED FURTHER that the General Manager of the District is hereby authorized and directed to include a copy of this Resolution in the District's 2010 Urban Water Management Plan and, in accordance with Water Code section 10644(a), to file the 2010 Urban Water Management Plan with the California Department of Water Resources, the California State Library, and any city or county within which the District provides water supplies, within thirty (30) days of this adoption date; and

RESOLVED FURTHER that in accordance with Water Code section 10645, the General Manager is hereby authorized and directed to make the 2010 Urban Water Management Plan available for public review during normal business hours at NCWD's administrative offices at 23780 North Pine Street, Santa Clarita, CA, not later than thirty (30) days after filing a copy thereof with the California Department of Water Resources; and

RESOLVED FURTHER that in accordance with Water Code section 10635(b), the General Manager is hereby authorized and directed to provide that portion of the 2010 Urban Water Management Plan prepared pursuant to Water Code section 10635(a) to any city or county

within which the District provides water supplies not later than sixty (60) days after filing a copy thereof with the California Department of Water Resources; and

RESOLVED FURTHER in accordance with the Urban Water Management Planning Act and SBX7-7, including, but not limited to, the District's Water Conservation Programs and its Water Shortage Contingency Plan, the General Manager is hereby authorized and directed to implement the components of the 2010 Urban Water Management Plan; and

RESOLVED FURTHER that the General Manager is authorized and directed to recommend to the Board of Directors additional steps necessary or appropriate to effectively carry out the implementation of the 2010 Urban Water Management Plan, the Urban Water Management Planning Act and SBX7-7.

RESOLVED FURTHER that the General Manager and District staff are hereby authorized and directed to take such other and further actions as may be necessary or appropriate to carry out the purposes of this resolution, the Act and SBX7-7.

PASSED, APPROVED AND ADOPTED at a Special Meeting of the Board of Directors of Newhall County Water District held on June 22, 2011. Resolution No. 2011-10 was adopted by the following vote:

AYES:	**Directors**	ATKINS, COLLEY, GUTZEIT, MORTENSEN, PLAMBECK
NOES:	**Directors**	NONE
ABSTAIN:	**Directors**	NONE

Dan Mortensen, President,
Board of Directors of the
Newhall County Water District

ATTEST:

Karin J. Russell
Secretary of the Board of Directors

EXHIBIT "A"

2010 UWMP
(Attached hereto)

STATE OF CALIFORNIA)
) ss.
COUNTY OF LOS ANGELES)

I, Karin J. Russell, Secretary of the Newhall County Water District, DO HEREBY CERTIFY that the foregoing is full, true and correct copy of Resolution No. 2011-10 of the Board of Directors of Newhall County Water District adopted at a Special Meeting held on June 22, 2011, and that the same has not been amended or repealed.

Karin J. Russell
Secretary of the Board of Directors

DATED: 6-22-2011 (SEAL)

VALENCIA WATER COMPANY
BOARD OF DIRECTORS MEETING (JUNE 27, 2011)
RESOLUTION ADOPTING
THE 2010 URBAN WATER MANAGEMENT PLAN

WHEREAS, the California Urban Water Management Planning Act, Water Code Section 10610, et seq. (the Act) mandates that every urban water supplier providing water for municipal purposes to more than 3,000 customers or supplying more than 3,000 acre feet of water annually, prepare and adopt an updated urban water management plan (UWMP) at least once every five years on or before December 31, in years ending five and zero; and

WHEREAS, the Valencia Water Company (VWC) is an urban water supplier for purposes of the Act, and in 2005 approved and adopted its most recent UWMP and submitted its 2005 UWMP to the California Department of Water Resources (DWR); and

WHEREAS, the Water Conservation Act of 2009, Water Code Section 10608 et seq. (SBX7-7), extended the time by which urban retail water suppliers must adopt 2010 UWMPs to July 1, 2011 to permit coordination between urban wholesale water suppliers and urban retail water suppliers and, among other things, established requirements for urban retail water suppliers to prepare urban water use targets in accordance with the goals of SBX7-7 to reduce statewide daily per capita water use by 15 percent by the year 2015 and 20 percent by the year 2020; and

WHEREAS, the VWC is an "urban retail water supplier" for purposes of SBX7-7 because it directly provides potable municipal water to more than 3,000 end users; and

WHEREAS, Section 10620(d)(1) of the Act encourages urban water suppliers to satisfy the requirements of the Act by participation in area wide urban water management planning where those plans will reduce preparation costs and contribute to the achievement of conservation and efficient water use; and

WHEREAS, Valencia Water Company, in cooperation with Castaic Lake Water Agency (CLWA), the CLWA Santa Clarita Water Division (SCWD), and Newhall County Water District (NCWD), prepared a document labeled "Public Review Draft 2010 Urban Water Management Plan" for the CLWA service area (Draft 2010 UWMP), upon which Los Angeles County Waterworks District No. 36 (LACWWD #36) participated as a cooperating agency; and

WHEREAS, in accordance with applicable law, including the requirements of the Act and of SBX7-7, CLWA has prepared the Draft 2010 UWMP and has undertaken certain agency coordination, public notice, public involvement and outreach, public comment, and other procedures in relation to the Draft 2010 UWMP; and

WHEREAS, as authorized by Section 10620(e) of the Act, CLWA and the retail purveyors have prepared the Draft 2010 UWMP with their own staff, with the assistance of consulting professionals and in cooperation with other governmental agencies, and has utilized and relied upon industry standards and the expertise of industry professionals in preparing its Draft 2010 UWMP, and have, in part, utilized and relied upon the DWR Guidebook to Assist Urban Water Suppliers to Prepare a 2010 Urban Water Management Plan (March 2011) and the DWR Methodologies for Calculating Baseline and Compliance Urban Per Capita Water Use (For the Consistent Implementation of the Water Conservation Act of 2009) (February 2011) in preparing the Draft 2010 UWMP; and

WHEREAS, CLWA and the retail purveyors began the public outreach and community involvement in the preparation of the Draft 2010 UWMP in May 2010, with the first scheduled community

workshop, followed by five more community workshops and three public hearings; and

WHEREAS, pursuant to Section 10621(b) of the Act, on March 3, 2011, CLWA notified the City of Santa Clarita and the Counties of Ventura and Los Angeles that it would be preparing the 2010 UWMP, and that the Draft 2010 UWMP would be released in April 2011, and subsequently met with, consulted with and obtained comments from the City of Santa Clarita, the United Water Conservation District and the County of Los Angeles; and

WHEREAS, in accordance with applicable law, including Water Code Sections 10608.26 and 10642, and Government Code Section 6066, the Draft 2010 UWMP was made available for public inspection, and notice was provided of the time and place of each joint public hearing on the Draft UWMP; and

WHEREAS, on March 23, 2011, CLWA and NCWD held a joint public hearing, properly noticed pursuant to Section 10642 of the Act and Government Code Section 6066, at which time CLWA's Board of Directors reviewed draft sections and tables for inclusion in the Draft 2010 UWMP, and, as part of that review, considered a presentation regarding the Draft 2010 UWMP by its staff and consultants, and oral and written public comments; and

WHEREAS, on May 18, 2011, CLWA and NCWD held a second joint public hearing, properly noticed pursuant to Section 10642 of the Act and Government Code Section 6066, at which time CLWA's Board of Directors considered further oral and written public comments, and responses to those comments by its staff and consultants, which included a presentation of the changes that had been made in the Public Review Draft 2010 UWMP; and

WHEREAS, on June 3, 2011, the VWC Board Secretary sent each Board of Director the Draft 2010 UWMP, Public Review Draft, dated April 2011, along with six public workshop presentations, two public hearing presentations and transcripts and eight letters/emails received to date from the public commenting on the Plan. At the time, the Secretary informed the Board that a secondary transmittal of information would be forthcoming on June 24, 2011;

WHEREAS, on June 15, 2011, CLWA circulated to each of the members of its Board of Directors a Final Draft 2010 UWMP; and

WHEREAS, on June 22, 2011, CLWA and NCWD held a properly noticed joint public meeting and public hearing to consider adoption of the Final Draft 2010 UWMP, at which time CLWA's Board of Directors considered further oral and written public comments, and responses to those comments by its staff and consultants, which included a presentation of the changes that had been made in the Final Draft 2010 UWMP, and reviewed and considered adoption of the Final Draft 2010 UWMP; and

WHEREAS, on June 24, 2010, the VWC Board received and reviewed a second transmittal, dated June 24, 2011, with additional information about the 2010 UWMP process, further 2010 UWMP documents, and the 2010 UWMP timeline;

WHEREAS, pursuant to Water Code Section 10620(d)(2), VWC coordinated the preparation of the Draft 2010 UWMP and Final Draft 2010 UWMP with CLWA and other appropriate agencies in the area, including other water suppliers that share a common source, water management agencies and relevant public agencies, to the extent practicable; and

WHEREAS, pursuant to Water Code Section 10620(f), the Draft 2010 UWMP and in the Draft Final 2010 UWMP describe the water management tools and options used by CLWA and the retail purveyors that will maximize resources and minimize the need to import water from other regions; and

WHEREAS, pursuant to Water Code Section 10641, CLWA and the retail purveyors consulted with and obtained comments from those public agencies or persons with special expertise with respect to demand management methods and techniques; and

WHEREAS, CLWA and the retail purveyors have encouraged the active involvement of diverse social, cultural and economic elements of the population within the CLWA service area with regard to the preparation of the Draft UWMP and Final Draft UWMP, allowed input by members of the public and any other interested party regarding all aspects of the Draft 2010 UWMP and Final Draft 2010 UWMP, allowed community input regarding the implementation plan for complying with SBX7-7, considered the economic impacts of the implementation plan for complying with SBX7-7 and adopted Method 1 under Water Code Section 10608.20(b) for determining its urban water use targets; and

WHEREAS, to assure public participation in the process, CLWA and the retail purveyors have exceeded the requirements of the Act, by holding more than one public hearing; and

WHEREAS, the VWC Board of Directors has considered the public and Board comments made at the three public hearings, as well as all written public comments on the Draft 2010 UWMP and the Final Draft 2010 UWMP distributed to the Board of Directors; and

WHEREAS, the VWC Board of Directors has carefully reviewed the Final Draft 2010 UWMP, any errata, revisions and modifications made at the final public hearing; and

WHEREAS, the VWC Board of Directors has carefully reviewed and considered the purposes and requirements of the Act and SBX7-7, the contents of the Final Draft 2010 UWMP, any errata, revisions and modifications made at the final public hearing, the documentation contained in the administrative record in support of the Final Draft 2010 UWMP, and all public and agency input received with regard to the Final Draft 2010 UWMP, and has determined that the factual analyses and conclusions set forth in the 2010 UWMP are supported by substantial evidence.

NOW THEREFORE, BE IT RESOLVED that the VWC Board of Directors does hereby adopt Method 1 under Water Code Section 10608.20(b) for determining urban water use targets, and the Final Draft 2010 UWMP, incorporated herein by this reference, including any errata, revisions and modifications made at the final public hearing, is hereby approved and adopted as the 2010 Urban Water Management Plan, and filed with the Secretary of the Board; and

RESOLVED FURTHER that the General Manager is hereby authorized and directed to include a copy of this Resolution in the 2010 Urban Water Management Plan and, in accordance with Water Code Section 10644(a), to file the 2010 Urban Water Management Plan with the California Department of Water Resources, the California State Library, and any city or county within which the Valencia Water Company provides water supplies within thirty (30) days of this adoption date; and

RESOLVED FURTHER that in accordance with Water Code Section 10645, the General Manager is hereby authorized and directed to make the 2010 Urban Water Management Plan available for public review during normal business hours at VWC's offices not later than thirty (30) days after filing a copy thereof with the California Department of Water Resources; and

RESOLVED FURTHER that in accordance with Water Code Section 10635(b), the General Manager is hereby authorized and directed to provide that portion of the 2010 Urban Water Management Plan prepared pursuant to Water Code Section 10635(a) to any city or county within which the Valencia Water Company provides water supplies not later than sixty (60) days after filing a copy thereof with the California Department of Water Resources; and

RESOLVED FURTHER in accordance with the Act and SBX7-7, including, but not limited to, the Water Conservation Programs and the Water Shortage Contingency Plan, the General Manager is hereby authorized and directed to implement the components of the 2010 Urban Water Management Plan; and

RESOLVED FURTHER that the General Manager is authorized and directed to recommend to the Board of Directors additional steps necessary or appropriate to effectively carry out the implementation of the 2010 Urban Water Management Plan, the Act, and SBX7-7.

I, the undersigned, hereby certify that I am the duly appointed Secretary of the Valencia Water Company, and that at a regular meeting of the Board of Directors of said Company held on Monday, June 27, 2011, the foregoing Resolution was duly and regularly adopted by said Board, and that said resolution has not been rescinded or amended since the date of its adoption, and that it is in full force and effect.

July 8, 2011

Greg Milleman

Greg Milleman, Secretary

Section 1: Introduction

1.1 Overview

This volume presents the Urban Water Management Plan 2010 (Plan) for the Castaic Lake Water Agency (Agency, CLWA) service area, which includes four retail water purveyors. These retail water purveyors are the Santa Clarita Water Division of CLWA, Newhall County Water District, Valencia Water Company and Los Angeles County Waterworks District 36. Together CLWA and the purveyors are the Santa Clarita Valley's 'water suppliers'. This chapter describes the general purpose of the Plan, discusses Plan implementation and provides general information about CLWA, the retail purveyors and service area characteristics.

1.2 Purpose

An Urban Water Management Plan (UWMP) is a planning tool that generally guides the actions of urban water suppliers. It provides managers and the public with a broad perspective on a number of water supply issues. It is not a substitute for project-specific planning documents, nor was it intended to be when mandated by the State Legislature. For example, the Legislature mandated that a plan include a section which "…describes the opportunities for exchanges or water transfers on a short-term or long-term basis." (Wat. Code, § 10631, subd. (d)). The identification of such opportunities and the inclusion of those opportunities in a plan's general water service reliability analysis neither commits an urban water supplier to pursue a particular water exchange/transfer opportunity, nor precludes it from exploring exchange/transfer opportunities never identified in its plan. Before an urban water supplier is able to implement any potential future sources of water supply identified in a plan, detailed project plans are prepared and approved, financial and operational plans are developed and all required environmental analysis is completed.

"A plan is intended to function as a planning tool to guide broad-perspective decision making by the management of water suppliers." (*Sonoma County Water Coalition v. Sonoma County Water Agency* (2010) 189 Cal. App. 4th 33, 39.) It should not be viewed as an exact blueprint for supply and demand management. Water management in California is not a matter of certainty and planning projections may change in response to a number of factors. "[L]ong-term water planning involves expectations and not certainties. Our Supreme Court has recognized the uncertainties inherent in long-term land use and water planning and observed that the generalized information required . . . in the early stages of the planning process are replaced by firm assurances of water supplies at later stages." (*Id.*, at 41.) From this perspective, it is appropriate to look at the UWMP as a general planning framework, not a specific action plan. It is an effort to generally answer a series of planning questions including:

- What are the potential sources of supply and what is the reasonable probable yield from them?
- What is the probable demand, given a reasonable set of assumptions about growth and implementation of good water management practices?
- How well do supply and demand figures match up, assuming that the various probable supplies will be pursued by the implementing agency?

Using these "framework" questions and resulting answers, the implementing agency will pursue feasible and cost-effective options and opportunities to meet demands.

The water suppliers will explore enhancing basic supplies from traditional sources such as the State Water Project (SWP) as well as other options. These include groundwater extraction, water exchanges and transfers, water conservation, recycling, brackish water desalination and water banking/conjunctive use. Specific planning efforts will be undertaken in regard to each option, involving detailed evaluations of how each option would fit into the overall supply/demand framework, how each option would impact the environment and how each option would affect customers. The objective of these more detailed evaluations would be to find the optimum mix of conservation and supply programs that ensure that the needs of the customers are met.

The California Urban Water Management Planning Act (Act) requires preparation of a plan that:

- Accomplishes water supply planning over a 20-year period in five year increments. (CLWA and the purveyors are going beyond the requirements of the Act by developing a plan which spans forty years.)
- Identifies and quantifies adequate water supplies, including recycled water, for existing and future demands, in normal, single-dry and multiple-dry years.
- Implements conservation and efficient use of urban water supplies.

Additionally, newly passed State legislation, Senate Bill 7 of Special Extended Session 7 (SBX7-7), was signed into law in November 2009, which calls for progress towards a 20 percent reduction in per capita water use statewide by 2020. As a result, the legislation now mandates each urban retail supplier to develop and report a water use target in the retailer's 2010 UWMP. The legislation further requires that retailers report an interim 2015 water use target, their baseline daily per capita use and 2020 compliance daily per capita use, along with the basis for determining those estimates.

SBX7-7 provides four possible methods for an urban retail water supplier to use to calculate its water use target. The California Department of Water Resources (DWR) has also developed methodologies for calculating base daily per capita water use; baseline commercial, industrial and institutional water use; compliance daily per capita water use; gross water use; service area population; indoor residential water use and landscape area water use.

Also of importance is Assembly Bill (AB) 1420. AB 1420, passed in 2007 and in effect as of January 2009, changes the funding eligibility requirements of Section 10631.5 of the Water Code. For any urban water supplier to be eligible for grant or loan funding administered by DWR, the State Water Resources Control Board (SWRCB) or the Bay-Delta Authority (such as those funding programs Propositions 50 and 84), the supplier must show implementation of water use efficiency demand management measures/best management practices (DMMs/BMPs) listed and described in the Act and the California Urban Water Conservation Council (CUWCC) Memorandum of Understanding Regarding Urban Water Conservation in California (MOU), or show the schedules and budgets by which the supplier will begin implementing the DMMs/BMPs. Any supplier not implementing the measures based on cost-effectiveness must submit proof showing why the measures are not cost-effective. Tables ensuring compliance with AB 1420 are provided in Appendix E.

A checklist to ensure compliance of this Plan with the Act requirements is provided in Appendix A.

It is the stated goal of CLWA and the retail water purveyors to deliver a reliable and high quality water supply to their customers, even during dry periods. Based on conservative water supply and demand assumptions over the next forty years in combination with conservation of non-essential demand during normal water years, the UWMP successfully achieves this goal.

1.3 Implementation of the Plan

CLWA has a contract with the State of California, through DWR, to acquire and distribute SWP water to its four local retail water purveyors in the Santa Clarita Valley: CLWA Santa Clarita Water Division (SCWD), Newhall County Water District (NCWD), Valencia Water Company (VWC) and Los Angeles County Waterworks District No. 36 (LACWWD 36). This Plan is required for CLWA and three of the purveyors, SCWD, NCWD and VWC. The fourth purveyor, LACWWD 36, is not required to prepare an UWMP because the District does not provide water to more than 3,000 customers or supply more than 3,000 acre-feet (AF) of water annually; however, LACWWD 36 participated in the development of the Plan on an "ad-hoc" basis. This subsection provides the cooperative framework within which the Plan will be implemented including agency coordination, public outreach and resources maximization.

1.3.1 Joint Preparation of the Plan

Water suppliers are permitted by the State to work together to develop a cooperative regional plan for the CLWA service area. This approach has been adopted by the water suppliers in the Santa Clarita Valley (Valley), which are jointly sponsoring the current Plan. Water resource specialists with expertise in water resource management were retained to assist the local water suppliers in preparing the details of the Plan. Agency coordination for this Plan is summarized in Table 1-1.

TABLE 1-1
AGENCY COORDINATION SUMMARY

	Participated in UWMP Development	Received Copy of Draft	Commented on Draft	Attended Public Meetings	Contacted for Assistance	Sent Notice of Intent to Adopt	Invited/Not Involved
Aquilar Landscape				X			
Atkins Environmental Help				X			
Assembly Member Audra Strickland (representatives)							X
Assembly Member Cameron Smyth (representatives)				X			
Assembly Member Jeff Gorell (representatives)				X			
Associated Builders and Contractors of CA				X			
Building Industry Association – Los Angeles/Ventura Chapter				X			
Burbank Water and Power				X			
California Department of Water Resources (SoCal; Glendale; retired)				X	X		
Castaic Lake Water Agency	X			X			
Castaic Area Town Council				X			
City of Los Angeles				X			
City of Santa Clarita Department of Planning and Building Services		X		X		X	
City of Santa Clarita Intergovernmental Relations				X		X	
CLWA Santa Clarita Water Division	X			X			
College of the Canyons				X			
Congressman Howard McKeon (representatives)				X			
Friends of the Santa Clara River			X				X
Grass Is Greener Landscape Design				X			
Impact Sciences				X	X		
Integrated Property Services Group, Inc.				X			
Los Angeles County Flood Control Department				X			
Los Angeles County Department of Public Works				X			
Los Angeles County Department of Regional Planning		X		X	X	X	
Los Angeles County LAFCO		X		X			
Los Angeles County Supervisor Mike Antonovich (representatives)				X		X	

	Participated in UWMP Development	Received Copy of Draft	Commented on Draft	Attended Public Meetings	Contacted for Assistance	Sent Notice of Intent to Adopt	Invited/Not Involved
Los Angeles County Waterworks District 36	X			X			
Metropolitan Water District of Southern California					X		
Newhall County Water District	X			X			
Santa Clarita Organization for Planning the Environment – SCOPE			X	X			
Santa Clarita Valley Chamber of Commerce				X			
Santa Clarita Valley Fair Elections Committee			X	X			
Santa Clarita Valley Residents Mr. and Mrs. Dunn			X	X			
Santa Clarita Valley Resident Mr. Naoum			X				
Santa Clarita Valley Resident Ms. Nolltemeyer			X	X			
Santa Clarita Valley Sanitation District				X	X		
Santa Clarita Valley Well Owners Association							X
Sierra Club Angeles Chapter			X				
Southern California Association of Governments							X
State Senator George Runner (representatives)				X			
State Senator Sharon Runner (representatives)				X			
State Senator Tony Strickland							X
Sutters Home Owners Association				X			
United Water Conservation District		X			X		
Valley Industrial Association of Santa Clarita							X
Valencia Water Company	X			X			
Ventura County LAFCO		X					
Ventura County Resource Management Agency		X				X	X
Vista Ridge Homeowners Association				X			
Waterwise				X			
West Ranch Town Council				X			
Whittaker Bermite Citizens Advisory Group			X	X			

1.3.2 Plan Adoption

CLWA and the retail purveyors began preparation of this Plan for the CLWA service area in November 2009. The final draft of the Plan was adopted by the Agency Board on June 22, 2011 and submitted to DWR within thirty days of Board approval. NWCD's Board adopted the final draft of the Plan on June 22, 2011. VWC's Board adopted the final draft of the Plan on June 27, 2011. This plan includes all information necessary to meet the requirements of Water Conservation Act of 2009 (Wat. Code, §§ 10608.12-10608.64) and the Urban Water Management Planning Act (Wat. Code, §§ 10610-10656).

1.3.3 Public Outreach

The water suppliers have encouraged community participation in water planning. For the current Plan, five public workshop sessions were held to solicit input on the Draft Plan before its adoption. Interested groups were informed about the development of the Plan along with the schedule of public activities. Notices of public meetings were published in the local press and at the water supplier websites. Copies of the Draft Plan were made available at the water suppliers' offices and websites, local public libraries and sent to the City of Santa Clarita, the County of Los Angeles and the County of Ventura, as well as to interested parties as identified in Table 1-1. The water suppliers also convened meetings with various interests to gather data concerning planned development and the probable implementation of approved development. Such informed data gathering on important issues is a means of checking the short-term "reality" of official projections and understanding the concerns of various groups.

CLWA contracted with a local public relations firm to coordinate preparation of the Plan with the local community and stakeholders. CLWA notified the cities and counties within its service area of the opportunity to provide input regarding the Plan. Table 1-2 presents a timeline for public participation during the development of the Plan. A copy of the public outreach materials, including paid advertisements, newsletter covers, website postings and invitation letters are attached in Appendix B.

TABLE 1-2
PUBLIC PARTICIPATION TIMELINE

Public Workshops and Hearings	Date	Public Participation Task
1st Public Workshop	May 25, 2010	Presented UWMP requirements and Plan outline
2nd Public Workshop	July 27, 2010	Progress update on UWMP requirements and process, discuss supplies
Presentation to the Upper Santa Clara River IRWMP Stakeholder Group	November 9, 2010	UWMP requirements, process, preliminary SBX7-7 calculations
3rd Public Workshop	November 16, 2010	Discussed Santa Clarita Valley supplies and demands, reliability analysis and SBX7-7 calculations
4th Public Workshop	January 25, 2011	Discussed supply and demand analysis and SBX7-7 calculations
5th Public Workshop	March 8, 2011	Discussed supply and demand analysis
1st Public Hearing	March 23, 2011	Presented overview of Draft 2010 UWMP
2nd Public Hearing	May 18, 2011	Discussed comments on Public Draft 2010 UWMP
3rd Public Hearing	June 22, 2011	Discussed comments on Public Draft 2010 UWMP
Plan Adoption	June 22, 2011	Adoption Hearing for CLWA and NCWD for Final Draft 2010 UWMP
Plan Adoption	June 27, 2011	Adoption of Final Draft 2010 UWMP by VWC's Board of Directors
Plan Submittal	July 21, 2011	File 2010 UWMP with DWR within thirty days of adoption

The components of public participation include:

Local Media

- Paid advertisements in local newspapers
- Meeting(s) with local editorial boards (*The Signal*)

Community-Based Outreach

- Building Industry Association
- Castaic Town Council
- Santa Clarita Valley Chamber of Commerce
- Friends of the Santa Clara River
- Santa Clarita Valley Well Owners Association
- Santa Clarita Organization for Planning the Environment
- Sierra Club
- Valley Industrial Association of Santa Clarita Valley
- West Ranch Town Council

Water Suppliers Public Participation

- Presentations to NCWD Board
- Presentations to CLWA Board

City/County Outreach

- Meeting with City of Santa Clarita Planning Division
- Meeting with Los Angeles County Department of Regional Planning
- Meeting with Supervisor Antonovich representatives Rosalind Wayman and Edel Vizcarra

Public Availability of Documents

- Water suppliers' offices and websites
- City Hall
- Local libraries

1.3.4 Resources Maximization

Several documents were developed to enable the water suppliers to maximize the use of available resources and minimize use of imported water, including the 2005 CLWA UWMP, CLWA's 2009 Water Supply Reliability Plan Update, the 2008 Integrated Regional Water Management Plan for the Upper Santa Clara River, the 2009 Santa Clarita Valley Water Report, DWR's 2009 State Water Project Delivery Reliability Report, the 2002 Draft Recycled Water Master Plan, the 2009 Basin Yield Analysis by Luhdorff and Scalmanini Consulting Engineers and GSI Water Solutions, Inc., the 2010 Data Document[1] and the 2003 Groundwater Management Plan (GWMP). Chapter 3 of this Plan describes in detail the water resources available to CLWA and the retail purveyors for the forty-year period covered by the Plan. A complete reference list is provided in Section 9 of this Plan.

1.4 Water Suppliers of the Santa Clarita Valley

1.4.1 Castaic Lake Water Agency

CLWA was formed in 1962 for the purpose of contracting with DWR to acquire and distribute imported SWP water to the water purveyors in the Valley. CLWA serves an area of 195 square miles in Los Angeles and Ventura Counties.

Adequate planning for, and the procurement of, a reliable water supply is a fundamental function of CLWA. CLWA obtains its water supply for wholesale purposes principally from the

[1] CLWA regularly updates its Data Document as the basis for establishing its facility capacity fees. Several significant developments since the last Data Document update in 2008 were incorporated into the 2010 Update: water conservation legislation that could significantly affect water demand projections and the cost of water conservation programs; the need to coordinate water supply and demand projections with the preparation of the 2010 Urban Water Management Plan; establishment of Total Maximum Daily Load allocations for the Santa Clara River that could affect recycled water availability; judicial and regulatory determinations for the Delta that affect SWP reliability; engineering studies completed since the 2008 Data Document, particularly those related to emergency and operating storage, recycled water, and transmission system improvements; and updated cost allocation issues from the 2008 Document.

SWP and currently has a Water Supply Contract with DWR for 95,200 acre-feet per year (AFY) of SWP Table A Amount[2]. The maximum annual Table A Amount in CLWA's SWP Water Supply Contract with DWR was originally 23,000 AF, but was amended to 41,500 AF in 1966. In 1991 CLWA purchased 12,700 AF of annual Table A Amount from a Kern County water district and in 1999 CLWA purchased 41,000 AF of annual Table A Amount from another Kern County water district, for the current total of 95,200 AFY. CLWA also imports water from two other water districts in Kern County. Under the 2007 Water Acquisition Agreement with the Buena Vista Water Storage District (Buena Vista, BVWSD) and the Rosedale-Rio Bravo Water Storage District (Rosedale-Rio Bravo, RRBWSD), Buena Vista's high flow Kern River entitlements (and other acquired waters that may become available) are captured and recharged within the Rosedale-Rio Bravo's service area on an ongoing basis. CLWA receives 11,000 AF of these supplies annually through either exchange of Buena Vista's and Rosedale-Rio Bravo's SWP supplies or through direct delivery of water to the California Aqueduct via the Cross Valley Canal. All 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, the water is treated at either CLWA's Earl Schmidt Filtration Plant or Rio Vista Water Treatment Plant and delivered to the retail water purveyors through transmission lines owned and operated by CLWA.

CLWA is able to meet approximately half of the Valley's urban demand with imported water. However, the availability of SWP supply is variable. It fluctuates from year to year depending on precipitation, regulatory restrictions, legislative restrictions and operational conditions and is subject to severe curtailment during dry years. Of particular concern is the recent (2007) U.S. District Court ruling whereby the SWP was held in violation of the federal Endangered Species Act due to potential pumping impacts on populations of the Delta smelt, a fish species living in the Sacramento-San Joaquin Delta, resulting in the order to curb water imports from the Delta by up to 35 percent from the SWP and the Central Valley Project. A similar court decision was rendered in 2009 involving endangered salmon. The results of these impacts on environmental resources in the Delta, when combined with recent socioeconomic conditions and hydrology changes, have already reduced the utilization of SWP and other imported supplies in the Region from a high in 2004 of about 47,500 AF to approximately 38,700 AF in 2009. Recently (December 14, 2010), the court overturned these rulings and has required new analysis of Delta pumping requirements. While the results are unknown at this time, it is expected that some level of SWP pumping restrictions will continue into the future. Further, in June 2008, Governor Arnold Schwarzenegger declared California to be in a statewide drought condition, and called for a reduction in statewide water uses by 20 percent by the year 2020, which resulted in the passage of SBX7-7 in late 2009.

CLWA and the retail purveyors mainly meet the balance of their demands with local groundwater and a small amount of recycled water. CLWA has evaluated the long-term water needs (water demand) within its service area based on applicable county and city land use plans and has compared these needs against existing and potential water supplies. Results indicate that as CLWA's water requirements utilize increased proportions of its SWP Table A Amount, conjunctive use, water conservation, water transfers, recycled water and water banking are becoming increasingly more important water management elements for CLWA's long-term water supply strategy.

[2] Table A is a schedule of annual water amounts as set forth in long-term SWP delivery contracts. Table A defines the annual volume of water that could be delivered to a SWP contractor in a given year under regular contract provisions without consideration of surplus SWP water deliveries or other supplies available to a SWP contractor.

Since the preparation of the 2005 Plan, DWR has prepared updates to the SWP Reliability Report in 2007 and 2009. Also, the water demand projections within CLWA's service area have been updated based on detailed information provided by CLWA's retail purveyors. In addition, based on DWR estimates of SWP supply reliability, CLWA has developed additional water supplies as well as capacity in groundwater banks. Together with its SWP Table A supply and the flexible storage allowed under the Monterey Amendments to the SWP Water Supply Contracts, these additional water management strategy elements have created a series of water management options that are addressed in this UWMP Update.

1.4.2 Retail Water Purveyors

Four retail purveyors provide water service to most residents of the Valley.

1. LACWWD 36's service area includes the Hasley Canyon area in the unincorporated community of Val Verde. During most years, the District obtains its water supply from CLWA.

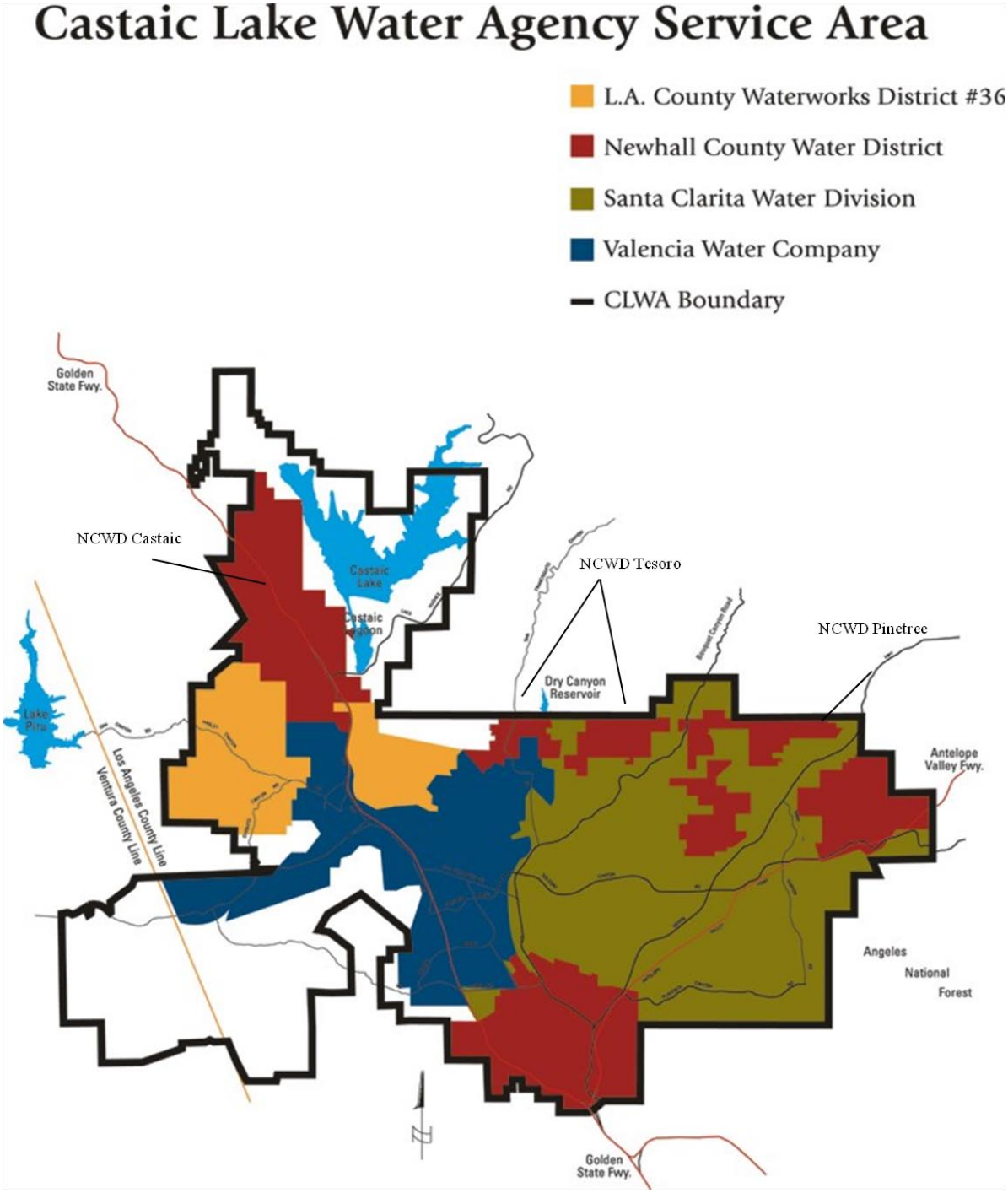
2. NCWD's service area includes portions of the City of Santa Clarita and unincorporated portions of Los Angeles County in the communities of Castaic, Newhall, Valencia and Canyon Country. The District supplies water from local groundwater and CLWA imported water.

3. SCWD's service area includes portions of the city of Santa Clarita and unincorporated portions of Los Angeles County in the communities of Canyon Country, Newhall and Saugus. SCWD supplies water from local groundwater and CLWA imported water.

4. VWC's service area includes a portion of the City of Santa Clarita and unincorporated portions of Los Angeles County in the communities of Valencia, Stevenson Ranch and portions of Castaic, Saugus and Newhall. VWC supplies water from local groundwater, CLWA imported water and recycled water.

The service area for CLWA and the retail water purveyors is shown on Figure 1-1.

FIGURE 1-1


Castaic Lake Water Agency Service Area
L.A. County Waterworks District #36
Newhall County Water District
Santa Clarita Water Division
Valencia Water Company
CLWA Boundary
Golden State Fwy.
NCWD Castaic
Castaic Lake
Castaic Lagoon
NCWD Tesoro
Dry Canyon Reservoir
NCWD Pinetree
Lake Piru
Los Angeles County Line
Ventura County Line
Antelope Valley Fwy.
Angeles National Forest
Golden State Fwy.

The four retail purveyors – (1) SCWD, (2) NCWD, (3) VWC and (4) LACWWD 36 – deliver these waters to primarily municipal and industrial (M&I) users within the Valley. Together, as shown below in Table 1-3, the purveyors provide water to nearly 70,000 service connections (2009 Santa Clarita Valley Water Report, May 2010).

TABLE 1-3
RETAIL WATER SERVICE CONNECTIONS

Retail Water Purveyor	Connections
LACWWD 36	1,400
NCWD	9,600
SCWD	28,700
VWC	30,000
Total Connections	**69,700**

Source: 2009 Santa Clarita Valley Water Report (May 2010)

1.5 Climate

The climate in CLWA's service area is generally semi-arid and warm. Summers are dry with temperatures as high as 110°F. Winters are somewhat cool with temperatures as low as 20°F. Average rainfall since 1980 is about 17.3 inches per year in the flat areas and about 25 to 30 inches in the mountains. The region is subject to wide variations in annual precipitation and also experiences periodic wildfires. The region's average climate conditions are presented in Tables 1-4 and 1-5.

TABLE 1-4
CLIMATE DATA FOR THE SANTA CLARITA VALLEY

Month	Standard Monthly Avg. ETo (in.)	Avg. Max. Temperature (Fahrenheit)
Jan	3.43	65.4
Feb	3.08	67.7
Mar	5.6	74.6
Apr	6.5	79.4
May	7.94	85.5
Jun	8.36	90.3
Jul	9.15	95.8
Aug	8.76	95.5
Sep	6.75	88.7
Oct	5.24	79.5
Nov	4.03	73.9
Dec	2.58	64.3
Annual	**71.42**	**80.0**

Source: California Irrigation Management System (CIMIS) data provided from Santa Clarita Station No. 204, Los Angeles region, January 2007 to December 2010 http://wwwcimis.water.ca.gov/cimis/welcome.jsp.
ETo = evapotranspiration

TABLE 1-5
ANNUAL RAINFALL RECORD FOR THE SANTA CLARITA VALLEY

Year	Annual Rainfall (in.)	Year	Annual Rainfall (in.)
1980	24.3	1995	29.2
1981	13.4	1996	15.8
1982	20.2	1997	7.1
1983	39.1	1998	28.2
1984	12.9	1999	9.0
1985	8.4	2000	13.6
1986	18.0	2001	18.8
1987	14.5	2002	7.8
1988	16.9	2003	15.6
1989	7.6	2004	22.8
1990	7.0	2005	37.2
1991	17.2	2006	13.9
1992	32.0	2007	5.8
1993	22.1	2008	18.2
1994	10.3	2009	11.6
		Average	**17.3**

Source: Data provided from rain gage Newhall-Soledad 32c, January 1980 to January 2009

1.6 Potential Effects of Climate Change

A topic of growing concern for water planners and managers is climate change and the potential impacts it could have on California's future water supplies. Climate change models have predicted that potential effects from climatic changes will result in increased temperature, reduction in Sierra Nevada snowpack depth, early snow melt and a rise in sea level.

In June 2005, Governor Arnold Schwarzenegger issued Executive Order S-3-05, which requires biennial reports on climate change impacts in several areas, including water resources. The Climate Action Team (CAT) was formed in response to Executive Order S-3-05. To help unify analysis across topic areas, the CAT worked with scientists from the California Applications Program's California Climate Change Center to select a set of future climate projections to be used for analysis. In the assessment *"Using Future Climate Projections to Support Water Resources Decision Making in California,"* the CAT selected six different global climate change models to evaluate climate change impacts, assuming two different greenhouse gas emission levels (a high end and a low end), for a total of 12 scenarios. The results of the study indicated that climate change has already been observed, in that in the last 100 years air temperatures have risen about one degree Fahrenheit and there has been a documented greater variance in precipitation, with greater extremes in both heavy flooding and severe droughts.

In July 2006, DWR issued "*Progress on Incorporating Climate Change into Management of California's Water Resources*," as required by Executive Order S-3-05. That report demonstrated how various analytical tools could be used to address issues related to climate change. The report presents analysis results showing potential impacts on SWP operations, including reservoir inflows, delivery reliability, and average annual carryover storage, as well as many other operational parameters. Some of the main impacts include changes to south-of-Delta SWP deliveries (from an increase of about one percent in a wetter climate change scenario to about a ten percent reduction for a drier scenario), increased winter runoff and lower

SWP allocations in the three driest scenarios, lower carryover storage in drier scenarios and higher carryover storage in the wetter scenario.

In the 2009 update of the DWR *California Water Plan*, multiple scenarios of future climate conditions are evaluated. These changing hydrological conditions could affect future planning efforts, which are typically based on historic conditions. The *California Water Plan* identifies the following probable impacts due to changes in temperature and precipitation:

- Decrease in snowpack, which is a major part of annual water storage, due to increasing winter temperatures.
- More winter runoff and less spring/summer runoff due to warmer temperatures.
- Greater extremes in flooding and droughts.
- Greater water demand for irrigation and landscape water due to increased temperatures and their impacts on plant water needs.
- Increased sea level rise, further endangering the functions of the SWP, which can depend on movement of water through the low-lying channels of the low-lying Sacramento-San Joaquin Delta. Sea level rise could also require the SWP to release additional storage water to avoid sea water intrusion into the Delta.

In its *State Water Project Delivery Reliability Report (Reliability Report)* (2009), DWR included the potential effects of climate change in its analysis of SWP delivery reliability under future conditions. For that report, DWR used a single climate change scenario, selecting a scenario with median effects out of a number of climate change scenarios it analyzed in 2009.

Even without population changes, water demand could increase. Precipitation and temperature influence water demand for outdoor landscaping and irrigated agriculture. Outdoor water use is a large component of Santa Clarita Valley water demands. Lower spring rainfall increases the need to apply irrigation water. Further, warmer temperatures increase crop evapotranspiration, which increases water demand.

These effects and their potential to impact the supplies available to the Santa Clarita Valley have been evaluated indirectly in DWR's *Reliability Report*, and their potential to impact demand is considered in CLWA's assessment of demands in Chapter 2 of this UWMP.

Section 2: Water Use

2.1 Overview

This chapter describes historic and current water usage and the methodology used to project future demands within CLWA's service area. Water usage is divided into sectors such as residential, industrial, commercial, landscape, agricultural, and other purposes. To undertake this evaluation, existing land use data and new housing construction information were compiled from each of the retail water purveyors and projections evaluated from each retailer's master planning documents. This information was then compared to historical trends for new water service connections and customer water usage information. In addition, weather and water conservation effects on historical water usage were considered in the evaluation.

Several factors can affect demand projections, including:

- Land use revisions
- New regulations
- Consumer choice
- Economic conditions
- Transportation needs
- Highway construction
- Environmental factors
- Conservation programs
- Building and plumbing codes

The foregoing factors affect the amount of water needed, as well as the timing of when it is needed. During an economic recession, there is a major downturn in development and a subsequent slowing of the projected demand for water. The projections in this Plan do not attempt to forecast recessions or droughts. Likewise, no speculation is made about future building and plumbing codes or other regulatory changes. However, the projections do include water conservation consistent with new legislative requirements calling for a 20 percent reduction in per capita demand by 2020 (SBX7-7).

An analysis was performed that combined growth projections with water use data to forecast total water demand in future years. Water uses were broken out into specific categories and assumptions made about each to more accurately project future use. Three separate data sets were collected and included in the model: historical water use by land use type, current population and projected population.

2.2 Demographics

Water service is provided to residential, commercial, industrial, institutional, recreational, and agricultural customers and for environmental and other uses, such as fire protection and landscaping.

The total demand trend on water supplies is expected to continue to rise within the Valley area (along with most of California) because of population, economic activity, environmental and water quality needs and regulatory requirements.

2.3 Historical Water Use

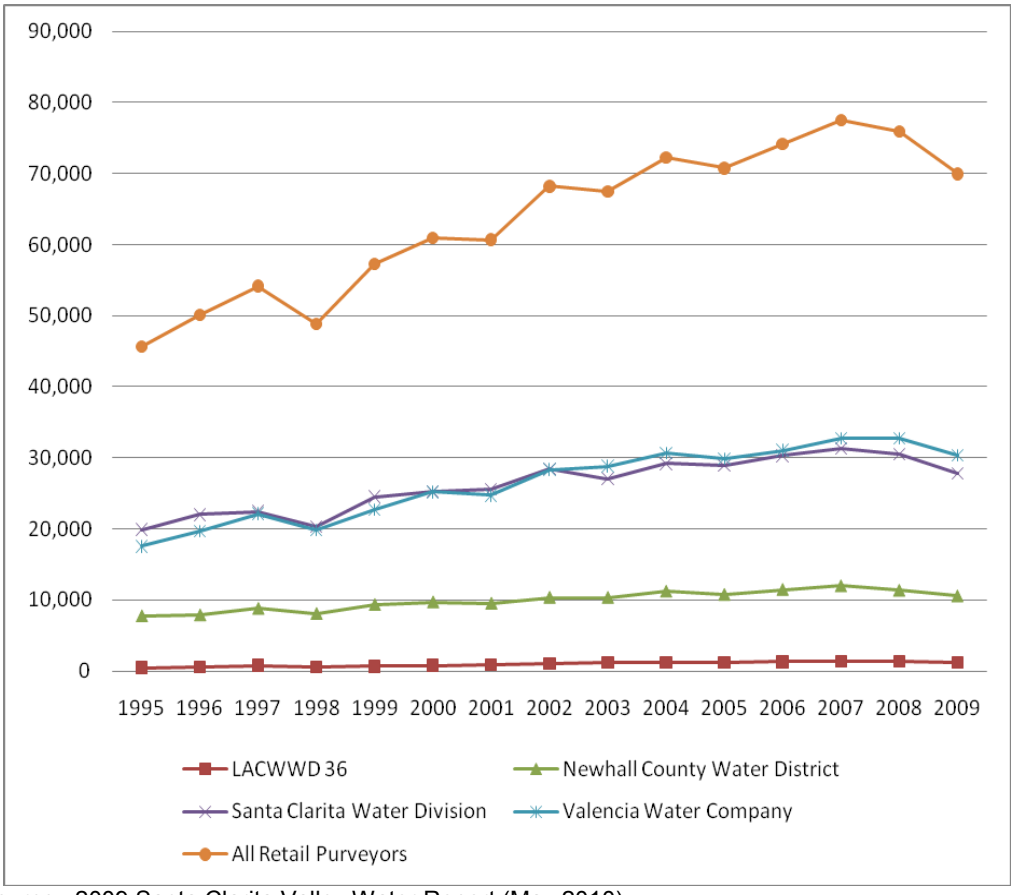
Predicting future water supply requires accurate historic water use patterns and water usage records. The historical use of all water supplies used to meet municipal water requirements, including the use of local groundwater, imported water supplies and recycled water, are summarized in Table 2-1. Figure 2-1 illustrates this use, which shows an increasing trend in Valley water demand since 1995 with a downturn in recent years likely due to weather conditions, response by customers to dry-year conservation efforts and economic conditions.

TABLE 2-1
HISTORICAL WATER USE BY RETAIL WATER PURVEYORS

Year	LACWWD 36	Newhall County Water District	Santa Clarita Water Division	Valencia Water Company	All Retail Purveyors
1995	477	7,755	19,898	17,543	45,673
1996	533	7,887	22,006	19,721	50,147
1997	785	8,801	22,456	22,131	54,173
1998	578	8,087	20,319	19,874	48,858
1999	654	9,348	24,513	22,735	57,250
2000	800	9,718	25,280	25,190	60,988
2001	907	9,525	25,544	24,715	60,691
2002	1,069	10,362	28,434	28,360	68,225
2003	1,175	10,351	27,092	28,829	67,447
2004	1,234	11,217	29,191	30,654	72,296
2005	1,200	10,756	28,921	29,891	70,768
2006	1,289	11,470	30,302	31,065	74,126
2007	1,406	11,975	31,355	32,756	77,492
2008	1,354	11,340	30,476	32,730	75,900
2009	1,243	10,560	27,816	30,355	69,974

Source: 2009 Santa Clarita Valley Water Report (May 2010)

FIGURE 2-1
HISTORICAL WATER USE



Source: 2009 Santa Clarita Valley Water Report (May 2010)

2.4 Projected Water Use

2.4.1 Purveyor Projections

Each of the four retail water purveyors provided projected water demands based on development projects that are under evaluation, in the planning process or the result of its own water planning efforts for its service area. The purveyors maintain historical data, as well as work closely with property owners and developers in their service areas, to ensure they have an adequate water supply and the necessary infrastructure to provide water service.

Since there are only four purveyors in the service area, there is close coordination and exchange of data. SCWD's engineering department continually updates expected demands and infrastructure needs. NCWD's master plans provide the basis for projected demands. VWC is an investor-owned utility regulated by the California Public Utilities Commission (PUC) and is required to regularly provide its service plan for rate increases and service area changes.

The projected water demands provided by the four purveyors are shown in Tables 2-3 through 2-6, for LACWWD 36, NCWD, SCWD and VWC, respectively. These tables show current and projected water demand, by customer type and in total, through 2050. Table 2-2 provides a summary from these tables of each purveyor's projected total water demands through 2050.

TABLE 2-2
SUMMARY OF PROJECTED WATER DEMANDS[(a)(b)(c)]

	2010	2015	2020	2025	2030	2035	2040	2045	2050	Annual Increase
Water Demands										
LACWWD 36[(d)]	1,243	1,759	2,189	2,619	3,048	3,478	3,908	4,338	4,768	3.5%
NCWD	10,560	12,571	14,246	15,922	17,598	19,273	20,949	22,624	24,300	2.2%
SCWD	27,816	31,633	34,814	37,995	41,176	44,357	47,538	50,719	53,900	1.7%
VWC	30,354	34,107	37,235	40,362	43,490	46,617	49,745	52,872	56,000	1.6%
Total Demand	69,973	80,070	88,484	96,898	105,313	113,725	122,141	130,553	138,968	1.8%

Notes:
(a) Summary of demands from Tables 2-3 to 2-6.
(b) Reflects existing and projected demands in CLWA service area only. CLWA's Annexation Policy requires annexing parties to provide additional fully reliable supplies.
(c) Demands exclude non-purveyor demands. Similarly, supplies evaluated in this UWMP exclude non-purveyor supplies.
(d) LACWWD 36 included for purposes of providing regional completeness; however, it is not required to prepare an UWMP.

TABLE 2-3
LOS ANGELES COUNTY WATERWORKS DISTRICT 36
CURRENT AND PROJECTED WATER DELIVERIES BY CUSTOMER TYPE

Year	Water Use Sectors	Single Family Residential[a]	Multi Family Residential[a]	Commercial	Construction/ Industrial	Institutional/ Government	Landscape	Total[b]
2010	No. of Accounts	1,527	6	5	6	6	6	1,555
	Deliveries (AF)	1,168	35	1	4	24	13	1,243
2015	No. of Accounts	2,155	8	5	8	8	8	2,194
	Deliveries (AF)	1,649	49	1	5	33	23	1,759
2020	No. of Accounts	2,682	10	5	10	10	10	2,729
	Deliveries (AF)	2,052	61	1	6	42	28	2,189
2025	No. of Accounts	3,209	12	5	12	12	12	3,264
	Deliveries (AF)	2,455	73	1	7	50	34	2,619
2030	No. of Accounts	3,735	14	5	14	14	14	3,797
	Deliveries (AF)	2,857	85	1	9	58	39	3,048
2035	No. of Accounts	4,262	17	6	17	17	17	4,333
	Deliveries (AF)	3,260	97	1	10	66	45	3,478
2040	No. of Accounts	4,788	19	6	19	19	19	4,863
	Deliveries (AF)	3,663	109	1	11	74	50	3,908
2045	No. of Accounts	5,315	21	7	21	21	21	5,405
	Deliveries (AF)	4,066	121	1	12	82	56	4,338
2050	No. of Accounts	5,842	23	8	23	23	23	5,940
	Deliveries (AF)	4,469	133	1	14	91	61	4,768

Notes:
(a) Projected Single Family and Multi-Family residential accounts have been adjusted to reflect dwelling units.
(b) Totals do not include fire services.

TABLE 2-4
NEWHALL COUNTY WATER DISTRICT
CURRENT AND PROJECTED WATER DELIVERIES BY CUSTOMER TYPE

Year	Water Use Sectors	Single Family Residential[a]	Multi Family Residential[a]	Commercial	Construction/ Industrial	Institutional/ Government	Landscape	Total[b]
2010 [c]	No. of Accounts	8,500	4,893	400	80	70	250	14,193
	Deliveries (AF)	6,400	1,500	560	100	400	1,600	10,560
2015	No. of Accounts	10,135	4,955	476	95	83	298	16,042
	Deliveries (AF)	7,631	1,785	655	119	476	1,906	12,571
2020	No. of Accounts	11,485	5,003	540	108	94	337	17,568
	Deliveries (AF)	8,647	2,023	742	135	540	2,159	14,246
2025	No. of Accounts	12,620	5,093	600	135	120	375	18,493
	Deliveries (AF)	9,665	2,261	831	151	603	2,412	15,922
2030	No. of Accounts	14,188	5,100	667	133	117	417	20,621
	Deliveries (AF)	10,682	2,499	917	168	667	2,666	17,598
2035	No. of Accounts	15,538	5,148	730	146	128	456	22,146
	Deliveries (AF)	11,699	2,737	1,005	182	730	2,920	19,273
2040	No. of Accounts	16,889	5,196	794	159	139	496	23,673
	Deliveries (AF)	12,716	2,975	1,091	198	793	3,175	20,949
2045	No. of Accounts	18,241	5,245	857	171	150	536	25,200
	Deliveries (AF)	13,733	3,213	1,179	214	857	3,428	22,624
2050	No. of Accounts	19,591	5,293	921	184	161	575	26,725
	Deliveries (AF)	14,750	3,452	1,266	230	920	3,681	24,300

Notes:

(a) Projected Single Family and Multi-Family residential accounts have been adjusted from the 2005 UWMP to reflect dwelling units.

(b) Totals do not include fire services.

(c) Year 2010 projection based on 2009 actual data. Growth to 2015 reflects six years of data.

TABLE 2-5
SANTA CLARITA WATER DIVISION
CURRENT AND PROJECTED WATER DELIVERIES BY CUSTOMER TYPE

Year	Water Use Sectors	Single Family Residential[a]	Multi Family Residential[a]	Commercial	Construction/ Industrial	Institutional/ Government	Landscape	Total[b]
2010[c]	No. of Accounts	24,382	13,151	726	71	107	890	39,327
	Deliveries (AF)	16,189	4,200	1,029	445	862	5,090	27,816
2015	No. of Accounts	26,368	14,311	781	135	117	990	42,702
	Deliveries (AF)	18,410	4,776	1,170	506	982	5,789	31,633
2020	No. of Accounts	29,019	15,750	859	148	129	1,089	46,994
	Deliveries (AF)	20,261	5,257	1,288	558	1,079	6,371	34,814
2025	No. of Accounts	31,670	17,188	938	162	141	1,189	51,288
	Deliveries (AF)	22,111	5,737	1,406	608	1,178	6,955	37,995
2030	No. of Accounts	34,320	18,627	1,016	175	152	1,288	55,578
	Deliveries (AF)	23,962	6,217	1,523	659	1,276	7,539	41,176
2035	No. of Accounts	36,971	20,066	1,095	189	164	1,388	59,873
	Deliveries (AF)	25,813	6,697	1,641	715	1,375	8,116	44,357
2040	No. of Accounts	39,622	21,504	1,174	203	176	1,487	64,166
	Deliveries (AF)	27,664	7,177	1,759	761	1,479	8,698	47,538
2045	No. of Accounts	42,273	22,943	1,252	216	188	1,587	68,459
	Deliveries (AF)	29,514	7,658	1,876	812	1,579	9,280	50,719
2050	No. of Accounts	44,930	24,385	1,331	230	200	1,687	72,763
	Deliveries (AF)	31,370	8,139	1,994	862	1,671	9,864	53,900

Notes:
(a) Projected Single Family and Multi-Family residential accounts have been adjusted from the 2005 UWMP to reflect dwelling units.
(b) Totals do not include fire services.
(c) Year 2010 projection based on 2009 actual data. Growth to 2015 reflects six years of data.

TABLE 2-6
VALENCIA WATER COMPANY
CURRENT AND PROJECTED WATER DELIVERIES BY CUSTOMER TYPE

Year	Water Use Sectors	Single Family Residential[a]	Multi Family Residential[a]	Commercial	Industrial	Institutional/ Government	Landscape[b]	Total[c]
	No. of Accounts	25,386	8,854	1,546	451	646	13	36,896
2010[d]	Deliveries (AF)	14,384	1,845	6,981	1,856	4,586	702	30,354
	No. of Accounts	26,497	11,956	1,598	485	647	362	41,545
2015	Deliveries (AF)	14,883	2,993	7,203	1,990	4,595	2,442	34,107
	No. of Accounts	27,423	14,542	1,641	514	648	652	45,419
2020	Deliveries (AF)	15,299	3,949	7,389	2,101	4,603	3,894	37,235
	No. of Accounts	28,348	17,127	1,684	542	650	943	49,294
2025	Deliveries (AF)	15,715	4,906	7,575	2,213	4,611	5,343	40,362
	No. of Accounts	29,274	19,713	1,727	570	651	1,233	53,168
2030	Deliveries (AF)	16,130	5,862	7,760	2,324	4,619	6,794	43,490
	No. of Accounts	30,200	22,298	1,770	599	652	1,524	57,042
2035	Deliveries (AF)	16,546	6,818	7,946	2,436	4,627	8,244	46,617
	No. of Accounts	31,125	24,883	1,813	627	653	1,814	60,917
2040	Deliveries (AF)	16,962	7,775	8,131	2,548	4,635	9,696	49,745
	No. of Accounts	32,051	27,469	1,856	656	654	2,105	64,791
2045	Deliveries (AF)	17,378	8,731	8,317	2,659	4,643	11,144	52,872
	No. of Accounts	32,977	30,054	1,900	684	655	2,395	68,665
2050	Deliveries (AF)	17,793	9,687	8,503	2,771	4,650	12,596	56,000

Notes:
(a) Projected Single Family and Multi-Family residential accounts have been adjusted from the 2005 UWMP to reflect dwelling units.
(b) Landscape customers consist of potable and recycled water users for outdoor irrigation.
(c) Totals do not include fire services.
(d) Year 2010 projection based on 2009 actual data. Growth to 2015 reflects six years of data.

2.5 Population

2.5.1 Historical Population

The methodology for estimating the historical populations of areas served by the water purveyors is prescribed by DWR[3]. The method enables those suppliers whose service areas are not fully contained in existing city boundaries to obtain service area population from a data source such as a regional planning agency or an association of governments (such as Southern California Association of Governments, SCAG), assuming that their estimates use the State Department of Finance (DOF) or U.S. Census Bureau data as a basis. In such situations water suppliers must use DOF, Census or SCAG data to a define persons per Single Family (SF) and Multi-Family (MF) residential connection factor, and then calculate yearly populations based on the number of SF and MF connections each year. This calculation of historical population must cover each year of the period 1995 to 2010.

Accordingly, each purveyor provided an accounting of its historical SF residential and MF residential dwelling units for the years 1995 to 2009 (LACWWD 36 provided 2000-2009 data). Planning assumptions utilized the 2000 U.S. Census, SCAG's 2012 Regional Transportation Plan (RTP) growth forecast (baseline 2008) and the DOF 2000 and 2010 datasets to capture both City of Santa Clarita and the northern portion of unincorporated Los Angeles County within the CLWA service area. Actual data for 2010 SF and MF dwelling units were provided by the purveyors.

The population for each purveyor was estimated by taking the number of accounts for SF and MF in a given year and multiplying by a persons-per-household (PPHH) factor for the number of people living at each type of account, and then summing the result. Using a PPHH factor of 3.11[4] and a growth rate of 0.53 percent, annual historical populations were calculated for each purveyor from 1995, as shown in Table 2-7. The total of these estimates, as summarized in Table 2-8, reflect the total population within the CLWA service area.

[3] See Appendix A in "*Methodologies for Calculating Baseline and Compliance per Capita Urban Water Use"* (DWR 2010).
[4] The PPHH of 3.11 was anchored to the purveyors' year 2000 residential connections and then projected backward to 1995 and forward to 2010 using the calculated growth rate.

TABLE 2-7
HISTORICAL POPULATION BY RETAIL PURVEYOR SERVICE AREA

	NCWD			SCWD		
Year	SF Residential Units[a]	MF Residential Units[a]	Population[b][c]	SF Residential Units[a]	MF Residential Units[a]	Population[b][c][d]
1995	5,680	4,552	30,898	17,632	10,062	83,628
1996	5,723	4,589	31,323	17,812	10,100	84,784
1997	6,035	4,612	32,533	17,856	9,842	84,634
1998	6,037	4,622	32,764	18,222	9,884	86,394
1999	6,202	4,651	33,561	18,671	9,994	88,642
2000	6,255	4,713	34,121	19,408	10,527	93,128
2001	6,428	4,768	35,041	20,145	10,985	97,430
2002	6,777	4,823	36,526	20,691	11,458	101,230
2003	7,199	4,852	38,178	21,278	11,685	104,427
2004	7,873	4,870	40,618	22,152	12,104	109,189
2005	8,163	4,875	41,814	23,035	12,479	113,897
2006	8,292	4,875	42,490	23,620	13,066	118,385
2007	8,431	4,875	43,206	24,347	13,195	121,903
2008	8,450	4,875	43,539	24,398	13,133	122,631
2009	8,492	4,875	43,951	24,374	13,126	123,302
2010	8,500	4,893	44,316	24,382	13,151	124,192

Notes:
(a) Single Family (SF) and Multi-Family (MF) residential units provided by each retail purveyor.
(b) Population estimated for non-census years assuming consistent exponential growth 1990-2000 and 2000-2010.
(c) Population derived from DOF population data for City of Santa Clarita. Table 1 Total Population 2000 and 2010 Incorporated Cities by County in California and Table 1 Population Change 1990-2000 Incorporated Cities by County, and City of Santa Clarita, 2000-2010 U.S. Census Bureau, 2000 Summary File 1 (SF1) 100 Percent Data, City of Santa Clarita, 2000, SCAG, Adopted 2008 RTP.
(d) SCWD data for 2010 population based on 2009 population and SCWD Water Master Plan (2008).
(e) LACWWD 36, rather than calculating population based on dwelling units, provided its historical population for 2000-2010.

TABLE 2-7 CON'T
HISTORICAL POPULATION BY RETAIL PURVEYOR SERVICE AREA

	VWC			LACWWD 36		
Year	SF Residential Units[a]	MF Residential Units[a]	Population[b][c]	SF Residential Units[a]	MF Residential Units[a]	Population[e]
1995	14,696	4,184	57,012	-	-	-
1996	15,433	4,285	59,895	-	-	-
1997	16,276	4,285	62,826	-	-	-
1998	17,311	5,191	69,168	-	-	-
1999	18,264	5,457	73,353	-	-	-
2000	19,179	5,725	77,476	948	5	2,965
2001	20,631	6,342	84,420	1,093	5	3,393
2002	21,818	6,941	90,556	1,177	5	4,232
2003	22,822	7,676	96,618	1,251	5	4,508
2004	24,193	7,949	102,451	1,278	5	4,600
2005	24,953	8,405	106,983	1,289	5	4,624
2006	25,044	8,437	108,043	1,300	5	4,660
2007	25,131	8,537	109,324	1,303	5	4,681
2008	25,211	8,590	110,443	1,310	5	4,688
2009	25,171	8,854	111,876	1,310	5	4,684
2010	25,386	8,854	113,296	1,527	6	4,947

Notes:

(a) Single Family (SF) and Multi-Family (MF) residential units provided by each retail purveyor.

(b) Population estimated for non-census years assuming consistent exponential growth 1990-2000 and 2000-2010.

(c) Population derived from DOF population data for City of Santa Clarita. Table 1 Total Population 2000 and 2010 Incorporated Cities by County in California and Table 1 Population Change 1990-2000 Incorporated Cities by County, and City of Santa Clarita, 2000-2010 U.S. Census Bureau, 2000 Summary File 1 (SF1) 100 Percent Data, City of Santa Clarita, 2000, SCAG, Adopted 2008 RTP.

(d) SCWD data for 2010 population based on 2009 population and SCWD Water Master Plan (2008).

(e) LACWWD 36, rather than calculating population based on dwelling units, provided its historical population for 2000-2010.

TABLE 2-8
SUMMARY OF HISTORICAL POPULATION BY RETAIL PURVEYOR SERVICE AREA[(a)]

Year	NCWD	SCWD	VWC	LACWWD 36[(b)]	Total CLWA Service Area
1995	30,898	83,628	57,012	-	**171,537**
1996	31,323	84,784	59,895	-	**176,002**
1997	32,533	84,634	62,826	-	**179,994**
1998	32,764	86,394	69,168	-	**188,326**
1999	33,561	88,642	73,353	-	**195,556**
2000	34,121	93,128	77,476	2,965	**207,690**
2001	35,041	97,430	84,420	3,393	**220,284**
2002	36,526	101,230	90,556	4,232	**232,544**
2003	38,178	104,427	96,618	4,508	**243,730**
2004	40,618	109,189	102,451	4,600	**256,857**
2005	41,814	113,897	106,983	4,624	**267,318**
2006	42,490	118,385	108,043	4,660	**273,578**
2007	43,206	121,903	109,324	4,681	**279,114**
2008	43,539	122,631	110,443	4,688	**281,301**
2009	43,951	123,302	111,876	4,684	**283,813**
2010	44,316	124,192	113,296	4,947	**286,750**

Notes:
(a) Summary of population from Table 2-7.
(b) LACWWD 36 included for purposes of providing regional completeness; however, it is not required to prepare an UWMP.

2.5.2 Population Projections

The population for the CLWA service area was projected for the years 2010 to 2050 using the connection-PPHH method described in Section 2.5.1. The purveyors provided their projections of SF and MF residential dwelling units within their service areas for the years 2010 to 2050, as estimated in their master planning documents. SCWD, rather than providing dwelling units, provided its projections of population at build-out of its service area in 2050.

Using a PPHH factor of 3.31[5] (increased by the growth rate from 3.11 PPHH in year 2000), assumed constant over the projection period, projections of population for years out to 2050 were calculated. The results of these calculations are shown in Table 2-9.

Based on these results, population in the CLWA service area is projected to grow at an average annual rate of approximately 1.5 percent per year over the 40-year planning period to 2050.

[5] The PPHH of 3.31 was projected forward from the year 2000 PPHH of 3.11, using the calculated growth rate.

TABLE 2-9
PROJECTED POPULATION

Year	NCWD[(a)]	SCWD[(b)]	VWC[(a)]	LACWWD 36[(a)]	Total CLWA Service Area
2010	44,316	124,192	113,296	4,947	**286,750**
2015	49,933	133,868	127,241	7,157	**318,199**
2020	54,559	143,544	138,862	8,908	**345,873**
2025	58,612	153,220	150,477	10,658	**372,967**
2030	63,824	162,896	162,098	12,405	**401,223**
2035	68,450	172,572	173,716	14,159	**428,897**
2040	73,079	182,248	185,330	15,906	**456,564**
2045	77,715	191,924	196,952	17,657	**484,248**
2050	82,341	201,600	208,570	19,407	**511,918**

Notes:
(a) Based on average household size calculated over the census decade to 3.31 persons per household, and remaining fixed through 2050.
(b) SCWD data based on SCWD Water Master Plan (2008).

2.5.3 Comparison to City and County Planning

One Valley, One Vision (OVOV) is a joint planning effort by the City of Santa Clarita and Los Angeles County representing the build-out of the entire Santa Clarita Valley, including Canyon Country, Newhall, Saugus and Valencia and the County communities of Stevenson Ranch, Castaic, Val Verde, Agua Dulce and the future Newhall Ranch. The OVOV includes both City and County jurisdictions in its planning effort which are the development of a General Plan and associated EIR. Both the OVOV area and the Santa Clarita Valley planning area (defined by SCAG) are slightly larger than the CLWA service area and factors into the modest differences in population projections. As the overwhelming majority of the OVOV population is located in the CLWA service area, it is appropriate to compare the CLWA service area population projections to the OVOV projections, as shown in Table 2-10.

TABLE 2-10
POPULATION COMPARISON

Year	Total CLWA Service Area[a]	OVOV[b]	Santa Clarita Valley Planning Area
2010	286,750	252,000[c]	267,299[d]
2015	318,199	278,000 - 280,750	319,715[d]
2020	345,873	304,000 - 309,500	352,336[d]
2025	372,967	330,000 - 338,250	384,217[d]
2030	401,223	356,000 - 367,000	397,112[d][e]
2035	428,897	382,000 - 395,750	410,008[d]
2040	456,564	408,000 - 424,500	448,228[f]
2045	484,248	434,000 - 453,250	490,011[f]
2050	511,918	460,000 - 482,000	535,689[f]

Notes:
(a) See Table 2-9.
(b) OVOV General Plan EIR.
(c) The OVOV estimated population in 2008 was 252,000 which, for this analysis, was assumed to occur in 2010.
(d) 2010 and 2035 Projection for Santa Clarita Valley Planning Area are the sums of the City of Santa Clarita and unincorporated Los Angeles area. The unincorporated area provided by the County of Los Angeles Department of Planning from adjusted GIS data from U.S. Census Bureau & SCAG data provided by email communication, April 5, 2011.
(e) Year 2030 value adjusted. Actual GIS data had 2030 value of 414,612 which was higher than 2035 value. Used growth rate assumptions to correct.
(f) Years 2040-2050 assumed 2010-2035 growth rates.

In Table 2-10, the OVOV projections and SCAG projections indicate a 1.6 to 1.8 percent annual growth rate of population for the Santa Clarita Valley. The purveyor projections of population growth are just slightly below that with a 1.5 percent annual growth rate. These population growth rates align with the annual rate of increase in the purveyors' projected water demands of 1.8 percent, as shown in Table 2-2.

Based on a detailed analysis of the OVOV Planning Area conducted by traffic analysis zones, County and City staff have determined that population of the Santa Clarita Valley at full build-out of the uses shown on the land use map of the Area Plan will be approximately 460,000 to 482,000 residents.

County staff has also provided updated and adjusted 2010 and 2035 population projections using SCAG data for the unincorporated areas of CLWA's service area (using year 2000 Census base data). Based on these projections for the unincorporated area and SCAG's projections for the City, projections for the Santa Clarita Valley at full build-out are about 535,700 persons.

The total population projected in this UWMP for the CLWA service area in 2050 is approximately 512,000 residents. The difference between this and OVOV projections may be due to some purveyors' master planning efforts taking a more conservative approach to ensure an adequate supply of water for all future uses.

2.6 Existing and Targeted Per Capita Water Use

2.6.1 Base Daily Per Capita Water Use for SBX7-7 Reduction

As described in Senate Bill 7 of Special Extended Session 7 (SBX7-7), it is the intent of the California legislature to increase water use efficiency and the legislature has set a goal of a twenty percent per capita reduction in urban water use statewide by 2020. As SBX7-7 applies to retail water suppliers, NCWD, SCWD and VWC must comport with its requirements. Consistent with SBX7-7, the 2010 UWMP must provide an estimate of Base Daily Per Capita Water Use. This estimate utilizes information on population as well as base gross water use. For the purposes of this UWMP, population was estimated as described in the previous section. Base gross water use is defined as the total volume of water, treated or untreated, entering the distribution systems of the retail purveyors, excluding (1) recycled water, (2) net volume of water placed into long-term storage and (3) water conveyed to another urban water supplier. This calculation of base daily per capita water use is limited to the NCWD, SCWD and VWC retail service areas.

The UWMP Act allows urban water retailers to evaluate their base daily per capita water use using two base periods, a 10 or 15-year continuous period is used to calculate baseline per capita water use. A 5-year base period is used to determine whether the 2020 per capita water use target meets the legislation's minimum water use reduction requirements of at least a 5 percent reduction per capita water use for those suppliers with baseline water use above 100 GPCD. The legislation provided some flexibility in what actual periods of time are used to establish these baselines, to account for short-term water demand variations resulting from weather influences, as well as acknowledging the advances of water suppliers that have already begun using recycled water to reduce potable demands. The 15-year base period within the range January 1, 1990 to December 31, 2010 is allowed if recycled water made up ten percent or more of 2008 retail water deliveries. If recycled water did not make up ten percent or more of the 2008 retail water deliveries, then a retailer must use a 10-year base period within the range January 1, 1995 to December 31, 2010. Recycled water did not make up ten percent of 2008 deliveries by NCWD, SCWD or VWC, and for this reason base daily per capita water use has been based on a 10-year period. The 5-year period required by SBX7-7 must be within the range January 1, 2003 to December 31, 2010.

Tables 2-11 to 2-13 provide the data used to calculate the base daily per capita water use in GPCD, and the 10-year and 5-year base periods for each purveyor. Tables 2-15, 2-17 and 2-19 provide the data used to determine whether the purveyor's 2015 and 2020 per capita water use targets meet the legislation's minimum water use reduction requirement of five percent. If the 2020 target is greater than the 5-year value, the target is reduced to this value. These tables show that the 2020 targets do not exceed these minimum values. Per SBX7-7 requirements, the 2015 interim targets were therefore set to the mid-point between the 10-year baseline per capita water use and the 2020 target.

TABLE 2-11
NEWHALL COUNTY WATER DISTRICT - BASE DAILY PER CAPITA WATER USE

Base Period Year		Distribution System Population	Annual System Gross Water Use (AFY)	Annual Daily Per Capita Water Use (GPCD)	10-Year Average (GPCD)	5-Year Average (GPCD)
Sequence Year	*Calendar Year*					
1	1995	30,898	7,755	224		
2	1996	31,323	7,887	225		
3	1997	32,533	8,801	242		
4	1998	32,764	8,087	220		
5	1999	33,561	9,348	249		
6	2000	34,121	9,718	254		
7	2001	35,041	9,525	243		
8	2002	36,526	10,362	253		
9	2003	38,178	10,351	242		
10	2004	40,618	11,217	247	240	
11	2005	41,814	10,756	230	240	
12	2006	42,490	11,470	241	242	
13	2007	43,206	11,975	247	243	241
14	2008	43,539	11,340	233	244	239
15	2009	43,951	10,560	214	240	233
				Period Selected	**244**	**241**

Note: Shaded cells show calendar years used in selected 5-year average.

TABLE 2-12
SANTA CLARITA WATER DIVISION - BASE DAILY PER CAPITA WATER USE

Base Period Year		Distribution System Population	Annual System Gross Water Use (AFY)	Annual Daily Per Capita Water Use (GPCD)	10-Year Average (GPCD)	5-Year Average (GPCD)
Sequence Year	*Calendar Year*					
1	1995	83,628	19,898	212		
2	1996	84,784	22,006	232		
3	1997	84,634	22,456	237		
4	1998	86,394	20,319	210		
5	1999	88,642	24,513	247		
6	2000	93,128	25,280	242		
7	2001	97,430	25,544	234		
8	2002	101,230	28,434	251		
9	2003	104,427	27,092	232		
10	2004	109,189	29,191	239	234	
11	2005	113,897	28,921	227	235	
12	2006	118,385	30,302	229	235	
13	2007	121,903	31,355	230	234	231
14	2008	122,631	30,476	222	235	229
15	2009	123,302	27,816	201	231	222
				Period Selected	**235**	**231**

Note: Shaded cells show calendar years used in selected 5-year average.

TABLE 2-13
VALENCIA WATER COMPANY - BASE DAILY PER CAPITA WATER USE

Base Period Year		Distribution System Population	Annual System Gross Water Use (AFY)[(a)]	Annual Daily Per Capita Water Use (GPCD)	10-Year Average (GPCD)	5-Year Average (GPCD)
Sequence Year	*Calendar Year*					
1	1995	57,012	17,543	275		
2	1996	59,895	19,721	294		
3	1997	62,826	22,131	314		
4	1998	69,168	19,874	257		
5	1999	73,353	22,735	277		
6	2000	77,476	25,190	290		
7	2001	84,420	24,715	261		
8	2002	90,556	28,360	280		
9	2003	96,618	28,779	266		
10	2004	102,451	30,234	263	278	
11	2005	106,983	29,473	246	275	
12	2006	108,043	30,646	253	271	
13	2007	109,324	32,286	264	266	258
14	2008	110,443	32,419	262	266	258
15	2009	111,876	30,027	240	263	253
				Period Selected	**278**	**258**

Notes: Shaded cells show calendar years used in selected 5-year average.

(a) Excludes recycled water use in years 2003-2009.

2.6.2 Urban Water Use Targets for SBX7-7 Reduction

In addition to calculating base gross water use, SBX7-7 requires that NCWC, SCWD and VWC, as retail purveyors, identify their demand reduction targets for year 2015 and 2020 by utilizing one of four options:

- Option 1. 80 percent of baseline GPCD water use (i.e., a 20 percent reduction).
- Option 2. The sum of the following performance standards: indoor residential use (provisional standard set at 55 GPCD); plus landscape use, including dedicated and residential meters or connections equivalent to the State Model Landscape Ordinance (80 percent ETo existing landscapes, 70 percent of ETo for future landscapes); plus 10 percent reduction in baseline commercial, industrial institutional use by 2020.
- Option 3. 95 percent of the applicable state hydrologic region target as set in the DWR "20x2020 Water Conservation Plan" (February, 2010) (20x2020 Plan).
- Option 4. Savings by Water Sector: this provisional method developed by DWR, identifies water savings obtained through identified practices and subtracts them from the base daily per capita water use value identified for the water supplier.

Option 2 and Option 4 were considered and not selected because they required data not currently being collected within the purveyors service areas.

The CLWA service area is within the South Coast Hydrologic Region (#4) as defined by DWR and this hydrologic region has been assigned a 2020 water use target of 149 GPCD per the DWR 20x2020 Plan. Therefore, in order to use Option 3, each purveyor's daily per capita water use for the 5-year base period would have to be close to 95 percent of the 149 GPCD target, or 142 GPCD. Since none of the purveyors 5-year base period is within this limit, as shown in Table 2-14, none of the purveyors chose this option as the target method.

TABLE 2-14
OPTION 3 – 95 PERCENT OF STATE HYDROLOGIC REGION TARGET

Purveyor	5-Year Base Period	95% of 5-Year Base Period (149 GPCD)
NCWD	241	229 > 149
SCWD	231	219 > 149
VWC	258	245 > 149

Option 1 is the simplest of the options provided and requires reduction to 80 percent of baseline per capita water use. Option 1 is also the most conservative of the four Options provided. Each of the purveyors selected Option 1 to calculate its SBX7-7 target.

This results in the 2020 GPCD targets for the purveyors as shown in Tables 2-15, 2-17, and 2-19. Each purveyor plans to meet the proposed 20X2020 water use targets implementing conservation methods that are discussed in Chapter 7 Demand Management Measures, as well as with recycled water as described in Chapter 4, Recycled Water. Tables 2-16, 2-18, and 2-20, show the calculation of reduction in demand required by each purveyor. SBX7-7 allows for both conservation and recycled water supply to assist in meeting these SBX7-7 conservation requirements.

The 2015 and 2020 projected consumption without additional reduction shown in Tables 2-16, 2-18, to 2-20 are calculated in accordance with SBX7-7 and, therefore, do not match the projected deliveries in Tables 2-4, 2-5 and 2-6 which are based on purveyors' master planning documents.

TABLE 2-15
NCWD - COMPONENTS OF TARGET DAILY PER CAPITA WATER USE

Period	Value		Unit	
10-year period selected for baseline GPCD	First Year	1999	Last Year	2008
5-year period selected for maximum allowable GPCD	First Year	2003	Last Year	2007
Highest 10-year Average	244		GPCD	
Highest 5-year Average	241		GPCD	
Compliance Water Use Target (20% Reduction on 10yr)	195		GPCD	
Minimum Water Use Reduction Requirement (5% Reduction 5yr)	229		GPCD	
2020 Target	**195**		GPCD	
2015 Interim Target	**219**		GPCD	
Methodology Used	**Option #1**			

TABLE 2-16
NCWD - SBX7-7 CONSERVATION SAVINGS SUMMARY

Description	Units	2015 Interim Target	2020 Compliance Target
Base Daily Water Use	GPCD	244	244
Population	GPCD	49,933	54,559
Method 1 Compliance Target	GPCD	219	195
GPCD Reduction		24	49
% Reduction		10%	20%
Projected Consumption w/out additional Reduction	AFY	13,647	14,912
Projected Consumption at Goal	AFY	12,283	11,929
Reduction to Meet Target	AFY	1,365	2,982

TABLE 2-17
SCWD - COMPONENTS OF TARGET DAILY PER CAPITA WATER USE

Period	Value		Unit	
10-year period selected for baseline GPCD	First Year	1997	Last Year	2006
5-year period selected for maximum allowable GPCD	First Year	2003	Last Year	2007
Highest 10-year Average	235		GPCD	
Highest 5-year Average	231		GPCD	
Compliance Water Use Target (20% Reduction on 10yr)	188		GPCD	
Minimum Water Use Reduction Requirement (5% Requirement 5yr)	219		GPCD	
2020 Target	**188**		GPCD	
2015 Interim Target	**212**		GPCD	
Methodology Used	**Option #1**			

TABLE 2-18
SCWD - SBX7-7 CONSERVATION SAVINGS SUMMARY

Description	Units	2015 Interim Target	2020 Compliance Target
Base Daily Water Use	GPCD	235	235
Population	GPCD	133,868	143,544
Method 1 Compliance Target	GPCD	212	188
GPCD Reduction		24	47
% Reduction		10%	20%
Projected Consumption w/out additional Reduction	AFY	35,239	37,786
Projected Consumption at Goal	AFY	31,715	30,229
Reduction to Meet Target	AFY	3,524	7,557

TABLE 2-19
VWC - COMPONENTS OF TARGET DAILY PER CAPITA WATER USE

Period	Value		Unit	
10-year period selected for baseline GPCD	First Year	1995	Last Year	2004
5-year period selected for maximum allowable GPCD	First Year	2003	Last Year	2007
Highest 10-year Average	278		GPCD	
Highest 5-year Average	258		GPCD	
Compliance Water Use Target (20% Reduction on 10yr)	222		GPCD	
Minimum Water Use Reduction Requirement (5% Reduction 5yr)	245		GPCD	
2020 Target	**222**		GPCD	
2015 Interim Target	**250**		GPCD	
Methodology Used	**Option #1**			

TABLE 2-20
VWC – SBX7-7 CONSERVATION SAVINGS SUMMARY

Description	Units	2015 Interim Target	2020 Compliance Target
Base Daily Water Use	GPCD	278	278
Population	GPCD	127,241	138,862
Method 1 Compliance Target	GPCD	250	222
GPCD Reduction		28	56
% Reduction		10%	20%
Projected Consumption w/out additional Reduction	AFY	39,623	43,242
Projected Consumption at Goal	AFY	35,661	34,593
Reduction to Meet Target	AFY	3,962	8,648

LACWWD 36 is not required to comport with the requirements of SBX7-7. However the District does implement conservation measures and will contribute to the conservation savings as indicated in Table 2-21.

TABLE 2-21
LACWWD 36 – CONSERVATION SAVINGS

Description	Units	2015	2020
Projected Consumption w/out additional Reduction	AFY	1,759	2,189
Projected Consumption at Goal	AFY	1,583	1,751
Reduction to Meet Target	AFY	176	438

2.6.3 Purveyor Projections and SBX7-7 Objectives

Table 2-22 summarizes the retail purveyors' projected water demands through 2050. This summary includes demands without conservation, based on the purveyors' projected water demands shown in Table 2-2, and with conservation, using the SBX7-7 requirements discussed previously in Section 2.6.2. Appendix C includes demand projections for a single-dry water year and a multiple-dry year period, assuming a ten percent increase in demand without conservation in dry years. It should be noted that the SBX7-7 conservation requirements do not change for different year types, so those requirements in the dry years shown in Appendix C are the same as SBX7-7 requirements shown in Table 2-22.

The demand reductions required to comply with SBX7-7 may be achieved through a combination of water conservation measures and the use of recycled water. The anticipated increase in recycled water use after 2020 could potentially reduce the quantity of water conservation needed to achieve the SBX7-7 goals. However, the water conservation amounts achieved by 2020 are assumed in this Plan to be maintained through 2050. These amounts plus planned recycled water use will exceed the SBX7-7 water reduction requirements for the period 2020-2050. Thus potable water reductions shown in Table 2-22 exceed the requirements of SBX7-7.

TABLE 2-22
NORMAL YEAR SBX7-7 DEMAND CALCULATIONS (AF)

	2015	2020	2025	2030	2035	2040	2045	2050
Water Demands w/ and w/o Conservation[a]								
LACWWD 36[b]								
Demand w/o Conservation[c]	1,759	2,189	2,619	3,048	3,478	3,908	4,338	4,768
Anticipated Conservation Objective[d]	176	438	524	610	696	782	868	954
Reduction from Recycled Water[e]	0	50	50	50	50	50	50	50
Net Anticipated Water Conservation[f]	176	388	474	560	646	732	818	904
Demand w/ Conservation[g]	1,583	1,801	2,145	2,489	2,833	3,177	3,520	3,864
SBX7-7 Compliance Calculations								
NCWD								
Demand w/o Conservation[c]	12,571	14,246	15,922	17,598	19,273	20,949	22,624	24,300
20x2020 Reduction[h]	1,365	2,982	3,204	3,489	3,742	3,995	4,248	4,501
Reduction from Recycled Water[e]	200	500	1,000	1,275	1,775	2,275	2,775	3,275
Reduction from Water Conservation[i]	1,165	2,482	2,482	2,482	2,482	2,482	2,482	2,482
Demand w/ Conservation[j]	11,406	11,764	13,440	15,115	16,791	18,466	20,142	21,818
SCWD								
Demand w/o Conservation[c]	31,633	34,814	37,995	41,176	44,357	47,538	50,719	53,900
20x2020 Reduction[k]	3,524	7,557	8,067	8,576	9,085	9,595	10,104	10,614
Reduction from Recycled Water[e]	100	500	1,500	2,275	2,775	3,775	4,775	5,775
Reduction from Water Conservation[i]	3,424	7,057	7,057	7,057	7,057	7,057	7,057	7,057
Demand w/ Conservation[j]	28,209	27,757	30,938	34,119	37,300	40,481	43,662	46,843
VWC								
Demand w/o Conservation[c]	34,107	37,235	40,362	43,490	46,617	49,745	52,872	56,000
20x2020 Reduction[l]	3,962	8,648	9,372	10,095	10,819	11,542	12,266	12,990
Reduction from Recycled Water[e]	1,000	2,000	3,000	4,500	6,000	8,000	10,000	12,200
Reduction from Water Conservation[i]	2,962	6,648	6,648	6,648	6,648	6,648	6,648	6,648
Demand w/ Conservation[j]	31,145	30,586	33,714	36,841	39,969	43,097	46,224	49,352
Regional Summary								
Demand w/o Conservation[c]	80,070	88,484	96,898	105,312	113,726	122,140	130,554	138,968
20x2020 Reduction	9,027	19,626	21,166	22,770	24,342	25,914	27,486	29,058
Reduction from Recycled Water[m]	1,300	3,050	5,550	8,100	10,600	14,100	17,600	21,300
Reduction from Water Conservation	7,727	16,576	16,662	16,748	16,833	16,919	17,005	17,091
Demand w/ Conservation	72,343	71,908	80,236	88,564	96,892	105,220	113,549	121,877

Notes:

(a) Reflects existing and projected demands in CLWA service area only. CLWA's Annexation Policy requires annexing parties to provide additional fully reliable supplies. Known parties potentially seeking annexation include Legacy/Stevenson Ranch Phase 5, Tapia Canyon and Tesoro Del Valle.

(b) LACWWD 36 included for purposes of providing regional completeness; however, it is not required to prepare an UWMP.

(c) Demand w/o Conservation from Table 2-2.

(d) LACWWD 36 conservation objective estimated at 20% of projected demand commencing 2020; see Table 2-21.

(e) Recycled water projections from Table 4-3.

(f) Net Anticipated Conservation for LACWWD 36 is Anticipated Conservation Objective minus Reduction from Recycled Water.

(g) Demand w/ Conservation for LACWWD 36 is Demand w/o Conservation minus Net Anticipated Conservation.

(h) NCWD 20x2020 Reduction from Table 2-16. The 20 percent conservation requirement is assumed to continue through 2050 and continue to be met with a mixture of recycled water and conservation.

(i) Reduction from Water Conservation is 20x2020 Reduction minus Reduction from Recycled Water for 2015 and 2020; the quantity of water conservation remains at least at 2020 amounts through 2050.

(j) Demand w/ Conservation is Demand w/o Conservation minus Reduction from Water Conservation.

(k) SCWD 20x2020 Reduction from Table 2-18. The 20 percent conservation requirement is assumed to continue through 2050 and continue to be met with a mixture of recycled water and conservation.

(l) VWC 20x2020 Reduction from Table 2-20. The 20 percent conservation requirement is assumed to continue through 2050 and continue to be met with a mixture of recycled water and conservation.

(m) Recycled water reductions do not include demands from Honor Rancho.

2.6.3.1 Low Income Projected Water Demands

Senate Bill 1087 requires that water use projections of a UWMP include the projected water use for single-family and multi-family residential housing for lower income households as identified in the housing element of any city, county, or city and county general plan in the service area of the supplier.

Housing elements rely on the Regional Housing Needs Allocation (RHNA) generated by the State Department of Housing and Community Development (HCD) to allocate the regional need for housing to the regional Council of Governments (COG) (or a HCD for cities and counties not covered by a COG) for incorporation into housing element updates. Before the housing element is due, the HCD determines the total regional housing need for the next planning period for each region in the state and allocates that need. The COGs then allocate to each local jurisdiction its "fair share" of the RHNA, broken down by income categories – very low, low, moderate and above moderate – over the housing element's planning period.

Jurisdictions located within the region covered by the Southern California Association of Governments (SCAG), including the County of Los Angeles, were required to submit their adopted Housing Elements to the State Department of Housing and Community Development by July 1, 2008.

The City of Santa Clarita and the County last updated their housing elements in 2008, and it covers the planning period 2008-2014. These elements incorporate the formally transmitted Los Angeles County housing allocation that was incorporated into the Final RHNA approved by the SCAG Regional Council on July 12, 2007[6]. The allocation for very low and low income classes as defined by the California Health and Safety Code were the following for the City of Santa Clarita:

- Very Low – 26.0%
- Low – 16.2%

Neither the SCAG RHNA nor the City of Santa Clarita and County housing elements further classify the allocation of low income households into single-family and multi-family residential housing units. For this reason, it is not possible to project water use for lower income households by this specific land use category. However, to remain consistent with the intent of the SB 1087 legislation and also to comply with the UWMP Planning Act, the water use projections for very low and low residential income households based on the income category were identified and their classification percentage was applied to the purveyor's calculated demand projections as shown in Table 2-23 on the following page.

Note that the current planning period for the RHNA is January 1, 2006 to June 30, 2014. The next RHNA planning cycle will cover January 1, 2011 to September 30, 2021. Thus, the 2015 UWMP update will need to be updated with the next RHNA planning cycle and classification percentages.

[6] Final Regional Housing Need Allocation Plan - Planning Period (January 1, 2006 - June 30, 2014) for Jurisdictions within the Six-County SCAG Region (approved by the SCAG Regional Council on July 12, 2007); http://www.scag.ca.gov/housing/pdfs/rhna/RHNA_FinalAllocationPlan071207.pdf

The City of Santa Clarita and/or County will not deny or condition approval of water services, or reduce the amount of services applied for by any proposed development unless one of the following occurs:

- City of Santa Clarita and the County specifically finds that it does not have sufficient water supply.
- City of Santa Clarita and the County is subject to a compliance order issued by the State Department of Public Health (DPH) that prohibits new water connections.
- The applicant has failed to agree to reasonable terms and conditions relating to the provision of services.

TABLE 2-23
LOW INCOME DEMANDS[(a)(b)]

	2015	2020	2025	2030	2035	2040	2045	2050
LACWWD 36								
Demand w/ Conservation[(c)]	1,583	1,801	2,145	2,489	2,833	3,177	3,520	3,864
Very Low[(d)]	412	468	558	647	737	826	915	1,005
Low[(e)]	256	292	347	403	459	515	570	626
Subtotal	*668*	*760*	*905*	*1,050*	*1,195*	*1,341*	*1,486*	*1,631*
NWCD								
Demand w/ Conservation[(c)]	11,406	11,764	13,440	15,115	16,791	18,466	20,142	21,818
Very Low[(d)]	2,966	3,059	3,494	3,930	4,366	4,801	5,237	5,673
Low[(e)]	1,848	1,906	2,177	2,449	2,720	2,992	3,263	3,534
Subtotal	*4,813*	*4,964*	*5,672*	*6,379*	*7,086*	*7,793*	*8,500*	*9,207*
SCWD								
Demand w/ Conservation[(c)]	28,209	27,757	30,938	34,119	37,300	40,481	43,662	46,843
Very Low[(d)]	7,334	7,217	8,044	8,871	9,698	10,525	11,352	12,179
Low[(e)]	4,570	4,497	5,012	5,527	6,043	6,558	7,073	7,589
Subtotal	*11,904*	*11,713*	*13,056*	*14,398*	*15,741*	*17,083*	*18,425*	*19,768*
VWC								
Demand w/ Conservation[(c)]	31,145	30,586	33,714	36,841	39,969	43,097	46,224	49,352
Very Low[(d)]	8,098	7,952	8,766	9,579	10,392	11,205	12,018	12,831
Low[(e)]	5,045	4,955	5,462	5,968	6,475	6,982	7,488	7,995
Subtotal	*13,143*	*12,907*	*14,227*	*15,547*	*16,867*	*18,187*	*19,507*	*20,826*
Total	**30,529**	**30,345**	**33,860**	**37,374**	**40,889**	**44,403**	**47,917**	**51,432**

Notes:
(a) Demands already included within purveyor projections.
(b) 2007 Adopted SCAG RHNA; allocation for very low income (26.0%) and low income (16.2%).
(c) From Table 2-22.
(d) 26.0% of total purveyor Demand w/ Conservation.
(e) 16.2% of total purveyor Demand w/ Conservation.

2.7 Other Factors Affecting Water Usage

A major factor that affects water usage is weather. Historically, when the weather is hot and dry, water usage increases. The amount of increase varies according to the number of consecutive years of hot, dry weather and the conservation activities imposed. During cool, wet years, historical water usage has decreased, reflecting less water usage for exterior landscaping. This factor is discussed below in detail.

2.7.1 Weather Effects on Water Usage

California faces the prospect of significant water management challenges due to a variety of issues including population growth, regulatory restrictions and climate change. Climate change is of special concern because of the range of possibilities and their potential impacts on essential operations, particularly operations of the SWP. The most likely scenarios involve increased temperatures, which will reduce the Sierra Nevada snowpack and shift more runoff to winter months, and accelerated sea level rise. These changes can cause major problems for the maintenance of the present water export system since water supplies are conveyed through the fragile levee system of the Sacramento-San Joaquin Delta. The other much-discussed climate scenario or impact is an increase in precipitation variability, with more extreme drought and flood events posing additional challenges to water managers[7].

Figure 2-2 shows the purveyors overall water use since 2000 as well as total precipitation occurring over the same time period. Past studies have indicated that during dry years within the Santa Clarita Valley, demands can increase from between five to ten percent. This analysis assumes a conservative ten percent increase in per capita demands during dry periods.

Figure 2-3 shows the purveyors average annual monthly water use since 2002. In the Santa Clarita Valley, the largest amount of water use occurs during the end of summer and in the beginning of fall months (July, August and September). Water is used least in the cooler months leading into spring (February, March). This variation gives some indication about how weather affects water demands in the CLWA service area.

2.7.2 Conservation Effects on Water Usage

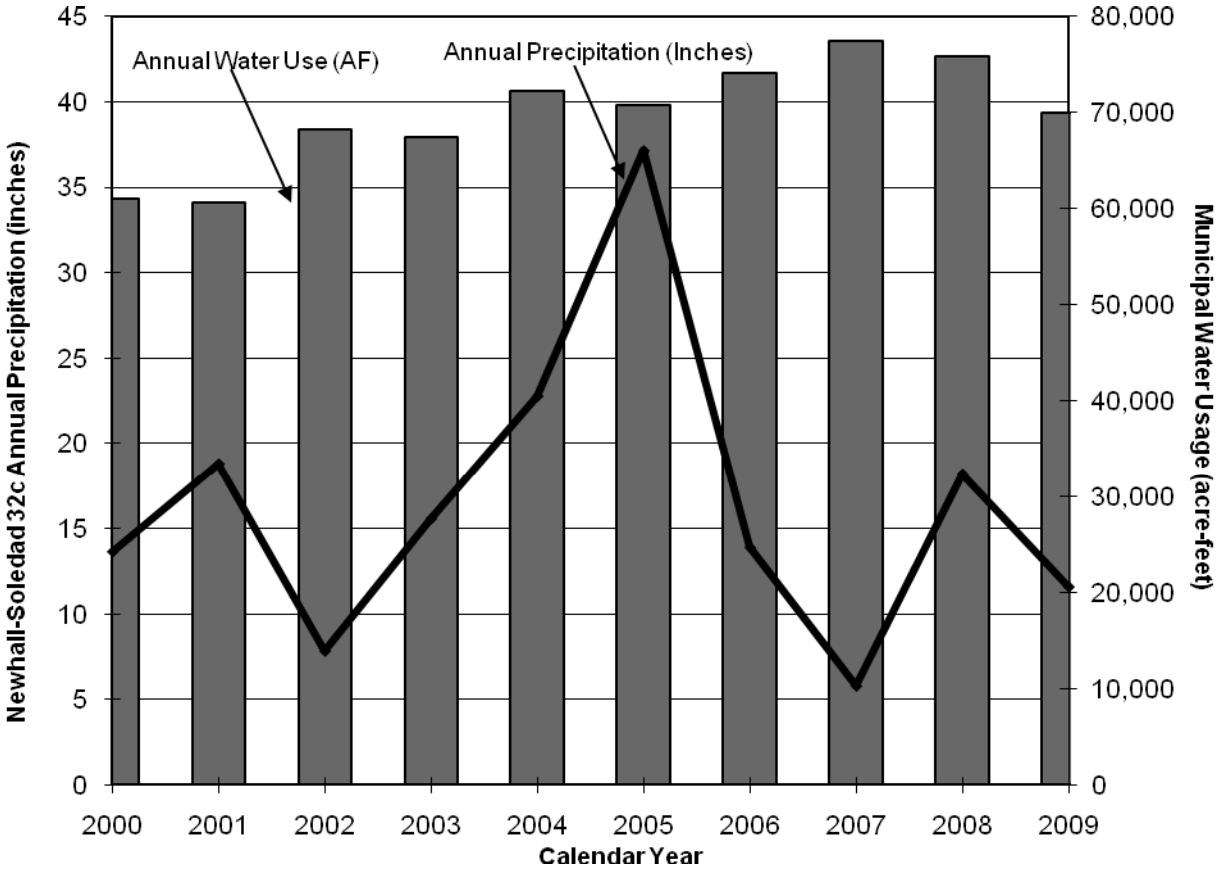
In recent years, water conservation has become an increasingly important factor in water supply planning in California. Since the 2005 UWMP there have been a number of regulatory changes related to conservation including new standards for plumbing fixtures, a new landscape ordinance, a state universal retrofit ordinance, new Green Building standards, demand reduction goals and more. The California plumbing code has also instituted requirements for new construction that mandate the installation of ultra low-flow toilets and low-flow showerheads.

During the 1987 to 1992 drought period, overall water requirements due to the effects of hot, dry weather were projected to increase by approximately ten percent. As a result of extraordinary conservation measures enacted during the period, the overall water requirements actually decreased by more than ten percent.

[7] Final California Water Plan Update 2009 Integrated Water Management: Bulletin 160.

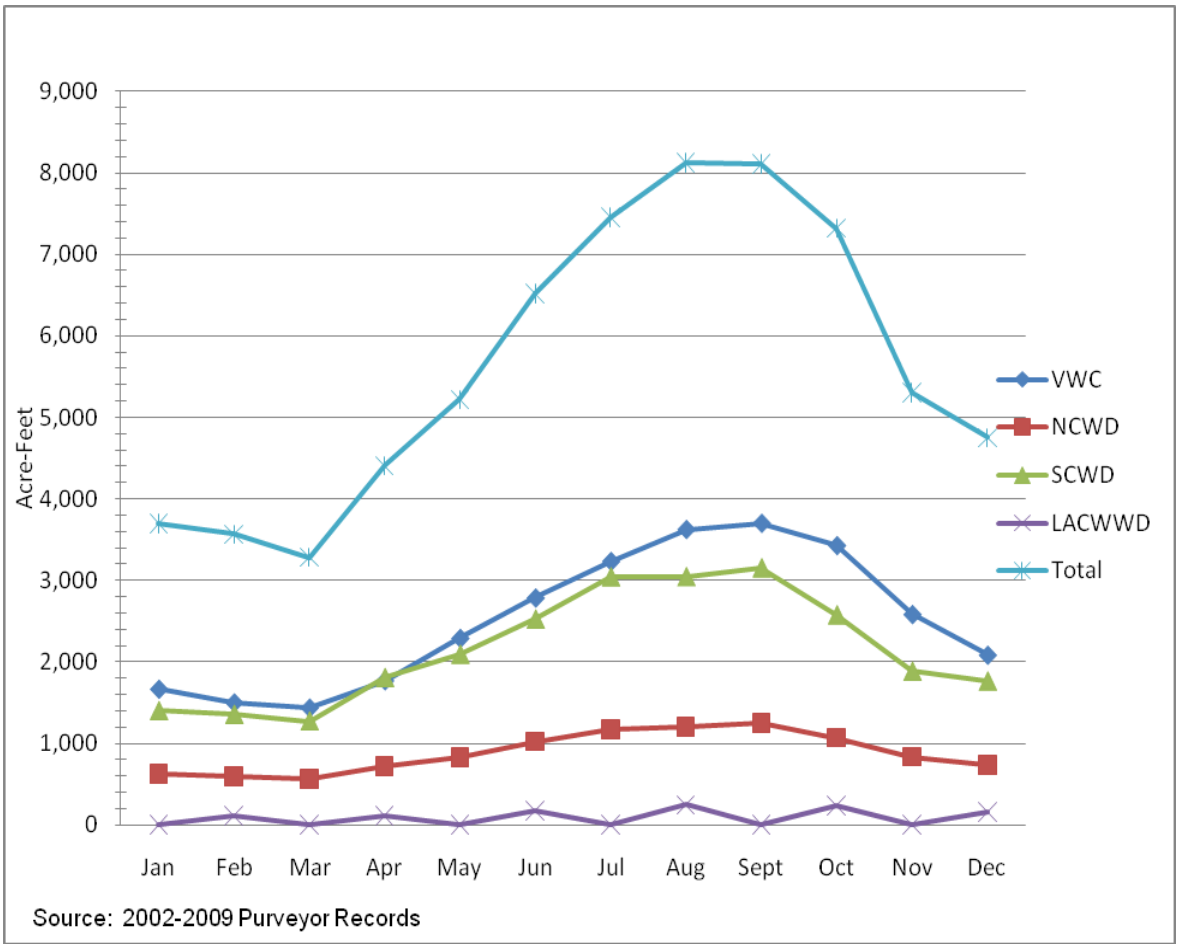
Residential, commercial, and industrial usage can be expected to decrease as a result of the implementation of more aggressive water conservation practices. In southern California, the greatest opportunity for conservation is in developing greater efficiency and reduction in landscape irrigation. The irrigation demand can typically represent as much as seventy percent of the water demand for residential customers depending on lot size and amount of irrigated turf and plants. Conservation efforts will increasingly target this component of water demand.

FIGURE 2-2
HISTORICAL WATER USE AND PRECIPITATION



Sources: Precipitation data provided from rain gage Newhall-Soledad 32c. Total water use from Table 2-1.

FIGURE 2-3
AVERAGE MONTHLY RETAIL CONSUMPTION



Section 3: Water Resources

3.1 Overview

This section describes the water resources available to CLWA and the purveyors for the next forty years. The suppliers' existing water resources include wholesale (imported) supplies, local groundwater, recycled water and water from existing groundwater banking programs. Planned supplies include new groundwater production as well as additional banking programs. These existing and planned supplies are summarized in Table 3-1 and discussed in more detail in this section.

The distribution of water supplies presented in this UWMP does not represent an allocation of water rights among the retail water purveyors. Local and imported water resources in the Santa Clarita Valley are managed cooperatively between CLWA and the purveyors. Just as the demands on the sources of supply were identified on an individual purveyor basis in Section 2, the existing and planned sources of supply have also been broken down by source on an individual purveyor basis. These tables have been included in Appendix C.

TABLE 3-1
SUMMARY OF CURRENT AND PLANNED WATER SUPPLIES AND BANKING PROGRAMS[a]

		2010	2015	2020	2025	2030	2035	2040	2045	2050
Existing Supplies										
Existing Groundwater[b]										
Alluvial Aquifer		24,385	24,000	24,000	24,000	25,000	25,000	25,000	25,000	25,000
Saugus Formation[c]		6,725	9,225	10,225	10,225	10,225	10,225	10,225	10,225	10,225
	Total Groundwater	**31,110**	**33,225**	**34,225**	**34,225**	**35,225**	**35,225**	**35,225**	**35,225**	**35,225**
Recycled Water[d]	**Total Recycled**	**325**	**325**	**325**	**325**	**325**	**325**	**325**	**325**	**325**
Imported Water										
State Water Project[e]		58,300	58,100	57,900	57,600	57,400	57,400	57,400	57,400	57,400
Flexible Storage Accounts[f]		6,060	6,060	4,680	4,680	4,680	4,680	4,680	4,680	4,680
Buena Vista-Rosedale		11,000	11,000	11,000	11,000	11,000	11,000	11,000	11,000	11,000
Nickel Water - Newhall Land		1,607	1,607	1,607	1,607	1,607	1,607	1,607	1,607	1,607
	Total Imported	**76,967**	**76,767**	**75,187**	**74,887**	**74,687**	**74,687**	**74,687**	**74,687**	**74,687**
Existing Banking Programs[g]										
Rosedale Rio-Bravo		20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000
Semitropic		15,000	15,000	15,000	-	-	-	-	-	-
Semitropic - Newhall Land		4,950	4,950	4,950	4,950	4,950	4,950	4,950	4,950	4,950
	Total Banking	**39,950**	**39,950**	**39,950**	**24,950**	**24,950**	**24,950**	**24,950**	**24,950**	**24,950**
Planned Supplies										
Future Groundwater[h]										
Alluvial Aquifer		-	-	1,000	2,000	3,000	4,000	5,000	6,000	7,000
Saugus Formation		-	1,375	1,375	1,375	1,375	1,375	1,375	1,375	1,375
	Total Groundwater	**-**	**1,375**	**2,375**	**3,375**	**4,375**	**5,375**	**6,375**	**7,375**	**8,375**
Recycled Water[i]	**Total Recycled**	**-**	**975**	**2,725**	**5,225**	**7,775**	**10,275**	**13,775**	**17,275**	**20,975**
Banking Programs	**Total Banking Programs**	**-**	**-**	**-**	**10,000**	**10,000**	**20,000**	**20,000**	**20,000**	**20,000**

Notes:

(a) The values shown under "Existing Supplies" and "Planned Supplies" are projected to be available in average/normal years. The values shown under "Existing Banking Programs" and "Planned Banking Programs" are the maximum capacity of program withdrawals.

(b) Existing groundwater supplies represent the quantity of groundwater anticipated to be pumped with existing wells. As indicated in Tables 3-8 and 3-9 and Tables 3-4 and 3-5 of the 2009 Groundwater Basin Yield Analysis, individual purveyors may have well capacity in excess of quantities shown in this table. As indicated in Table 3-10, existing and planned groundwater pumping remain within the groundwater operating plan shown on Table 3-5.

(c) SCWD's existing Saugus 1 and Saugus 2 wells resumed production in 2011 with the completion of the perchlorate treatment facility.

(d) Represents recycled water being delivered in 2010 with existing facilities. CLWA currently has 1,700 AFY under contract.

(e) SWP supplies are based on the Department of Water Resources "*2009 State Water Project Delivery Reliability Report*."

(f) Includes both CLWA and Ventura County entities flexible storage accounts. Initial term of agreement with Ventura County entities expires after 2015.

(g) Supplies shown are annual amounts that can be withdrawn and would typically be used only during dry years.

(h) Planned groundwater supplies represent new groundwater well capacity that may be required by an individual purveyor's production objectives in the Alluvial Aquifer and the Saugus Formation. When combined with existing purveyor and non-purveyor groundwater supplies, total groundwater production remains within the sustainable ranges identified in Table 3-8 of 2009 Groundwater Basin Yield Analysis. As indicated in Table 3-10, existing and planned groundwater pumping remain within the basin operating plan shown on Table 3- 5.

(i) See Table 4-3. Total Purveyor Recycled Water less Existing Recycled Supply.

The term "dry" is used throughout this chapter and in subsequent chapters concerning water resources and reliability as a measure of supply availability. As used in this Plan, dry years are those years when supplies are the lowest, which occurs primarily when precipitation is lower than the long-term average precipitation. The impact of low precipitation in a given year on a particular source of supply may differ based on how low the precipitation is, or whether the year follows a high-precipitation year or another low-precipitation year. For the SWP, a low-precipitation year may or may not affect supplies, depending on how much water is in SWP storage at the beginning of the year. Also, dry conditions can differ geographically. For example, a dry year can be local to the Valley area (thereby affecting local groundwater replenishment and production), local to northern California (thereby affecting SWP water deliveries), or statewide (thereby affecting both local groundwater and the SWP). When the term "dry" is used in this Plan, statewide drought conditions are assumed, affecting both local groundwater and SWP supplies at the same time.

3.2 Wholesale (Imported) Water Supplies

CLWA's imported water supplies consist primarily of SWP supplies, which were first delivered to CLWA in 1980. From the SWP, CLWA also has access to water from Flexible Storage Accounts in Castaic Lake, which are planned for dry-year use, but are not strictly limited as such. More detail on SWP supplies is provided in Section 3.2.1. In addition to its SWP supplies, CLWA has an imported surface supply from the Buena Vista Water Storage District (BVWSD) and Rosedale Rio-Bravo Water Storage District (RRBWSD) in Kern County, which was first delivered to CLWA in 2007. More information on this supply is provided in Section 3.2.2. CLWA wholesales both these imported supplies to each of the local retail water purveyors. Additionally, Newhall Land has acquired a water transfer supply from a source in Kern County. This supply, referred to as Nickel water, would be made available to VWC through CLWA.

3.2.1 State Water Project Supplies

3.2.1.1 Background

3.2.1.1.1 SWP Facilities

The SWP is the largest state-built, multi-purpose water project in the country. It was authorized by the California State Legislature in 1959, with the construction of most initial facilities completed by 1973. Today, the SWP includes 28 dams and reservoirs, 26 pumping and generating plants and approximately 660 miles of aqueducts. The primary water source for the SWP is the Feather River, a tributary of the Sacramento River. Storage released from Oroville Dam on the Feather River flows down natural river channels to the Sacramento-San Joaquin River Delta (Delta). While some SWP supplies are pumped from the northern Delta into the North Bay Aqueduct, the vast majority of SWP supplies are pumped from the southern Delta into the 444-mile-long California Aqueduct. The California Aqueduct conveys water along the west side of the San Joaquin Valley to Edmonston Pumping Plant, where water is pumped over the Tehachapi Mountains and the aqueduct then divides into the East and West Branches. CLWA takes delivery of its SWP water at Castaic Lake, a terminal reservoir of the West Branch. From Castaic Lake, CLWA delivers its SWP supplies to the local retail water purveyors through an extensive transmission pipeline system.

3.2.1.1.2 SWP Water Supply Contracts

SWP Water Supplies

In the early 1960s, DWR entered into individual SWP Water Supply Contracts with urban and agricultural public water supply agencies located throughout northern, central and southern California for SWP water supplies. CLWA is one of 29 water agencies (commonly referred to as "contractors") that have an SWP Water Supply Contract with DWR. Each SWP contractor's SWP Water Supply Contract contains a "Table A," which lists the maximum amount of contract water supply, or "Table A water," an agency may request each year throughout the life of the contract. The Table A Amounts in each contractor's SWP Water Supply Contract ramped up over time, based on projections at the time the contracts were signed of future increases in population and water demand, until they reached a maximum Table A Amount. Most contractor's Table A Amounts reached their maximum levels in the early to mid 1990s. Table A Amounts are used in determining each contractor's proportionate share, or "allocation," of the total SWP water supply DWR determines to be available each year.

The total planned annual delivery capability of the SWP and the sum of all contractors' maximum Table A amounts was originally 4.23 MAF. The initial SWP storage facilities were designed to meet contractors' water demands in the early years of the SWP, with the construction of additional storage facilities planned as demands increased. However, essentially no additional SWP storage facilities have been constructed since the early 1970s. SWP conveyance facilities were generally designed and have been constructed to deliver maximum Table A amounts to all contractors. After the permanent retirement of some Table A amount by two agricultural contractors in 1996, the maximum Table A amounts of all SWP contractors now totals about 4.17 MAF. Currently, CLWA's annual Table A Amount is 95,200 AF[8].

The primary supply of SWP water made available under the SWP Water Supply Contracts is allocated Table A supply. An estimation of Table A supply availability is provided in Section 3.2.1.2. Each contractor has some flexibility in managing the Table A supply allocated to it in a given year. A contractor may take delivery of that supply for direct use or storage within its service area, store that water outside its service area for later withdrawal and use within its service area, or carry over a portion of that supply for storage on an as-available-basis in SWP reservoirs, for delivery the following year.

[8] CLWA's original SWP Water Supply Contract with DWR was amended in 1966 for a maximum annual Table A Amount of 41,500 AF. In 1991, CLWA purchased 12,700 AF of annual Table A Amount from a Kern County water district, and in 1999 purchased an additional 41,000 AF of annual Table A Amount ("41K transfer") from another Kern County water district, for a current total annual Table A Amount of 95,200 AF. Later in 1999 legal action was filed challenging the sufficiency of the Environmental Impact Report ("EIR") prepared in connection with the 41K transfer. (*Friends of the Santa Clara River v. Castaic Lake Water Agency*, LASC Case No. BS 056954.) In late 2004, CLWA approved a revised EIR for the 41K transfer ("2004 EIR"). In 2005, new legal actions were filed (and subsequently consolidated) in the Los Angeles County Superior Court (LASC) challenging the sufficiency of the 2004 EIR. (*Planning & Conservation League v. Castaic Lake Water Agency*, LASC Consolidated Case No. BS 098724.) On December 17, 2009, the Court of Appeal, Second District, issued a published decision upholding the sufficiency of the 2004 EIR under the California Environmental Quality Act ("CEQA"). (*Planning & Conservation League v. Castaic Lake Water Agency* (2009) 180 Cal.App.4th 210) Remittitur was issued on March 19, 2010, and final Judgment was entered on July 12, 2010. The entry of final Judgment by the LASC concluded eleven years of legal challenges concerning the sufficiency of the 41K transfer EIRs prepared by CLWA, and it resolved all issues that may have remained concerning the adequacy of the 2004 EIR and the finality of the 41K transfer.

In addition to Table A supplies, the SWP Water Supply Contracts provide for additional types of water that may periodically be available, including "Article 21" water and Turnback Pool water. Article 21 water (which refers to the SWP contract provision defining this supply) is water that may be made available by DWR when excess flows are available in the Delta (i.e., when Delta outflow requirements have been met, SWP storage south of the Delta is full and conveyance capacity is available beyond that being used for SWP operations and delivery of allocated and scheduled Table A supplies). Article 21 water is made available on an unscheduled and interruptible basis and is typically available only in average to wet years, generally only for a limited time in the late winter. The Turnback Pool is a program through which contractors with allocated Table A supplies in excess of their needs in a given year may "turn back" that excess supply for purchase by other contractors who need additional supplies that year. The Turnback Pool can make water available in all types of hydrologic years, although generally less excess water is turned back in dry years. As urban contractor demands have increased, the amount of water turned back and available for purchase has diminished.

The availability of Article 21 water and Turnback Pool water is uncertain. When available, these supplies provide additional water that CLWA may be able to use, either directly to meet demands or for later use after storage in its groundwater banking programs. Due to the uncertainty in availability of Article 21 water and Turnback Pool water, supplies of these types of SWP water are not included in this report. However, to the extent CLWA is able to make use of these supplies when available, CLWA may be able to improve the reliability of its SWP supplies beyond the values used throughout this Plan.

While not specifically provided for in the SWP Water Supply Contracts, DWR has in critically dry years created Dry Year Water Purchase Programs for contractors needing additional supplies. Through these programs, water is purchased by DWR from willing sellers in areas that have available supplies and is then sold by DWR to contractors willing to purchase those supplies. The availability of these supplies is uncertain, and are therefore not included in this report. However, CLWA's access to these supplies when they are available would enable it to improve the reliability of its dry-year supplies beyond the values used throughout this report.

Flexible Storage Account

As part of its water supply contract with DWR, CLWA has access to a portion of the storage capacity of Castaic Lake. This Flexible Storage Account allows CLWA to utilize up to 4,684 AF of the storage in Castaic Lake. Any of this amount that CLWA borrows must be replaced by CLWA within five years of its withdrawal. CLWA manages this storage by keeping the account full in normal and wet years and then delivering that stored amount (or a portion of it) during dry periods. The account is refilled during the next year that adequate SWP supplies are available to CLWA to do so. In 2005, CLWA negotiated with Ventura County SWP contractor agencies to obtain the use of their Flexible Storage Account. This allows CLWA access to another 1,376 AF of storage in Castaic Lake. CLWA access to this additional storage is available on a year-to-year basis through 2015. While it is expected that CLWA and Ventura County will extend the existing flexible storage agreement beyond the 2015 term, it is not assumed to be available beyond 2015 in this Plan.

3.2.1.1.3 Factors Affecting SWP Table A Supplies

While Table A identifies the maximum annual amount of Table A water a SWP contractor may request, the amount of SWP water actually available and allocated to SWP contractors each

year is dependent on a number of factors and can vary significantly from year to year. The primary factors affecting SWP supply availability include: the availability of water at the source of supply in northern California, the ability to transport that water from the source to the primary SWP diversion point in the southern Delta and the magnitude of total contractor demand for that water.

Availability of SWP Source Water

SWP supplies originate in northern California, primarily from the Feather River watershed. The availability of these supplies is dependent on the amount of precipitation in the watershed, the amount of that precipitation that runs off into the Feather River, water use by others in the watershed and the amount of water in storage in the SWP's Lake Oroville at the beginning of the year. Variability in the location, timing, amount and form (rain or snow) of precipitation, as well as how wet or dry the previous year was, produces variability from year to year in the amount of water that flows into Lake Oroville. However, Lake Oroville acts to regulate some of that variability, storing high inflows in wetter years that can be used to supplement supplies in dry years with lower inflows.

As discussed in Section 1.6 and in DWR's *2009 Reliability Report*, climate change adds another layer of uncertainty in estimating the future availability of SWP source water. Current literature suggests that global warming may change precipitation patterns in California from the patterns that occurred historically. While different climate change models show differing effects, potential changes could include more precipitation falling in the form of rain rather than snow and earlier snowmelt, which would result in more runoff occurring in the winter rather than spread out over the winter and spring.

Ability to Convey SWP Source Water

As discussed previously, water released from Lake Oroville flows down natural river channels into the Delta. The Delta is a network of channels and reclaimed islands at the confluence of the Sacramento and San Joaquin rivers. The SWP and the federal Central Valley Project (CVP) use Delta channels to convey water to the southern Delta for diversion, making the Delta a focal point for water distribution throughout the state.

A number of issues affecting the Delta can impact the ability to divert water supplies from the Delta, including water quality, fishery protection and levee system integrity. Water quality in the Delta can be adversely affected by both SWP and CVP diversions, which primarily affect salinity, as well as by urban discharge and agricultural runoff that flows into the Delta, which can increase concentrations of constituents such as mercury, organic carbon, selenium, pesticides, toxic pollutants and reduce dissolved oxygen. The Delta also provides a unique estuarine habitat for many resident and migratory fish species, some of which are listed as threatened or endangered. The decline in some fish populations is likely the result of a number of factors, including water diversions, habitat destruction, degraded water quality and the introduction of non-native species. Delta islands are protected from flooding by an extensive levee system. Levee failure and subsequent island flooding can lead to increased salinity requiring the temporary shut down of SWP pumps.

In order to address some of these issues, SWP and CVP operations in the Delta are limited by a number of regulatory and operational constraints. These constraints are primarily incorporated

into the State Water Resources Control Board's (SWRCB) Water Rights Decision 1641 (D-1641), which establishes Delta water quality standards and outflow requirements that the SWP and CVP must comply with. In addition, SWP and CVP operations are further constrained by requirements included in Biological Opinions (BOs) for the protection of threatened and endangered fish species in the Delta, issued by the United States Fish and Wildlife Service (FWS) in December 2008 and the National Marine Fishery Service (NMFS) in June 2009. The requirements in the BOs are based on real-time physical and biological phenomena (such as turbidity, water temperature and location of fish), which results in uncertainty in estimating potential impacts on supply of the additional constraints imposed by the BOs.

Demand for SWP Water

The reliability of SWP supplies is affected by the total amount of water requested and used by SWP contractors, since an increase in total requests increases the competition for limited SWP supplies. As previously mentioned, contractor Table A Amounts in the SWP Water Supply Contracts ramped up over time, based on projected increases in population and water demand at the time the contracts were signed. Urban SWP contractors' requests for SWP water were low in the early years of the SWP, but have increased steadily over time, although more slowly than the ramp-up in their Table A Amounts, which reached a maximum for most contractors in the early to mid 1990s. Since that time, urban contractors' requests for SWP water have continued to increase until recent years when nearly all SWP contractors are requesting their maximum Table A Amounts.

Consistent with other urban SWP contractors, SWP deliveries to CLWA have increased as its requests for SWP water have increased. Historical total SWP deliveries to CLWA are shown at the end of this Section 3.2 in Table 3-3. The table shows deliveries to the service area for supply to the purveyors, as well as delivery to storage programs outside the service area. A breakdown of Table 3-3 showing how much imported supply was delivered to each purveyor is provided in Appendix H. SWP demand projections provided by CLWA to DWR are shown at the end of this Section 3.2 in Table 3-4. CLWA demand projections provided to DWR are typically conservative in order to maximize water deliveries available to CLWA in any given year for both deliveries to purveyors and current and future storage programs.

3.2.1.2 SWP Table A Supply Assessment

The "*State Water Project Delivery Reliability Report"* (*Reliability Report*), prepared biennially by DWR, assists SWP contractors and local planners in assessing the reliability of the SWP component of their overall supplies. In its 2009 update of the *Reliability Report*, DWR provides SWP supply estimates for SWP contractors to use in their planning efforts, including for preparing their 2010 Urban Water Management Plans. The 2009 *Reliability Report* includes DWR's estimates of SWP water delivery reliability under both current (2009) and future (2029) conditions.

3.2.1.2.1 Analysis Assumptions

DWR's estimates of SWP deliveries are based on a computer model that simulates monthly operations of the SWP and CVP systems. Key inputs to the model include the facilities included in the system, hydrologic inflows to the system, regulatory and operational constraints on system operations and contractor demands for SWP water. In conducting its model studies, DWR must make assumptions regarding each of these key inputs.

In the model studies for the 2009 *Reliability Report*, DWR assumed existing facilities for the analyses of both current and future conditions, with no additional storage or significant improvements to convey water through or past the Delta. Hydrologic inflows to the model are based on 82 years of historical inflows (1922 through 2003), adjusted to reflect current and future levels of development in the source areas. Hydrologic inflows for the future conditions analysis were further adjusted to reflect potential impacts due to climate change and accompanying sea level rise. The 2009 *Reliability Report* model studies include current regulatory and operational constraints in the analyses of both current and future conditions, including D-1641, the 2008 FWS BO and the 2009 NMFS BO. Contractor demands for SWP water used in the analysis of current conditions are derived from recent historical data and information from the contractors. Contractor demands for the future conditions analysis are assumed at maximum Table A Amounts in all 82 years of the simulation.

3.2.1.2.2 Analysis Results

DWR's 2009 *Reliability Report* estimates that for all contractors combined, the SWP can deliver a total Table A supply of 60 percent of total maximum Table A Amounts on a long-term average basis, under both current and future conditions. In the worst-case single critically dry year, DWR estimates the SWP can deliver a total Table A supply of seven percent of total maximum Table A Amounts under current conditions and eleven percent under future conditions. During multiple-year dry periods, DWR estimates the SWP can deliver a total Table A supply averaging 34 to 36 percent of total maximum Table A Amounts under current conditions and 28 to 32 percent under future conditions.

The results DWR presents in its 2009 *Reliability Report* are of total SWP Table A deliveries, which it also expresses as a percentage of total maximum Table A Amounts. However, these percentages are SWP-wide averages and do not reflect the differences among contractors in assumed SWP requests and use, and the differing allocations to individual contractors that result. For this reason, DWR also made available on its website more detailed results from the same model studies presented in the 2009 *Reliability Report*, showing SWP deliveries to each contractor (http://baydeltaoffice.water.ca.gov/swpreliability/index.cfm).

For this Plan, SWP Table A supplies to CLWA were taken from DWR's more detailed, contractor-specific delivery data from its analyses for the 2009 *Reliability Report*. DWR's analysis of current (2009) conditions is used in this Plan to estimate 2010 SWP supplies and its analysis of future (2029) conditions is used to estimate 2030-2050 SWP supplies. As suggested by DWR, SWP supplies for the five-year increments between 2010 and 2030 are interpolated between these values. Since SWP demands cannot increase beyond the maximum demands assumed in the future conditions analysis, SWP supplies for years beyond 2030 are assumed to be the same as for 2030.

Table 3-2 shows CLWA's contractor-specific SWP supplies projected to be available in average/normal years (based on the average delivery over the study's historic hydrologic period from 1922 through 2003). Table 3-2 also summarizes estimated SWP supply availability in a single dry year (based on a repeat of the worst-case historic hydrologic conditions of 1977) and over a multiple dry year period (based on a repeat of the historic four-year drought of 1931 through 1934).

TABLE 3-2
SWP TABLE A SUPPLY RELIABILITY (AF)[(a)(b)]

Wholesaler (Supply Source)	2010	2015	2020	2025	2030-2050
Average Water Year[(c)]					
DWR (SWP)					
Table A Supply	58,300	58,100	57,900	57,600	57,400
% of Table A Amount[(d)]	61%	61%	61%	61%	60%
Single Dry Year[(e)]					
DWR (SWP)					
Table A Supply	12,800	11,900	11,000	10,000	9,100
% of Table A Amount	13%	12%	12%	11%	10%
Multi-Dry Year[(f)]					
DWR (SWP)					
Table A Supply	32,800	32,900	32,900	33,000	33,000
% of Table A Amount	34%	35%	35%	35%	35%

Notes:
(a) Supplies to CLWA provided by DWR from detailed delivery results from the analyses presented in DWR's "*2009 SWP Delivery Reliability Report*." As indicated in the 2009 *Reliability Report*, the supplies are based on existing SWP facilities and current regulatory and operational constraints.
(b) Table A supplies include supplies allocated in one year that are carried over for delivery the following year.
(c) Based on average deliveries over the study's historic hydrologic period of 1922 through 2003.
(d) Supply as a percentage of CLWA's Table A Amount of 95,200 AF.
(e) Based on the worst case historic single dry year of 1977.
(f) Supplies shown are annual averages over four consecutive dry years, based on the historic four-year dry period of 1931-1934.

3.2.1.2.3 Potential Future SWP Supplies

An ongoing planning effort to increase long-term supply reliability for both the SWP and CVP is taking place through the Bay Delta Conservation Plan (BDCP) process. The co-equal goals of the BDCP are to improve water supply and restore habitat in the Delta. The BDCP is being prepared through a collaboration of state, federal and local water agencies, state and federal fish agencies environmental organizations and other interested parties. Several "isolated conveyance system" alternatives are being considered in the plan that would divert water from the north Delta to the south Delta where water is pumped into the south-of-Delta stretches of the SWP and CVP. The new conveyance facilities would allow for greater flexibility in balancing the needs of the estuary with reliable water supplies.

In December 2010, DWR released a "Highlights of the BDCP" document that summarizes the activities and expected outcomes of the BDCP. The results of preliminary analysis included in the document indicate the proposed conveyance facilities may increase the combined average long-term water supply to the SWP and CVP from 4.7 MAF per year to 5.9 MAF/year. This would represent an increase in SWP supply reliability from 60 to 75 percent. Planned completion of the BDCP and corresponding environmental analysis documents is early 2013.

DWR estimates of SWP supply reliability in its 2009 *Reliability Report* are based on existing facilities, and so do not include the proposed conveyance facilities that are part of the BDCP. Since this Plan uses DWR's 2009 *Reliability Report* to estimate SWP supplies to CLWA, the improvements in SWP supply reliability that would result from the proposed facilities are not included in this Plan. Any of the proposed facilities that are completed would increase SWP reliability beyond the values used throughout this Plan.

3.2.1.3 Recent Changes to Factors Affecting SWP Supplies

Since the last round of UWMPs were prepared in 2005, DWR has twice updated its *Reliability Report*. In each of its updates, DWR has projected further reductions in average SWP water deliveries than were projected in 2005. The 2009 *Reliability Report* is the most recent update, and identifies several emerging factors that have the potential to affect the availability and reliability of SWP supplies. Although the 2009 *Reliability Report* presents a conservative projection of SWP delivery reliability, particularly in light of events occurring since its release, it remains the best available information concerning the SWP. Following is information and a brief summary of several factors identified in the 2009 *Reliability Report* having the potential to affect the availability and reliability of SWP supplies. A more detailed discussion of the factors discussed below is attached as Appendix D.

A. FWS and NMFS Biological Opinions

As discussed previously in Subsection 3.2.1.1.3, in December 2008 and June 2009, respectively, the FWS and NMFS issued BOs, with each agency concluding that the operation of the SWP and CVP as proposed by DWR and the Bureau of Reclamation would jeopardize the continued existence of protected species.[9] As required by the Endangered Species Act (ESA), FWS and NMFS each developed a Reasonable and Prudent Alternative (RPA) to the proposed SWP and CVP operations, and included that RPA in its respective BO. If the RPA terms are fully implemented, the resulting SWP and CVP operations are deemed to be in compliance with the ESA.

The RPAs developed and adopted by FWS and NMFS impose many new restrictions and requirements on SWP and CVP operations which can result in substantially reduced water exports from the Delta. Preliminary estimates prepared by DWR indicate that implementation of the RPAs in both BOs could reduce SWP deliveries by 28 to 39 percent during average and dry conditions, respectively. Supply impacts resulting from the BO RPAs can vary from year to year, since the operating restrictions in them are dependent upon highly variable factors such as hydrologic and flow conditions in the Delta, migratory and reproductive patterns of the protected species and numerous other non-SWP and non-CVP factors that impact the abundance of the species. Moreover and as further discussed below, legal challenges have been filed against the FWS and NMFS BOs and, should a court conclude the RPA restrictions are invalid, SWP exports could return to higher levels.

1. FWS BO Litigation

In early 2009, the State Water Contractors, the San Luis Delta-Mendota Water Authority and several individual State and Federal contractor water agencies filed legal challenges against the FWS Delta smelt BO (*The Consolidated Delta Smelt Cases*, E.D. Cal. 1:09-CV-00407-OWW-GSA). Plaintiffs claim that the federal defendants violated the National Environmental Policy Act (NEPA) by failing to perform NEPA analysis prior to provisionally adopting and implementing the FWS BO and RPA and that FWS violated the ESA and the Administrative Procedure Act (APA) in adopting the BO's RPA. In December 2010, the court issued a memorandum decision that invalidated the BO and RPA in several respects and remanded the matter to FWS. Further proceedings are expected to address interim operations of the SWP and CVP while the BO and RPA are revised by FWS.

[9] The December 15, 2008 FWS B.O. evaluated impacts to the Delta smelt. The June 4, 2009 NMFS B.O. evaluated impacts to winter-run and spring-run Chinook salmon, steelhead, green sturgeon and resident killer whales.

2. NMFS BO Litigation

After issuance of the NMFS BO in June 2009, the State Water Contractors and other water agencies filed legal challenges against the NMFS salmonid BO (*The Consolidated Salmon Cases*, E.D. Cal. 1:09-CV-1053-OWW-DLB). In May 2010, the court ruled that the federal defendants violated NEPA by failing to analyze the impact of the BO and RPA on humans and the human environment and authorized the SWP and CVP to operate in accordance with D-1641 until the end of June 2010, unless there was a showing of jeopardy to the species or adverse modification of its critical habitat. Motions for summary judgment to obtain a final ruling in the cases were heard in mid-December 2010 and a decision is expected in 2011.

B. Consistency Determination Litigation

Because the Delta smelt and salmon species are also protected under California's ESA (CESA), the SWP and CVP are required to obtain take authorization for SWP and CVP operations from the California Department of Fish and Game (DFG). In July 2009 and September 2009, respectively, DFG issued "consistency determinations" pursuant to CESA and determined that SWP and CVP operations do not violate that statute to the extent the operations are in compliance with the RPAs set forth in the FWS and NMFS BOs. Because the consistency determinations pose a risk that the SWP could remain bound to the terms of the RPAs even if the BOs are overturned by a federal court, DFG's decisions were challenged in state court by the State Water Contractors and Kern County Water Agency. The cases are currently stayed pending the outcome of *The Consolidated Delta Smelt Cases* and *The Consolidated Salmon Cases* (above).[10]

C. Longfin Smelt Protections

Regulatory actions related to longfin smelt also have the potential to affect the availability and reliability of SWP supplies. In February 2008, longfin smelt were listed as a "candidate" species under CESA and DFG imposed certain interim restrictions on the SWP for protection of the longfin smelt and its critical habitat. In February 2009, shortly before longfin smelt were officially listed as a "threatened" species under CESA, DFG issued Incidental Take Permit No. 2081-2009-001-03 (the Permit) to DWR, which imposes terms and conditions on the ongoing and long-term operations of SWP facilities in the Delta. The operating restrictions under the Permit are based in large part on the restrictions imposed on the SWP by the new FWS BO for Delta smelt (see above). The resulting water supply reductions under the Permit depend on several variable factors, such as Delta hydrology, migratory and reproductive patterns of longfin smelt and other factors affecting species abundance in the Delta. Notably, DWR has not indicated whether any particular reductions in SWP exports are likely to result from the Permit. In March 2009, a legal challenge was filed against the Permit.[11] Although that litigation is currently stayed pursuant to a stipulation of the parties, the challenge puts DFG's ability to enforce the Permit into question.

[10] See, e.g., State Water Contractors v. Cal. Dept. of Fish and Game, Sac. Sup. Ct. Case No. 34-2010-80000552; State Water Contractors v. Cal. Dept. of Fish and Game, Sac. Sup. Ct. Case No. 34-2010-80000560.

[11] See State Water Contractors v. California Dept. of Fish and Game, et al., Sac. Sup. Ct. Case No. 34-2009-80000203.

D. Development of Delta Plan and Delta Flow Criteria Pursuant to New State Laws

In November 2009, the California Legislature enacted SBX7-1 as part of a multi-pronged water package related to water supply reliability, ecosystem health and the Delta.[12] Among other things, SBX7-1 creates the Delta Stewardship Council (Council) and directs the Council to develop a comprehensive management plan for the Delta by January 1, 2012 (the Delta Plan). In addition, the State Water Resources Control Board (SWRCB) was directed to develop flow criteria for the Delta to protect public trust resources, including fish, wildlife, recreation and scenic enjoyment and DFG was required to identify quantifiable biological objectives and flow criteria for species of concern in the Delta.

In August 2010, the SWRCB adopted Resolution No. 2010-0039 approving its report entitled "Development of Flow Criteria for the Sacramento-San Joaquin Delta Ecosystem" (Flow Criteria). The SWRCB report concludes that substantially higher flows are needed through the Delta than in have occurred in previous decades in order to benefit zooplankton and various fish species.[13] Separately, in September 2010, DFG issued a draft report entitled "Quantifiable Biological Objectives and Flow Criteria for Aquatic and Terrestrial Species of Concern Dependent on the Delta" (DFG Report). The DFG Report is based on similar biological objectives and recommends Delta flows similar to those set forth in the SWRCB's Flow Criteria.[14] Notably, both the SWRCB and DFG recognize that their recommended flow criteria for the Delta do *not* balance the public interest or the need to provide an adequate and reliable water supply.[15] Also of importance, both the SWRCB and DFG acknowledge that their recommended flow criteria do not have any regulatory or adjudicatory effect; however, they may be used to inform the Council as it prepares the Delta Plan and may be considered as the BDCP process moves forward.[16]

E. Resulting Effect on SWP Supplies

DWR's latest published report on SWP supply reliability, the 2009 *Reliability Report*, includes assumptions to account for the institutional, environmental, regulatory and legal factors affecting SWP supplies, including but not limited to water quality constraints, fishery protections, other D-1641 requirements and the operational limitations imposed by the FWS and NMFS BOs. The *Reliability Report* assumes that all of these restrictions and limitations will remain in place over the next twenty-year period and that no actions to improve the Delta will occur, even though numerous legal challenges, various Delta restoration processes and new legal requirements for Delta improvements are currently underway (i.e., BDCP, Delta Vision, Delta Plan, etc.). Further, DWR's future conditions analysis incorporates assumptions to account for potential supply impacts related to global climate change.[17] These and other factors result in DWR presenting a conservative projection of SWP delivery reliability in its 2009 *Reliability Report*.

[12] SBX7-1 became effective February 3, 2010 and adds Division 35 to the California Water Code (commencing with Section 85300). Division 35 is referred to as the Sacramento-San Joaquin Delta Reform Act of 2009.
[13] (Flow Criteria at 5-8.)
[14] (DFG Report at 13.)
[15] (Flow Criteria at 4; DFG Report at 16.)
[16] (Flow Criteria at 3, 10; DFG Report at ES-4.)
[17] (*See*, *e.g.*, DWR Report at 19, 29-30, Appendices A-B.)

Conservative projections are useful from a long-range urban water supply planning perspective.[18] But it is noted that recent rulings in various legal actions and other factors described above, among others, support higher estimates of average annual SWP deliveries than projected in DWR's 2009 *Reliability Report*. While this may lead DWR to increase its projections in its next update of the *Reliability Report*, the 2009 *Reliability Report* remains the best available information concerning the long-term delivery reliability of SWP supplies. Therefore, the conservative estimates from the 2009 *Reliability Report* are used in this Plan.

3.2.2 Other Imported Supplies

The following supplies are now available to CLWA and the purveyors through transfers that have been executed since 2005. These supplies are now part of the imported supplies available to the service area.

3.2.2.1 Buena Vista-Rosedale

CLWA has executed a long-term transfer agreement for 11,000 AFY with BVWSD and RRBWSD. These two districts, both located in Kern County, joined together to develop a program that provides both a firm water supply and a water banking component. Both districts are member agencies of the Kern County Water Agency (KCWA), a SWP contractor and both districts have contracts with KCWA for SWP Table A Amounts. The supply is based on existing long-standing Kern River water rights held by BVWSD, and is delivered by exchange of the two districts' SWP Table A supplies. This water supply is firm; that is, the total amount of 11,000 AFY is available in all water year types based on the Kern River water right. CLWA began taking delivery of this supply in 2007 as shown in Table 3-3.

3.2.2.2 Nickel Water - Newhall Land

Newhall Land has acquired a water transfer from Kern County sources known as the Nickel water. This source of supply totals 1,607 AFY. The Nickel water comes from a firm source of supply. This source of supply was acquired in anticipation of the Newhall Ranch Specific Plan development. In this UWMP it is anticipated that the water supply will be available to the VWC.

[18] *See*, *e.g.*, *Sonoma County Water Coalition v. Sonoma County Water Agency* (2010) 189 Cal.App.4th 33; *Watsonville Pilots Association v. City of Watsonville* (2010) 183 Cal.App.4th 1059; *Vineyard Area Citizens for Responsible Growth v. City of Rancho Cordova* (2007) 40 Cal.4th 412.

TABLE 3-3
HISTORICAL IMPORTED SUPPLY DELIVERIES (AF)

Year	SWP Deliveries to CLWA Service Area[a]	SWP Deliveries to Out-of-Service Area Storage[b]	Withdrawals from Out-of-Service Area Storage[b]	Other Imported Deliveries to CLWA Service Area[c]	Total Imported Supplies to CLWA Service Area
1980	1,210	-	-	-	1,210
1981	5,761	-	-	-	5,761
1982	9,516	-	-	-	9,516
1983	9,476	-	-	-	9,476
1984	11,477	-	-	-	11,477
1985	12,401	-	-	-	12,401
1986	13,928	-	-	-	13,928
1987	16,167	-	-	-	16,167
1988	18,904	-	-	-	18,904
1989	21,719	-	-	-	21,719
1990	22,139	-	-	-	22,139
1991	7,357	-	-	-	7,357
1992	14,812	-	-	-	14,812
1993	13,787	-	-	-	13,787
1994	14,919	-	-	-	14,919
1995	17,747	-	-	-	17,747
1996	18,448	-	1,256	-	19,704
1997	21,586	1,256	-	-	21,586
1998	19,782	-	-	-	19,782
1999	28,813	-	-	-	28,813
2000	31,085	-	2,589	-	33,674
2001	35,632	2,589	-	-	35,632
2002	42,080	24,000	395	-	42,475
2003	44,967	-	-	-	44,967
2004	47,463	32,522	-	-	47,463
2005	36,747	20,000	-	-	36,747
2006	39,622	20,395	-	-	39,622
2007	34,919	8,200	-	11,000	45,919
2008	31,878	-	-	11,000	42,878
2009	26,096	-	1,650	11,000	38,746

Sources: DWR Bulletin 132, Management of the California State Water Project; and DWR delivery files.
Notes:
(a) Includes deliveries of Table A supplies, carryover water, Article 21 water, Turnback Pool water, local supply (from West Branch reservoirs) and water purchased through DWR.
(b) Out-of-service area storage includes flexible storage in Castaic Lake, the Semitropic Banking Program and the Rosedale-Rio Bravo Banking Program.
(c) Deliveries from Buena Vista-Rosedale.

TABLE 3-4
CLWA DEMAND PROJECTIONS PROVIDED TO WHOLESALE SUPPLIERS[a] (AF)

Wholesaler (Supply Source)	2015	2020	2025	2030	2035	2040	2045	2050
DWR (SWP)[b]	95,200	95,200	95,200	95,200	95,200	95,200	95,200	95,200
BVWSD/RRBWSD (Kern River)[c]	11,000	11,000	11,000	11,000	11,000	11,000	11,000	11,000

Notes:
(a) Nickel Water is excluded from this table because it is not contractually a CLWA supply. It is a Newhall Land supply that would be conveyed by CLWA and made available to VWC. Under Newhall Land's agreement for this fixed water supply, the provider is required to provide the amount contracted for every year.
(b) CLWA has provided demand projections to DWR through 2035 based on its maximum Table A Amount and anticipates that its demands beyond 2035 will also be at maximum Table A Amounts.
(c) Under the agreement for this fixed water supply, the wholesale provider is required to provide the amount contracted for every year. Therefore, no demand projections are actually provided to BVWSD and RRBWSD.

3.3 Groundwater

This section presents information about the purveyors groundwater supplies, including a summary of the adopted groundwater management plan (GWMP).

3.3.1 Santa Clara River Groundwater Basin – East Subbasin

The sole source of local groundwater for urban water supply in the Valley is the groundwater Basin identified in the DWR Bulletin 118, 2003 Update as the Santa Clara River Valley Groundwater Basin, East Subbasin (Basin) (Basin No. 4-4.07). The Basin is comprised of two aquifer systems, the Alluvium and the Saugus Formation. The Alluvium generally underlies the Santa Clara River and its several tributaries, to maximum depths of about 200 feet; and the Saugus Formation underlies practically the entire Upper Santa Clara River area, to depths of at least 2,000 feet. There are also some scattered outcrops of Terrace deposits in the Basin that likely contain limited amounts of groundwater. However, since these deposits are located in limited areas situated at elevations above the regional water table and are also of limited thickness, they are of no practical significance as aquifers for municipal water supply; consequently they have not been developed for any significant water supply in the Basin and are not included as part of the existing or planned groundwater supplies described in this UWMP. Figure 3-1 illustrates the mapped extent of the Santa Clara River Valley East Subbasin in DWR Bulletin 118 (2003), which approximately coincides with the outer extent of the Alluvium and Saugus Formation. The CLWA service area is also shown on Figure 3-1.

3.3.2 Adopted Groundwater Management Plan

As part of legislation authorizing CLWA to provide retail water service to individual municipal customers, Assembly Bill (AB) 134 (2001) included a requirement that CLWA prepare a GWMP in accordance with the provisions of Water Code Section 10753, which was originally enacted by AB 3030. The general contents of CLWA's GWMP were outlined in 2002, and a detailed plan was adopted in 2003 to satisfy the requirements of AB 134. The plan both complements and formalizes a number of existing water supply and water resource planning and management activities in CLWA's service area, which effectively encompasses the East Subbasin of the Santa Clara River Valley Groundwater Basin. Notably, CLWA's GWMP (provided on CD as Appendix G) also includes a basin-wide monitoring program, the results of which provide input to annual reporting on water supplies and water resources in the Basin, as well as input to assessment of Basin yield for water supply as described herein. The existing

groundwater monitoring program will be reflected in the upcoming groundwater reporting to DWR as part of SBX7-6 implementation.

The GWMP contains four management objectives, or goals, for the Basin including (1) development of an integrated surface water, groundwater and recycled water supply to meet existing and projected demands for municipal, agricultural and other water uses; (2) assessment of groundwater basin conditions to determine a range of operational yield values that use local groundwater conjunctively with supplemental SWP supplies and recycled water to avoid groundwater overdraft; (3) preservation of groundwater quality, including active characterization and resolution of any groundwater contamination problems and (4) preservation of interrelated surface water resources, which includes managing groundwater to not adversely impact surface and groundwater discharges or quality to downstream basin(s).

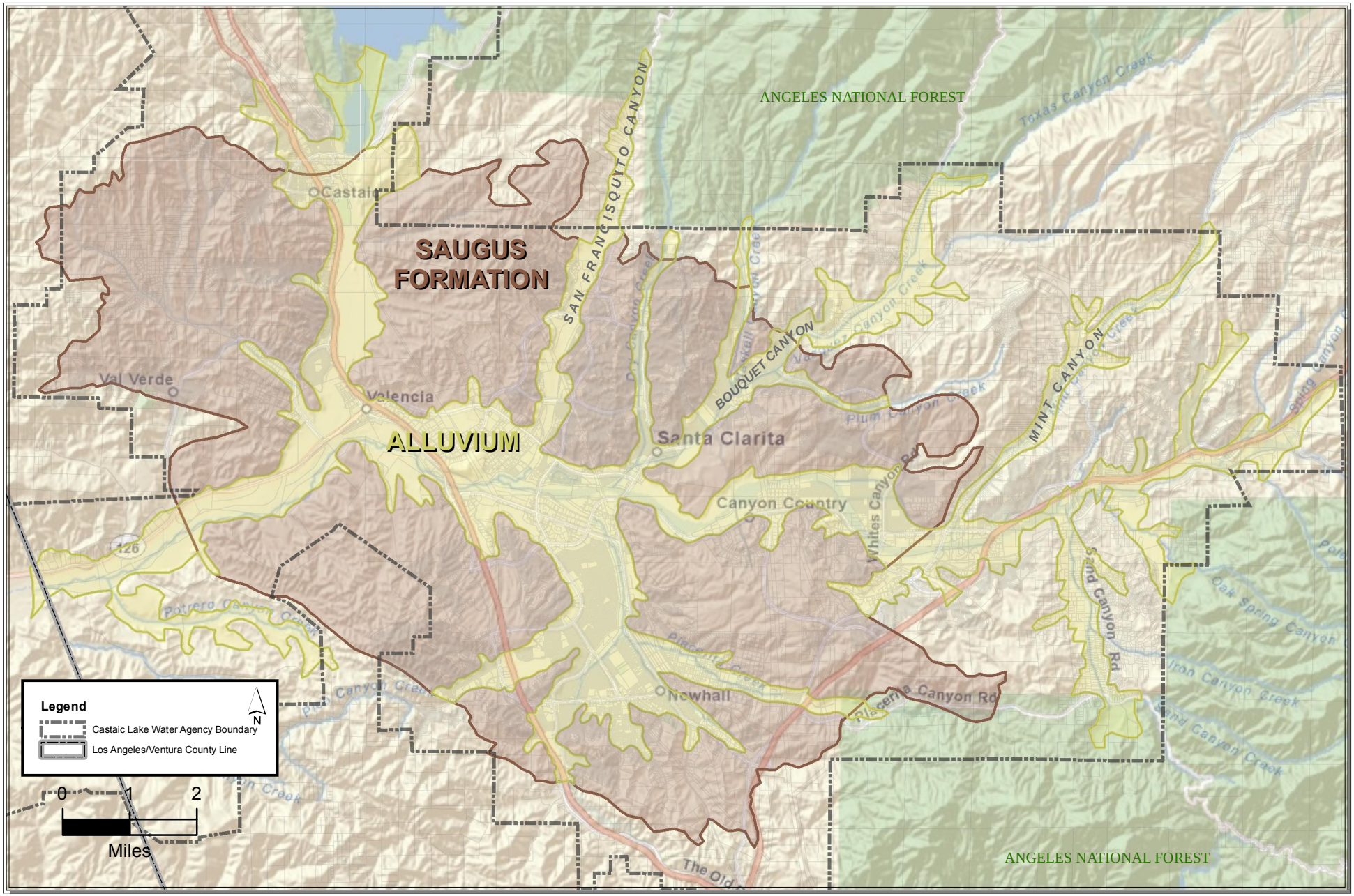


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Figure 3-1
Santa Clara River Valley, East Groundwater Subbasin

Prior to preparation and adoption of the GWMP, a local Memorandum of Understanding (MOU) process among CLWA, the retail water purveyors and United Water Conservation District (UWCD) in neighboring Ventura County, downstream of the East Subbasin of the Santa Clara River Valley, had produced the beginning of local groundwater management, now embodied in the GWMP. Prepared and implemented in 2001, the MOU was a collaborative and integrated approach to several of the aspects of water resource management included in the GWMP. As a result of the MOU, the cooperating agencies integrated their respective database management efforts and continued to monitor and report on the status of Basin conditions, as well as on geologic and hydrologic aspects of their respective parts of the overall stream-aquifer system. Following adoption of the GWMP, the water suppliers developed and utilized a numerical groundwater flow model for analysis of groundwater basin yield and for analysis of extraction and containment of groundwater contamination. The results of those basin yield and contamination analyses, most recently updated in 2009 (Basin Yield Analysis, 2009), are bases for the amounts and allocations of groundwater supplies in this UWMP.

The adopted GWMP includes 14 elements intended to accomplish the Basin management objectives listed above. In summary, the plan elements include:

- Monitoring of groundwater levels, quality, production and subsidence
- Monitoring and management of surface water flows and quality
- Determination of Basin yield and avoidance of overdraft
- Development of regular and dry-year emergency water supply
- Continuation of conjunctive use operations
- Long-term salinity management
- Integration of recycled water
- Identification and mitigation of soil and groundwater contamination, including involvement with other local agencies in investigation, cleanup and closure
- Development and continuation of local, state and federal agency relationships
- Groundwater management reports
- Continuation of public education and water conservation programs
- Identification and management of recharge areas and wellhead protection areas
- Identification of well construction, abandonment and destruction policies
- Provisions to update the groundwater management plan

Work on a number of the GWMP elements had been ongoing for some time prior to the formal adoption of the GWMP, and expanded work on implementation of the GWMP continues on an ongoing basis. The results of some of that work were incorporated in the last UWMP, and subsequent analyses of the groundwater basin are reflected in this current UWMP. Notable in the implementation of the GWMP has been the annual preparation of a Santa Clarita Valley Water Report that summarizes (1) water requirements, (2) all three sources of water supply (groundwater, imported surface water and recycled water, all as part of the GWMP's overall management objectives) and (3) projected water supply availability to meet the following year's projected water requirements.

3.3.2.1 Available Groundwater Supplies

The groundwater component of overall water supply in the Valley derives from a groundwater operating plan developed and analyzed over the last 25 years to meet water requirements (municipal, agricultural, small domestic) while maintaining the Basin in a sustainable condition, specifically no long-term depletion of groundwater or interrelated surface water. The operating plan also addresses groundwater contamination issues in the Basin, all consistent with the GWMP described above. The groundwater operating plan is based on the concept that pumping can vary from year to year to allow increased groundwater use in dry periods and increased recharge during wet periods to collectively assure that the groundwater Basin is adequately replenished through various wet/dry cycles. As ultimately formalized in the GWMP, the operating yield concept has been quantified as ranges of annual pumping volumes to capture year-to-year pumping fluctuations in response to both hydrologic conditions and customer demand.

Ongoing work through implementation of the GWMP has produced three detailed technical reports in addition to the annual Water Reports (the most recent of which, for 2009, was the twelfth annual report). The first report (CH2M Hill, April 2004) documents the construction and calibration of the groundwater flow model for the Valley. The second report (CH2M Hill and LSCE, August 2005) presents the initial modeling analysis of the purveyors' original groundwater operating plan. The most recent report, an updated analysis of the basin (LSCE and GSI, August, 2009) presents the modeling analysis of the current groundwater operating plan, including restoration of contaminated wells for municipal supply after treatment and also presents a range of potential impacts deriving from climate change considerations. All those results are reflected in this UWMP. The primary conclusion of the modeling analysis is that the groundwater 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. The analysis of sustainability for groundwater and interrelated surface water is described in detail in "Analysis of Groundwater Supplies and Groundwater Basin Yield, Upper Santa Clara River Groundwater Basin, East Subbasin," prepared by Luhdorff and Scalmanini, Consulting Engineers and GSI Water Solutions, Inc. August 2009 (Basin Yield Analysis, 2009).

The updated groundwater operating plan, summarized in Table 3-5, is as follows:

- **Alluvium:** Pumping from the Alluvial Aquifer in a given year is governed by local hydrologic conditions in the eastern Santa Clara River watershed. Pumping ranges between 30,000 and 40,000 AFY during normal and above-normal rainfall years. However, due to hydrogeologic constraints in the eastern part of the Basin, pumping is reduced to between 30,000 and 35,000 AFY during locally dry years.

- **Saugus Formation:** Pumping from the Saugus Formation in a given year is tied directly to the availability of other water supplies, particularly from the SWP. During average-year conditions within the SWP system, Saugus pumping ranges between 7,500 and 15,000 AFY. Planned dry-year pumping from the Saugus Formation ranges between 15,000 and 25,000 AFY during a drought year and can increase 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 after the higher pumping during dry years.

TABLE 3-5
GROUNDWATER OPERATING PLAN FOR THE SANTA CLARITA VALLEY

	Groundwater Production (AF)			
Aquifer	**Normal Years**	**Dry Year 1**	**Dry Year 2**	**Dry Year 3**
Alluvium	30,000 to 40,000	30,000 to 35,000	30,000 to 35,000	30,000 to 35,000
Saugus Formation	7,500 to 15,000	15,500 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**

Within the groundwater operating plan, three factors affect the availability of groundwater supplies: sufficient source capacity (wells and pumps), sustainability of the groundwater resource to meet pumping demand on a renewable basis and protection of groundwater sources (wells) from known contamination, or provisions for treatment in the event of contamination. The first two factors are briefly discussed below, and more completely addressed in the 2009 Annual Water Report and the aforenoted Basin Yield Analysis (2009).

Protection of groundwater sources and provisions for treatment in the event of contamination are discussed further in Chapter 5.

Recent historical groundwater pumping by the retail water purveyors and other groundwater users is summarized in Table 3-6. Planned future groundwater pumping in normal years, by the retail water purveyors as well as by other groundwater users, is summarized in Table 3-7. Existing and planned groundwater pumping by the retail water purveyors as well as by other groundwater users, for normal, single-dry and multiple-dry years, are summarized in Section 3.3.3.4 and in Tables 3-10 through 3-12 below.

TABLE 3-6
RECENT HISTORICAL GROUNDWATER PRODUCTION[a]

Basin Name	Groundwater Pumped (AF)				
	2005	2006	2007	2008	2009
Santa Clara River Valley East Subbasin					
SCWD	12,408	13,156	10,686	11,878	10,077
Alluvium	12,408	13,156	10,686	11,878	10,077
Saugus Formation	0	0	0	0	0
LACWWD 36	343	0	0	0	0
Alluvium	343	0	0	0	0
Saugus Formation	0	0	0	0	0
NCWD	4,824	5,572	5,497	5,912	5,728
Alluvium	1,389	2,149	1,806	1,717	1,860
Saugus Formation	3,435	3,423	3,691	4,195	3,868
VWC	14,741	14,333	15,570	16,094	15,295
Alluvium	12,228	11,884	13,140	14,324	12,459
Saugus Formation	2,513	2,449	2,367	1,770	2,836
Total Purveyor	**32,316**	**33,061**	**31,690**	**33,884**	**31,100**
Alluvium	**26,368**	**27,189**	**25,632**	**27,919**	**24,396**
Saugus Formation	**5,948**	**5,872**	**6,058**	**5,965**	**6,704**
Agricultural and Other[b]	12,785	17,312	14,768	14,750	16,564
Alluvium	12,280	15,872	13,141	13,797	15,590
Saugus Formation	505	1,440	1,627	953	974
Total Basin	**45,101**	**50,373**	**46,458**	**48,634**	**47,664**
Alluvium	**38,648**	**43,061**	**38,773**	**41,716**	**39,986**
Saugus Formation	**6,453**	**7,312**	**7,685**	**6,918**	**7,678**
Groundwater Fraction of Total Municipal Water Supply	**46%**	**45%**	**41%**	**45%**	**44%**

Notes:
(a) From 2009 Santa Clarita Valley Water Report (May 2010).
(b) Includes agricultural and other small private well pumping.

TABLE 3-7
PROJECTED GROUNDWATER PRODUCTION (NORMAL YEAR)[a]

	Groundwater Pumping (AF)							
Basin Name	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
Santa Clara River Valley								
East Subbasin								
LACWWD 36								
Alluvium	0	0	0	0	0	0	0	0
Saugus Formation	500	500	500	500	500	500	500	500
NCWD								
Alluvium	1,825	1,825	1,825	1,825	1,825	1,825	1,825	1,825
Saugus Formation	4,400	4,400	4,400	4,400	4,400	4,400	4,400	4,400
SCWD								
Alluvium	10,500	10,500	10,500	11,500	11,500	11,500	11,500	11,500
Saugus Formation	2,850	3,350	3,350	3,350	3,350	3,350	3,350	3,350
VWC								
Alluvium	11,675	12,675	13,675	14,675	15,675	16,675	17,675	18,675
Saugus Formation	2,850	3,350	3,350	3,350	3,350	3,350	3,350	3,350
Total Purveyor								
Alluvium	**24,000**	**25,000**	**26,000**	**28,000**	**29,000**	**30,000**	**31,000**	**32,000**
Saugus Formation	**10,600**	**11,600**	**11,600**	**11,600**	**11,600**	**11,600**	**11,600**	**11,600**
Agricultural and Other[b]								
Alluvium	14,500	13,500	12,500	10,100	9,100	8,100	7,100	6,600
Saugus Formation	900	900	900	900	900	900	900	900
Total Basin								
Alluvium	**38,500**	**38,500**	**38,500**	**38,100**	**38,100**	**38,100**	**38,100**	**38,600**
Saugus Formation	**11,500**	**12,500**	**12,500**	**12,500**	**12,500**	**12,500**	**12,500**	**12,500**

Notes:
(a) Existing and planned pumping by individual purveyors is shown in Appendix C. The distribution of pumping does not represent a formal allocation of water resources among the retail purveyors.
(b) Agricultural and other small private well pumping, including Newhall Land, Robinson Ranch Golf Course, Wayside Honor Rancho, Valencia Golf Course and proposed Palmer Golf Course.

As reflected in Table 3-7, the groundwater operating plan recognizes ongoing pumping for the two major uses of groundwater in the Basin, municipal and agricultural water supply. Consistent with the groundwater operating plan, projected groundwater pumping includes an ongoing conversion of pumping, coincident with planned land-use changes, from agricultural to municipal water supply. This is shown in Table 3-7, with projected pumping by agricultural and other users decreasing as purveyor pumping increases by a similar amount, resulting in total pumping remaining essentially constant through 2050. The groundwater operating plan and projected pumping also includes other small private domestic and related pumping (discussed further below). As shown in Table 3-7, total projected groundwater pumping by all users within each aquifer is within the ranges for normal year pumping identified in the groundwater operating plan (Table 3-5).

During preparation of the 2005 Plan, the Santa Clarita Valley Well Owners' Association submitted some limited information about the nature and magnitude of private well pumping. This included a detailed estimate of private well pumping in the San Francisquito Canyon portion of the Basin – a total of 85 AFY by 73 individual private pumpers, or nearly 1.2 AFY per private well pumper. As a result of that input, it continues to be recognized that total private pumping is likely well within the 500 AFY estimates of small private well pumping in recent annual Water Reports, or about 1 percent of typical Alluvial Aquifer pumping by the purveyors

and other known private well owners, e.g. agricultural pumpers, combined. Thus, while the small private wells are not explicitly modeled in the Basin yield analysis described herein because their locations and operations are not known, their operation creates a pumping stress that is essentially negligible at the scale of the regional model. Ultimately, implementation of the GWMP 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 small private groundwater use on an ongoing basis.

Another change that has affected the UWMP is the requirement by DWR pursuant to the UWMP Act to provide estimates of the projected groundwater use of each of the purveyors. For the purposes of this report and compliance with the UWMP Act, the retail water purveyors have each set forth their estimates of projected groundwater use. The Agency and the retail water purveyors recognize that these estimates of projected groundwater use are subject to adjustment based on various factors and conditions occurring from time to time. These estimates are provided for the planning purposes of this report and the UWMP, and do not constitute an allocation of groundwater from the local groundwater basins.

3.3.2.2 Alluvium

Based on a combination of historical operating experience and recent (2005 and 2009) groundwater modeling analyses, the Alluvial Aquifer can supply groundwater on a long-term sustainable basis in the overall range of 30,000 to 40,000 AFY, with a probable reduction in dry years to a range of 30,000 to 35,000 AFY. Both of those ranges include about 15,000 AFY of Alluvial pumping for current agricultural and other non-municipal water uses. The dry year reduction is a result of practical constraints in the eastern part of the Basin, where lowered groundwater levels in dry periods have the effect of reducing pumping capacities in that shallower portion of the aquifer. Over time, directly related to the rate of suburban development and corresponding decrease in agricultural land use the amount of Alluvial pumping for agricultural water supply is expected to decrease, with an equivalent increase in the amount of Alluvial pumping for municipal water supply. On an overall basis, Alluvial pumping is intended to remain within the sustainable ranges in the groundwater operating plan.

Adequacy of Supply

For municipal water supply, with existing wells and pumps, the three retail water purveyors with Alluvial wells (NCWD, SCWD and VWC) have a combined pumping capacity from active wells of nearly 42,000 gallons per minute (gpm), which translates into a current full-time Alluvial source capacity of approximately 67,000 AFY. Alluvial pumping capacity from all the active municipal supply wells is summarized in Table 3-8. The locations of the various municipal Alluvial wells throughout the Basin are illustrated on Figure 3-2.

In terms of adequacy and availability, the combined active Alluvial groundwater source capacity of municipal wells, approximately 67,000 AFY, is more than sufficient to meet the current and potential future municipal, or urban, component of groundwater supply from the Alluvium, which in the near term is about 24,000 to 26,000 AFY of the total planned Alluvial pumping of 30,000 to 40,000 AFY. The higher individual and cumulative pumping capacities are, of course, primarily for operational reasons (i.e., to meet daily and other fluctuations from average day to maximum day and peak hour system demands). As noted above, the balance of Alluvial pumping in the operating plan is for agricultural and other non-municipal, including small private, pumping.

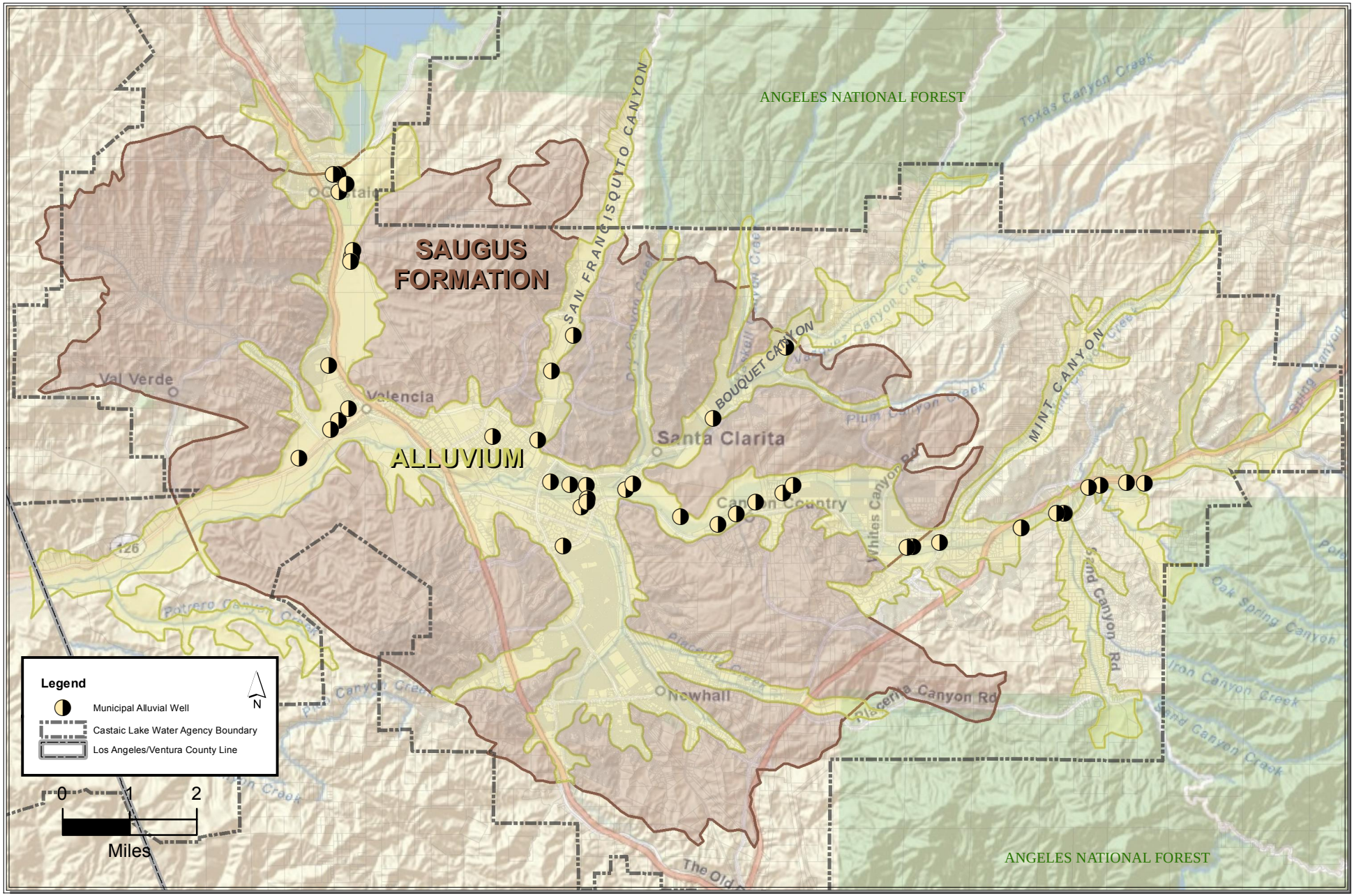

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Figure 3-2
Municipal Alluvial Well Locations
Santa Clara River Valley, East Groundwater Subbasin

TABLE 3-8
ACTIVE MUNICIPAL GROUNDWATER SOURCE CAPACITY — ALLUVIAL AQUIFER WELLS

	Well	Pump Capacity (gpm)	Max. Annual Capacity (AF)	Normal Year Production[(a)] (AF)	Dry-Year Production[(a)] (AF)
NCWD					
	Castaic 1	650	1,040	350	250
	Castaic 2	450	720	100	100
	Castaic 4	270	430	100	0
	Castaic 7	1,450	2,330	300	200
	Pinetree 1	300	480	150	0
	Pinetree 3	550	880	350	300
	Pinetree 4	400	640	300	200
	Pinetree 5	550	880	300	200
	NCWD Subtotal	*4,620*	*7,400*	*1,950*	*1,250*
SCWD					
	Clark	600	960	700	700
	Guida	1,000	1,610	1,300	1,200
	Honby	950	1,530	1,000	700
	Lost Canyon 2	850	1,370	300	0
	Lost Canyon 2A	825	1,330	300	0
	Mitchell 5A	950	1,530	500	200
	Mitchell 5B	700	1,120	800	300
	N. Oaks Central	1,275	2,050	850	700
	N. Oaks East	950	1,530	800	700
	N. Oaks West	1,300	2,290	800	700
	Sand Canyon	1,050	1,690	200	0
	Santa Clara	1,500	2,420	1,200	1,200
	Sierra	1,500	2,420	1,100	700
	Valley Center	1,200	1,930	1,200	1,200
	SCWD Subtotal	*14,650*	*23,580*	*11,050*	*8,300*
VWC					
	Well D	1,050	1,690	880	880
	Well E-15	1,400	2,250	800	800
	Well N	1,250	2,010	650	650
	Well N7	2,500	4,030	1,160	1,160
	Well N8	2,500	4,030	1,160	1,160
	Well Q2	1,200	1,930	1,100	1,100
	Well S6	2,000	3,220	1,000	1,000
	Well S7	2,000	3,220	500	500
	Well S8	2,000	3,220	500	500
	Well T7	1,200	1,930	750	750
	Well U4	1,000	1,610	800	800
	Well U6	1,250	2,010	800	800
	Well W9	800	1,290	1,000	1,000
	Well W10	1,500	2,420	800	800
	Well W11	1,000	1,610	950	950
	VWC Subtotal	*22,650*	*36,470*	*12,850*	*12,850*
Total Purveyors		**41,920**	**67,450**	**25,850**	**22,400**

Note:
(a) Production amounts simulated in the updated Basin Yield analysis (LSCE & GSI, 2009).

Sustainability

Until 2003, the long-term renewability of Alluvial groundwater was empirically determined from approximately 60 years of pumping and groundwater level records. Generally, those long-term observations included stability in groundwater levels and storage, with some dry-period fluctuations in the eastern part of the Basin, over a historical range of total Alluvial pumpage from as low as about 20,000 AFY to as high as about 43,000 AFY. Those empirical observations have since been complemented by the development and application of a numerical groundwater flow model, which has been used to simulate aquifer response to the planned operating ranges of pumping. The numerical groundwater flow model has also been used to analyze the control of perchlorate contaminant migration under selected pumping conditions that have now been implemented to restore, with treatment, pumping capacity that was formerly inactivated due to perchlorate contamination detected in some wells in the Basin. To examine the yield of the Alluvium, or the sustainability of the Alluvium on a renewable basis, the original groundwater flow model was used to examine the 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, documented in the "Analysis of Groundwater Basin Yield, Upper Santa Clara River Groundwater Basin, East Subbasin, Los Angeles County, California, prepared for the Upper Basin Water Purveyors" (2005 Basin Yield Analysis), prepared by CH2M Hill & LSCE, 2005). To examine the response of the entire aquifer system, the original model also incorporated pumping from the Saugus Formation in accordance with the normal (7,500 to 15,000 AFY) and dry year (15,000 to 35,000 AFY) operating plan for that aquifer. The model was run over a synthetic 78-year hydrologic period, which was selected from actual historical precipitation to examine a number of hydrologic conditions expected to affect both groundwater pumping and groundwater recharge.

Simulated Alluvial Aquifer response to the 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 included (1) generally constant groundwater levels in the middle to western portion of the Alluvium, and fluctuating groundwater levels in the eastern portion 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. Consequently, the Alluvial Aquifer was considered in the 2005 UWMP to be a sustainable water supply source to meet the Alluvial portion of the operating plan for the groundwater Basin.

In 2008, partly in preparation for this 2010 UWMP, and partly in response to concerns about events expected to impact the future reliability of supplemental water supply from the SWP, an updated analysis was undertaken to assess groundwater development potential and possible augmentation of the groundwater operating plan. In addition to extending the model's calibration, the updated analysis simulated the historical record of climate and incorporated SWP deliveries for those climatic conditions for an 86-year period from 1922 through 2007, in place of the original model's synthetic 78-year hydrologic period that had been developed prior to the availability of combined climate and SWP deliveries since 1922. While the overall operating plan ranges in the updated basin yield analysis did not change from the original operating plan, prevailing land-use conditions and the specific distributions of pumping reflected in Tables 3-8 and 3-9 were found to produce the same kinds of resultant Alluvial groundwater conditions as concluded to be sustainable in 2005 – (1) no long-term declines in Alluvial groundwater levels and storage; (2) multi-year periods of locally declining, or locally increasing, groundwater levels in response to cycles of below-normal and above-normal precipitation and

(3) short-term impacts on pumping capacities in eastern parts of the basin due to declining groundwater levels during dry periods, mitigable by some redistribution of pumping (reflected in pumping volumes included in this UWMP) and by conformance with the dry-period reduction in Alluvial pumping in the operating plan (Table 3-5). Based on the results of the updated basin yield analysis (LSCE & GSI, 2009), the operating plan is considered to reflect ongoing sustainable groundwater supply rates. In the Alluvium, sustainability was found via explicit simulation of pumping in wet/normal years near the upper end of the operating plan range. In dry years, sustainability was found via explicit simulation of pumping throughout the dry-year operating plan range, with the additional consideration that some pumping redistribution (reflected in this UWMP) be implemented to achieve pumping rates near the upper end of the dry-period range.

3.3.2.3 Saugus Formation

Based on historical operating experience and recent (2005 and 2009) groundwater modeling analysis, the Saugus Formation can supply water on a long-term sustainable basis in a normal range of 7,500 to 15,000 AFY, with intermittent increases to 25,000 to 35,000 AF in dry years. The dry-year increases, based on limited historical observation and modeled projections, demonstrate that a small amount of the large groundwater storage in the Saugus Formation can be pumped over a relatively short (dry) period. This would be followed by recharge (replenishment) of that storage during a subsequent normal-to-wet period when pumping would be reduced.

Adequacy of Supply

For municipal water supply with existing wells, the three retail water purveyors with Saugus wells (NCWD, SCWD and VWC) have a combined pumping capacity from active wells of nearly 17,000 gpm, which translates into a full-time Saugus source capacity of about 27,000 AFY. Saugus pumping capacity from all the active municipal supply wells is summarized in Table 3-9; the locations of the various active municipal Saugus wells are illustrated on Figure 3-3. These capacities include two Saugus wells contaminated by perchlorate (Saugus 1 and 2), which have now been returned to service with treatment facilities for use of the treated water for municipal supply under permit from the State Department of Public Health. They also reflect the most recent replacement well, VWC's Well 207, in a non-impacted part of the basin. Excluded from these capacities is VWC Well 201 that was recently impacted by the detection of perchlorate. The well represents a total of 2,400 gpm of pumping capacity (for a dry-year production capacity of 3,777 AFY). VWC has removed Well 201 from service.

TABLE 3-9
MUNICIPAL GROUNDWATER SOURCE CAPACITY—SAUGUS FORMATION WELLS

Well	Pump Capacity (gpm)	Max. Annual Capacity (AF)	Normal Year Production[(a)] (AF)	Dry-Year Production[(a)] (AF)
NCWD				
12	2,400	3,870	1,765	2,494
13	2,250	3,630	1,765	2,494
NCWD Subtotal	*4,650*	*7,500*	*3,530*	*4,988*
VWC				
159	500	800	50	50
160	2,000	3,220	500	830
205	2,700	4,350	1,211	4,038
206	2,500	4,030	1,175	3,500
207	2,500	4,030	1,175	3,500
VWC Subtotal	*10,200*	*16,430*	*4,111*	*11,918*
SCWD				
Saugus 1	1,100	1,770	1,772	1,772
Saugus 2	1,100	1,770	1,772	1,772
SCWD Subtotal	*2,200*	*3,540*	*3,544*	*3,544*
Total Purveyors	**17,050**	**27,470**	**11,185**	**20,450**

Note:
(a) Production amounts simulated in the updated Basin Yield analysis (LSCE & GSI, 2009).

In terms of adequacy and availability, the combined active Saugus groundwater source capacity of municipal wells of 27,000 AFY is more than sufficient to meet the planned use of Saugus groundwater in normal years of 7,500 to 15,000 AFY. This currently active capacity is more than sufficient to meet water demands, in combination with other sources. In order to supplement near term dry-year supplies, VWC Well 201 could be brought back into service within two years utilizing treatment technologies currently being used in the Santa Clarita Valley (See Section 5). This estimate is conservative because, in 2005, VWC Well Q2 was restored to service in October 2005, six months after perchlorate was detected in the well in April 2005. In addition, in 2005 there was no third-party funding initially available to pay for the cost of putting the well back into service; VWC negotiated a separate agreement with the Whittaker-Bermite property owners to pay for the cost. Also in May 2007, the perchlorate litigation settlement agreement was executed, which established a "Rapid Response Fund" to immediately treat any additional wells that could be become impacted by perchlorate.

With the restored capacity of the VWC Well 201, the Saugus Formation groundwater source capacity of municipal wells would be increased to 31,000 AFY. In order to accommodate longer-term dry-year needs, additional Saugus wells are planned by 2020 and expected to have a combined capacity of 10,000 AFY.

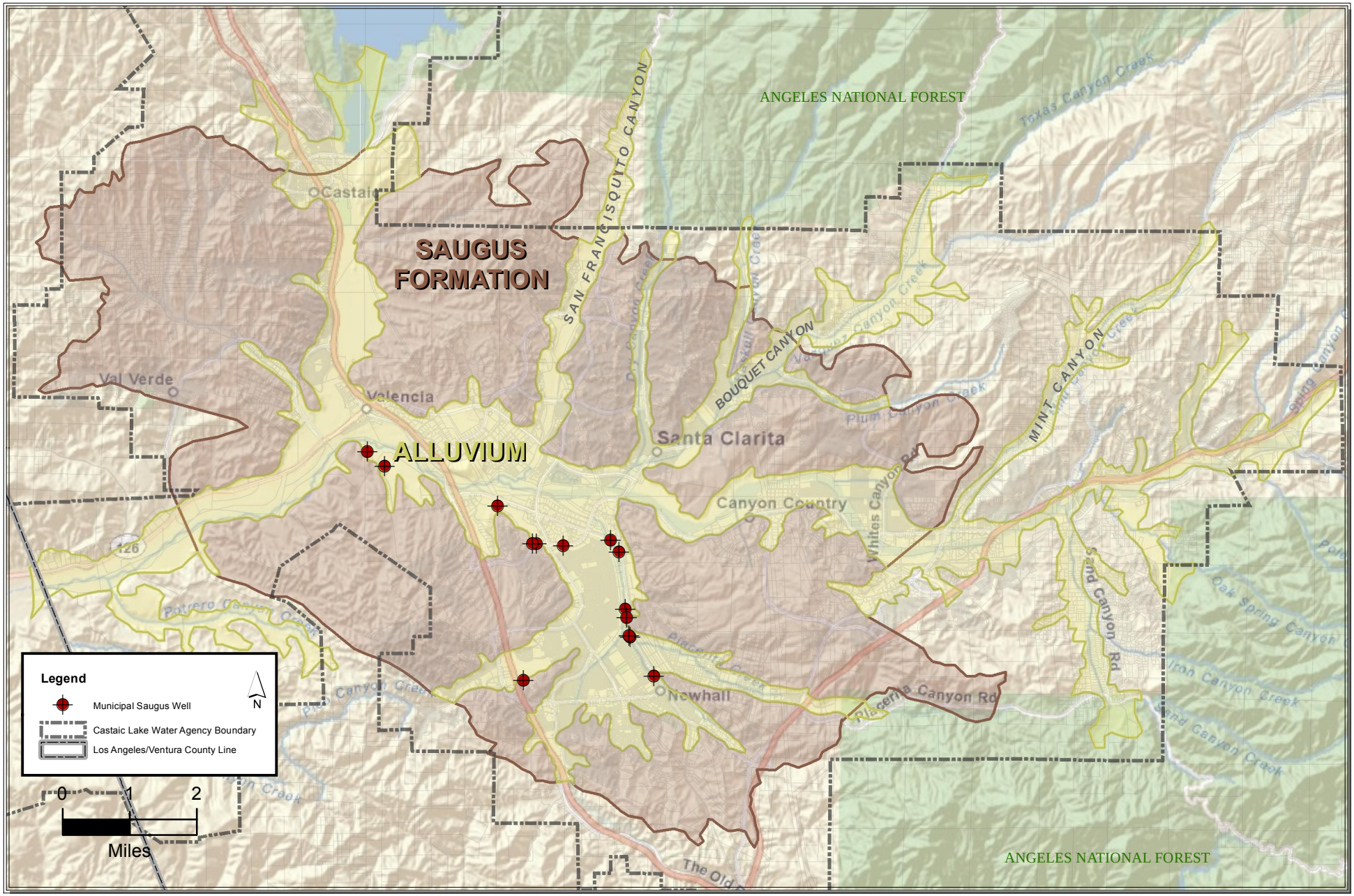

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Figure 3-3
Saugus Well Locations
Santa Clara River Valley, East Groundwater Subbasin

Sustainability

Until 2003, the long-term sustainability of Saugus groundwater was empirically estimated from limited historical experience. Historically (and continuing to the present), pumping from the Saugus has been fairly low in most years, with one four-year period of increased pumping up to about 15,000 AFY that had short-term water level impacts but produced no long-term depletion of the substantial groundwater storage in the Saugus. Those empirical observations have now been complemented by the development and application of the numerical groundwater flow model, which has been used to examine aquifer response to the operating plan for pumping from both the Alluvium and the Saugus and also to examine the effectiveness of pumping for both contaminant extraction and control of contaminant migration within the Saugus Formation. The latter aspects of Saugus pumping were being studied at the time of the 2005 UWMP, and were thus reflected at that time as groundwater extraction capacity to be restored. As discussed in Section 3.3.3 those restoration efforts have been undertaken and that pumping is thus reflected in this UWMP as part of the Saugus operating plan (Table 3-5) and pumping distribution (Table 3-9).

To examine the yield of the Saugus Formation, or its sustainability on a renewable basis, the original groundwater flow model was used to examine long-term projected response to pumping from both the Alluvium and the Saugus over the synthetic 78-year period of hydrologic conditions that incorporated alternating wet and dry periods as have historically occurred (CH2M Hill and LSCE, 2005). The pumping simulated in the model was in accordance with the then-current operating plan for the Basin. For the Saugus, simulated pumping included the then-planned restoration of historic pumping from the perchlorate-impacted wells.

The originally simulated Saugus Formation response to the ranges of operating plan pumping under assumed recurrent historical hydrologic conditions was consistent with actual experience under smaller pumping rates: (1) short-term declines in groundwater levels and storage near pumped wells during dry-period pumping, (2) 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 recharge and pumping up to about 15,000 AFY, complemented by modeled projections of aquifer response that showed 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, was the basis for concluding that the Saugus Formation could be considered a sustainable water supply source to meet the Saugus portion of the operating plan for the groundwater Basin.

As discussed under Sustainability of the Alluvium above, an updated basin yield analysis was undertaken in 2008 to assess groundwater development potential and possible augmentation of the groundwater operating plan. After extended and updated model calibration and incorporation of extended historical records, the overall operating plan (Table 3-5) and specific distribution of Saugus pumping (Table 3-9) were found to produce the same kinds of resultant Saugus groundwater conditions as concluded to be sustainable in 2005 – (1) long-term stability of groundwater levels, with no sustained declines; (2) groundwater levels slightly below historic Saugus levels, in response to greater long-term utilization of the Saugus and (3) maintenance of sufficiently high Saugus groundwater levels to ensure achievement of planned individual pumping capacities (Table 3-9). Thus, the operating plan for the Saugus, with fairly low pumping in wet/normal years and increased pumping through dry periods, is concluded to reflect sustainable groundwater supply rates.

3.3.3 Existing and Planned Groundwater Pumping

3.3.3.1 Impacted Well Capacity

As discussed in the 2000 UWMP Perchlorate Contamination Amendment, and again in the 2005 UWMP, certain wells in the Basin were impacted by perchlorate contamination and thus represented a temporary loss of well capacity within CLWA's service area. Six wells were ultimately taken out of service upon the detection of perchlorate including four Saugus wells and two Alluvial wells. All have either been (1) abandoned and replaced, (2) returned to service with the addition of treatment facilities that allow the wells to be used for municipal water supply as part of the overall water supply systems permitted by the State Department of Public Health (DPH) or (3) will be replaced under an existing perchlorate litigation settlement agreement (See Section 5). The restored wells (two Saugus wells and one Alluvial well) and the replacement wells (one Saugus and one Alluvial well), which collectively restore much of the temporarily lost well capacity, are now included as parts of the active municipal groundwater source capacities delineated in Tables 3-8 and 3-9. An additional two wells will be drilled to fully restore 4,200 gpm (6,776 AFY) of the impacted well capacity, thus restoring the operational flexibility that existed prior to the perchlorate being discovered. The cost of drilling the remaining two wells will be fully reimbursed under the terms of the perchlorate litigation settlement agreement. Additional information concerning water quality issues and maintenance of pumping capacity is provided in Section 5.

Most recently, in August 2010, VWC's Well 201, located downgradient from the Whittaker-Bermite site and downgradient from the initially impacted Saugus 1, Saugus 2 and V157 wells, had detectable concentrations of perchlorate and the well was taken out of service. Water sampling tests from August 2010 through April 2011 also confirmed the presence of perchlorate over the adopted regulatory standard. This well was immediately taken out of service in August 2010 and its capacity is not included in active groundwater sources delineated in Table 3-9. VWC plans to actively seek remediation under the settlement agreement and restore the impacted well capacity in the near term.

3.3.3.2 Alluvium

In terms of adequacy and availability, the combined active Alluvial Aquifer groundwater sources of municipal wells, approximately 67,000 AFY, are more than sufficient to meet the current and potential future urban component of the groundwater supply from the Alluvium. The potential future urban component of groundwater from the Alluvium in the near-term is about 24,000 to 26,000 AFY of the total planned Alluvial pumping of 30,000 to 40,000 AFY. The higher individual and cumulative pumping capacities of the purveyors are for operational reasons (i.e., to meet daily and other fluctuations from average day to maximum day and peak hour system demands).

Tables 6-2, 6-3 and 6-4 as well as Tables C-2, C-5 and C-8 include planned Alluvial Aquifer supplies. These planned supplies do not increase the quantity of water being withdrawn from Alluvial Aquifer, but represent anticipated or potential shifts in pumping involving different or new wells.

For example, VWC's planned Alluvial Aquifer supplies represent a shifting of pumping from Newhall Land agricultural uses to VWC for the anticipated Newhall Ranch project. While new or improved wells would be required, no net change in Alluvial Production would be anticipated. There is also a potential that SCWD may require additional well capacity to meet the total

anticipated pumping for a single dry year as described in Tables C-4 and C-5. Overall purveyor and non-purveyor supplies remain consistent with the operating plan shown on Table 3-5.

3.3.3.3 Saugus Formation

In terms of adequacy and availability, the combined active Saugus groundwater source municipal well capacity of 27,000 AFY is more than sufficient to meet the planned use of Saugus groundwater in normal years of 7,500 to 15,000 AFY. This current active capacity is also more than sufficient to meet water demands, in combination with other sources. In order to supplement near term dry-year supplies, VWC Well 201 could conservatively be brought back into service within two years utilizing treatment technologies currently being used in the Santa Clarita Valley (see Section 5). In order to accommodate the longer-term demands, additional Saugus wells would be required to meet the planned use of 35,000 AFY of Saugus groundwater during a multiple-dry year period.

Tables 6-2, 6-3 and 6-4 as well as Tables C-2, C-5 and C-8 include planned Saugus Formation supplies. Planned Saugus Formation pumping would only increase the quantity of water being withdrawn from Saugus Formation to levels consistent with the operating plan shown on Table 3-5. To obtain full Saugus Formation supplies of 35,000 AFY in certain dry years, restoration of the perchlorate impacted well (VWC Well 201) along with additional wells with a collective combined total production of approximately 14,000 AFY would be required.

LACWWD 36 anticipates planned Saugus Formation supplies of 500 AFY to be available beginning in 2011. This planned supply included in Tables C-2, C-5 and C-8 is incorporated into Tables 6-2, 6-3 and 6-4; however, the total purveyor and non-purveyor Saugus Formation supplies remain consistent with the operating plan shown on Table 3-5.

There is also a potential that NCWD may require additional well capacity to meet anticipated pumping levels included in Tables C-2, C-5 and C-8 and incorporated into Tables 6-2, 6-3 and 6-4. Overall NCWD existing and planned Saugus Formation supplies, along with the supplies of the other purveyors and non-purveyors, are consistent with the operating plan shown on Table 3-5.

As previously discussed in this section, VWC expects to remediate the capacity from its recently impacted Well 201 in the near term under conservative projections (i.e., within two years utilizing replacement well construction and/or treatment technologies currently being used in the Santa Clarita Valley; see Section 5).

The need for additional new Saugus Formation wells to achieve full dry-year pumping has been planned for some time. Most notably, as part of the 2009 Updated Basin Yield Analysis, three new Saugus wells were simulated in the western part of the basin, remote from the Whittaker-Bermite site and perchlorate-impacted Saugus wells. The conclusion of the analysis that Saugus pumping is sustainable included multiple dry-year pumping at a combined capacity for the three wells of 9,750 AFY.

3.3.3.4 Summary

Overall, the total municipal supply in this Plan includes a groundwater component that is, in turn, part of the overall groundwater supply of the Valley. As such, the municipal groundwater supply, distributed among the retail purveyors, recognizes the existing and projected future uses of groundwater by overlying interests in the Valley such that the combination of municipal and

all other groundwater pumping remains within the groundwater operating plan (Table 3-5) that has been analyzed for sustainability. The distribution of groundwater among the purveyors are detailed in Appendix C and aggregated for all the purveyors in Chapter 6 for normal years, single dry years and multiple dry years. Relative to the 2009 Groundwater Basin Yield Analysis, total groundwater pumping, by all other pumpers as well as by the purveyors from their existing and planned wells, is summarized in Tables 3-10 through 3-12 for normal, single-dry and multiple-dry years.

TABLE 3-10
AVERAGE/NORMAL YEAR EXISTING AND PLANNED GROUNDWATER USAGE IN UPPER SANTA CLARA RIVER BASIN (AF)

Alluvium Supplies	2015	2020	2025	2030	2035	2040	2045	2050
Purveyors Existing	24,000	24,000	24,000	25,000	25,000	25,000	25,000	25,000
Purveyors Planned	0	1,000	2,000	3,000	4,000	5,000	6,000	7,000
Purveyors Existing and Planned	24,000	25,000	26,000	28,000	29,000	30,000	31,000	32,000
Non purveyors	14,500	13,500	12,500	10,100	9,100	8,100	7,100	6,600
Total Alluvium Production	**38,500**	**38,500**	**38,500**	**38,100**	**38,100**	**38,100**	**38,100**	**38,600**
Alluvium Yield	*38,600*	*38,600*	*38,600*	*38,600*	*38,600*	*38,600*	*38,600*	*38,600*

Saugus Formation Supplies	2015	2020	2025	2030	2035	2040	2045	2050
Purveyors Existing	9,225	10,225	10,225	10,225	10,225	10,225	10,225	10,225
Purveyors Planned	1375	1375	1375	1375	1375	1375	1375	1375
Purveyors Existing and Planned	10,600	11,600	11,600	11,600	11,600	11,600	11,600	11,600
Non Purveyors	900	900	900	900	900	900	900	900
Total Saugus	**11,500**	**12,500**	**12,500**	**12,500**	**12,500**	**12,500**	**12,500**	**12,500**
Saugus Yield	*12,500*	*12,500*	*12,500*	*12,500*	*12,500*	*12,500*	*12,500*	*12,500*

TABLE 3-11
SINGLE-DRY YEAR EXISTING AND PLANNED GROUNDWATER USAGE IN UPPER SANTA CLARA RIVER BASIN (AF)

Alluvium Supplies	2015	2020	2025	2030	2035	2040	2045	2050
Purveyors Existing	20,300	20,250	20,200	21,050	21,050	21,025	21,000	20,650
Purveyors Planned	200	1,250	2,300	3,850	4,850	5,875	6,900	7,750
Purveyors Existing and Planned	20,500	21,500	22,500	24,900	25,900	26,900	27,900	28,400
Non purveyors	14,350	13,350	12,350	9,950	8,950	7,950	6,950	6,450
Total Alluvium Production	**34,850**	**34,850**	**34,850**	**34,850**	**34,850**	**34,850**	**34,850**	**34,850**
Alluvium Yield	*34,850*	*34,850*	*34,850*	*34,850*	*34,850*	*34,850*	*34,850*	*34,850*

Saugus Formation Supplies	2015	2020	2025	2030	2035	2040	2045	2050
Purveyors Existing	20,400	20,400	20,400	20,400	20,400	20,400	20,400	20,400
Purveyors Planned (Restored Well)	825	3,777	3,777	3,777	3,777	3,777	3,777	3,750
Purveyors Planned (New Wells)	2,875	9,923	9,923	9,923	9,923	9,923	9,923	9,950
Purveyors Existing and Planned	24,100	34,100	34,100	34,100	34,100	34,100	34,100	34,100
Non purveyors	900	900	900	900	900	900	900	900
Total Saugus	**25,000**	**35,000**	**35,000**	**35,000**	**35,000**	**35,000**	**35,000**	**35,000**
Saugus Yield	*25,000*	*35,000*	*35,000*	*35,000*	*35,000*	*35,000*	*35,000*	*35,000*

TABLE 3-12
MULTIPLE-DRY YEAR EXISTING AND PLANNED GROUNDWATER USAGE IN UPPER SANTA CLARA RIVER BASIN (AF)

Alluvium Supplies	2015	2020	2025	2030	2035	2040	2045	2050
Purveyors Existing	20,425	20,425	20,425	21,825	21,825	21,825	21,825	21,325
Purveyors Planned	0	1,000	2,000	3,000	4,000	5,000	6,000	7,000
Purveyors Existing and Planned	20,425	21,425	22,425	24,825	25,825	26,825	27,825	28,325
Non purveyors	14,425	13,425	12,425	10,025	9,025	8,025	7,025	6,525
Total Alluvium Production	**34,850**	**34,850**	**34,850**	**34,850**	**34,850**	**34,850**	**34,850**	**34,850**
Alluvium Yield	*34,850*	*34,850*	*34,850*	*34,850*	*34,850*	*34,850*	*34,850*	*34,850*

Saugus Formation Supplies	2015	2020	2025	2030	2035	2040	2045	2050
Purveyors Existing	19,700	19,700	19,700	19,700	19,700	19,700	19,700	19,700
Purveyors Planned (Restored Well)	2,375	1,625	1,500	1,400	1,275	1,125	1,000	875
Purveyors Planned (New Wells)	2,250	10,325	10,450	10,550	10,675	10,825	10,950	11,075
Purveyors Existing and Planned	24,325	31,650	31,650	31,650	31,650	31,650	31,650	31,650
Non purveyors	900	900	900	900	900	900	900	900
Total Saugus	**25,225**	**32,550**	**32,550**	**32,550**	**32,550**	**32,550**	**32,550**	**32,550**
Saugus Yield	*25,225*	*32,550*	*32,550*	*32,550*	*32,550*	*32,550*	*32,550*	*32,550*

3.4 Transfers and Exchanges

An opportunity available to CLWA to increase water supplies is to participate in voluntary water transfer programs. Since the drought of 1987-1992, the concept of water transfer has evolved into a viable supplemental source to improve supply reliability. The initial concept for water transfers was codified into law in 1986 when the California Legislature adopted the "Katz" Law (California Water Code, Sections 1810-1814) and the Costa-Isenberg Water Transfer Law of 1986 (California Water Code, Sections 470, 475, 480-483). These laws help define parameters for water transfers and set up a variety of approaches through which water or water rights can be transferred among individuals or agencies.

Up to 27 MAF of water are delivered for agricultural use every year. Over half of this water use is in the Central Valley, and much of it is delivered by, or adjacent to, SWP and CVP conveyance facilities. This proximity to existing water conveyance facilities could allow for the voluntary transfer of water to many urban areas, including CLWA, via the SWP. Such water transfers can involve water sales, conjunctive use and groundwater substitution and water sharing. They usually occur as a form of spot, option or core transfers agreements. The costs of a water transfer would vary depending on the type, term and location of the transfer. The most likely voluntary water transfer programs would probably involve the Sacramento or southern San Joaquin Valley areas.

One of the most important aspects of any resource planning process is flexibility. A flexible strategy minimizes unnecessary or redundant investments (or stranded costs). The voluntary transfer of water between willing sellers and buyers can be an effective means of achieving flexibility. However, not all water transfers have the same effectiveness in meeting resource

needs. Through the resource planning process and ultimate implementation, several different types of water transfers could be undertaken.

3.4.1 Core Transfers

Core transfers are agreements to purchase a defined quantity of water every year. These transfers have the benefit of more certainty in costs and supply, but in some years can be surplus to imported water (available in most years) that is already paid for.

3.4.2 Spot Market Transfers

Spot market transfers involve water purchased only during the time of need (usually a drought). Payments for these transfers occur only when water is actually requested and delivered, but there is usually greater uncertainty in terms of costs and availability of supply. Examples of such transfers were the Drought Water Banks of 1991, 1992 and 1994 and DWR Dry Year Water Purchase Programs in 2001 through 2004 and 2008. An additional risk of spot market transfers is that the purchases may be subject to institutional limits or restricted access (e.g., requiring the purchasing agency to institute rationing before it is eligible to participate in the program).

3.4.3 Option Contracts

Option contracts are agreements that specify the amount of water needed and the frequency or probability that the supply will be called upon (an option). Typically, a relatively low up-front option payment is required and, if the option is actually called upon, a subsequent payment would be made for the amount called. These transfers have the best characteristics of both core and spot transfers. With option contracts, the potential for redundant supply is minimized, as are the risks associated with cost and supply availability.

3.4.4 Future Market Transfers

The most viable types of water transfers are core and option transfers and, as such, represent CLWA's long-term strategy. The most recent costs for this type of transfer is estimated to be about $300 per AFY (equivalent to $5,500 per AF for Table A Amount) for core transfers.

3.5 Groundwater Banking Programs

With recent developments in conjunctive use and groundwater banking, significant opportunities exist to improve water supply reliability for CLWA. Conjunctive use is the coordinated operation of multiple water supplies to achieve improved supply reliability. Most conjunctive use concepts are based on storing surface supplies in groundwater basins in times of surplus for withdrawal and use during dry periods and drought when surface water supplies would likely be reduced.

Groundwater banking programs involve storing available SWP surface water supplies during wet years in groundwater basins in, for example, the San Joaquin Valley. Water would be stored either directly by surface spreading or injection, or indirectly by supplying surface water to farmers for their use in lieu of their intended groundwater pumping. During water shortages, the stored water could be pumped out and conveyed through the California Aqueduct to CLWA

as the banking partner, or used by the farmers in exchange for their surface water allocations, which would be delivered to CLWA as the banking partner through the California Aqueduct.

CLWA is a partner in two existing groundwater banking programs, the Semitropic Banking Program and RRBWSD Banking Program, discussed below in Sections 3.5.1 and 3.5.2, respectively. Newhall Land is also a partner in the Semitropic Banking Program, as discussed in Section 3.5.3, with its supplies assumed to be available to VWC. In addition, CLWA has updated its plan to enhance its overall supply reliability, including the need for additional banking programs, as discussed in Section 3.5.4.

3.5.1 Semitropic Banking Program

Semitropic Water Storage District (Semitropic) provides SWP water to farmers for irrigation. Semitropic is located in the San Joaquin Valley in the northern part of Kern County immediately east of the California Aqueduct. Using its available groundwater storage capacity (approximately one MAF), Semitropic has developed a groundwater banking program, that takes available SWP supplies in wet years and returns the water in dry years. As part of this dry-year return, Semitropic can leave its SWP water in the Aqueduct for delivery to a banking partner and increase its groundwater production for its farmers. Semitropic constructed facilities so that groundwater can be pumped into a Semitropic canal and, through reverse pumping plants, be delivered to the California Aqueduct. Semitropic currently has six long-term first priority banking partners: the Metropolitan Water District of Southern California (Metropolitan), Santa Clara Valley Water District, Alameda County Water District, Alameda County Flood Control and Water Conservation District Zone 7, Vidler Water Company and Newhall Land and Farming. The total amount of storage under contract is approximately one MAF.

In 2002, CLWA entered into a temporary storage agreement with Semitropic, and stored an available portion of its Table A supply (24,000 AF) in an account in Semitropic's program. In 2004, 32,522 AF of available 2003 Table A supply was stored in a second temporary Semitropic account. In accordance with the terms of CLWA's storage agreements with Semitropic, 90 percent of the banked amount, or a total of 50,870 AF, was recoverable through 2013 to meet CLWA water demands when needed. Each account had a term of ten years for the water to be withdrawn and delivered to CLWA.[19] Of this recoverable storage, 4,950 AF has been withdrawn, with 1,650 AF delivered in 2009 and 3,300 AF delivered in 2010, leaving a balance of 45,920 AF in storage available to meet future CLWA needs. CLWA executed an amendment for a ten-year extension of each banking agreement with Semitropic in April 2010. A negative declaration for the program extension was approved by CLWA's Board of Directors on January 19, 2011 and by the Semitropic Board of Directors on April 6, 2011.

Current operational planning includes use of the water stored in Semitropic for dry-year supply. Accordingly, it is reflected in the available supplies delineated in this section, and it is also reflected as contributing only to dry-year supply reliability in Chapter 6, through 2023.

3.5.2 Rosedale-Rio Bravo Banking Program

Also located in Kern County, immediately adjacent to the Kern Water Bank, RRBWSD has developed a Water Banking and Exchange Program. CLWA has entered into a long-term agreement with RRBWSD that provides it with storage and pumpback capacity of 20,000 AFY,

[19] Thereafter, the remaining amount of project water would be forfeited from the account.

with up to 100,000 AF of storage capacity. CLWA began storing water in this program in 2005 and has since reached the program's maximum storage capacity, with 100,000 AF currently available for withdrawal.

This project is a water management program to improve the reliability of CLWA's existing dry-year supplies; it is not an annual supply that could support growth. Accordingly, it is reflected in the available supplies delineated in this section and it is also reflected as contributing only to dry-year supply reliability in Chapter 6.

3.5.3 Semitropic Banking Program – Newhall Land

As mentioned above, one of Semtropic's long-term groundwater banking partners is Newhall Land. In its agreement with Semitropic, Newhall Land has available to it a pumpback capacity of 4,950 AFY and a storage capacity of 55,000 AF. Newhall Land has a current storage balance of 18,828 AF. This supply is assumed to be available to VWC and is planned to be used only in dry years. Accordingly, it is reflected in the available supplies delineated in this section, and it is also reflected as contributing only to dry-year supply reliability in Chapter 6.

3.5.4 Other Opportunities

In 2003, CLWA produced a Water Supply Reliability Plan (Reliability Plan), and updated it in 2009. The Reliability Plan outlines primary elements that CLWA should include in its water supply mix to obtain maximum overall supply reliability enhancement. These elements include both conjunctive use and groundwater banking programs, which enhance the reliability of both the existing and future supplies, as well as water acquisitions. The Reliability Plan recommends water banking storage and pumpback capacity north and south of Tehachapi Mountains, the latter of which would provide an emergency supply in case of catastrophic outage along the California Aqueduct. The Reliability Plan also contains a recommended implementation plan and schedule. CLWA has made significant progress on its water supply reliability program, obtaining storage capacity in two banking programs north of the Tehachapi Mountains, with approximately 146,000 AF of water currently banked in those programs and available for withdrawal. Negotiations with one program south of the Tehachapis were initiated, but identification of a program for emergency outage storage remains ongoing.

The 2009 update of the Reliability Plan presents the implementation schedule recommended for both storage and pumpback capacity beginning in 2010 and incrementally increasing through 2050. CLWA's plans call for development of additional groundwater banking programs, with pumpback capacity of at least an additional 10,000 AF by 2025, and a second additional 10,000 AF by 2035. Table 3-13 summarizes CLWA's future reliability enhancement programs.

TABLE 3-13
FUTURE RELIABILITY ENHANCEMENT PROGRAMS

		Proposed Quantities (AF)		
Project Name	Year Available	Average/ Normal Year	Single Dry Year[(a)]	Multiple Dry Years[(b)]
Additional Planned Banking Programs	2025	0	10,000	7,500
	2035	0	20,000	15,000

Notes:
(a) Supplies shown are maximum annual withdrawal capacity.
(b) Supplies shown are average withdrawals during four consecutive dry years.

3.6 Planned Water Supply Projects and Programs

The Reliability Plan also discusses the potential for acquiring additional water supplies to meet future demands (the plan refers to these as "water transfer opportunities"). CLWA has been participating in the initial planning stages of the Garden Bar Water and Power Supply Project. This north-of-Delta water supply project is sponsored by the South Sutter Water District (SSWD). The project consists of a new dam and associated hydroelectric facilities. SSWD is investigating a reservoir with a storage capacity of between 245,000 and 350,000 AF. Table 3-14 summarizes CLWA's transfer and exchange opportunities.

TABLE 3-14
TRANSFER AND EXCHANGE OPPORTUNITIES

Source Transfer Agency	Transfer/ Exchange	Year Available	Short/Long Term	Proposed Quantity (AFY)
South Sutter Water District	Transfer	2020-2025	Long Term	TBD

3.7 Development of Desalination

The California UWMP Act requires a discussion of potential opportunities for use of desalinated water (Water Code Section 10631[i]). CLWA has explored such opportunities, and they are described in the following section, including opportunities for desalination of brackish water, groundwater and seawater. However, at this time, none of these opportunities are practical or economically feasible for CLWA and CLWA has no current plans to pursue them. Therefore, desalinated supplies are not included in the supply summaries in this Plan (e.g., Tables 3-1, 6-2, 6-3 and 6-4).

3.7.1 Opportunities for Brackish Water and/or Groundwater Desalination

As discussed in Chapter 3, the two sources of groundwater in the Santa Clarita Valley are drawn from the Alluvial Aquifer and from the Saugus Formation. Neither of these supplies can be considered brackish in nature, and desalination is not required.

However, CLWA and the retail water purveyors could team with other SWP contractors and provide financial assistance in construction of other regional groundwater desalination facilities in exchange for SWP supplies. The desalinated water would be supplied to users in communities near the desalination plant, and a similar amount of SWP supplies would be exchanged and allocated to CLWA from the SWP contractor. A list summarizing the groundwater desalination plans of other SWP contractors is not available; however, CLWA would begin this planning effort should the need arise.

In addition, should an opportunity emerge with a local agency other than a SWP contractor, an exchange of SWP deliveries would most likely involve a third party, such as Metropolitan. Most local groundwater desalination facilities would be projects implemented by retailers of SWP contractors and, if an exchange program was implemented, would involve coordination and wheeling of water through the contractor's facilities to CLWA.

3.7.2 Opportunities for Seawater Desalination

Because the Santa Clarita Valley is not in a coastal area, it is neither practical nor economically feasible for CLWA and its purveyors to implement a seawater desalination program. However, similar to the brackish water and groundwater desalination opportunities described above, CLWA and the purveyors could provide financial assistance to other SWP contractors in the construction of their seawater desalination facilities in exchange for SWP supplies.

CLWA and the purveyors have been following the existing and proposed seawater desalination projects along California's coast. Table 3-15 provides a summary of the status of several of California's municipal/domestic seawater desalination facilities.

As shown Table 3-15, most of the existing and proposed seawater desalination facilities are/would be operated by agencies that are not SWP contractors. However, in these cases as described above, an exchange for SWP deliveries would most likely involve a third party (SWP contractor), the local water agency and CLWA.

TABLE 3-15
EXISTING AND PROPOSED SEAWATER DESALINATION FACILITIES ALONG THE CALIFORNIA COAST

Project	Member Agency Service Area	AF per Year	Status
Long Beach Seawater Desalination Project	Long Beach Water Department	10,000	Pilot study
South Orange Coastal Ocean Desalination Project	Municipal Water District of Orange County	16,000-28,000	Pilot study
Carlsbad Seawater Desalination Project	San Diego County Water Authority	56,000	Permitting
West Basin Seawater Desalination Project	West Basin Municipal Water District	20,000	Pilot study
Huntington Beach Seawater Desalination Project	Municipal Water District of Orange County	56,000	Permitting
Camp Pendleton Seawater Desalination Project	San Diego County Water Authority	56,000 to 168,000	Planning
Rosarito Beach Seawater Desalination Feasibility Study	San Diego County Water Authority	28,000 to 56,000	Feasibility study
	Total AFY	**102,000-280,000**	

Source: MWD 2010 UWMP

Although not listed in Table 3-15, the Bay Area Regional Desalination Partnership, comprised of five agencies collaborating on a Regional Desalination Project in the San Francisco Bay area, is working to develop desalination as a water supply for the region. The agencies are the San Francisco Public Utilities Commission, Santa Clara Valley Water District, East Bay Municipal Utilities District, Contra Costa Water District and Alameda County Flood Control and Water Conservation District Zone 7. This regional desalination project is an example of the type of project that CLWA could participate in on an exchange basis.

To date the Partnership has completed a feasibility study to refine the institutional, technical, environmental and scientific merits of developing a regional facility and are planning to build and test a pilot plant in Contra Costa County. Construction is planned for 2012.

Section 4: Recycled Water

This section of the Plan describes the existing and future recycled water opportunities available to the CLWA service area. The description includes estimates of potential recycled water supply and demand for 2010 to 2050 in five year increments, as well as CLWA's proposed incentives and implementation plan for recycled water.

4.1 Recycled Water Master Plan

In normal years, approximately 55 percent of the demands within CLWA's service area is met with imported water. However, the reliability of the imported SWP supply is variable (due in part to its dependence on current year hydrology in northern California and prior year storage in SWP reservoirs). When sufficient imported water is not available, the balance is met with local groundwater provided by the purveyors and from water banking programs.

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. Recycled water enhances reliability in that it provides an additional source of supply and allows for more efficient utilization of CLWA's groundwater and imported water supplies. Draft Recycled Water System Master Plans for the CLWA service area were completed in 1993 and 2002. These master plans considered significant developments affecting recycled water sources, supplies, users and demands so that CLWA could develop a cost-effective recycled water system within its service area. In 2007, CLWA completed California Environmental Quality Act (CEQA) analysis of the 2002 Recycled Water Master Plan (Recycled Plan). This analysis consisted of a Program Environmental Impact Report (EIR) covering the various phases for a recycled water system as outlined in the Recycled Plan. The Program EIR was certified by the CLWA Board in March 2007.

Table 4-1 provides a list of the agencies that participate in the implementation of the Recycled Plan.

CLWA has constructed Phase I of the Recycled Plan, which can deliver 1,700 AFY of water to the VWC service area. Deliveries of recycled water began in 2003 for irrigation water supply at a golf course and in roadway median strips. In 2009, recycled water deliveries were 328 AF.

TABLE 4-1
PARTICIPATING AGENCIES

Participating Agencies	Role in Plan Development
Castaic Lake Water Agency	Wholesale water provider
Newhall County Water District	Retail water purveyor
Santa Clarita Water Division	Retail water purveyor
Valencia Water Company	Retail water purveyor
Los Angeles County Waterworks District No. 36	Retail water purveyor
Los Angeles County Sanitation District No. 26[20]	Recycled water supplier
Los Angeles County Sanitation District No. 32[21]	Recycled water supplier
Berry Petroleum	Potential recycled water supplier

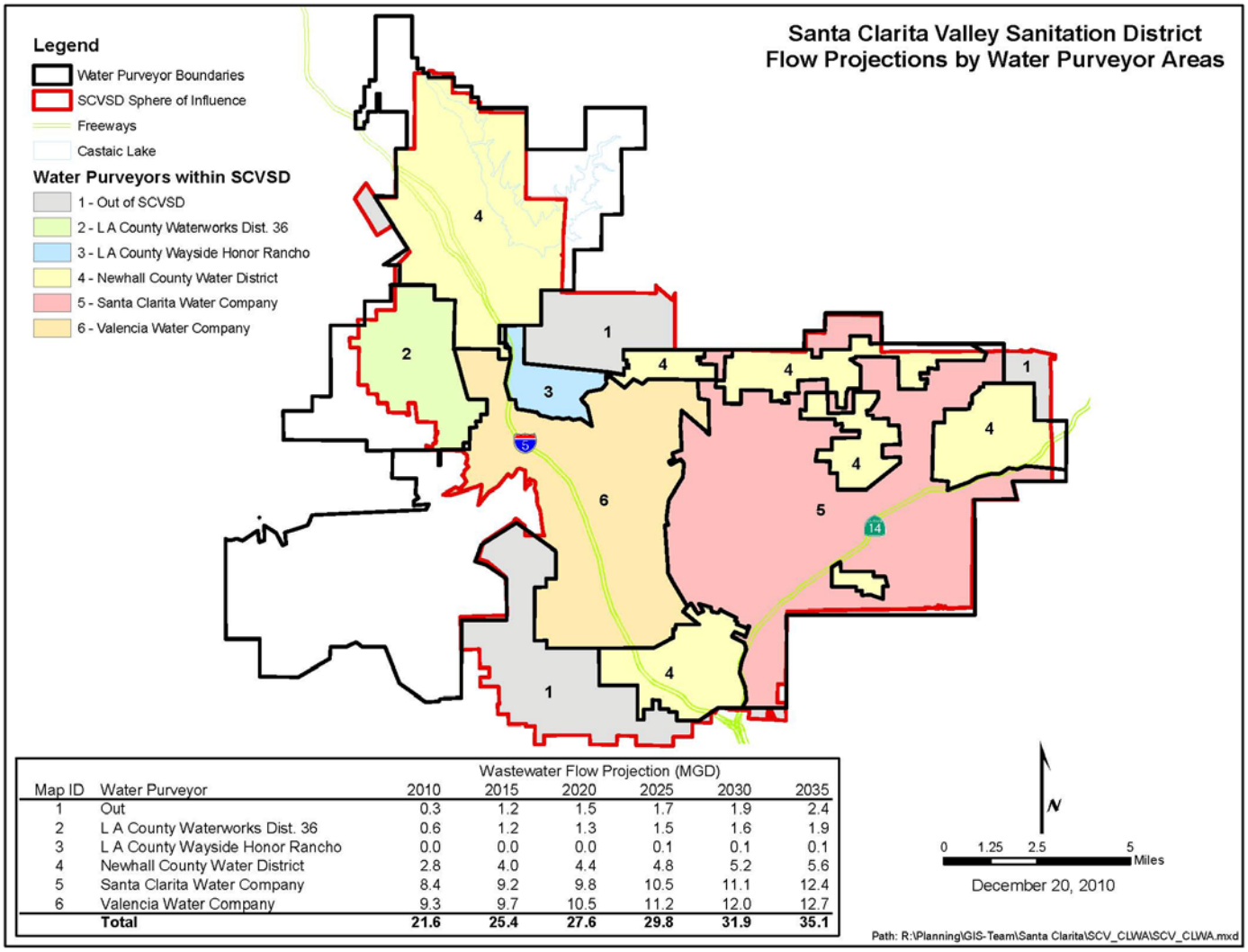
Overall, the Recycled Plan along with the Newhall Ranch development is expected to ultimately recycle up to 22,800 AF of treated (tertiary) wastewater suitable for reuse on golf courses, landscaping and other non-potable uses.

CLWA completed a preliminary design report in 2009 on the second phase of the Recycled Plan (Phase 2A) that will take water from the Saugus Water Reclamation Plant (WRP) and distribute it to identified users to the north, across the Santa Clara River and then to the west and east. Customers included in the Phase 2A expansion will be Santa Clarita Central Park and the Bridgeport and River Village developments. Large irrigation customers will be served with this expansion with a collective design that will increase recycled water deliveries by 500 AFY.

Recycled water will be further expanded with the South End Recycled Water project (Phase 2C). VWC has initiated project design expanding the existing recycled water transmission and distribution system southerly to supply recycled water to additional customers as well as to potentially supply a source of recycled water to customers of adjacent water agencies. Phase 2C of the Recycled Plan will result in the use of 910 AFY of recycled water.

[20] Los Angeles County Sanitation District No. 26 and No. 32, the majority of which serve the City of Santa Clarita, have been consolidated into the Santa Clarita Valley Sanitation District.
[21] Ibid.

FIGURE 4-1
SANTA CLARITA VALLEY SANITATION DISTRICT FLOW PROJECTIONS BY WATER PURVEYOR SERVICE AREA



		Wastewater Flow Projection (MGD)					
Map ID	Water Purveyor	2010	2015	2020	2025	2030	2035
1	Out	0.3	1.2	1.5	1.7	1.9	2.4
2	L A County Waterworks Dist. 36	0.6	1.2	1.3	1.5	1.6	1.9
3	L A County Wayside Honor Rancho	0.0	0.0	0.0	0.1	0.1	0.1
4	Newhall County Water District	2.8	4.0	4.4	4.8	5.2	5.6
5	Santa Clarita Water Company	8.4	9.2	9.8	10.5	11.1	12.4
6	Valencia Water Company	9.3	9.7	10.5	11.2	12.0	12.7
	Total	**21.6**	**25.4**	**27.6**	**29.8**	**31.9**	**35.1**

4.2 Existing Wastewater Treatment Facilities

The Santa Clarita Valley Sanitation District (SCVSD) of Los Angeles County owns and operates two Water Reclamation Plants (WRPs), the Saugus WRP and the Valencia WRP, within the CLWA service area. The water is treated to tertiary levels and, with the exception of water used in Phase I of the Recycled Plan, is discharged to the Santa Clara River. The Newhall Ranch development is also planning to construct a WRP, and non-potable recycled water from this source may be incorporated into CLWA's recycled water system.

The Valencia WRP, completed in 1967, is located on The Old Road near Magic Mountain Amusement Park. The Valencia WRP has a current treatment capacity of 21.6 million gallons per day (MGD), equivalent to 24,192 AFY, developed over time in stages. In 2010, the Valencia WRP produced an average of 15.17 MGD (16,993 AFY) of tertiary recycled water. Use of recycled water from the Valencia WRP is permitted under Los Angeles Regional Water Quality Control Board (RWQCB) Order Nos. 87-48 and 97-072.

The Saugus WRP, completed in 1962, is located southeast of the intersection of Bouquet Canyon Road and Soledad Canyon Road. The Saugus WRP has a current treatment capacity of 6.5 MGD (7,280 AFY). No future expansions are possible at the plant due to space limitations at the site. In 2010, the Saugus WRP produced an average of 5.02 MGD (5,623 AFY) of tertiary recycled water. Use of recycled water from this facility is permitted under Los Angeles RWQCB Order Nos. 87-49 and 97-072.

The Saugus and Valencia WRPs 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. Together, the Valencia and Saugus WRPs have a design capacity of 28.1 MGD (31,472 AFY). In 2008 they produced an average of 20.9 MGD (23,422 AFY). The primary sources of wastewater to the Saugus and Valencia WRPs are domestic. Both plants are tertiary treatment facilities and produce high quality effluent. Historically, the effluent from the two WRPs has been discharged 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.

Phase 1 of the Recycled Plan has been constructed and begins with a 4,000 gpm pump station at the Valencia Water Reclamation Plant that connects to a 1.5 mg reservoir in the Westridge area with 15,600 linear feet of 24- and 20-inch pipeline. It serves landscape customers along The Old Road and the Tournament Players Club golf course, all of which are VWC customers. Phase 2C of the Recycled Plan (the South End project) would use this existing system and connect at The Old Road and Valencia Boulevard. From there it would cross the freeway and run south in Rockwell Canyon Road, ultimately reaching the intersection of Orchard Village Road and Lyons Avenue. The proposed Recycled Plan Phase 2A project would start at the Saugus WRP and cross the Santa Clara River through an existing pipeline. It would then serve customers on the north side of the river, generally along Newhall Ranch Road both west and east of Bouquet Canyon Road (Figure 4-2).

FIGURE 4-2
RECYCLED WATER MASTER PLAN PHASES 2A, 2B, 2C

4.3 Wastewater Treatment Facility Improvements and Expansions

To accommodate anticipated growth in the Santa Clarita Valley, a 6 MGD expansion of the Valencia WRP is planned as indicated in the 2015 Joint Sewerage System Facilities Plan and EIR (Los Angeles County Sanitation District [LACSD] 1998). With this expansion, the capacity of the Valencia WRP would be 27.6 MGD (30,912 AFY), a need the SCVSD projects by 2035. No expansion is planned at the Saugus WRP. The total current planned capacity for both WRPs is 34.1 MGD (38,197 AFY). Based on the Recycled Plan, reuse of the tertiary treated water from these two plants is anticipated at 15.5 MGD (17,400 AFY) by year 2030. As this UWMP plans to 2050, supplies in the Recycled Plan projected to be available by year 2030 have similarly been assumed to be available through 2050 and beyond.

A third Valley reclamation plant, the Newhall Ranch WRP, 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 would be constructed in stages, with an ultimate capacity of 6.8 MGD (7,616 AFY) as stated in the RWQCB's Order R4-2007-0046. According to the Draft Newhall Ranch Resource Management and Development Plan/Spineflower Conservation Plan EIS/EIR, April 2009, approximately 5,400 AFY of the tertiary treated water from this plant is projected to be used by the Newhall Ranch Project. The WRP will serve the Newhall Ranch Specific Plan and a new County Sanitation District has been created to operate and maintain the Newhall Ranch WRP.

Table 4-2 provides the projected wastewater flows in each purveyor's service area from the combined Valencia and Saugus WRP planning area and from the proposed Newhall Ranch WRP. Projected wastewater flow for the Valencia and Saugus WRPs was determined using projected populations from Table 2-9 and the wastewater generation factor SCVSD uses for planning of 86 GPCD, and for the Newhall Ranch WRP based on its projections of production capacity.

Table 4-2 does not reflect Newhall Ranch WRP production capacity from 2010 through 2024. During this interim period, Newhall Ranch-generated wastewater would be temporarily treated at the Valencia WRP based on the need to build-up an adequate, steady flow of wastewater until construction of the Newhall Ranch WRP. The Valencia WRP has sufficient capacity to tertiary-treat wastewater from Newhall Ranch during this interim period, consistent with the Interconnection Agreement approved by SCVSD in 2002.

TABLE 4-2
PROJECTED WASTEWATER FLOWS

	2010	2015	2020	2025	2030	2035	2040	2045	2050
Projected Populations									
LACWWD 36	4,947	7,157	8,908	10,658	12,405	14,159	15,906	17,657	19,407
NCWD	44,316	49,933	54,559	58,612	63,824	68,450	73,079	77,715	82,341
SCWD	124,192	133,868	143,544	153,220	162,896	172,572	182,248	191,924	201,600
VWC	113,296	127,241	138,862	150,477	162,098	173,716	185,330	196,952	208,570
Total Projected Populations[a]	**286,751**	**318,199**	**345,873**	**372,967**	**401,223**	**428,897**	**456,563**	**484,248**	**511,918**
Wastewater Generation									
LACWWD 36	476	689	858	1,027	1,195	1,364	1,532	1,701	1,869
NCWD	4,269	4,810	5,255	5,646	6,148	6,593	7,039	7,486	7,931
SCWD	11,962	12,894	13,826	14,758	15,690	16,622	17,554	18,486	19,418
VWC	10,913	12,256	13,375	14,494	15,613	16,732	17,851	18,970	20,089
Total Wastewater Generated (AF)[b]	**27,620**	**30,649**	**33,314**	**35,924**	**38,646**	**41,311**	**43,976**	**46,643**	**49,308**
WRP Production Capacity									
Saugus and Valencia WRPs									
Treatment Capacity (MGD)[c]	28.1	28.1	28.1	28.1	28.1	34.1	34.1	34.1	34.1
Treatment Capacity (AF)	31,472	31,472	31,472	31,472	31,472	38,192	38,192	38,192	38,192
Newhall Ranch WRP (MGD)[d]	-	-	-	2.0	2.0	4.0	4.0	6.8	6.8
Newhall Ranch WRP (AF)	-	-	-	2,240	2,240	4,480	4,480	7,616	7,616
Total WRP Production Capacity (AF)	**31,472**	**31,472**	**31,472**	**33,712**	**33,712**	**42,672**	**42,672**	**45,808**	**45,808**
Wastewater Treated (AF)[e]	**27,620**	**30,649**	**31,472**	**33,712**	**33,712**	**41,311**	**42,672**	**45,808**	**45,808**

Notes:
(a) From Table 2-9.
(b) Based on projected populations and SCVSD's wastewater generation planning factor of 86 GPCD.
(c) Existing WRP capacity of 28.1 MGD, plus planned Valencia WRP expansion assumed on line by 2035, for total planned capacity of 34.1 MGD. Timing for increase in WRP treatment capacity is based on SCVSD's population projections, which are lower than those presented in this table. SCVSD will continue to monitor sewer flows and expand Valencia WRP when available capacity becomes limited.
(d) Per RWQCB Order No. R4-2007-0046, the Newhall Ranch WRP will incrementally increase its design capacity to accommodate the development project as completed (2.0 MGD in Phase I, 4.0 MGD in Phase II and 6.8 MGD in Phase III). For the purposes of this analysis, Phase I begins in 2025 commensurate with increased planned recycled water demand.
(e) Lesser of Wastewater Generated and Total WRP Production Capacity.

4.4 Recycled Water Supply

The use of wastewater effluent is limited by various state water laws, codes and court decisions. These regulatory limitations are described in greater detail in the Recycled Plan.

CLWA is currently approved to use 1,700 AFY. Any additional ultimate use of existing wastewater for recycled water use is governed by, among other things, the availability of native versus foreign water as shown in Table 4-3 and the impacts to legal users of water. Native water is water that under natural conditions would contribute to a given stream or other body of water (i.e., surface water or upwelling groundwater). "Foreign" water is water that is not natural to a watercourse and occurs in the watercourse through human efforts. Foreign water can be removed from a watercourse without infringing on the water rights of downstream water users. Use may also be restricted to protect biological resources in the river. The Santa Clarita Valley Sanitation District will need to assess the issues of water rights and protection of biological resources relative to Sections 1210 and 1211 of the Water Code as CLWA's recycled water program expands.

In 2010, the Valley's potable water supply was approximately less than one percent recycled water, 44 percent groundwater (native water) and 55 percent imported water (foreign water)[22]. Projected potable water demand less recycled water for 2050 is 99,077 with conservation, 56 percent derived from foreign water and 44 percent derived from native sources, in a normal year. Accordingly, the potential recycled water component would consist of approximately 56 percent (55,477 AF foreign/99,077 AF total) of projected wastewater generation. This volume is determined by multiplying the percentage of foreign water by the wastewater flow. The future foreign water portion of wastewater is 27,609 AFY (56 percent times 49,308 AFY). It is important to note that these percentages are of potable water demand only (i.e., they do not include the use of recycled water in the calculation) and as such are not percentages of total water demand. The demand numbers used for the calculation reflect the implementation of SBX7-7, which requires retailers to reduce demand by 20 percent by 2020. Although the foreign water percentage of potable water demand only increases by one percent from 2010 to 2050, actual use of foreign water increases by nearly 50 percent.

Assuming the capacities and recycled water demand (as discussed in Section 4.3), the existing and projected wastewater flows and potential recycled water use are as summarized in Table 4-3. These numbers differ slightly from those presented in the Recycled Plan and are more conservative in terms of wastewater flows. Table 4-3 also shows the associated wastewater generation through 2050.

[22] Demand for foreign water is calculated as demand with conservation, less recycled water use, less local groundwater pumping.

TABLE 4-3
PROJECTED WASTEWATER GENERATION AVAILABLE FOR RECYCLED WATER USE (AF)

	2010	2015	2020	2025	2030	2035	2040	2045	2050
Projected Wastewater Generation[a]	**27,620**	**30,649**	**33,314**	**35,924**	**38,646**	**41,311**	**43,976**	**46,643**	**49,308**
Demand w/ Conservation[b]	69,673	72,343	71,908	80,236	88,564	96,892	105,220	113,549	121,877
Recycled Water									
LACWWD 36	0	0	50	50	50	50	50	50	50
NCWD	0	200	500	1,000	1,275	1,775	2,275	2,775	3,275
SCWD	0	100	500	1,500	2,275	2,775	3,775	4,775	5,775
VWC	325	1,000	2,000	3,000	4,500	6,000	8,000	10,000	12,200
Total Purveyor	325	1,300	3,050	5,550	8,100	10,600	14,100	17,600	21,300
Non-Purveyor (Honor Rancho)	0	0	0	0	1,500	1,500	1,500	1,500	1,500
Total Purveyor and Non-Purveyor Recycled Water[c]	**325**	**1,300**	**3,050**	**5,550**	**9,600**	**12,100**	**15,600**	**19,100**	**22,800**
Potable Demand[d]	69,348	71,043	68,858	74,686	78,964	84,792	89,620	94,449	99,077
Supplies to Meet Potable Demand									
Groundwater[e]	31,100	34,600	36,600	37,600	39,600	40,600	41,600	42,600	43,600
Imported (foreign) water[f]	38,248	36,443	32,258	37,086	39,364	44,192	48,020	51,849	55,477
Foreign % of Potable Demand	55%	51%	47%	50%	50%	52%	54%	55%	56%
Potentially Available for Recycled Water Use[g]	**15,233**	**15,722**	**15,607**	**17,838**	**19,265**	**21,531**	**23,563**	**25,605**	**27,609**

Notes:
(a) From Table 4-2.
(b) From Table 2-22.
(c) Projected recycled water demand based on implementation of complete build-out of Recycled Water Master Plan.
(d) Demand w/ Conservation minus Recycled Water.
(e) From Table 3-7.
(f) Potable Demand minus Groundwater.
(g) Projected Wastewater Generation multiplied by Foreign Percent of Potable Demand.

4.4.1 Alternative Water Resources Management Program

Salinity and nutrient management concerns in the Upper Santa Clara River Watershed are primarily driven by salt sensitive crops located downstream. High chloride levels are of particular concern since high value, chloride sensitive crops like strawberries and avocados grown in the lower watershed utilize surface waters or ground water influenced by surface water for irrigation. Findings from previous reports cite the sources of chloride as source waters and residential self-regenerating water-softeners (SRWS). In 2003, SCVSD passed an ordinance banning the installation of all new SRWSs, and by passage of Senate Bill 475, the District has authority to remove all SRWSs remaining in the Santa Clarita Valley that were installed prior to 2003.

A Total Maximum Daily Load (TMDL) for chloride in the Upper Santa Clara River (Reaches 5 and 6) was adopted by the Los Angeles RWQCB and became effective on May 5, 2005. The Basin Plan Amendment for the chloride TMDL in the Upper Santa Clara River was unanimously adopted by the RWQCB on December 11, 2008. The TMDL established waste load allocations of 100 mg/L for the Saugus and Valencia WRPs. The TMDL implementation schedule allows for several special studies to determine whether existing Water Quality Objectives (WQOs) and waste-load allocations for chloride can be revised, and provides for an 11-year schedule to attain compliance with the final water quality objectives and waste-load allocations for chloride.

In 2008, the SCVSD evaluated the Alternative Water Resources Management (AWRM) Program. This program was developed jointly between Upper Basin Water Purveyors, Ventura County agricultural and water interests and the SCVSD to comply with the chloride WQOs established by the TMDL. Stakeholders along the Los Angeles County and Ventura County stretches of the Santa Clara River collaboratively developed an alternative approach to water resources management that will achieve TMDL compliance. The AWRM uses a basin water supply management approach to achieve the final water quality objectives and waste-load allocation for chloride determined through the TMDL collaborative process. AWRM permits a TMDL for the Santa Clara River that diverges from the Basin Plan, but protects beneficial uses while establishing feasible site specific objectives (SSOs). The program requires studies that showed the alternative WQO was protective of threatened and endangered species, sensitive agriculture and groundwater under the influence of surface water. AWRM, in comparison with the conventional approach, would have a number of benefits in terms of economics, public acceptance, feasibility and environmental quality.

A groundwater and surface water interaction model (GSWI) was developed (March 2008) to evaluate the impact of WRP effluent discharges to the Santa Clara River on downstream surface water and groundwater in the Los Angeles and Ventura County portion of the watershed. The same model is now being used by the AWRM Program to study the link between imported water quality, chloride and total dissolved solids (TDS) in the Upper Santa Clara River. In the model, historical water levels, flows, concentrations and movements within the time period of 1975 through 2005 were simulated and then calibrated to assess the assimilative capacity of surface water in Reaches 4 through 6 and the underlying groundwater basins in these areas. Additional assessments were made regarding (1) the gradient of chloride concentrations from the Saugus and Valencia WRP outfalls to receiving water stations located downstream, (2) the impacts of the WRP effluent in the USCR's groundwater and (3) simulations of potential chloride impacts projected for 2007 through 2030. These findings[23]

[23] The results of the initial GSWI Study are presented in a report entitled “Task 2B-1 Numerical Model Development and Scenario Results” (CH2M Hill, 2008; Geomatrix, 2008a).

resulted in the development of the AWRM Program where chloride WQOs would be increased in select groundwater basins and reaches of the USCR watershed while being decreased in the eastern Piru Basin where the ultimate objective would be an overall reduction in chloride loading and benefits to the water supply.

Given the benefits of chloride reduction and in the context of achieving a salt balance for the watershed, RWQCB staff proposed conditional SSOs that support the AWRM, while still being protective of beneficial uses. When implemented with the AWRM Program, the conditional SSOs of 117 mg/L during normal conditions and 130 mg/L during drought conditions in Reach 4B and the underlying groundwater will protect agricultural uses in the area (USCR Chloride TMDL Conditional SSOs Staff Report, Los Angeles RWQCB 2008). These conditional SSOs apply and supersede the existing regional water quality objectives of 100 mg/L only when chloride load reductions and/or chloride export projects are in operation by the SCVSD according to the implementation provisions provided in the RWQCB's Staff Report (RWQCB 2008).

Special studies were required for the implementation of AWRM and to evaluate whether the SSOs were protective of beneficial uses. The GSWI model was used to evaluate the effectiveness of the AWRM after the program was implemented. A study using the model showed that the AWRM WQOs could meet SSOs for chloride under drought and non-drought conditions. Based on the Final Staff Report from the Los Angeles RWQCB, the additional studies showed the chloride level protective of the most chloride-sensitive organisms for which data are available and is below the U.S. Environmental Protection Agency aquatic life chloride criteria. The conditional SSOs are not expected to harm in-stream or riparian species or habitat.

Due to ratepayer concerns regarding the perceived high cost of the AWRM Program, the recommended wastewater rate increases to implement AWRM were not approved by the SCVSD Board. In response, SCVSD and the water suppliers have been exploring alternative approaches that could result in revisions to the TMDL. These evaluations are ongoing.

4.5 Other Potential Sources of Recycled Water

Oilfield produced water is a by-product of oil production generated when oil is extracted from the oil reservoir. It is generally of poor quality and unsuitable for potable, industrial or irrigation use without treatment. Because of the poor water quality, reinjection has often been the most cost-effective disposal option. Treatment processes can produce potable quality water; yet, because of the poor initial water quality and the organic constituents, it is often more appropriate for treated oilfield produced water to be used for irrigation or industrial purposes to offset potable water demand. The economics of oil production are market-driven and are different from those of drinking water supplies. As oil prices rise or drop, oilfield production is increased or decreased as dictated by economics. Also, oilfields are eventually depleted of supply and abandoned. Therefore, while oilfield produced water should be considered as long-term, it is not a completely firm supply and is not permanent.

Berry Petroleum has expressed interest in treating oilfield produced water from the Placerita Oilfield for sale to CLWA for non-potable uses. Studies of the potential reuse of treated oilfield produced water from the Placerita Oilfield have indicated that approximately 44,000 barrels per day (1.8 MGD or 2,016 AFY) of treated oilfield produced water may be available. Pilot studies performed at the Placerita Oilfield 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. 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).

4.6 Recycled Water Demand

Currently, recycled water is served to landscape irrigation customers, including the TPC Golf Course. Potential recycled water users have been identified through a number of sources including:

- 1993 Recycled Water Master Plan
- Water consumption records for LACWWD 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
- On-site surveys of the CLWA service area
- 2002 Recycled Water Master Plan

In order to be considered as a potential recycled water user, the user has to be located within CLWA's service area and have a potential non-potable water demand of at least 4 AFY. A total potential demand for existing and future recycled water users is 34,500 AFY for 2015 as identified in the Recycled Plan. As this volume is already greater than the anticipated source of recycled water supply, additional future recycled users were not identified at this time. However, CLWA reevaluates the list of recycled users as conditions change or during the designing of projects under the Recycled Plan including users not identified in 2002. For example, the Los Angeles County Sheriff's Honor Rancho has undertaken sod farming operations. CLWA has therefore identified it as a potential future customer for 1,500 AFY of recycled water.

The initial list of potential recycled water users was reduced by evaluating the potential users that would be most expensive to serve until potential users totaled approximately 17,400 AF. The unit cost 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 retained for recycled water service have costs ranging from $120 to $5,000 per AFY. Areas eliminated from service had costs as high as $13,000 per AFY. However, only two of the proposed phases in the Recycled Plan had costs above $1,000 per AFY. In addition, the Newhall Ranch project will require about 5,400 AFY. The resulting proposed recycled water service area encompasses a large portion of CLWA's western service area.

The total potential annual recycled water demand identified in the Recycled Plan and for the Newhall Ranch project that is cost effective to serve is approximately 22,800 AFY. Of this total 21,300 AFY is projected use by purveyor customers. Implementation of the recycled water system is expected to occur over the next 40 years.

4.7 Recycled Water Comparison

The 2005 Santa Clarita Valley UWMP projected a total recycled water demand of 1,600 AFY by the year 2010. Although it did not specifically state a projected 2005 demand, CLWA had approval for 1,700 AFY of recycled water use and was in the process of constructing the necessary facilities to deliver this amount at the time the 2005 UWMP was written. Approximately 325 AFY was served in 2010 to landscape irrigation customers, including the TPC Golf Course. Current demand is lower than originally predicted due to lack of funding available to expand the recycled water distribution system. Table 4-4 provides a comparison of the 2005 projected demand versus the actual 2010 demand.

TABLE 4-4
RECYCLED WATER USES - 2005 PROJECTION COMPARED WITH 2010 USE

User Type	2005 Projection for 2010 (AF)	2010 Use (AF)
Landscape	1,600	325
Total	**1,600**	**325**

Table 4-5 provides the comparison of anticipated demands and supplies. As shown in the table, potential demand for recycled water is equal to supplies.

TABLE 4-5
POTENTIAL RECYCLED WATER SUPPLIES AND DEMANDS

Demand	Supply (AF)	Adjusted Demands (AF)
Recycled Plan	17,400	
Newhall Ranch Project	5,400	
Total	**22,800**	**22,800**

4.8 Methods to Encourage Recycled Water Use

In order to provide an incentive to recycled water users, it was recommended in the Recycled Plan that CLWA issue a monthly rebate directly to each recycled water user. CLWA plans on making recycled water available at a reduced rate relative to the cost of potable water. CLWA may consider providing financial assistance to retail water providers to offset the costs of extending the recycled water conveyance system or to existing customers to cover all or a portion of the costs to convert their potable water systems to receive recycled water.

4.9 Implementation Plan for the Recycled Water Plan

Production from the WRPs is not anticipated to be adequate to meet the total demands of the existing 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.

Oilfield produced water would also not be available immediately, nor would it be available as a permanent source of supply. Instead, this alternative water source could be used as an interim long-term supply when the field is in operation and inadequate recycled water is available from

the Valencia and Saugus WRPs. Oilfield produced water is anticipated to be available for approximately the next twenty years. Implementation phasing considers when this water source would be available. A detailed discussion of the recommended phasing plan is provided in the Recycled Plan.

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 funding requirements would be spread over CLWA's current planning period through 2050.
- Oilfield produced water is not immediately (nor permanently) available.
- Demand is increasing due to development of Newhall Ranch.

The recycled water system is divided into implementation phases based primarily on service zone boundaries.

In general, the following factors were 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, Saugus WRP or Placerita Oilfield).

4.10 Additional Considerations Relating to the Use of Recycled Water

4.10.1 Salt and Nutrient Management Plan

The SWRCB adopted a statewide Recycled Water Policy (Policy) on February 3, 2009 to establish uniform requirements for the use of recycled water. The purpose of this Policy is to increase the use of recycled water from municipal wastewater sources that meet the definition in Water Code Section 13050, subdivision (n), in a manner that implements state and federal

water quality laws. As part of this Policy, the preparation of a salt and nutrient management plan for each basin/subbasin in California, including compliance with CEQA and participation by Los Angeles RWQCB staff, is required by 2014. The Policy states that salts and nutrients from all sources should be managed on a basin wide or watershed wide basis in a manner that ensures attainment of water quality objectives and protection of beneficial uses.

The SWRCB finds that the appropriate way to address salt and nutrient issues is through the development of regional or sub-regional salt and nutrient management plans rather than through imposing requirements solely on individual recycled water projects. These plans shall be consistent with the DWR Bulletin 160 as appropriate and shall be locally developed. The salt and nutrient plan should include a basin/sub basin wide monitoring plan that specifies an appropriate network of monitoring locations. The monitoring plan should be site specific and must be adequate to provide a reasonable, cost-effective means of determining whether the concentrations of salt, nutrients and other constituents of concern as identified in the salt and nutrient plans are consistent with applicable water quality objectives.

CLWA, along with other Upper Santa Clara River Integrated Regional Water Management Plan participants, applied for a Proposition 84 Planning Grant that would update the IRWMP including preparation of a salt and nutrient management plan. In January 2011 CLWA was notified that its proposal was placed on the list of proposals recommended for funding. CLWA anticipates completing the study in 2012 at which time its impacts on the proposed recycled water supply and costs would be assessed.

4.10.2 Basin Plan

The Santa Clara River watershed has basin objectives established by the Regional Water Quality Control Board Los Angeles Region (Region 4). Water quality objectives were established to protect the various beneficial uses for that particular water body or reach. Table 4-6 shows the water quality objectives for salt and nutrients for the Santa Clara River watershed.

TABLE 4-6
WATER QUALITY OBJECTIVES FOR WATERS IN THE SANTA CLARA RIVER WATERSHED

	TDS (mg/L)	Chloride (mg/L)[a]	Sulfate (mg/L)	Nitrogen (mg/L)	SAR (mg/L)[b]	Boron (mg/L)
Inland Surface Waters						
Above Lang gaging station	500	50	100	5	5	0.5
Between Lang gaging station and Bouquest Canyon Road Bridge	800	100	150	5	5	1.0
Between Bouquet Canyon Road Bridge and West Pier Highway 99	1000	100	300	10	5	1.5
Between West Pier Highway 99 and Blue Cut gaging station	1000	100	400	5	10	1.5
Between Piru Creek and A Street, Fillmore[c]	1300	100	600	5	5	1.5
Between Blue Cut gaging station and Piru Creek, Fillmore[c]	1300	100	600	5	5	1.5
Between A Street, Fillmore and Freeman Diversion "Dam" near Saticoy[d]	1300	100	650	5	5	1.5
Between Freeman Diversion "Dam" near Saticoy and Highway 101 Bridge	1200	150	600	-	-	1.5
Between Highway 101 Bridge and Santa Clara River Estuary[e]			See basin plan			
Santa Paula Creek above Santa Paula Water Works diversion Dam	600	45	250	5	5	1.0
Sespe Creek above gaging station 500' downstream from Little Sespe Creek	800	60	320	5	5	1.5
Piru Creek above gaging station below Santa Felicia Dam	800	60	400	5	5	1.0
Groundwater Basins						
Acton Valley	550	100	150	10;45;10;1[f]	NA	1.0
Sierra Pelona Valley (Agua Dulce)	600	100	100	10;45;10;1[f]	NA	0.5
Upper Mint Canyon	700	100	150	10;45;10;1[f]	NA	0.5
Upper Bouquet Canyon	400	30	50	10;45;10;1[f]	NA	0.5
Green Valley	400	25	50	10;45;10;1[f]	NA	-
Lake Elizabeth-Lake Hughes area	500	50	100	10;45;10;1[f]	NA	0.5
Santa Clara-Mint Canyon	800	150	150	10;45;10;1[f]	NA	1.0
South Fork	700	100	200	10;45;10;1[f]	NA	0.5
Placerita Canyon	700	100	150	10;45;10;1[f]	NA	0.5
Santa Clara-Bouquet and San Francisquito Canyons	700	100	250	10;45;10;1[f]	NA	1.0
Castaic Valley	1000	150	350	10;45;10;1[f]	NA	1.0
Saugus Formation	-	-	-		NA	-

Notes:
(a) The RWQCB has adopted revised SSOs for chloride. See Section 4.4.1 and RWQCB Order No. R4-2008-012,
(b) SAR = Sodium adsorption ratio.
(c) The reach of the Santa Clara River between Blue Cut gaging station and A Street, Fillmore has been split into two reaches, between the confluence of Piru Creek and A Street, Fillmore and between the Blue Cut gaging station and the confluence of Piru Creek under RWQCB Resolution No. R4-2007-018.
(d) The chloride objective for this reach has been revised from 80 mg/L to 100 mg/L under RWQCB Resolution No. 2003-015.
(e) The reach between Highway 101 bridge and the Santa Clara River Estuary have not be designated with specific water quality objectives. In this case general objectives to protect specific beneficial uses are assigned in the basin plan.
(f) 10 mg/L nitrogen (as nitrate + nitrite); 45 mg/L nitrate (as NO_3); 10 mg/L nitrate-nitrogen; 1 mg/L nitrite-nitrogen

4.10.3 Nutrients

The LARWQCB found that the Santa Clara River was being impacted by ammonia and nitrate plus nitrite (nitrogen compounds) with the primary source being wastewater discharge into the river. Nitrogen compounds can cause or contribute to eutrophic effects such as low dissolved oxygen, algae blooms and reduced benthic macro invertebrates. Three reaches in the Santa Clara River have been identified as impaired due to ammonia (Reaches 3, 7 and 8), two of which exceed Basin Plan water quality objectives. These findings lead to a Basin Plan Amendment for a nitrogen compounds TMDL for the Santa Clara River that was adopted on March 23, 2004. The TMDL includes numeric targets for ammonia as listed in Table 4-7, and also for nitrate plus nitrite as shown in Table 4-8.

In 2005 the SCVSD upgraded the treatment processes at the Valencia and Saugus WRPs to include nitrification/denitrification to address nutrients. The 2010 average ammonia levels in the Valencia and Saugus WRP recycled water were 1.05 and 1.16 mg/L, respectively (SCVSD Industrial Waste Pretreatment Program, 2011). The 2010 average nitrate plus nitrite levels in Valencia and Saugus WRP recycled water were 2.41 and 4.08 mg/L, respectively (SCVSD Industrial Waste Pretreatment Program, 2011).

TABLE 4-7
TMDL FOR AMMONIA ON THE SANTA CLARA RIVER

Reach	One-hour NT (mg-N/L)	Thirty-day NT (mg-N/L)
Reach 8	14.8	3.2
Reach 7 above Valencia	4.8	2.0
Reach 7 below Valencia	5.5	2.0
Reach 7 at County Line	3.4	1.2
Reach 3 above Santa Paula	2.4	1.9
Reach 3 at Santa Paula	2.4	1.9
Reach 3 below Santa Paula	2.2	1.7

Source: LARWQCB Santa Clara River TMDL for Nitrogen Compounds Staff Report, June 2003

TABLE 4-8
TMDL FOR NITRATE PLUS NITRITE ON THE SANTA CLARA RIVER

Reach	Thirty-day Average (mg-N/L)
Reach 8	9.0
Reaches 3 and 7 above Valencia	4.5

Source: LARWQCB Santa Clara River TMDL for Nitrogen Compounds Staff Report, June 2003

4.10.4 Projected Salt Levels from Recycled Water

Salt balances depend on the amount imported and the amount exported. The total salt and nutrient loads in waste water discharges primarily depend on the levels in source waters and the type of treatment process that the water agency employs. Recycled water does not import additional salt into the watershed; instead the salt is transferred and cycled within the watershed. Recycled water generally contains salt levels 150 to 400 mg/L above potable water levels and 15 to 50 mg/L of ammonia.

Within California, agricultural irrigation is the largest consumer of recycled water followed by landscape irrigation, which are also typical uses in the Santa Clara River watershed. However, in the Los Angeles region, which is governed by RWQCB Region 4, groundwater recharge is the largest use of recycled water.

Table 4-9 represents the amount of salt above baseline levels that will need management. These levels are projected and may vary due to regulatory changes or changes in the source waters. The amounts do not represent the total loading but represent salt that will not be exported from the watershed through discharge into surface waters Management of salts and nutrients within the watershed is anticipated to be addressed through development of Salt and Nutrient Management Plans discussed in Section 4.10.1.

TABLE 4-9
ESTIMATED SALT ABOVE POTABLE LEVELS BY RECYCLED WATER USERS

	2010	2015	2020	2025	2030	2035	2040	2045	2050
Projected recycled water use (AF)[(a)]	325	1,300	3,050	5,550	9,600	12,100	15,600	19,100	22,800
Non-exported salt levels (tons/yr)[(b)(c)(d)]	121	486	1,140	2,075	3,589	4,524	5,833	7,142	8,525

Notes:
(a) From Table 4-3.
(b) Amounts are in addition to baseline levels.
(c) Assumes average salt in recycled water is 275 mg/L based on Salt Management Guide for Landscape Irrigation with Recycled Water in Coastal Southern California, A Comprehensive Literature Review. The range cited for most recycled water is 150-400 mg/L.
(d) Based on the following conversions: 456,592 mg/lb; 0.0006063 lb/L; 1,233,481 L/AF; 747.82 lb/AF; 2,000 lb/ton.

Section 5: Water Quality

5.1 Overview

The quality of any natural water is dynamic in nature. This is true for the SWP and the local groundwater of the Basin. During periods of intense rainfall or snowmelt, routes of surface water movement are changed and new constituents are mobilized and enter the water while other constituents are diluted or eliminated. The quality of water changes over the course of a year. These same basic principles apply to groundwater. Depending on water depth, groundwater will pass through different layers of rock and sediment and leach different materials from those strata. Water depth is a function of local rainfall and snowmelt. During periods of drought, the mineral content of groundwater increases. Water quality is not a static feature of water, and these dynamic variables must be recognized.

Water quality regulations also change. This is the result of the discovery of new contaminants, changing understanding of the health effects of previously known as well as new contaminants, development of new analytical technology and the introduction of new treatment technology. All water suppliers are subject to drinking water standards set by the United States Environmental Protection Agency (EPA) and DPH. Additionally, investor-owned water utilities, such as VWC, are subject to water quality regulation by the PUC. CLWA provides imported water from the SWP and other sources, while local retail water purveyors combine local groundwater with treated imported water from CLWA for delivery to their customers. (While LACWWD 36 currently exclusively takes imported water from CLWA, it anticipates bringing a groundwater well into production soon). An annual Consumer Confidence Report (CCR) or Water Quality Report is provided to all Valley residents who receive water from CLWA and one of the four retail water purveyors. That report includes detailed information about the results of quality testing of the water supplied during the preceding year (Water Quality Report 2010). Water quality is also addressed in the annual Santa Clarita Valley Water Report (CLWA et. al., 2009), which describes the current water supply conditions in the Valley and provides information about the water requirements and water supplies of the Santa Clarita Valley.

The quality of water received by individual customers will vary depending on whether they receive imported water, groundwater or a blend. Some will receive only imported water at all times, while others will receive only groundwater. Others may receive water from one well at one time, water from another well at a different time, different blends of well and imported water at other times, and only imported water at yet other times. These times may vary over the course of a day, a week, or a year.

This section provides a general description of the water quality of the supplies within the Valley, aquifer protection and a discussion of potential water quality impacts on the reliability of these supplies.

5.2 Water Quality Constituents of Interest

The Santa Clarita Valley's water suppliers (Section 1.4) are committed to providing their customers with high quality water that meets all federal and state primary drinking water standards. Some contaminants are naturally-occurring minerals and radioactive material. In some cases the presence of animals or human activity can contribute to the constituents in the

source waters. The following sections address constituents reported in the 2010 CCR that may impact water quality.

5.2.1 Perchlorate

Perchlorate, a chemical used in making rocket and ammunitions propellants, has been a water quality concern in the Santa Clarita Valley since 1997 when it was originally detected in four wells operated by the purveyors in the eastern part of the Saugus Formation, near the former Whittaker-Bermite facility. In late 2002, the contaminant was detected in a fifth well, an Alluvial well (SCWD's Stadium Well) also located near the former Whittaker-Bermite site, which was immediately taken out of service. Perchlorate was detected again in early 2005 in a second Alluvial well (VWC's Well Q2) near the former Whittaker-Bermite site, and in 2006 in very low concentrations (below the detection limit for reporting) in a Saugus well (NCWD's NC-13) near one of the originally impacted wells. The maximum contaminant level (MCL) of 6 µg/L was adopted by DPH in 2007.

In August 2010, perchlorate was detected VWC's Saugus Well 201. Confirmation sampling in the months that followed confirmed the detection of perchlorate at concentrations that ranged from 5.7 to 12 micrograms per liter (µg/L). VWC removed Well 201 from service when perchlorate was first detected and is currently evaluating remediation alternatives including wellhead treatment in order to return the well to service and restore impacted well capacity. To date, perchlorate has been detected in a total of 8 wells, in both the Saugus Formation and the Alluvium. Table 5-1 summarizes the current remediation status of all wells where perchlorate has been detected.

The following is a summary of the status of perchlorate remediation and restoration of perchlorate-impacted groundwater supply. A more detailed discussion of pertinent events related to perchlorate contamination, containment, remediation and water supply restoration is included in Appendix I. As part of the evaluation of the containment system's effectiveness, the groundwater model is being updated and recalibrated using actual pumping data. These discussions are provided to illustrate that work toward the reactivation of impacted groundwater supply wells has progressed on several integrated fronts over the last ten years and is being expanded to include VWC Well 201. With the updated model VWC will be evaluating response actions to the contamination in Well 201.

TABLE 5-1
STATUS OF IMPACTED WELLS

Year Perchlorate Detected	Purveyor Well	Groundwater Aquifer	Status
1997	SCWD Saugus 1	Saugus	DPH approved well return to service in January 2011; well in active service utilizing approved perchlorate treatment.
1997	SCWD Saugus 2	Saugus	DPH approved wells return to service in January 2011; well in active service utilizing approved perchlorate treatment.
1997	VWC Well 157	Saugus	Sealed and capacity replaced by new well.
1997	NCWD Well 11	Saugus	Out of service.
2002	SCWD Stadium Well	Alluvium	Sealed and capacity replaced by new well.
2005	VWC Well Q2	Alluvium	DPH approved perchlorate treatment removal in 2007; treatment was installed in 2005 and relocated for potential future use; well remains in service.
2006	NCWD Well NC-13	Saugus	DPH approved annual monitoring, results have always been below the detection limit for reporting; well remains in service.
2010	VWC Well 201	Saugus	Out of service pending additional monitoring and evaluation of remediation alternatives.

In 2002 CLWA and the U.S. Army Corps of Engineers (ACOE) signed a cost-sharing agreement for a feasibility study of the area. Under federal and state law, the owners of the Whittaker-Bermite property have the responsibility for the groundwater cleanup. CLWA, the purveyors, and the Department of Toxic Substances Control (DTSC) signed an oversight agreement in 2003 regarding studies of treatment technologies for removing perchlorate from water supplies, and have also been working with DPH to obtain the necessary permits for these treatment processes. Treatment method pilot studies were conducted during 2003, and in 2004 CLWA and the purveyors selected ion exchange as the preferred treatment method for removing perchlorate.

Although that agreement expired in January 2005 the parties, under DTSC oversight, jointly developed a plan to “pump and treat” contaminated water from two of the purveyors’ impacted wells to stop migration of the contaminant plume and to partially restore the municipal well capacity that has been impacted by perchlorate. The containment plan specifies that wells Saugus 1 and Saugus 2 operate at a continuous pumping rate of 1,100 gpm at each well, for a combined total of 2,200 gpm from the two wells. The annual pumping volume of 1,772 AFY per well assumes that pumping will occur continuously, except for occasional maintenance purposes.

A final settlement to fund, remediate and treat the contaminated water was completed and executed by the parties in April 2007. Design of the CLWA treatment facilities and related pipelines was completed in 2007. Construction of the treatment facility and pipelines began in

November 2007 and treatment of the water began in 2010. Since January 2011 when DPH issued a permit for CLWA to serve this water, CLWA has included this water as part of its supply and has been delivering this water to purveyors. This water is shown as part of the regional supply in Section 3, and as part of NCWD's and SCWD's supply in the detailed supply tables by purveyor in Appendix C.

VWC and CLWA are pursuing the funding for evaluating remediation alternatives, including wellhead treatment of contaminated water from VWC Well 201 through the final settlement agreement. The schedule for restoring service to Well 201 is in development but is projected to be less than two years. During that time, however, the removal from service of Well 201 will not limit the ability to meet dry year target production levels from the Saugus Formation since there is sufficient capacity in the remaining, non-impacted Saugus production facilities to make up for the temporary loss of capacity from VWC Well 201 through the first two years of a multiple dry-year period. Restoration of VWC Well 201 and new Saugus well construction are planned to achieve full Saugus Formation capacity through a third year or longer dry period as discussed in Section 3.

Returning the impacted Saugus well (VWC Well 201) to municipal water supply service by installing treatment requires DPH approval before the water can be considered potable and safe for delivery to customers. The permit requirements are contained in DPH Policy Memo 97-005 for direct domestic use of impaired water sources.

Before issuing a permit to a water utility for use of an impaired source as part of the utility's overall water supply permit, DPH requires that studies and engineering work be performed to demonstrate that pumping the well and treating the water will be protective of public health for users of the water. The Policy Memo 97-005 requires that DPH review the local retail water purveyor's plan, establish appropriate permit conditions for the wells and treatment system, and provide overall approval of returning the impacted wells to service for potable use. Ultimately, VWC's plan and the DPH requirements are intended to ensure that the water introduced to the potable water distribution system has no detectable concentration of perchlorate.

The DPH Policy Memo 97-005 requires, among other things, the completion of a source water assessment for the impacted well intended to be returned to service. The purpose of the assessment is to determine the extent to which the aquifer is vulnerable to continued migration of perchlorate and other contaminants of interest from the Whittaker-Bermite site. The assessment includes the following:

- Delineation of the groundwater capture zone caused by operating the impacted wells.
- Identification of contaminants found in the groundwater at or near the impacted wells.
- Identification of chemicals or contaminants used or generated at the Whittaker-Bermite facility.
- Determination of the vulnerability of pumping the impacted wells to these contaminant sources.

The groundwater model that was developed for use in analyzing the operating yield and sustainability of groundwater in the Basin was also used for simulating the capture and control of perchlorate contamination in the originally impacted Saugus wells. The results of that work are summarized in "Analysis of Perchlorate Containment in Groundwater Near the Whittaker-Bermite Property, Santa Clarita, California" (CH2M Hill, December 2004). The recent detection

of perchlorate in VWC Well 201 was not totally unexpected in light of the previously identified gradient for groundwater flow (westerly) from the source location and previously impacted wells. That gradient is now being controlled by the containment and extraction program that is in operation for the originally impacted wells, as discussed in this section and in Appendix I. The analysis is expected to be used in the development of the source water assessment of VWC Well 201.

All proceedings and data are available to the public through a DTSC information repository as well as public meetings.

5.2.2 Metals and Salts

Metals and salts are tested in wells at least every three years and in Castaic Lake water every month. Small quantities of naturally occurring arsenic are found in Castaic Lake and in a few wells. Inorganic compounds such as salts and metals can be naturally occurring or result from urban storm water runoff, industrial or domestic wastewater discharges, oil and gas production, mining or farming. Arsenic levels in the Santa Clarita Valley are below the MCL (Luhdorff & Scalmanini, 2010).

Nitrate in drinking water at levels above 45 mg/L is a health risk for infants less than six months of age due to the possibility of methemoglobinemia. Nitrate levels may rise quickly for short periods of time because of rainfall or agricultural activity. 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. Nitrates are tested at least annually and the drinking water meets federal and state MCL standards (CCR, 2010).

A chloride TMDL was established in 1998 due to the listing of Reaches 5 and 6 of the Upper Santa Clara River for chloride on the 303(d) list. Sources of chloride include water softeners, SWP and other imported water and wastewater effluent. The chloride TMDL includes a number of special studies to provide scientific certainty over the appropriate waste load allocations and objectives for chloride that are necessary to support various beneficial uses, including salt-sensitive agriculture, groundwater and endangered species. The special studies performed for the TMDL found that the WQO of 100 mg/L could not be achieved as adopted in 2005. As a result, conditional site specific objectives were adopted in 2008 as described by the Los Angeles RWQCB Staff Report on the Upper Santa Clara River Chloride TMDL Reconsideration and Conditional Site-Specific Objectives. To comply with the chloride TMDL, a stakeholder-driven group developed the Alternative Water Resources Management (AWRM) Plan that provides multiple benefits for stakeholders in Los Angeles and Ventura Counties. These benefits include the revision of water quality objectives that will support water recycling and thereby increase water supplies in the CLWA service area. In addition, the AWRM will implement water supply facilities in Ventura County that will allow for the conjunctive use of groundwater and surface water resources to increase water supplies and improve water quality in groundwater and surface waters of the Santa Clara River watershed. As part of the agreement, the SCVSD and CLWA plan to amend the existing recycled water agreement to expand the quantity of recycled water that can be purchased by the water suppliers from the SVCSD. The AWRM also calls for accelerated expansion of CLWA's Recycled Plan, which would reduce chloride mass loading in the Santa Clara River, particularly during dry seasons, additional information provided in Chapter 4.

SCVSD, CLWA and the retail water purveyors have been exploring alternative approaches towards developing an adaptive management strategy that could reduce the cost of implementing the AWRM.

5.2.3 Disinfection By-Products

CLWA uses ozone and chloramines to disinfect its water. Disinfection By-Products (DBPs), which include Trihalomethanes (THMs) and Haloacetic Acids (HAA5), are generated by the interaction between naturally occurring organic matter and disinfectants such as chlorine and ozone. THMs and HAA5 are measured at several points in each system and averaged once per quarter and reported as a running annual average.

Ozone is a very powerful disinfectant that not only kills organisms that no other disinfectant can, but also destroys organic chemicals that causes unpleasant tastes and odors. However, ozone can also interact with bromide, a naturally occurring salt, to produce bromate. As a result, CLWA is required to analyze the water leaving its two treatment plants for bromate once a month under federal regulations and the State's adopted Disinfectants and Disinfection Byproducts Rule (D/DBP Rule).

5.2.4 Hardness

In 2008, the VWC began a demonstration project delivering pre-softened groundwater from one of its wells to approximately 420 residents located in the Copperhill Community of Valencia. Hard water is the primary complaint from Valley customers and it is estimated that more than 50 percent have installed individual water softening units in their homes. In addition to having high operating costs, many of these units are designed to discharge a brine (salt) solution to the sanitary sewer system that is eventually discharged to the Santa Clara River. The environmental impact of such discharges was the subject of the chloride TMDL investigation which concluded with a commitment by the purveyors to achieve surface water quality goals for instream discharge from the basin. VWC's project is aimed at improving the quality of water for its customers to eliminate the need for home softening devices and to achieve the environmental benefits of reduced chloride discharge to the river.

The demonstration project utilizes softening technology that removes calcium and produces small calcium carbonate pellets that can be reused in a variety of industries. The demonstration project has now been operated for over two years and provides VWC with customer feedback and technical/financial information to assess potential future expansion of treatment to other well sites.

5.2.5 Microbiological

Microbial contaminants, such as viruses and bacteria, can be naturally occurring or result from urban storm water runoff, sewage treatment plants, septic systems, agricultural livestock operations and wildlife. Water is tested throughout the systems weekly for Total Coliform bacteria and testing for *Escherichia coli* (*E. coli*) occurs when coliform testing is positive. No *E. coli* was detected in any drinking waters in 2010. The MCL for total coliforms is 5 percent of all monthly tests showing positives for larger systems. Bacteriological tests met federal and state requirements. Additional microbiological tests for the water-borne parasites *Cryptosporidium parvum* and *Giardia lamblia* were performed on Castaic Lake water, and none were detected.

5.2.6 Radiological Tests

Radioactive compounds can be found in both ground and surface waters, and can be naturally occurring or be the result of oil and gas production and mining activities. Testing is conducted for two types of radioactivity; alpha and beta. If none is detected at concentrations above five picoCuries per liter no further testing is required. If it is detected, the water must be checked for uranium and radium. Although naturally occurring radioactivity can be detected, the levels meet the federal and state MCL standards.

5.2.7 Organic Compounds

Organic chemical contaminants, including synthetic and volatile organic chemicals, are by-products of industrial processes and petroleum production, and can also come from gas stations, urban storm water runoff and septic systems. Organic compounds also include pesticides and herbicides, which may come from a variety of sources such as agriculture, urban storm water runoff and residential uses. Water is tested for two types of organic compounds, volatile organic compounds (VOCs) and non-volatile synthetic organic compounds (SOCs). These organic compounds are synthetic chemicals produced from industrial and agricultural uses. Castaic Lake water is checked annually for VOCs and SOCs. Tetrachloroethylene (TCE) was found in trace levels below the MCL in groundwater in the Valley. Local wells are tested at least annually for VOCs and periodically for SOCs.

5.3 Imported Water Quality

CLWA provides SWP and other imported water to the Valley. The source of SWP water is rain and snow of the Sierra Nevada, Cascade and Coastal mountain ranges. This water travels to the Delta through a series of rivers and various SWP structures. From there it is pumped into a series of canals and reservoirs, which provide water to urban and agricultural users throughout the San Francisco Bay Area and central and southern California. The most southern reservoir on the West Branch of the SWP California Aqueduct is Castaic Lake. CLWA receives water from Castaic Lake and distributes it to the purveyors following treatment.

CLWA operates two water treatment plants, the Earl Schmidt Filtration Plant located near Castaic Lake and the Rio Vista Water Treatment Plant located in Saugus. CLWA produces water that meets drinking water standards set by the U.S. EPA and DPH. SWP water has different aesthetic characteristics than groundwater, with lower dissolved mineral concentrations (total dissolved solids) of approximately 250 to 360 mg/L, and lower hardness (as calcium carbonate) of about 105 to 135 mg/L. Historically, the chloride content of SWP water varies widely from over 100 milligrams per liter (mg/L) to below 40 mg/L, depending on Delta conditions; however as discussed below, SWP operations have changed significantly since historic levels of chloride were experienced.

Historically, the SWP delivered only surface water from the Sacramento-San Joaquin River Delta. However, CLWA and other SWP users, in anticipation of increased demand and dry periods, began “water banking” programs where SWP water could be stored or exchanged during wet years and withdrawn in dry years. The last three years have seen severe statewide drought. As a result, water has been withdrawn from the banking programs. This withdrawn water can either be delivered by exchange with SWP supplies allocated to others, or by pumping it into the SWP system. During the period of 2008 through 2010, a greater portion of water in the SWP has been this “pumped-in” water. The “pumped-in” water has met all water

quality standards established by DWR under its anti-degradation policy for the SWP. In particular, the pumped-in water serves to reduce the chloride concentration in SWP water. CLWA, on behalf of the SCVSD, is currently developing a SWP water quality model to quantify potential chloride reductions in SWP water due to "pumped-in" water. The results of this modeling will inform potential modifications to the AWRM Plan.

The SWP water chemistry may fluctuate and is influenced by its passage through the Delta in which large amounts of organic material are present and salt water from San Francisco Bay that contributes bromide and chlorides. Chloride levels from the Delta elevate chloride locally resulting in concern for local agriculture that grows chloride sensitive crops. Additionally, bromide and total organic carbon (TOC) may react with disinfectants such as ozone, chlorine, or DBPs. All constituents meet the federal and state MCL levels as reported in the CCR but remain a management concern in the watershed.

5.4 Surface Water Quality

CLWA does not deliver and treat water from the Santa Clara River as a source of supply; however, this source is a continual source of recharge to the underlying groundwater basin.

Surface water quality data for the Upper Santa Clara River in the County is based on the DWR investigation of water quality and beneficial uses conducted for the Upper Santa Clara River Hydrologic Area (DWR 1993). The investigation found that Castaic Lake and Castaic Lagoon water are influenced by thermal stratification and biochemical processes. Castaic Lake contains a high level of sodium chloride from SWP deliveries to the system; while sodium-calcium bicarbonate to sodium bicarbonate dominates Bouquet Canyon due to water deliveries from the Los Angeles Aqueduct (Mono-Owens water) that is stored in Bouquet Reservoir.

The surface water quality data in the Upper Santa Clara River are obtained from continuous sampling records at two gaging stations at the Old Highway Bridge and at the Los Angeles - Ventura County Line and historical records at two stations near Ravenna and Lang. The period of water quality records for these stations is from 1951 to 1990 (UWCD and CLWA 1996). These data have shown increasing concentrations of TDS and sulfate downstream and an overall general decrease, respectively, over the studied time period.

Nitrate ranged from 9 to 35 milligrams per liter (mg/L) nitrate at the Blue Cut gaging station near the County line but it generally occurs in very low concentrations in the undeveloped drainages north of the Santa Clara River. Chloride concentrations tend to also be relatively low in undeveloped portions of the watershed and higher in developed areas. Sources of chloride include water softeners, SWP water and wastewater effluent. Salt loading during 2001-2007 from the Saugus and Valencia WRP ranged from 23,500 pounds per day (ppd) to 28,500 ppd. SWP chloride contributions measured between 28 mg/L to 128 mg/L based on records from the past thirty years (Los Angeles RWQCB 2008) and have averaged just over 70 mg/L for the past few years.

5.5 Groundwater Quality

The groundwater basin has two sources of groundwater, the Alluvial Aquifer whose quality is primarily influenced by rainfall and stream flow, and the Saugus Formation which is a much deeper aquifer and recharged primarily by a combination of rainfall and deep percolation from the partially overlying Alluvium. A larger part of the Valley's groundwater supply is from the

Alluvial Aquifer, between 30,000 to 40,000 AFY; and a smaller portion of the Valley's water supply is drawn from the Saugus Formation, between 7,500 and 15,000 AFY in normal water years.

Local groundwater does not have microbial water quality problems. Parasites, bacteria and viruses are filtered out as the water percolates through the soil, sand and rock on its way to the aquifer. Even so, disinfectants are added to local groundwater when it is pumped by wells to protect public health. Local groundwater has very little TOC and generally has very low concentrations of bromide, minimizing potential for DPB formation. Taste and odor problems from algae are not an issue with groundwater.

The mineral content of local groundwater is very different from SWP water. The groundwater is very "hard," and it has high concentrations of calcium and magnesium (approximately 250 to 600 mg/L total hardness as $CaCO_3$). Groundwater may also contain higher concentrations of nitrates and chlorides when compared to SWP water. However, all groundwater meets drinking water standards.

5.5.1 Water Quality - Alluvium

Groundwater quality is a key factor in assessing the Alluvial Aquifer as a municipal and agricultural water supply. Groundwater quality details and long-term conditions, examined by integration of individual records from several wells completed in the same aquifer materials and in close proximity to each other, have been discussed in the annual Water Reports and in the 2005 UWMP. There were some changes in groundwater quality in 2009 that reflect fluctuations, trends or other groundwater quality conditions. Most of the trends show a significant lowering of the specific conductance values by half following the wet years of 2004-2005. Since then, those trends have returned to 2004 levels but do not exceed historical levels. In summary, those conditions include no long-term overall trend and, most notably, no long-term decline in Alluvial groundwater quality; a general groundwater quality "gradient" from east to west, with lowest dissolved mineral content to the east, increasing in a westerly direction; and periodic fluctuations in some parts of the basin, where groundwater quality has inversely varied with precipitation and stream flow. Those variations are typically characterized by increased mineral concentrations through dry periods of lower stream flow and lower groundwater recharge, followed by lower mineral concentrations through wetter periods of higher stream flow and higher groundwater recharge.

Specific conductance throughout the Alluvium is currently below the Secondary (aesthetic) MCL of 1,600 micromhos per centimeter (µmhos/cm). The presence of long-term consistent water quality patterns, although intermittently affected by wet and dry cycles, supports the conclusion that the Alluvial aquifer is a viable ongoing water supply source in terms of groundwater quality.

The most notable groundwater quality issue in the Alluvium is perchlorate contamination. Section 5.2.1 describes this issue in detail.

5.5.2 Water Quality - Saugus Formation

Water quality in the Saugus Formation has not historically exhibited the precipitation-related fluctuations seen in the Alluvium. As discussed above for the Alluvium, groundwater quality is a key factor in also assessing the Saugus Formation as a municipal and agricultural water supply. 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. However, integration of individual records from several wells has been used to examine general water quality trends. Based on those records, water quality in the Saugus Formation had not historically exhibited the precipitation-related fluctuations seen in the Alluvium. Based on available data over the last fifty years, groundwater quality in the Saugus had exhibited a slight overall increase in dissolved mineral content. More recently, several wells within the Saugus Formation exhibited an additional increase in dissolved mineral content, similar to short term changes in the Alluvium, possibly as a result of recharge to the Saugus Formation from the Alluvium. Since 2005, however, these levels have been steadily dropping or remaining constant.

Dissolved mineral concentrations in the Saugus Formation remain below the Secondary (aesthetic) MCL. Groundwater quality within the Saugus will continue to be monitored to ensure that degradation that presents concern relative to the long-term viability of the Saugus as an agricultural or municipal water supply does not occur.

As with the Alluvium, the most notable groundwater quality issue in the Saugus Formation is perchlorate contamination. Perchlorate was originally detected in four Saugus wells operated by the retail water purveyors in the eastern part of the Saugus Formation in 1997, near the former Whittaker-Bermite facility. Two of those impacted wells have now been "restored" and returned to municipal water supply service as described in Section 5.2.1. A third impacted well has been abandoned and replaced by a new well, distant from the perchlorate-impacted part of the Saugus Formation. The fourth impacted well remains out of service, with its capacity made up from the restored and other non-impacted Saugus wells. The inactivation of that well does not limit the ability of the purveyors to meet water requirements. The local retail water purveyors continue to test for perchlorate in active water supply wells near the Whittaker-Bermite site. While perchlorate was detected in a fifth Saugus well nearby, the concentration was very low and below the detection limit for reporting. The sixth Saugus well with recently detected perchlorate concentrations that exceed the maximum contaminant levels for drinking water has been taken out of service pending evaluation of remediation alternatives including wellhead treatment and reactivation. There has been no additional detection of perchlorate above the detection limit for reporting in any other municipal Saugus well.

5.6 Aquifer Protection

There has been extensive investigation of the extent of perchlorate contamination which, in combination with the groundwater modeling previously described in Section 3.3.2.1, has led to the now-implemented plan for integrated control of contamination migration and restoration of impacted pumping (well) capacity. While most of the perchlorate contamination control and restoration plan is focused on the Saugus Formation, part of that plan includes potential capture of contaminated groundwater in the Alluvium by pumping of selected Saugus wells. Specific long-term resolution of perchlorate contamination in the Alluvium, which impacted two water supply wells, had focused on a combination of temporary wellhead treatment at one well, VWC's Well Q2, replacement of the second impacted well, SCWD's Stadium well, and several source control methods such as on-site pumping and treatment in the northern Alluvium (at the northerly portion of the former Whittaker-Bermite site). An ongoing challenge is protection of active Alluvial wells that could be impacted, including what effect that might have on adequacy of Alluvial groundwater pumping capacity and what response will be taken.

In April 2005, perchlorate was detected in VWC's Well Q2. VWC's response was to remove the well from active water supply service and to rapidly seek approval for installation of wellhead

treatment and return of the well to service. As part of outlining its plan for treatment and return of the well to service, VWC analyzed the impact of the temporary inactivation of the well on its water supply capability; the analysis determined that VWC's other sources are sufficient to meet demand and that the inactivation of Well Q2 had no impact on VWC's water supply capability (LSCE, 2005). VWC proceeded through mid-2005 to gain approval for installation of wellhead treatment (ion-exchange as described below), including environmental review and completed the installation of the wellhead treatment facilities in September 2005. Well Q2 was returned to active water supply service in October 2005.

After nearly two years of operation with wellhead treatment, including regular monitoring specified by DPH, all of which resulted in no detection of perchlorate in Well Q2, Valencia requested that DPH allow treatment to be discontinued. DPH approved that request in August 2007, and treatment was subsequently discontinued. DPH-specified monitoring for perchlorate continues at Well Q2, which remains in service; there has been no detection of perchlorate since discontinuation of wellhead treatment.

Ongoing monitoring of all active municipal wells near the Whittaker-Bermite site has 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, complemented by findings in the ongoing on-site and off-site investigations by Whittaker-Bermite and the ACOE, there is logical concern that perchlorate could impact nearby, downgradient Alluvial wells. As a result, provisions are 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) (Technical Memorandum "*Analysis of Near-Term Groundwater Capture Areas for Production Wells Located Near the Whittaker-Bermite Property (Santa Clarita, California)*", CH2M Hill, December 2004). The capture zone analysis of Alluvial wells generally near the Whittaker-Bermite site suggests that inflow to those wells will either be upgradient of the contamination site, or will be from the Alluvium beyond where perchlorate is most likely to be transported, with the possible exception of the VWC's Pardee wellfield (which includes Wells N, N7 and N8). Although the capture zone analysis does not show the Pardee wells to be impacted, they are considered to be at some potential risk due to the proximity of their capture zone to the Whittaker-Bermite site.

The combined pumping capacity of VWC's Pardee wells is 6,200 gpm, which equates to about 10,000 AF of maximum annual capacity. However, in the operating plan for both normal and dry-year Alluvial pumping, the planned use of those wells represents 2,940 AFY of the total 30,000 to 40,000 AFY Alluvial groundwater supply. Thus, if the wells were to become contaminated with perchlorate, they would represent an amount of the total Alluvial supply that could be readily replaced on a short-term interim basis by utilizing an equivalent amount of imported water from CLWA or by utilizing existing capacity from other Alluvial wells. However, if the Pardee wells were to become contaminated by perchlorate contamination, VWC has made site provisions at its Pardee wellfield for installation of wellhead treatment. Such treatment would be the same methodology as installed at its Well Q2.

On the Whittaker-Bermite site, soil remediation activities in operating unit subareas started in 2005. Groundwater "pump and treat" operations in the Northern Alluvium also started in 2005 and is ongoing. Expanded pumping, intended to effect perchlorate containment as well as to treat 'hot spots' in the Northern Alluvium, became operational in October 2007.

In addition, on-site remediation, a Work Plan for a Pilot Remediation Pumping Program in the Northern Alluvium and certain on-site sub-areas east/southeast, or generally upgradient of the impacted Stadium Well, was completed in June 2005. The pilot program began sustained operation in October 2007. That program involves the establishment of containment, generally along the northern boundary of the Whittaker-Bermite site, upgradient of the Stadium Well, by continuous pumping of a former Whittaker-Bermite facility well, complemented by pumping at several groundwater "hot spots" also generally upgradient of the Stadium Well. Due to the low conductivity of the aquifer materials at the various "hot spots," pumping for containment at those locations would be from several wells at low pumping capacities. Extracted water would be treated at Whittaker-Bermite's existing on-site treatment system. Generally consistent with the Saugus restoration concept, the Northern Alluvium pumping program would have the concurrent objectives of preventing site-related contaminants from leaving the site and removing some contamination from groundwater such that it can be removed in the on-site treatment process prior to discharge of the water back to the groundwater Basin.

In February 2003, DTSC and the impacted purveyors entered into a voluntary cleanup agreement entitled *Environmental Oversight Agreement*. Under the Agreement, DTSC is providing review and oversight of the response activities being undertaken by CLWA and the purveyors related to the detection of perchlorate in the impacted wells. Under the Agreement's Scope of Work, CLWA and impacted purveyors prepared a Work Plan for sampling the production wells, a report on the results and findings of the production well sampling, a draft Human Health Risk Assessment, a draft Remedial Action Work Plan, an evaluation of treatment technologies and an analysis showing the integrated effectiveness of a project to restore impacted pumping capacity, extract perchlorate-impacted groundwater from two Saugus wells for treatment, and control the migration of perchlorate in the Saugus Formation. Environmental review of that project was completed in 2005 with adoption of a mitigated Negative Declaration. The Final Interim Remedial Action Plan for containment and extraction of perchlorate was completed and approved by DTSC in January 2006. Design and construction of the treatment facilities and related pipelines to implement the pump and treat program and to also restore inactivated municipal well capacity has been completed and the restored wells are now returned to service as part of the operational Saugus groundwater supply (see Section 3.3).

A Rapid Response Fund has also been established under the terms of the CLWA Litigation Settlement Agreement. The fund will be used if the remedy to contain perchlorate contamination in the Alluvial Aquifer and portions of the Saugus Formation does not prevent migration of the perchlorate plume towards downgradient threatened wells (VWC Wells N, N-7, N-8, S6, S7, S8, 201 and 205 and NCWD Wells NC-10, NC-12 and NC-13). The Rapid Response Fund provides up to $10 million for any additional costs of providing replacement water, associated operations and maintenance costs of treatment equipment and resin under the terms of the Agreement. As noted, VWC Well 201 was a downgradient threatened well, so it is anticipated that the fund will be used for evaluating remediation alternatives, including wellhead treatment, of perchlorate recently detected in Well 201.

5.7 Water Quality Impacts on Reliability

Three factors affecting the availability of groundwater are sufficient source capacity (wells and pumps),sustainability of the groundwater resource to meet pumping demand on a renewable basis and protection of groundwater sources (wells) from known contamination, or provisions for treatment in the event of contamination. The first two of those factors are addressed in Section 3. The resolution of contamination for aquifer protection is addressed below.

Perchlorate has been a water quality concern in the Valley since 1997 when it was originally detected in four wells operated by the purveyors in the eastern part of the Saugus Formation, near the former Whittaker-Bermite facility. Subsequent monitoring well installation has been completed; and a focused study of the Saugus Formation has ultimately been incorporated into the overall groundwater remediation and perchlorate containment. All remedial action has been reviewed by the DTSC.

Overall, the plans developed for groundwater operation will allow CLWA and the retail purveyors to meet near term and long term demand within the CLWA service area. Any well impacted by perchlorate will be removed from service in the near term and the loss of capacity will be met by near-term excess capacity in non-impacted wells or through the installation of replacement well(s), if necessary, until remediation alternatives, including wellhead treatment, and DPH approval is obtained for restoration of the impacted supply. The current removal of VWC Well 201 from service does not limit the reliability of the water supply since there is sufficient excess capacity in Saugus wells to meet water supply projections during the period required for its restoration. Therefore, no anticipated change in reliability or supply due to water quality is anticipated based on the present data, as is shown in Table 5-2.

TABLE 5-2
CURRENT AND PROJECTED WATER SUPPLY CHANGES DUE TO WATER QUALITY - PERCENTAGE CHANGE

Water source	2010	2015	2020	2025	2030	2035	2040	2045	2050
Groundwater									
Alluvial	0%	0%	0%	0%	0%	0%	0%	0%	0%
Saugus	16%[(a)]	0%	0%	0%	0%	0%	0%	0%	0%
Imported Water	0%	0%	0%	0%	0%	0%	0%	0%	0%
Recycled Water	0%	0%	0%	0%	0%	0%	0%	0%	0%
Banking Programs	0%	0%	0%	0%	0%	0%	0%	0%	0%

Note:

(a) The removal of VWC Well 201 would on a temporary basis reduce the quantity of water available from the Saugus Formation by 3,777 AFY in certain dry years. The 16% water supply impact shown in this table represents the percentage of VWC Well 201 capacity to the total 24,100 AFY single dry year well capacity from the Saugus Formation as indicated in Table 3-11. Table 8-3 illustrates that the removal of VWC Well 201 would not result in inadequate well capacity should a multi-year dry period occur in the near term. Further, Tables 6-4 and 6-5 illustrate that, for a single dry year, existing and planned water supplies exceed demand by more than 28,000 AFY and 36,000 AFY assuming 2015 levels of demand. In conclusion, the temporary loss of capacity from VWC Well 201, as discussed in Sections 3, 5, 6 and 8 and Appendices C and I, does not result in a shortage to the water suppliers.

Section 6: Reliability Planning

6.1 Overview

The Act requires urban water suppliers to assess water supply reliability that compares total projected water use with the expected water supply over the next twenty years in five year increments. The Act also requires an assessment for a single dry year and multiple dry years. This chapter presents the reliability assessment for CLWA's service area.

It is the stated goal of CLWA and the retail water purveyors to deliver a reliable and high quality water supply for their customers, even during dry periods. Based on conservative water supply and demand assumptions over the next forty years in combination with conservation of non-essential demand during certain dry years, the Plan successfully achieves this goal.

6.2 Reliability of Water Supplies

Each water supply source has its own reliability characteristics. In any given year, the variability in weather patterns around the state may affect the availability of supplies to the Valley differently. For example, from 2000 through 2002, southern California experienced dry conditions in all three years. During the same period, northern California experienced one dry year and two normal years. The Valley is typical in terms of water management in southern California; local groundwater supplies are used to a greater extent when imported supplies are less available due to dry conditions in the north, and larger amounts of imported water supplies are used during periods when northern California has wetter conditions. This pattern of "conjunctive use" has been in effect since SWP supplies first came to the Valley in 1980. SWP and other imported water supplies have supplemented the overall supply of the Valley, which previously depended solely on local groundwater supplies.

To supplement these local groundwater supplies, CLWA contracted with DWR for delivery of SWP water, providing an imported water supply to the Valley. However, the variability in SWP supplies affects the ability of the purveyors to meet the overall water supply needs for the service area. While each of the Valley's available supply sources has some variability, the variability in SWP supplies has the largest effect on overall supply reliability.

As discussed in Section 3.2, each SWP contractor's Water Supply Contract contains a Table A Amount that identifies the maximum amount of Table A water that contractor may request each year. However, the amount of SWP water actually allocated to contractors each year is dependent on a number of factors than can vary significantly from year to year. The primary factors affecting SWP supply availability include the availability of water at the source of supply in northern California, the ability to transport that water from the source to the primary SWP diversion point in the southern Delta and the magnitude of total contractor demand for that water. In many years, the availability of SWP supplies to CLWA and the other SWP contractors is less than their maximum Table A Amounts, and can be significantly less in very dry years.

DWR's *Reliability Report*, prepared biennially assists SWP contractors and local planners in assessing the reliability of the SWP component of their overall supplies. In its Reliability Reports, DWR presents the results of its analysis of the reliability of SWP supplies, based on

model studies of SWP operations. In general, DWR model studies show the anticipated amount of SWP supply that would be available for a given SWP water demand, given an assumed set of physical facilities and operating constraints, based on 82 years of historic hydrology. 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.

DWR's 2009 update of the *Reliability Report* presents the results of model studies for years 2009 and 2029. In these model studies, DWR assumed existing SWP facilities and operating constraints for both the 2009 and 2029 studies. The primary differences between the two studies are an increase in projected SWP contractor demands, an increase in projected upstream demands (which affects SWP supplies by reducing the amount of inflows available for the SWP), and the inclusion in the 2029 study of potential impacts on historic hydrology of the effects of climate change and accompanying sea level rise. In the report, DWR presents the SWP delivery capability resulting from these studies as a percent of maximum contractor Table A Amounts. To estimate supply capability in intermediate years between 2009 and 2029, DWR interpolates between the results of those studies.

6.3 Normal, Single-Dry, and Multiple-Dry Year Planning

The water suppliers have various water supplies available to meet demands during normal, single-dry, and multiple-dry years. The following sections elaborate on the different supplies available to the water suppliers including groundwater, recycled water and imported supplies.

6.3.1 Groundwater

In accordance with the groundwater operating plan for the basin, groundwater supplies for all uses from the Alluvial Aquifer are planned to be in the range 30,000 to 40,000 AFY in average years and 30,000 to 35,000 AFY in dry years; supplies from the Saugus Formation are projected to be 7,500 to 15,000 AFY in average years and 15,000 to 35,000 AFY in dry years. The updated Basin Yield analysis (LSCE and GSI, 2009) concluded pumping in those ranges to be sustainable. While there is sufficient Alluvial pumping capacity to achieve the Alluvial groundwater supply (Table 3-8), it is planned that VWC will develop some future capacity as it constructs municipal supply wells to replace existing agricultural wells when planned development converts existing agricultural land use to municipal land use. Existing Saugus pumping capacity is sufficient to achieve about 27,000 AFY (Table 3-9), or about 77 percent of the upper end of the Saugus operating plan. Hence, it is planned that restored capacity (VWC Well 201) and future Saugus pumping capacity (new wells) will be added to achieve the full range of the Saugus operating plan.

The existing and planned groundwater supplies used in this Plan are generally the pumping rates, within the operating plan ranges, that were analyzed in the Basin Yield update. As such, they tend toward the upper ends of the respective ranges except for normal year Saugus pumping, which is closer to mid-range of the Saugus operating plan. For the multiple-dry year period, it was assumed that pumping from the Saugus Formation would be governed by the groundwater operating plan summarized in Table 3-5, with average pumping over the 4-year dry period of about 21,500 AFY. Total projected Alluvial and Saugus pumping, including pumping by the purveyors and by agricultural and other users, is shown by year type in Tables 3-7 to

3-12 in Section 3. As shown there, total pumping in each year type remains within the pumping ranges in the groundwater operating plan.

6.3.2 Recycled Water

Recycled water is available from the Saugus WRP and Valencia WRP. Recycled water is also anticipated to be produced by the Newhall WRP for the Newhall Ranch Specific Plan development, as described in Section 4.

CLWA has completed construction of Phase I of its Recycled Plan, a multi-phased program to deliver recycled water in the Valley. Phase 1 can deliver 1,700 AFY of water through the VWC system. Deliveries of recycled water began in 2003 for irrigation water supply at a golf course and in roadway median strips. In 2010, recycled water deliveries were approximately 325 AF.

CLWA completed a preliminary design report in 2009 on the second phase of the Recycled Plan (Phase 2A), which will take water from the Saugus WRP and distribute it to identified users to the north, across the Santa Clara River and then to the west and east. Large irrigation customers will be served with this expansion with a collective design that will increase recycled water deliveries by 500 AFY.

Recycled water will be further expanded within the region with the South End Recycled Water project (Phase 2C), which will expand the existing recycled water transmission and distribution system southerly to supply recycled water to additional VWC customers, as well as some customers served by NCWD and the SCWD. The Project includes the planning, designing and construction of Phase 2C of the region's Recycled Plan, with recycled water improvements including various recycled water pipelines and pumping stations resulting in the use of an estimated 910 AFY of recycled water.

Overall, the recycled water program is expected to ultimately deliver up to 22,800 AFY of treated (tertiary) wastewater suitable for reuse on golf courses, landscaping and other non-potable uses. Of this total, 21,300 AFY is projected use by purveyor customers. This supply is assumed to be available in an average year, a single-dry year, and in each year of a multiple-dry year period.

6.3.3 State Water Project Table A Supply

For this Plan, the availability of SWP supplies to CLWA was based on DWR's 2009 *Reliability Report*, taken from more detailed results provided by DWR from the model studies presented in the 2009 *Reliability Report*. For the three hydrologic conditions evaluated here, the SWP deliveries to CLWA were taken from DWR's analyses based on the following: average/normal year based on the average deliveries over the studies' 82-year historical hydrologic study period (1922-2003), single-dry year based on a repeat of the worst-case historical hydrologic conditions of 1977, and multiple-dry year period based on a repeat of the historical four-year drought of 1931-1934.

As discussed in more detail in Section 3 (see Section 3.2.1.2.3), a planning effort to increase long-term supply reliability for both the SWP and CVP is taking place through the Bay Delta Conservation Plan (BDCP). While the proposed conveyance facilities that are part of the BDCP would increase SWP supply reliability, that increase is not included here. Any of the proposed

facilities that are completed would increase SWP reliability beyond the values used throughout this Plan.

6.3.3.1 Flexible Storage Account

Under the Water Supply Contracts with DWR for SWP water, 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." The 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 currently 4,684 AF. After negotiations with Ventura County water agencies in 2005, CLWA gained access to their 1,376 AF of flexible storage for ten years through 2015. While it is expected that CLWA and Ventura County will extend the existing flexible storage agreement beyond the 2015 term, in this Plan it is not assumed to be available beyond 2015.

CLWA plans to use this supply only in dry years. For the single-dry year condition, it was assumed the entire amount would be used. For the multiple-dry year condition, it was 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. Any water withdrawn was assumed to be replaced in intervening average and wet years and would be available again for use in the next dry year.

6.3.4 Buena Vista-Rosedale

BVWSD and RRBWSD, both member districts of KCWA, have jointly developed a program that provides both a firm water supply of 11,000 AFY and a water banking component. This supply program provides a firm annual water supply available every year based on existing and long-standing Kern River water rights, which is delivered by exchange of Buena Vista's and Rosedale's SWP Table A supplies.

6.3.5 Nickel Water - Newhall Land

This supply is similar to Buena Vista-Rosedale supply both in regard to its source (Kern River water rights) and level of reliability. The supply from this program is up to 1,607 AFY of firm supply, which is available in every year. It was acquired by the developer of the Newhall Ranch project to supplement groundwater and recycled water sources of supply for that project, which is in the CLWA service area. In this Plan, it is anticipated that this water supply will be available to VWC.

6.3.6 Semitropic Banking Program

In 2002, CLWA stored 24,000 AF of its allocated SWP Table A supply through a groundwater banking agreement with Semitropic. In 2004, CLWA stored 32,522 AF of its 2003 allocated SWP Table A supply in a second Semitropic storage account. Under the terms of those agreements, and after consideration for losses within the groundwater basin, CLWA could withdraw up to 50,870 AF when needed within ten years of when the water was stored. Of this storage, CLWA withdrew 4,950 AF in 2009 and 2010, leaving 45,920 AF currently available for

withdrawal. CLWA executed an amendment for a ten-year extension of each banking agreement with Semitropic in April 2010.

In addition to this short-term storage for CLWA, Semitropic has a long-term groundwater banking program with several other partners. 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 the water in that year.

CLWA plans to use this supply only in dry years. For the single dry year, it was assumed that competition among Semitropic's banking partners for use of return facilities would limit CLWA's supply to about one third of the storage available, or about 15,000 AF. For the multiple-dry year period, it was 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 about 11,500 AF. Under the agreements for this program, including the agreement for the ten-year time extension, the stored water must be withdrawn within twenty years of when it was stored. Therefore, it was assumed that this supply is available only through 2023.

6.3.7 Semitropic Banking Program - Newhall Land

As was the case for the Nickel water, the banking program was entered into by the developer of the Newhall Ranch project to firm up the reliability of the water supply for the project, which is in the CLWA service area. The storage capacity of this program is 55,000 AF. Newhall Land currently has 18,892 AF stored in this program. It is anticipated that this supply will be available to VWC.

VWC plans to use this supply only in dry years. For the single-dry year, supplies were assumed at the program's maximum withdrawal capacity of 4,950 AFY. For the multiple-dry year period, supplies in each year of the dry period were assumed at the program's maximum withdrawal capacity of 4,950 AFY and that additional supplies would be banked during wetter years to allow withdrawal of this amount.

6.3.8 Rosedale-Rio Bravo Banking Program

RRBWSD has also developed a water banking and exchange program. CLWA has entered into a long-term agreement with RRBWSD which provides it with storage and withdrawal capacity of 20,000 AFY and up to 100,000 AF of storage capacity. Withdrawals from the program can be made by exchange of Rosedale's SWP Table A supply, or by pumpback into the California Aqueduct. CLWA began storing water in this program in 2005 and has since reached the program's maximum storage capacity, with 100,000 AF currently available for withdrawal.

CLWA plans to use this supply only in dry years. For the single-dry year, supplies were assumed at the program's maximum withdrawal capacity of 20,000 AF. For the multiple-dry year period, it was assumed that supplies would average at least 15,000 AFY over the dry period and that additional supplies would be banked during wetter years to allow withdrawal of at least this amount.

6.3.9 Additional Planned Banking

CLWA's 2009 update of its Reliability Plan identifies a need for additional banking programs to firm up the dry-year reliability of service area supplies, and includes an implementation schedule to increase both storage and pumpback capacity beginning in 2010 and incrementally increasing through 2050. While a specific banking program has not yet been identified, CLWA's plans call for development of additional groundwater banking programs with pumpback capacity of at least an additional 10,000 AF by 2025, and a second additional 10,000 AF by 2035. For the single-dry year, supplies were assumed at the programs' pumpback capacity. For the multiple-dry year period, it was assumed that supplies would average at least 75 percent of the pumpback capacity over the dry period.

6.4 Supply and Demand Comparisons

The available supplies and water demands for CLWA's service area were analyzed to assess the region's ability to satisfy demands during three scenarios: a normal water year, single-dry year and multiple-dry years. The tables in this section present the supplies and demands for the various drought scenarios for the projected planning period of 2015-2050 in five year increments. The available supplies and water demands broken down by purveyor during the same three scenarios were also analyzed over the project planning period, and these tables are provided in Appendix C. Table 6-1 presents the base years for the development of water year data. Tables 6-2, 6-3 and 6-4 at the end of this section summarize, respectively, Normal Water Year, Single-Dry Water Year and Multiple-Dry Year supplies.

The reader is referred to Chapter 2 for development of retail purveyor demands and current and projected water supplies are developed in Chapters 3 and 4.

TABLE 6-1
BASIS OF WATER YEAR DATA

Water Year Type	Base Years	Historical Sequence
Normal Water Year	Average	1922-2003
Single-Dry Water Year	1977	--
Multiple-Dry Water Years	1931-1934	--

6.4.1 Normal Water Year

Table 6-2 summarizes the water suppliers' supplies available to meet demands over the 40-year planning period during an average/normal year. As presented in the table, the water suppliers' water supply is broken down into existing and planned water supply sources, including wholesale (imported) water, local supplies and banking programs. Demands are shown with and without the urban demand reduction resulting from SBX7-7 conservation objectives.

See Appendix C for the breakdown by purveyor of supplies available to meet demands over the 40-year planning period during an average/normal year.

TABLE 6-2
PROJECTED AVERAGE/NORMAL YEAR SUPPLIES AND DEMANDS

	2015	2020	2025	2030	2035	2040	2045	2050
Existing Supplies								
Existing Groundwater[a]								
Alluvial Aquifer	24,000	24,000	24,000	25,000	25,000	25,000	25,000	25,000
Saugus Formation[b]	9,225	10,225	10,225	10,225	10,225	10,225	10,225	10,225
Total Groundwater	**33,225**	**34,225**	**34,225**	**35,225**	**35,225**	**35,225**	**35,225**	**35,225**
Recycled Water[c]	325	325	325	325	325	325	325	325
Imported Water								
State Water Project[d]	58,100	57,900	57,600	57,400	57,400	57,400	57,400	57,400
Flexible Storage Accounts	-	-	-	-	-	-	-	-
Buena Vista-Rosedale	11,000	11,000	11,000	11,000	11,000	11,000	11,000	11,000
Nickel Water - Newhall Land	1,607	1,607	1,607	1,607	1,607	1,607	1,607	1,607
Total Imported	**70,707**	**70,507**	**70,207**	**70,007**	**70,007**	**70,007**	**70,007**	**70,007**
Banking Programs[e]								
Rosedale Rio-Bravo	-	-	-	-	-	-	-	-
Semitropic	-	-	-	-	-	-	-	-
Semitropic - Newhall Land	-	-	-	-	-	-	-	-
Total Banking	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Total Existing Supplies	**104,257**	**105,057**	**104,757**	**105,557**	**105,557**	**105,557**	**105,557**	**105,557**
Planned Supplies								
Future Groundwater[f]								
Alluvial Aquifer	-	1,000	2,000	3,000	4,000	5,000	6,000	7,000
Saugus Formation	1,375	1,375	1,375	1,375	1,375	1,375	1,375	1,375
Total Groundwater	**1,375**	**2,375**	**3,375**	**4,375**	**5,375**	**6,375**	**7,375**	**8,375**
Recycled Water[c]	975	2,725	5,225	7,775	10,275	13,775	17,275	20,975

	2015	2020	2025	2030	2035	2040	2045	2050
Banking Programs[e]	-	-	-	-	-	-	-	-
Total Planned Supplies	**2,350**	**5,100**	**8,600**	**12,150**	**15,650**	**20,150**	**24,650**	**29,350**
Total Existing and Planned Supplies	**106,607**	**110,157**	**113,357**	**117,707**	**121,207**	**125,707**	**130,207**	**134,907**
Demand w/o Conservation[g]	80,070	88,484	96,898	105,312	113,726	122,140	130,554	138,968
20x2020 Reduction[h]	9,027	19,626	21,166	22,770	24,342	25,914	27,486	29,058
Reduction from Recycled Water[i]	1,300	3,050	5,550	8,100	10,600	14,100	17,600	21,300
Reduction from Water Conservation[j]	7,727	16,576	16,662	16,748	16,833	16,919	17,005	17,091
Demand w/ Conservation[k]	**72,343**	**71,908**	**80,236**	**88,564**	**96,892**	**105,220**	**113,549**	**121,877**

Notes:

(a) Existing groundwater supplies represent the quantity of groundwater anticipated to be pumped with existing wells. As indicated in Tables 3-8 and 3-9 and Tables 3-4 and 3-5 of the 2009 Groundwater Basin Yield Analysis, individual purveyors may have well capacity in excess of quantities shown in this table. As indicated in Table 3-10, existing and planned groundwater pumping remain within the groundwater operating plan shown on Table 3-5.
(b) SCWD's existing Saugus 1 and Saugus 2 wells resumed production in 2011 with the completion of the perchlorate treatment facility.
(c) Recycled water projections from Table 4-3.
(d) SWP supplies are based on the Department of Water Resources "2009 State Water Project Delivery Reliability Report."
(e) Not needed in average/normal years.
(f) Planned groundwater supplies represent new groundwater well capacity that may be required by an individual purveyor's production objectives in the Alluvial Aquifer and the Saugus Formation. As indicated in Table 3-10, existing and planned groundwater pumping remain within the groundwater operating plan shown on Table 3- 5.
(g) Demand w/o Conservation data from Table 2-2.
(h) 20x2020 Reduction for the Region from Table 2-22.
(i) Recycled Water Reduction for the Region from Table 2-22; does not include demands from Honor Rancho.
(j) Reduction from Water Conservation calculation for Region from Table 2-22.
(k) Demand w/ Conservation is Demand w/o Conservation minus Reduction from Water Conservation.

6.4.2 Single-Dry Year

The water supplies and demands for the water suppliers over the 40-year planning period were analyzed in the event that a single-dry year occurs, similar to the drought that occurred in California in 1977. Table 6-3 summarizes the existing and planned supplies available to meet demands during a single-dry year. Base demand (demand without conservation) during dry years was assumed to increase by 10 percent. Demands are also shown with the urban demand reduction resulting from SBX7-7 conservation objectives.

See Appendix C for the breakdown by purveyor of supplies available to meet demands over the 40-year planning period during a single-dry year.

TABLE 6-3
PROJECTED SINGLE-DRY YEAR SUPPLIES AND DEMANDS

	2015	2020	2025	2030	2035	2040	2045	2050
Existing Supplies								
Existing Groundwater[a]								
Alluvial Aquifer	20,300	20,250	20,200	21,050	21,050	21,025	21,000	20,650
Saugus Formation	20,400	20,400	20,400	20,400	20,400	20,400	20,400	20,400
Total Groundwater	**40,700**	**40,650**	**40,600**	**41,450**	**41,450**	**41,425**	**41,400**	**41,050**
Recycled Water[b]	325	325	325	325	325	325	325	325
Imported Water								
State Water Project[c]	11,900	11,000	10,000	9,100	9,100	9,100	9,100	9,100
Flexible Storage Accounts[d]	6,060	4,680	4,680	4,680	4,680	4,680	4,680	4,680
Buena Vista-Rosedale	11,000	11,000	11,000	11,000	11,000	11,000	11,000	11,000
Nickel Water - Newhall Land	1,607	1,607	1,607	1,607	1,607	1,607	1,607	1,607
Total Imported	**30,567**	**28,287**	**27,287**	**26,387**	**26,387**	**26,387**	**26,387**	**26,387**
Banking Programs								
Rosedale Rio-Bravo[e]	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000
Semitropic[f]	15,000	15,000	-	-	-	-	-	-
Semitropic - Newhall Land[g]	4,950	4,950	4,950	4,950	4,950	4,950	4,950	4,950
Total Banking	**39,950**	**39,950**	**24,950**	**24,950**	**24,950**	**24,950**	**24,950**	**24,950**
Total Existing Supplies	**111,542**	**109,212**	**93,162**	**93,112**	**93,112**	**93,087**	**93,062**	**92,712**
Planned Supplies								
Future Groundwater[h]								
Alluvial Aquifer	200	1,250	2,300	3,850	4,850	5,875	6,900	7,750
Saugus Formation (Restored Well)	825	3,777	3,777	3,777	3,777	3,777	3,777	3,750
Saugus Formation (New Wells)	2,875	9,923	9,923	9,923	9,923	9,923	9,923	9,950
Total Groundwater	**3,900**	**14,950**	**16,000**	**17,550**	**18,550**	**19,575**	**20,600**	**21,450**
Recycled Water[b]	975	2,725	5,225	7,775	10,275	13,775	17,275	20,975

	2015	2020	2025	2030	2035	2040	2045	2050
Banking Programs[i]	-	-	10,000	10,000	20,000	20,000	20,000	20,000
Total Planned Supplies	**4,875**	**17,675**	**31,225**	**35,325**	**48,825**	**53,350**	**57,875**	**62,425**
Total Existing and Planned Supplies	**116,417**	**126,887**	**124,387**	**128,437**	**141,937**	**146,437**	**150,937**	**155,137**
Demand w/o Conservation[j]	88,077	97,333	106,588	115,843	125,099	134,354	143,609	152,865
20x2020 Reduction[k]	9,027	19,626	21,166	22,770	24,342	25,914	27,486	29,058
Reduction from Recycled Water[l]	1,300	3,050	5,550	8,100	10,600	14,100	17,600	21,300
Reduction from Water Conservation[m]	7,727	16,576	16,662	16,748	16,833	16,919	17,005	17,091
Demand w/ Conservation[n]	**80,350**	**80,757**	**89,926**	**99,096**	**108,265**	**117,434**	**126,604**	**135,773**

Notes:

(a) Existing groundwater supplies represent the quantity of groundwater anticipated to be pumped with existing wells. As indicated in Tables 3-8 and 3-9 and Tables 3-4 and 3-5 of the 2009 Groundwater Basin Yield Analysis, individual purveyors may have well capacity in excess of quantities shown in this table. As indicated in Table 3-11, existing and planned groundwater pumping remain within the groundwater operating plan shown on Table 3-5. SCWD's existing Saugus 1 and Saugus 2 wells resumed production in 2011 with the completion of the perchlorate treatment facility.

(b) Recycled water projections from Table 4-3.

(c) SWP supplies are based on the Department of Water Resources "*2009 State Water Project Delivery Reliability Report*."

(d) Includes both CLWA and Ventura County entities flexible storage accounts. Initial Term of agreement with Ventura County entities expires after 2015.

(e) CLWA has a maximum withdrawal capacity of 20,000 AFY and a storage capacity of 100,000 AF. As of 6/1/2011, there is 100,000 AF of recoverable water.

(f) CLWA has 45,920 AF of recoverable water as of 6/1/2011.

(g) Newhall Land has a maximum withdrawal capacity of 4,950 AFY and a storage capacity of 55,000 AF. As of 6/1/2011 there is 18,892 AF of recoverable water. Delivery of stored water from the Newhall Land's Semitropic Water Banking and Exchange Program is assumed available to VWC.

(h) Planned groundwater supplies represent new groundwater well capacity that may be required by an individual purveyor's production objectives in the Alluvial Aquifer and the Saugus Formation, including 3,777 AFY of restored capacity from VWC Well 201 and approximately 10,000 AFY of new Saugus Formation well capacity. When combined with existing purveyor and non-purveyor groundwater supplies, total groundwater production is consistent with the 1977 single dry-year levels identified in Table 3-8 of the 2009 Groundwater Basin Yield Analysis. As indicated in Table 3-11, existing and planned groundwater pumping remain within the groundwater operating plan shown on Table 3-5.

(i) Includes banking programs with 10,000 AF of additional pumpback capacity by 2025 and a second additional 10,000 AF by 2035.

(j) Demand w/o Conservation data from Table 2-2. Includes a 10 percent increase in demand during dry years.

(k) 20x2020 Reduction for the Region from Table 2-22.

(l) Recycled Water Reduction for the Region from Table 2-22; does not include demands from Honor Rancho.

(m) Reduction from Water Conservation calculation for Region from Table 2-22.

(n) Demand w/ Conservation is Demand w/o Conservation minus Reduction from Water Conservation.

6.4.3 Multiple-Dry Year

The water supplies and demands for the water suppliers' water supply over the 40-year planning period were analyzed in the event that a four-year multiple-dry year event occurs, similar to the drought that occurred during the years 1931 to 1934. Table 6-4 summarizes the existing and planned supplies available to meet demands during multiple-dry years. Base demand during dry years was assumed to increase by 10 percent. Demands are also shown with the urban demand reduction resulting from SBX7-7 conservation objectives.

See Appendix C for the breakdown by purveyor of supplies available to meet demands over the 40-year planning period during a multiple-dry year.

TABLE 6-4
PROJECTED MULTIPLE-DRY YEAR SUPPLIES AND DEMANDS

	2015	2020	2025	2030	2035	2040	2045	2050
Existing Supplies								
Existing Groundwater[a]								
Alluvial Aquifer	20,425	20,425	20,425	21,825	21,825	21,825	21,825	21,325
Saugus Formation	19,700	19,700	19,700	19,700	19,700	19,700	19,700	19,700
Total Groundwater	**40,125**	**40,125**	**40,125**	**41,525**	**41,525**	**41,525**	**41,525**	**41,025**
Recycled Water[b]	325	325	325	325	325	325	325	325
Imported Water								
State Water Project[c]	32,900	32,900	33,000	33,000	33,000	33,000	33,000	33,000
Flexible Storage Accounts[d]	1,510	1,170	1,170	1,170	1,170	1,170	1,170	1,170
Buena Vista-Rosedale	11,000	11,000	11,000	11,000	11,000	11,000	11,000	11,000
Nickel Water - Newhall Land	1,607	1,607	1,607	1,607	1,607	1,607	1,607	1,607
Total Imported	**47,017**	**46,677**	**46,777**	**46,777**	**46,777**	**46,777**	**46,777**	**46,777**
Banking Programs								
Rosedale Rio-Bravo[e]	15,000	15,000	15,000	15,000	15,000	15,000	15,000	15,000
Semitropic[f]	11,500	11,500	-	-	-	-	-	-
Semitropic - Newhall Land[g]	4,950	4,950	4,950	4,950	4,950	4,950	4,950	4,950
Total Banking	**31,450**	**31,450**	**19,950**	**19,950**	**19,950**	**19,950**	**19,950**	**19,950**
Total Existing Supplies	**118,917**	**118,577**	**107,177**	**108,577**	**108,577**	**108,577**	**108,577**	**108,077**
Planned Supplies								
Future Groundwater[h]								
Alluvial Aquifer	-	1,000	2,000	3,000	4,000	5,000	6,000	7,000
Saugus Formation (Restored Well)	2,375	1,625	1,500	1,400	1,275	1,125	1,000	875
Saugus Formation (New Wells)	2,250	10,325	10,450	10,550	10,675	10,825	10,950	11,075
Total Groundwater	**4,625**	**12,950**	**13,950**	**14,950**	**15,950**	**16,950**	**17,950**	**18,950**
Recycled Water[b]	975	2,725	5,225	7,775	10,275	13,775	17,275	20,975

	2015	2020	2025	2030	2035	2040	2045	2050
Banking Programs[i]	-	-	7,500	7,500	15,000	15,000	15,000	15,000
Total Planned Supplies	**5,600**	**15,675**	**26,675**	**30,225**	**41,225**	**45,725**	**50,225**	**54,925**
Total Existing and Planned Supplies	**124,517**	**134,252**	**133,852**	**138,802**	**149,802**	**154,302**	**158,802**	**163,002**
Demand w/o Conservation[j]	88,077	97,333	106,588	115,843	125,099	134,354	143,609	152,865
20x2020 Reduction[k]	9,027	19,626	21,166	22,770	24,342	25,914	27,486	29,058
Reduction from Recycled Water[l]	1,300	3,050	5,550	8,100	10,600	14,100	17,600	21,300
Reduction from Water Conservation[m]	7,727	16,576	16,662	16,748	16,833	16,919	17,005	17,091
Demand w/ Conservation[n]	**80,350**	**80,757**	**89,926**	**99,096**	**108,265**	**117,434**	**126,604**	**135,773**

Notes:

(a) Existing groundwater supplies represent the quantity of groundwater anticipated to be pumped with existing wells. As indicated in Tables 3-8 and 3-9 and Tables 3-4 and 3-5 of the 2009 Groundwater Basin Yield Analysis, individual purveyors may have well capacity in excess of quantities shown in this table. As indicated in Table 3-12, existing and planned groundwater pumping remain within the groundwater operating plan shown on Table 3-5. SCWD's existing Saugus 1 and Saugus 2 wells resumed production in 2011 with the completion of the perchlorate treatment facility.

(b) Recycled water projections from Table 4-3.

(c) SWP supplies are based on the Department of Water Resources "*2009 State Water Project Delivery Reliability Report*."

(d) Includes both CLWA and Ventura County entities flexible storage accounts. Initial Term of agreement with Ventura County entities expires after 2015.

(e) CLWA has a maximum withdrawal capacity of 20,000 AFY and a storage capacity of 100,000 AF. As of 6/1/2011, there is 100,000 AF of recoverable water.

(f) CLWA has 45,920 AF of recoverable water as of 6/1/2011.

(g) Newhall Land has a maximum withdrawal capacity of 4,950 AFY and a storage capacity of 55,000 AF. As of 6/1/2011 there is 18,892 AF of recoverable water. Delivery of stored water from the Newhall Land's Semitropic Water Banking and Exchange Program is assumed available to VWC.

(h) Planned groundwater supplies represent new groundwater well capacity that may be required by an individual purveyor's production objectives in the Alluvial Aquifer and the Saugus Formation, including 3,777 AFY of restored capacity from VWC Well 201 and approximately 10,000 AFY of new Saugus Formation well capacity. When combined with existing purveyor and non-purveyor groundwater supplies, total groundwater production is consistent with the 1931-1934 multiple dry-year levels identified in Table 3-8 of the 2009 Groundwater Basin Yield Analysis. As indicated in Table 3-12, existing and planned groundwater pumping remain within the groundwater operating plan shown on Table 3-5.

(i) Includes banking programs with 10,000 AF of additional pumpback capacity by 2025 and a second additional 10,000 AF by 2035.

(j) Demand w/o Conservation data from Table 2-2. Includes a 10 percent increase in demand during dry years.

(k) 20x2020 Reduction for the Region from Table 2-22.

(l) Recycled Water Reduction for the Region from Table 2-22; does not include demands from Honor Rancho.

(m) Reduction from Water Conservation calculation for Region from Table 2-22.

(n) Demand w/ Conservation is Demand w/o Conservation minus Reduction from Water Conservation.

6.4.4 Summary of Comparisons

As shown in the analyses above, CLWA and the retail purveyors have adequate supplies to meet CLWA service area demands during normal, single-dry, and multiple-dry years throughout the 40-year planning period.

Section 7: Water Demand Management Measures

This section describes the water Demand Management Measures (DMMs) implemented by CLWA and the retail purveyors as a part of the effort to reduce water demand in the Valley.

7.1 Overview

CLWA and the retail purveyors are subject to the Urban Water Management Planning Act, AB1420 and SBX7-7 requirements, in addition to the commitment of compliance with the Best Management Practices (BMPs) as signatories to the Memorandum of Understanding Regarding Water Conservation in California (MOU). In the CLWA service area, demand management is addressed at both the local (retail agency) and regional (Santa Clarita Valley-wide) levels.

The MOU and BMPs were revised by the California Urban Water Conservation Council (CUWCC) in 2008. The revised BMPs now contain a category of "Foundational BMPs" that signatories are expected to implement as a matter of their regular course of business. These include Utility Operations (metering, water loss control, pricing, conservation coordinator, wholesale agency assistance programs and water waste ordinances) and Public Education (public outreach and school education programs). The remaining "Programmatic" BMPs have been placed into three categories: Residential, Large Landscape, and Commercial, Industrial, Institutional (CII) Programs and are similar to the original quantifiable BMPs. These revisions are reflected in the CUWCC reporting database starting with reporting year 2009 and the 2010 UWMP's DMM compliance requirements. The new category of foundational BMPs is a significant shift in the revised MOU. For CLWA and other wholesalers however, these changes do not represent a substantive shift in requirements.

A key intent of the recent MOU revision was to provide retail water agencies with more flexibility in meeting requirements and allow them to choose program options most suitable to their specific needs. Therefore, as alternatives to the traditional Programmatic BMP requirements, agencies may also implement the MOU Flex Track or GPCD options.

Under the Flex Track option, an agency is responsible for achieving water savings greater than or equal to those it would have achieved using only the BMP list items. The CUWCC has developed three Flex Track Menus – Residential, CII, and Landscape – and each provides a list of program options that may be implemented in part or any combination to meet the water savings goal of that BMP. Custom measures can also be developed and require documentation on how savings were realized and the method and calculations for estimating savings.

The GPCD option sets a water use reduction goal of 18 percent reduction by 2018. The MOU defines the variables involved in setting the baseline and determining final and interim targets. The GPCD option and requirements track well with the requirements of SBX7-7. All three retail suppliers – SCWD, VWC and NCWD – have chosen to implement the GPCD compliance option.

Signatories to the urban MOU are allowed by Water Code Section 10631(j) to include their biennial CUWCC BMP reports in an UWMP to meet the requirements of the DMM sections of the UWMP Act. The retail suppliers have chosen to comply with the requirements of the Act by providing the information required by the DMMs in this section of the Plan instead of attaching the 2009 and 2010 BMP Reports. CLWA has filed its 2009 and 2010 BMP reports (attached as Appendix E).

As a wholesaler MOU signatory, CLWA assists SCWD, VWC and NCWD with BMP implementation and reporting, although CLWA files BMP reports only for itself. LACWWD 36 BMP implementation and reporting is done by the County of Los Angeles on behalf of all its Waterworks Districts.

As the water wholesaler for the region, CLWA is responsible for the implementation of a subset of the BMPs. However, CLWA in partnership with the water purveyors has taken a leadership role in the implementation and support of a number of the BMPs that extend beyond a wholesaler's responsibilities in the MOU. The following sections provide more detail on the water suppliers' conservation programs and compliance with the BMPs.

7.2 Castaic Lake Water Agency

In 2001 CLWA became a signatory to the MOU and a member of the CUWCC, establishing a firm commitment to the implementation of the BMPs or DMMs. The CUWCC is a consensus-based partnership of agencies and organizations concerned with water supply and conservation of natural resources in California. By becoming a signatory, CLWA committed to implement a specific set of locally cost-effective conservation practices in its service area.

In addition to meeting its MOU commitments, CLWA is working with its retail purveyors to identify and implement water use efficiency programs that meet long-term reduction goals. In 2007, CLWA and the retail water purveyors entered into an MOU to prepare a Santa Clarita Valley Water Use Efficiency Strategic Plan (SCVWUESP). The purpose of the effort was to prepare a comprehensive long-term conservation plan for the Santa Clarita Valley by adopting objectives, policies and programs designed to promote proven and cost-effective conservation practices. A consultant was hired to prepare the SCVWUESP, which included input from stakeholders and the community at large. The SCVWUESP was completed in 2008 and provides a detailed study of existing residential and commercial water use, and recommends programs designed to reduce overall Valley-wide water demand by ten percent by 2030. The programs are designed to provide Valley residents with the tools and education to use water more efficiently. The seven programs identified in the SCVWUESP are:

1. HET Rebates (Single and Multi-Family)
2. Large Landscape Audits (with incentives)
3. CII Audits and Customized Incentives
4. Landscape Contractor Certification
5. HE Clothes Washer Rebates
6. New Construction Building Code
7. Valley-Wide Marketing

In addition to these seven programs, the SCVWUESP also identifies other key factors that will help reduce the Valley's overall water demand including passive conservation and new, more water efficient building ordinances. By 2009, CLWA and the water purveyors were implementing the majority of the programs identified in the SCVWUESP in some form.

Finally, the SCVWUESP includes an Appendix with more aggressive water use efficiency measures designed to meet a potential twenty percent reduction in water use by 2020. This

includes funding more active conservation programs, retrofit on resale ordinances, water rate reform, water budget based rates and a more aggressive recycled water program.

By implementing a portfolio of water use efficiency programs, Santa Clarita Valley water suppliers and their customers benefit in a number of ways:

- **Cost Avoidance for Purchased Water:** Although the Santa Clarita Valley has projected adequate water supply for the near future, the cost of water has risen dramatically and is expected to continue to rise. The best way to avoid purchasing expensive imported water is to use less through efficiency. Programs are an effective efficiency mechanism.
- **Limited State Resources:** California's water resources are becoming increasingly stretched due to population, housing growth and decreased water supply from state water projects. Agencies need to stretch water supplies and increase efficiencies.
- **Drought Preparedness:** It is inevitable that southern California, as well as the state, will experience another drought. The big question is when and how severe the next one will be. One way to lessen the severity of a drought's effect on Santa Clarita Valley is to prepare in advance for this event by creating a community that operates at a high level of efficiency.
- **Reduced Carbon Footprint:** The production and delivery of water requires a tremendous amount of energy on both a statewide and local level. The Santa Clarita Valley can do its part to reduce green house gases by using water more efficiently.
- **Reduced Waste Water Flows:** Sanitation plants and systems must be sized to meet historic and planned wastewater flows. Increasing the efficient use of water will result in a reduction of wastewater into the system.
- **Reduced Urban Runoff:** Achieving increased water use efficiency outdoors means less water running off landscaped areas into the streets, storm drains and ultimately into the Santa Clara River. Education efforts and installation of efficient technologies will ensure that more of our valuable water is delivered to appropriate landscaping and less of it as urban runoff.

The water suppliers are administering, managing and financing the SCVWUESP programs. Since the adoption of the SCVWUESP, SBX7-7 was enacted, which requires a more aggressive demand reduction target of 20 percent by 2020. CLWA and the purveyors are currently developing an implementation plan that builds on the SCVWUESP while accelerating and expanding its goals to identify other opportunities that will help meet long-term goals such as those required by SBX7-7. This UWMP provides an overview of the programs proposed for implementation to meet the SBX7-7 requirements.

7.2.1 Utility Operations

7.2.1.1 Conservation Coordinator

CLWA has one full time staff person that works in collaboration with its retail purveyors and exclusively on conservation programs. CLWA also employs a number of consultants to work on program development and implementation.

7.2.1.2 Wholesale Agency Assistance Programs

CLWA provides both technical and financial assistance to the retail purveyors. In addition to the requirements specified in the BMPs, CLWA provides the following support to its retail purveyors:

- **Program Planning:** CLWA hired consultants and worked closely with the purveyors to implement the programs in the SCVWUESP. CLWA is currently providing a similar service in developing implementation options for meeting SBX7-7 requirements.
- **Residential Landscape Program:** This program targets residential landscape maintenance providers in the Santa Clarita Valley and individual homeowners eligible to participate. It is primarily designed to provide gardeners incentives to install residential water efficiency devices such as weather-based irrigation controllers (WBIC). The program offers homeowners and gardeners free landscape classes. After completing the landscape class, a resident receives one free WBIC and gardeners can keep receiving WBICs after confirmation that the previous WBIC was installed properly on a property within CLWA service area. The program is projected to save 50 AF in the first year.
- **Large Landscape Program:** This program offers homeowners associations, parks and landscape maintenance divisions the opportunity for a CLWA representative to visit the site and develop a customized plan and offer rebates for items to further water conservation.
- **Commercial, Industrial and Institutional (CII) Audit and Customized Incentive Program:** The CII Program offers businesses and institutions the opportunity to save money and water by signing up for free water use check-ups. As part of the check-up, a CLWA representative visits the site and develops a customized plan and offers rebates for the items to further water conservation.
- **High Efficiency Toilet (HET) Replacement Program:** HET toilet replacement vouchers are provided to retail purveyors for distribution. Homes older than 1992 are eligible for up to $115 per toilet.
- **Landscape Education Program:** Free monthly workshops are provided in a classroom and garden setting for residents who want to learn more about gardening and conservation.
- **School and Public Information Programs:** See Section 7.2.2.

7.2.1.3 Water Loss Control

CLWA has completed AWWA's M36 Water Loss analysis, which consists of a component analysis of leaks into "revenue" and "non-revenue" categories, among others, and an economic analysis of recoverable loss. Pre-screen results range from 99.5 to 100 percent. CLWA's M36 'Reporting Worksheet' for 2010 is provided in Appendix E.

7.2.2 Education

7.2.2.1 Public Information

In 2008 CLWA hired a social marketing firm to develop a Valley-wide conservation outreach plan. The "What's your water number?" campaign had its kick-off that summer and focused on proper irrigation and landscape maintenance. The campaign utilizes radio, billboards, television

and print. CLWA also distributes a monthly electronic community newsletter that addresses water conservation.

In October 2010, CLWA conducted a phone survey to measure the response to the campaign's messages to determine the most successful outlets used to deliver the messages among Santa Clarita Valley residents. Results indicated that overall campaign messaging was effective, with more than one-third of respondents stating the conservation tips made them re-think their current water use. Respondents also reported a substantial decrease in their total outdoor water use versus 2008. Eighty-seven percent of single-family home respondents said they reduced outdoor water usage already or are likely to do so in the near future. Respondents also reported a strong recall of the campaign. The majority of respondents recalled seeing or hearing conservation tips in the past six months. Results suggest that residents who previously watered every day, water every other day post-campaign.

In addition to its conservation outreach campaign, CLWA has a water-efficient landscape demonstration garden open to the public and which hosts about 60 school classes each year. CLWA also maintains an active website and Facebook page with water saving tips for residents and businesses, conservation checklists and program and incentive information.

7.2.2.2 School Education

Started in 1993, CLWA's award-winning Education Program is dedicated to helping students in school learn through age-appropriate programs, from kindergarten all the way through high school. The program provides hands-on field trips and in-class presentations for elementary and junior high school students at public and private schools in the Santa Clarita Valley (Table 7-1). In 2008, CLWA provided almost 350 class presentations and hosted 14 teacher workshops. In addition to the presentations and field trips, CLWA's Education Department administers the local high school Water Challenge scholarship program, which is open to students in grades 9 through 12. Through 2010, the Education Program has educated more than 104,000 students about the importance of efficient water use.

TABLE 7-1
SCHOOL EDUCATION (NUMBER OF STUDENTS)

Grade Level	2006	2007	2008	2009	2010
K - 3	5,677	7,320	6,290	6,686	7,296
4 - 6	3,753	4,872	4,195	4,768	5,212
7 - 8	798	1,102	1,345	1,210	315
9 - 12	0	223	141	40	491
Totals	**10,228**	**13,517**	**11,971**	**12,704**	**13,314**

7.3 Regional BMP Implementation

In 2001, the CLWA Board approved signing the CUWCC's MOU on behalf of both the wholesale and retail service areas (CLWA and SCWD), thus meeting one of the recommendations of the 2000 UWMP. Los Angeles County signed the MOU prior to the 2000 UWMP on behalf of all its Waterworks Districts; NCWD signed the MOU on its own behalf in September 2002 and VWC signed in 2006. In 2009, the CUWCC changed its policy to specify that each signatory had to join individually and that a wholesaler could no longer be a signatory on behalf of its retailers.

The following sections provide a summary of the BMP status of the retail purveyors, in addition to the SCVWUESP activities.

7.4 Santa Clarita Water Division

Programs and planning efforts that focus on demand management have increased significantly since the 2005 UWMP. These efforts have been both by SCWD individually as well as regional approaches that involve CLWA and the retailers.

In 2001, the CLWA Board approved signing the CUWCC's MOU for both the wholesale and retail service areas (CLWA and SCWD). Since that time, SCWD has been reporting and filing BMP reports as a signatory. SCWD filed BMP reports through 2008. In 2009, the CUWCC changed its policy to specify that each signatory had to join individually and that a wholesaler could no longer be a signatory on behalf of its retailers. As a result, SCWD is no longer included as member of the CUWCC.

SCWD developed a Water Conservation Plan (WCP) in April 2009 to complement the SCVWUESP adopted by the CLWA Board of Directors in February 2009. In its WCP, SCWD recognizes the need to implement the urban water conservation BMPs as described by the CUWCC and identify additional conservation measures that could accelerate savings in the SCWD service area. The WCP identified the elements, processes, costs, staff resources and activities to further promote conservation and further complement the SCVWUESP. The WCP also identified activities not addressed in the regional plan.

SCWD is implementing all of the Foundational BMPs as required in the revised MOU and UWMP Act. The Programmatic BMPs are being implemented through a GPCD approach. The BMP and SBX7-7 goals and implementation plan are discussed further in Sections 7.4.2 and 7.4.3.

The following sections describe the various programs and conservation activities currently being implemented by SCWD.

7.4.1 Foundational BMPs

7.4.1.1 Utility Operations

Conservation Coordinator

SCWD's conservation program is staffed in various ways. Internally, management, administration and oversight are the responsibility of the Associate Water Resources Planner. In addition, SCWD has helped fund a conservation coordinator position at CLWA since 2004; this position supports regional planning and implementation. SCWD also utilizes consultant services to support program planning and management as well as to implement the various programs including residential landscape training as well as residential, CII and large landscape audits.

Water Waste Prevention

SCWD supports water waste prevention activities through both direct Board activities and in collaboration with the City of Santa Clarita.

On September 10, 2008, the CLWA Board of Directors signed Resolution No. 2605 declaring an Agency-wide water supply and conservation alert. The resolution encourages residents to follow the Voluntary Water Conservation Action Plan (Plan) and achieve a ten percent overall reduction in water demand. The Plan establishes voluntary water conservation measures to be taken by residents and businesses and includes a set of guidelines and recommendations for both indoor and outdoor water use improvements.

SCWD is also actively supporting the City and County in establishing terms of service for water efficient design in new development, complaint with AB 1881. SCWD participates in compliance review of new water efficient landscaping requirements, reviewing the Water Efficient Landscape Worksheet (WELW) and, after a project is completed, conducting periodic audits and tracking consumption to ensure the project remains in compliance with the water allowance requirements.

SCWD also has a Water Shortage Contingency Plan (see Appendix F) and works closely with the City and County in supporting all local ordinances that prohibit water waste.

Water Loss Control

SCWD monitors its water losses on a monthly basis. Production losses in 2008 and 2009 were estimated at 7.9 and 6.0 percent, respectively. SCWD has completed AWWA's M36 Water Loss analysis, which consists of a component analysis of leaks into "revenue" and "non-revenue" categories, among others, and an economic analysis of recoverable loss. SCWD's M36 'Reporting Worksheet' for 2009 is provided in Appendix E.

Results of the preliminary analysis show a water audit data validity score of 64 and an Infrastructure Leakage Index (ILI) of 3.79. A validity score between 51 and 70 indicates that the validity of the data is reasonable, with opportunity for improvement. According to general guidelines, an ILI between 3 and 5 is appropriate when water resources can be developed or purchased at a reasonable expense; existing water supply capability is sufficient to meet long-term demand as long as reasonable leakage management controls are in place; and water resources are believed to be sufficient but demand management measures are included in long-term planning. The audit highlights some strengths and weaknesses of the system. SCWD is evaluating the preliminary results and recommendations of the audit.

Metering with Commodity Rates for all New Connections and Retrofit of Existing Connections

All of SCWD's customers are metered and billed volumetrically. Commercial, industrial and institutional accounts and parks are encouraged to have dedicated irrigation meters, and many do. In addition, SCWD has identified the Automated Meter Reading (AMR)/ Advanced Metering Infrastructure (AMI) technologies as a conservation priority. This technology is being implemented and will be very helpful in identifying leaks, mitigating losses, and monitoring customer usage.

Retail Conservation Pricing

All of SCWD's customers are metered and billed monthly. On January 1, 2010, SCWD migrated its residential customers to a tiered rate structure and its landscape customers to a fixed rate set at the highest tier rate.

Since 2007 the proportion of revenue from fixed charge has met the BMP requirement of not to exceed 30 percent. Table 7-2 shows the portion of revenues that come from fixed charges. Total revenue includes meter, consumption, energy, purchased water and other small miscellaneous charges. Note that 2010 data are only through September and do not reflect a full year's revenue; SCWD expects to meet the threshold requirements once a full year's data is incorporated.

TABLE 7-2
REVENUE

Operating Revenues	2007	2008	2009	2010[(a)]
Fixed Charges	$ 5,880,400	$ 6,282,400	$ 6,354,900	$ 5,500,100
Volumetric Charges	$ 13,629,600	$14,401,100	$ 15,516,300	$12,261,800
% Fixed Charges	**30%**	**30%**	**29%**	**31%**

Note:
(a) Reflects revenues only through September 2010. BMP requirement anticipated to be met with complete 2010 revenue accounted for.

7.4.1.2 Education

Public Information Programs

SCWD provides informational materials to customers through media events, neighborhood expos and other activities (Table 7-3). SCWD also communicates with its customers in coordination with CLWA through a variety of media outlets including Santa Clarita Valley TV, billboards, newspapers, magazines, radio, paid advertising, bill inserts, its website (http://www.scwater.org/) and public service announcements. Conservation messages are also included on customers' monthly bills. Two tips ran in October and December 2008 and one ran on every bill issued in 2009. In 2009 SCWD instituted an automatic calling campaign to alert its customers of dry conditions and the importance of conservation. Almost 70,000 calls were made between December 2009 and October 2010.

TABLE 7-3
SCWD OUTREACH EVENTS

2009	2010
Earth Day	Earth Day
Home and Garden Expo	Water Awareness
Water Awareness	River Rally
River Rally	Make a Difference Day
Neighborhood Expo (3): Canyon County, Saugus, Newhall	Realtors' Breakfast
Emergency Expo	

School Education Programs

SCWD implements its school programs in coordination with the CLWA, reaching almost 6,400 students a year since 2007 (Table 7-4). The CLWA's award winning program is available to grades K through 8 and includes in class presentations and field trips. See Section 7.2.2.2 for more information on CLWA's school programs.

TABLE 7-4
SCHOOL EDUCATION (NUMBER OF STUDENTS)

Grade Level	2007	2008	2009	2010
K - 3	2,474	2,694	3,300	2,947
4 - 6	2,656	1,600	2,412	2,063
7 - 8	335	860	605	94
9 - 12	63	141	40	348
Totals	**5,528**	**5,295**	**6,357**	**5,452**

7.4.2 Programmatic BMPs

Prior to 2007, SCWD focused most of its conservation programs on the Foundational type of activities. In 2007, SCWD starting expanding its programs by incorporating incentives and other elements. In 2009, the SCVWUESP was adopted by the CLWA Board of Directors in February and SCWD developed its own Water Conservation Plan (WCP) in April. These documents set, for the first time, water savings goals, identified activities to meet the goals and developed a long-term conservation program. In its WCP, SCWD recognizes the need to implement the BMPs and identify additional conservation measures that could accelerate savings in the SCWD service area.

The majority of SCWD's programmatic BMPs are being implemented in collaboration with CLWA. In order to maintain consistency the SBX7-7 planning process, SCWD has chosen the GPCD alternative for complying with the MOU.

The following sections describe the programs being implemented in the service area.

7.4.2.1 Residential Programs

The largest customer class in the SCWD service area is residential, accounting for approximately 90 percent of customers and 70 percent of total use. SCWD has about 21,200 SF and 4,700 MF residential accounts. SCWD is focusing the majority of its conservation efforts on residential use.

1) **Residential Audit Program**
   SCWD's indoor residential audit program is structured to respond to customer requests but does not currently actively promote indoor audits. SCWD provides water conservation items that include low-flow showerheads, conservation materials, hose nozzles and aerators. These items are provided at festivals, fairs and other events, and are available for pick up at the SCWD office. This distribution program started in 2008; SCWD distributed about 600 conservation items in 2009 and 2010.

2) **Landscape Training and Incentive Program**
   Residential landscapes are a significant use in SCWD's service area. SCWD is working with CLWA to offer a program that combines training and fixtures in the form of landscape classes and WBICs to its residential customers. The program offers homeowners and gardeners free landscape classes; after residents or their gardeners complete the training, they receive free WBICs. They also receive free inspections of their WBIC installations and programming to ensure they are properly installed and programmed. The classes are offered in both English and Spanish and have been very

popular with residents. At the end of 2010, six classes were held and 70 WBICs have been installed and inspected within the SCWD service area.

SCWD has focused its landscape surveys on its largest users, although all customers are welcome. These are typically homeowners associations (HOAs). HOA customers with dedicated irrigation meters are classified as "irrigation" customers rather than "residential" and the program is designed to develop an appropriate water budget and help them implement it. The program is further described in Section 7.4.2.3.

3) High Efficiency Toilet Rebate Program

The SCVWUESP estimates that in 2008 about 62 percent of residential toilets used 1.6 gallons per flush or less. A program at least as effective as a retrofit on resale, which is the BMP threshold, requires SCWD to provide about 200 rebates per year. SCWD is currently participating in CLWA's HET voucher rebate program and has provided 900 rebates since 2007, almost 70 percent of which were rebated in 2010. The program has been ramping up steadily and the goal is to provide 600 rebates a year. Incentives valued at $115 are provided for HETs replacing models that flush at 3.5 gpf or more.

In addition, SCWD will be realizing the benefits of SB 407, effective January 1, 2014. SB 407 requires that all pre-1994 residential, multi-family and commercial customers replace non-compliant plumbing fixtures (including toilets, faucets, and showerheads) with water-conserving fixtures when making certain improvements or alterations to a building. By 2017, all single-family homes must replace non-compliant plumbing fixtures and by 2019 all multifamily and commercial buildings must have compliant water-conserving plumbing fixtures in place.

4) WaterSense Specification for New Residential Development

SCWD is working closely with the City of Santa Clarita's response in its development and implementation of landscape requirements that comply with AB 1881.

SCWD is supporting adoption of the 2010 California Green Building Standards Code, which went into effect January 2011. The Code sets mandatory green building measures, including a twenty percent reduction in indoor water use, as well as dedicated meter requirements and regulations addressing landscape irrigation and design. Local jurisdictions, at a minimum, must adopt the mandatory measures; the Code also identifies voluntary measures that set a higher standard of efficiency, which can also be adopted. SCWD will review the proposed standards and determine the most appropriate approach.

7.4.2.2 Commercial, Industrial, and Institutional (CII) BMPs

CII use does not account for a large portion of consumption in SCWD's service area. SCWD has about 840 CII accounts which use about 1,900 AFY, or 7 percent of total use.

In FY 2010/11 the CLWA began implementing a CII Audit and Customized Incentive Program which offers comprehensive water audits with follow-up reports that provide recommendations, information on costs, savings, payback and other implementation-oriented information. The program targets high use and high savings potential customers such as amusement parks, colleges and universities, hotels and hospitals. Recommendations include both site-specific and general opportunities. The key decision makers are identified and contacted to enlist

participation. The goal is to tailor the amount of incentive to the water savings based upon the findings of the audit. Customers are eligible to receive financial incentives to offset any investments in water use efficiency in the amount of up to $300 per AF of water saved.

To date forty large water users have been contacted and twenty within SCWD service area are moving forward.

7.4.2.3 Landscape

SCWD encourages installation of dedicated irrigation meters on all commercial, industrial and institutional accounts, parks and city landscaping. SCWD has 864 dedicated irrigation accounts, the majority of which are HOAs.

SCWD is working on developing water budgets for all its dedicated irrigation accounts; to date 188 accounts have water budgets. The budgets are developed based on historical water use data, landscape acreage and the Maximum Applied Water Allowance as defined by DWR. If the accounts exceed their budgets, SCWD contacts the customer with offers of a free audit, nozzles and/or WBICs (when available) as well as a free walk-through with the landscape contractor followed up with a report containing findings and recommendations.

SCWD is also participating in the CLWA-sponsored large landscape program which offers audits to its large landscape customers. Currently forty sites are enrolled; eighteen are within the SCWD service area where the focus is on HOA customers. The program offers large landscape customers such as HOAs, parks and landscape maintenance districts the opportunity to receive free water-use and cost-benefit analysis reports, free workshops for property management and landscapers and rebates for water-saving measures and devices. Customers are also eligible to receive financial incentives to offset any investments in landscape efficiency in the amount of up to $300 per AF of water saved. CLWA works with its retailers to select sites that meet the large landscape specifications.

To date, five sites have final reports; one site has completed recommended infrastructure modifications and has received the rebate based on an estimated potential savings of 4.21 AFY. The others will complete modifications throughout 2011 and 2012.

7.4.3 SCWD DMM and SBX7-7 Implementation Plan

SCWD recognizes the need to expand conservation programs and efforts in order to meet both its SBX7-7 and DMM requirements.

The SBX7-7 baseline and target calculations are addressed in Chapter 2. The DMM GPCD goals, shown in Table 7-5 are determined by calculating the following:

1. *Baseline GPCD = average annual Potable Water GPCD for the years 1997 through 2006*

2. *2018 GPCD Target = Baseline GPCD multiplied by 0.82 (an 18% reduction)*

3. *Biennial GPCD Targets = Baseline GPCD multiplied by that year's Target (% Baseline). A retail water agency may choose a starting point as either its Baseline GPCD or its 2006 Potable Water GPCD.*

TABLE 7-5
DMM GPCD TARGET CALCULATIONS

Year	Per Capita Water Use (GPCD)
1997	237
1998	210
1999	247
2000	242
2001	234
2002	251
2003	232
2004	239
2005	227
2006	229
Baseline	**234**
Target (2018)	**192**

Compliance is evaluated in relation to the Compliance Table below (Table7-6) and relative progress toward the goal will be acknowledged in Council Compliance Reports. The compliance tables are read as five increments with reporting goals relative to their first through fifth Compliance reports.

TABLE 7-6
ANNUAL COMPLIANCE TARGETS (IN GPCD)

Year	Compliance Report	Target	Highest Acceptable Bound
2010	1	220	234
2012	2	217	225
2014	3	209	217
2016	4	200	209
2018	5	192	192

The GPCD option for MOU compliance and the SBX7-7 targets are consistent with one another (Table 7-7) and SCWD is utilizing the SCVWUESP as well as its own WCP to implement programs that meet these goals.

TABLE 7-7
COMPLIANCE TARGETS

		Target GPCP		
	Baseline GPCD	**2015**	**2018**	**2020**
MOU/AB 1420	234		192	
SBX7-7	235	211		188

In the 2008 SCVWUESP, a comprehensive assessment of SCWD's demographics, levels of past conservation, age of housing, natural turnover, the effects of plumbing codes and more was completed to determine the potential of future conservation activities and programs.

SCWD has already begun implementing five of the seven programs identified in the SCVWUESP: HET rebates (Single family), large landscape audits (with incentives), CII audits and customized incentives, landscape contractor certification and valley-wide marketing; HET clothes washer rebates and multi-family HET rebates are planned for implementation in 2011.

Both the regional SCVWUESP and SCWD's WCP recognize the need to expand conservation programs and efforts. The adoption of SBX7-7 has increased the urgency for implementation. CLWA is in the process of reviewing its incentive programs and SCWD is currently working with CLWA as well as the other purveyors to identify programs that could be implemented regionally.

The programs identified to meet future requirements combine financial incentives, regulation and information elements, and building onto existing activities. Included in the programs being considered for implementation are the following:

Financial Incentives

1) High-Efficiency Clothes Washers (HECWs): Clothes washer rebates are on the list of programs identified for implementation in the SCVWUESP. CLWA will be expanding its program to include clothes washer rebates in FY 2011/12 and SCWD will participate.

2) Zero and Low-Flow Urinal Rebates: Rebates will include CII fixtures such as zero consumption and ultra low volume urinals as well as CII specific HETs. This program will launch in FY 2011/12.

3) Expansion of fixture rebates to CII and Multi-family customers: Currently the toilet rebate program is only available to single-family residential customers. Starting 2011, the programs will be expanded to all customers and there will be increased focus on marketing to large HOA accounts.

4) Expand rebates to include a larger variety of fixtures: Being considered for inclusion are hot water distribution tanks, pressurized water brooms and high-pressure spray nozzles.

5) Cash for Grass Rebate: Customers will be provided with an incentive of up to $1 per acre-foot of turf removed and replaced with landscape appropriate plants. The program is being considered for both residential and CII customers.

6) Expansion of large landscape program: The purveyors will be evaluating the effectiveness of the current landscape program in FY 2011/12 and adjusting depending on the results. If the program is found to be successful at meeting reduction targets, the program will be accelerated and more devices will be offered, such as Precision Nozzles.

Building Code/New Standards

The SCVWUESP developed a comprehensive list of new building standards, beyond those currently in code. Code changes that improve the efficiency of fixtures and design account for about 60 percent of the expected reduction in demand, and will therefore be a significant program priority. Some of the changes proposed will be captured in the State Model Efficient Landscape Ordinance effective January 2010, CAL Green Building Code adopted January 2011, and SB 407 and standard updates for toilets and washers that are being phased in.

Information/Tracking

Information and tracking represents a new element to the existing programs focusing on collecting and processing information and ensuring that the programs are on track to meet the goals. These activities will also help in program design by providing more robust information about customers and their water use patterns. The immediate priorities include:

1) Automatic Meter Reading (AMR): SCWD has identified AMR as a priority in its WCP and critical to obtaining real time data for water usage and utilizing it to identify customer-side leaks. This information can also help SCWD monitor the impacts of existing programs, make adjustments where necessary and develop new programs.

2) Water Use Tracking Tools: Another WCP priority, SCWD plans to design and develop database tracking tools for water savings associated with its conservation plans and increase flexibility by adding or changing program elements.

SCWD is developing a plan that includes accelerating the current programs, adding additional elements that include programmatic, regulatory and information-based activities to meet the requirements of SBX7-7. This planning process was started in 2010 and implementation will begin in 2011.

Evaluating Effectiveness of the DMMs

SCWD will continue to track all program activities including outreach activities, rebate distribution and audits. Program effectiveness and per capita use will be monitored through the billing and consumption system.

Impacts of Conservation

It is not expected that, at this time, the conservation programs currently being implemented or scheduled for implementation will have any significant negative effect on water use within SCWD's service area or affect SCWD's ability to further reduce demand. The funding for current and future programs is being identified.

Economic Impacts

Analysis of the requirements for BMP compliance yields program costs of roughly $500,000.

7.5 Valencia Water Company

VWC recognizes that conserving water is an integral component of a responsible water strategy and is committed to providing education, tools and incentives to help its customers reduce the amount of water they use. VWC is implementing programs locally as well as leveraging the conservation resources available through CLWA. In 2006, VWC became a signatory to the CUWCC MOU, establishing a firm commitment to the implementation of the BMPs or DMMs. Prior to signing the MOU, VWC had been actively engaged in conservation and implemented several of the CUWCC recommended conservation programs.

In 2007, VWC coordinated the development and execution of a MOU with the other retail water purveyors and CLWA to prepare the SCVWUESP. VWC served as the project administrator for

the Santa Clarita Valley water suppliers in developing the SCVWUESP. The SCVWUESP recommended programs to reduce the overall valley wide water demand by ten percent by 2030 (see Section 7.2 for more information), but also included more aggressive programs to achieve greater demand reductions at an accelerated pace. These programs were designed to provide Valley residents and businesses with the tools and education to use water more efficiently.

Since 2002, VWC's focus on demand management has continued to increase. In addition to the activities identified in the SCVWUESP, VWC has implemented a number of other conservation activities to meet the requirements of the MOU and SBX7-7 goals. VWC has an internal Water Use and Energy Efficiency Plan (WUEEP). The WUEEP provides a broad framework defining VWC's conservation policies as well as detailed conservation programs. The WUEEP is reviewed annually and updated every three years.

VWC is implementing all of the Foundational BMPs as required in the revised MOU and UWMP Act. The Programmatic BMPs are being implemented through a GPCD approach. The BMP and SBX7-7 goals and implementation plans are discussed further in Section 7.5.2 and 7.5.3.

The following sections describe the various programs and conservation activities implemented by VWC.

7.5.1 Foundational BMPs

7.5.1.1 Utility Operations

Conservation Coordinator

VWC has had a full-time conservation coordinator since 2005 and added a second in 2009; there are currently two full-time equivalent (FTE) positions dedicated to conservation. The coordinators manage BMP implementation and other water conservation implementation and planning activities. VWC also utilizes consultant services to implement the various programs including water audits, landscape training and public outreach. In the future, VWC plans to establish a third conservation position to focus on CII activities.

Water Waste Prohibition

VWC operates under CPUC-approved rules that include Rule No. 14.1, the Water Conservation and Rationing Plan, and Rule 11, Discontinuance and Restoration of Service.

Rule 11, Discontinuance and Restoration of Service, allows the company to restrict and/or disconnect water service for customers using water in a wasteful manner.

The PUC's methodology for water utilities to implement water conservation plans is documented in Standard Practice U-40-W, "Instructions for Water Conservation, Rationing, and Service Connection Moratoria." Water shortage contingency plans must be approved by the PUC prior to implementation by VWC. As stated in the Standard Practice U-40-W, the PUC shall authorize mandatory conservation and rationing by approving Schedule No. 14.1, Mandatory Water Conservation and Rationing. Schedule No. 14.1 sets forth water use violation fines, charges for removal of flow restrictors, and the period during which mandatory conservation and rationing measures will be in effect.

Water Loss Control

VWC's overall water delivery system is relatively new with a weighted average plant in service life of 11 years. As a newer system, VWC doesn't experience a significant amount of water loss. Nonetheless, VWC conducts quarterly pre-screening system audits which calculate verifiable use as a percent of total production. VWC's historic annual water loss since 2000, as a percent of total production, ranged from one to seven percent.

VWC has completed AWWA's M36 Water Loss analysis, which consists of a component analysis of leaks into "revenue" and "non-revenue" categories, among others, and an economic analysis of recoverable loss. VWC's M36 'Reporting Worksheet' for 2009 and 2010 are provided in Appendix E. Results of the preliminary audits show a water audit validity score of 89 for both 2009 and 2010 and ILI of 0.62 and 0.20 for 2009 and 2010, respectively. VWC intends to refine and improve its assumptions used per M36 manual as its system expands and matures.

VWC's maintenance program also helps minimize water losses. This program helps keep the VWC production system in optimal condition, thus reducing water losses. This program includes, among other things, daily inspections of water wells and pumping equipment, weekly inspections of water tanks and exercising critical system valves. VWC also calibrates its production meters annually.

When a leak occurs, VWC responds quickly to isolate the leak and repair it. VWC tracks leaks in its GIS system, which gives it the ability to visually monitor leak locations and identify potential problem areas or trends.

VWC's meter change-out program replaces its older water meters on a regular basis to ensure metering accuracy. Based on AWWA standards and VWC's experience, this program targets change-outs at 15 years or less.

Metering with Commodity Rates for all New Connections and Retrofit of Existing Connections

All of VWC's customers are metered and billed volumetrically on a monthly basis.

Monthly water allocations (i.e., water budgets) were introduced in late 2009 under the new WaterSMART Allocation program, in which individually metered residential customers receive their monthly allocations on billing statements. In, 2011 a tiered pricing structure based on WaterSMART allocations was implemented.

Retail Conservation Pricing

On February 1, 2011 VWC changed its single volumetric rate structure to a tiered structure (Table 7-8). The tiered system was designed to support the WaterSMART Allocation (WSA) program, which sets customer specific allocations for all individually metered residential customers. Starting in 2009, customer bills included information on their allocation, allowing time for acclimation to the new approach before it was fully implemented with tiered rates in 2011.

The rate structure is designed to provide support and encourage appropriate use. If a customer's water use is within the designated "efficient" range for their allocated volume, the customer is charged standard rates. If the customer uses less than the efficient limit, the

customer is charged at a lower rate and, conversely, if the customer uses more, the customer is charged at the higher rates. There are five (5) tiers, ranging from Super Efficient at $1.144/CCF to Wasteful at $2.878/CCF. Customers are encouraged to access their allocation and billing information on the company's website.

Residential class customers were the first to be placed on WSA and the tiered rate structure as this group represents approximately 54 percent of VWC's total consumption. Dedicated landscape irrigation meters, including those at CII customer locations will be placed on WSA with a tiered rate structure in 2012. VWC will evaluate the challenges of migrating the remaining customer classifications to WSA and tiered rates in the future.

TABLE 7-8
QUANTITY RATES AND SERVICE CHARGES

		Quantity rates:
Tier Name	**Level**	**Rate per 100 cubic feet**
Super Efficient	Tier 1: Indoor monthly water allocation	$1.144
Efficient	Tier 2: Outdoor monthly water allocation (Tiers 1+2=100% of monthly allocation)	$1.362
Inefficient	Tier 3: 101% to 150% of monthly water allocation	$1.703
Excessive	Tier 4: 151%-200% of monthly water allocation	$2.214
Wasteful	Tier 5: Use in excess of 200% of monthly water allocation	$2.878
Non-residential	(not applicable)	$1.362

The proportion of revenue from volumetric charges meets the BMP requirement at about 71 to 73 percent (Table 7-9).

TABLE 7-9
REVENUE

	2006	2007	2008	2009	2010
Fixed Charges	NR	$5,258,800	$6,122,000	$6,150,500	$6,153,500
Volumetric Charges	NR	$13,921,300	$14,788,900	$14,784,500	$15,287,500
Total Revenue	NR	$19,180,100	$20,910,900	$20,935,000	$21,441,000
% Volumetric	**NR**	**73%**	**71%**	**71%**	**71%**

7.5.1.2 Education

Public Information

VWC implements public outreach in coordination with CLWA. See Section 7.2.2.1 for detail on specific programs administered by CLWA.

In addition to the regional activities, VWC provides information on efficient water use on customer bills and on its website. Bills show current water usage in comparison with the previous year's usage for that period, and for residential customers it shows their WaterSMART allocations. VWC maintains an active website that provides information on the various programs available to customers, conservation tips, links and full details on the WaterSMART program. In addition, VWC representatives promote conservation at local special events,

including the Emergency Expo, Earth/Arbor Day, CLWA Water Awareness, River Rally and Make a Difference Day. Outreach activities are summarized in Table 7-10.

TABLE 7-10
SUMMARY OF OUTREACH ACTIVITIES

Item	2006	2007	2008	2009	2010
Bill Inserts / Newsletters / Brochures	NR	0	1	2	1
Bill showing current water usage in comparison with prior year usage	NR	Yes	Yes	Yes	Yes
Special Events	NR	4	4	3	4
Program to coordinate with other government agencies, industry, public interest groups and media	NR	Yes	Yes	Yes	Yes

School Education

VWC's school education program is implemented in coordination with CLWA at no cost to school districts. The CLWA's award winning program is available to grades K through 12 and includes in class presentations and field trips (Table 7-11). See Section 7.2.2.2 for more information on CLWA's school programs.

VWC previously contracted with Resource Action Programs, partnering with Southern California Edison (SCE) and Southern California Gas Company (SCGC) to implement the Living Wise Program. This program was designed to teach communities about conservation and increase environmental awareness. Sixth graders received Resource Action Living Wise Activity Kits, which enabled them to perform home water/energy audits. The program was active thru mid-2009.

TABLE 7-11
SCHOOL EDUCATION (NUMBER OF STUDENTS)

Grades	2006	2007	2008	2009	2010
K-3	1,984	3,501	2,372	2,115	3,016
4 - 6	1,559	1,593	1,895	1,577	2,176
7 - 8	527	737	485	350	0
9 - 12	0	160	0	0	143
Totals	**4,070**	**5,991**	**4,752**	**4,042**	**5,335**

7.5.2 Programmatic BMPs

VWC is pursuing a GPCD approach to complying with the Programmatic BMPs. The following section describes VWC program activities.

7.5.2.1 Residential Programs

Almost 54 percent of VWC's total water use is residential, the majority of which are single-family accounts.

1) Residential Survey and Retrofit Programs

VMC has two programs that address residential surveys, – a traditional audit program and a leak only audit – to best address specific customer needs, increase responsiveness and improve water use efficiency.

Since 2007, VWC has offered a free residential water audits to its residential customers, which include both an indoor and landscape element. The program is administered and implemented by a consultant. Customers are notified of the program by consultant outreach efforts, VWC referrals and advertisement on VWC's website, reception area and at community events. The goals of the program are to provide customers with a better understanding of their water use; identify inefficient uses; and offer incentives for replacement of high-water use devices such as toilets and WBICs. The number of surveys that were conducted is summarized in Table 7-12.

In addition to the full audit, VWC initiated a supplemental program in January 2011 to specifically address leaks. This program was developed to be cost-effective, and to respond quickly and mitigate unnecessary losses resulting from leaks and other unintentional water consumption. In order to better serve its customers, VWC combines smart Automated Meter Reading (AMR) and current manual read systems to notify customers when their consumption has either registered higher than normal or if continuous flow has been detected by the meter (alerts automatically occur when the meter registers continuous flow for 24 consecutive hours). VWC customers can respond to the notification by requesting a Leak Only audit or a full residential audit to assist with the identification and quantification of the abnormal water use and to provide instructions to stabilize or reduce consumption.

VWC's device distribution programs have continued over the years (Table 7-12); devices are distributed as part of the surveys as well as through community events and the Living Wise program (described below). Devices include low-flow showerheads and aerators. In addition, CLWA distributes free water-saving devices to Valley residents at community events.

VWC previously benefited from audits conducted by students through the Living Wise Program in schools (see Section 7.5.1.2). The Living Wise surveys are each counted as the equivalent of one-third of a survey in terms of BMP reporting (only indoor use is evaluated in the program). The program was active through 2009.

TABLE 7-12
RESIDENTIAL SURVEYS AND RETROFITS

	2006	2007	2008	2009	2010
Single Family Accounts					
Surveys Offered	NR	2,520	13,969	4,308	20,901
Surveys Completed	NR	542	813	528	238
Multi-Family Accounts					
Surveys Offered	NR	0	156	0	0
Surveys Completed	NR	0	126	0	0
Devices					
Showerheads	NR	1,583	2,357	1,303	460
Aerators	NR	3,154	4,610	2,473	564

Audit and retrofit program participation is tracked through a manual spreadsheet; water savings are estimated at 32 AFY.

2) Residential Landscape Water Survey Program

VWC has identified landscape conservation as a priority program and has developed various tools to address irrigation use. Section 1) above describes the residential water audit programs, including both the full audit and leak only programs, which are a combined indoor and landscape audit. In addition to those programs, VWC is working with CLWA to offer a program that combines training and fixtures in the form of landscape classes and WBICs to its residential customers.

The CLWA sponsored WBIC program began in 2009. It offers homeowners and gardeners free landscape classes and, after residents or their gardeners complete the training, they receive free WBICs. The classes have been very popular with Valley residents. Classes are offered in both English and Spanish and, after completing the training, attendees, as well as their gardeners, receive official certification for attending the workshop and committing to water efficient practices at their sites. VWC is working with CLWA and the other retailers to track program participation and actual water savings in this first year of the program, and will make adjustments to the program as necessary.

For VWC customers who take the CLWA class and receive a WBIC, VWC provides free installation and programming service, which is not part of the CLWA program. At the end of 2010, there have been six classes, and 70 WBICs that have been distributed to VWC customers through the CLWA WBIC program. VWC has installed four of these WBICs through this program in December 2010. VWC encourages participation in CLWA's program.

From 2007 to late 2010, VWC held landscape irrigation courses and provided free WBICs, including installation, to customers with irrigated areas greater than 2,500 square feet. VWC terminated the WBIC program during 2010 to gain efficiencies by combining this program with the CLWA WBIC program. The VWC standalone WBIC program resulted in 338 installed WBICs at customer homes over the four years of the program. Additionally, since 2007 VWC has required developers to install WBICs in all new residential homes constructed in its service area.

3) WaterSense Specification Toilets

VWC and CLWA both offer rebates to VWC customers for purchase and installation of high-efficiency toilets (HETs) using 1.28 gpf or less. Rebates are up to $115 for homes built before 1993, or $50 for homes built after that year.

A summary of rebates that have been issued is provided in Table 7-13.

TABLE 7-13
TOILET REBATE AND REPLACEMENT PROGRAMS

Type	2006	2007	2008	2009	2010
Single-Family					
HET Rebate	NR	33	110	477	1,200
Multi-Family					
HET Distribution	NR	0	87	0	0

Customers are notified about the program through advertising in the lobby, high bill inquiries, water audits consultants, community events, in-store promotions and through VWC website; the program is also marketed regionally by CLWA. Program participation is being tracked through VWC. VWC is exceeding the BMP requirement by about 270 retrofits per year, and estimates that the program will provide about 300 AF of water savings (cumulative) through 2020. Additionally, in 2008 VWC provided a one-time incentive at a multi-family senior center complex and replaced 87 toilets with 1.28 gallons per flush HETs.

In addition to the rebates, VWC will be realizing the benefits of SB 407, effective January 1, 2014. SB 407 requires installation of water-conserving plumbing fixtures (including toilets, faucets, and showerheads). The saturation rate of conservation fixtures will be accelerated by compliance with SB 407. This regulation requires all residential, multi-family and commercial customers with pre-1994, non-compliant fixtures to replace them with water-conserving fixtures when making certain improvements or alterations to a building. By 2017, all single-family homes must replace non-compliant plumbing fixtures and, by 2019, all multifamily and commercial buildings must have compliant water-conserving plumbing fixtures in place.

7.5.2.2 Commercial, Industrial, and Institutional (CII)

CII water use accounts for about 44 percent of VWC's total water use. These accounts have been identified and ranked by water use.

VWC has identified approximately 1,250 meters in its CII accounts that are dedicated to irrigating landscapes. During 2011, simply as an administrative procedure, VWC will move these metered accounts from CII to Landscape customers. Regardless of the current customer classification, VWC will target its Large Landscape conservation programs to all meters that are dedicated to landscape irrigation, including those currently included in CII.

VWC provides free audits for CII customers through CLWA's Water Checkup Program (Table 7-14). The audits focus on five areas: irrigation, plumbing fixtures, cooling towers (HVAC systems), manufacturing processes and other efficiency opportunities. After audits are completed, reports are created that summarize findings and suggestions and these are discussed in-person with the customers. Customers that complete and implement the recommended conservation upgrades are eligible for $300 per AF saved rebates. Five industries with the most promising opportunities to provide water savings have been targeted for the program:

- Amusement Park
- Colleges and Universities
- Hotels (Hospitality Industry)
- Hospitals
- Restaurants

Prior to the Water Checkup Program VWC provided free indoor and landscape water audits to CII customers through a program that ended in mid-2009 (Table 7-14). The audit included testing equipment, reviewing water use patterns and sharing water use efficiency information

with the customer. After the audit, the customer received a report identifying water efficiency opportunities, recommending courses of action, estimating water savings, and providing a cost benefit analysis. The recommended efficiency measures included devices such as pre-rinse spray nozzles, efficient toilets and urinals, cooling tower conductivity controllers, high-efficiency clothes washers, irrigation clock management and use of drought tolerant plants. Audits were provided to a wide variety of customers including restaurants, schools, hotels, manufacturing companies and others.

Customers are notified about the CLWA program through VWC's website, referrals by VWC and through direct contacts from the contractor. Program participation and estimated savings for 2010 are tracked by CLWA; prior to 2010, the program participation was tracked by VWC. Limited follow-up for the CII surveys occurred during the transitional years 2009 and 2010. The CLWA program includes follow-up, so VWC anticipates customers receiving surveys will be contacted thereafter.

TABLE 7-14
CII SURVEY PROGRAM

CII Surveys	2006	2007	2008	2009	2010
Surveys Offered					
Commercial	NR	62	30	15	6
Industrial	NR	61	48	5	1
Institutional	NR	0	0	0	4
Mixed Use/Landscape	NR	124/0	86/0	8/18	4/8
Surveys Completed					
Commercial	NR	0	6	15	1
Industrial	NR	7	12	5	0
Institutional	NR	0	0	0	2
Mixed Use/Landscape	NR	7/0	20/0	8/18	0/4
Follow-up within 1 year					
Commercial	NR	2	0	0	0
Industrial	NR	3	3	0	0
Institutional	NR	2	0	0	0

7.5.2.3 Large Landscape

VWC has 13 metered accounts dedicated to irrigation in 2010 that are classified as Landscape and that account for approximately two percent of total water use. This is comprised of three potable meters and ten recycled water meters. The ten recycled water users consist of one golf course and nine street medians.

Additionally, VWC has identified approximately 1,250 meters included in its CII accounts that are dedicated to irrigating landscapes. VWC will target its Large Landscape conservation programs to all meters that are dedicated to irrigating landscapes, including those currently included in CII.

VWC is participating in the CLWA-sponsored large landscape program that offers audits to its large landscape customers. Currently 40 sites are enrolled in the program, including 17 within the VWC service area, where the focus is primarily HOA customers. The program offers large landscape customers such as HOAs and parks and landscape maintenance districts the

opportunity to receive free water-use and cost/benefit analysis reports, free workshops for property management and landscapers and rebates for water-saving measures and devices.

Targeted customers, both public and private sector, are contacted by phone to solicit participation. During the audit, the efficiency of the irrigation system is assessed and leaks and repair needs may be identified. Following the site visit, irrigation system efficiency is evaluated to determine an effective watering schedule, and a water budget is developed based on the size of the landscape. The audit report includes upgrade recommendations, available incentives, new irrigation schedules, the water budget and a benefit/cost analysis. The report is delivered in person to further educate the customer.

Customers are eligible to receive financial incentives to offset investments in landscape efficiency of up to $300 per AF of water saved. CLWA works with its retailers to select sites that meet the large landscape specifications. To date, final reports have been generated for five sites; recommended infrastructure modifications have been completed and five rebates were issued. Modifications at another site will be implemented throughout 2011 and 2012.

Currently, customers are notified about the program through VWC's website, referrals or through direct contact from the contractor. Program participation and estimated savings are tracked through the contractor administering the program.

Prior to 2010, the Large Landscape Audit program was conducted and monitored by VWC. The results of these surveys are included in Table 7-14 above.

7.5.3 VWC DMM and SBX7-7 Implementation Plan

VWC recognizes the need to expand conservation programs and efforts in order to meet both its SBX7-7 and DMM requirements.

The SBX7-7 baseline and target calculations are addressed in Chapter 2. The DMM GPCD goals, shown in Table 7-15, are determined by calculating the following:

1. *Baseline GPCD = average annual Potable Water GPCD for the years 1997 through 2006*

2. *2018 GPCD Target = Baseline GPCD multiplied by 0.82 (an 18% reduction)*

3. *Biennial GPCD Targets = Baseline GPCD multiplied by that year's Target (% Baseline). A retail water agency may choose a starting point as either its Baseline GPCD or its 2006 Potable Water GPCD.*

TABLE 7-15
DMM GPCD TARGET CALCULATIONS

Year	Per Capita Water Use (GPCD)
1997	314
1998	257
1999	277
2000	290
2001	261
2002	280
2003	266
2004	263
2005	246
2006	253
Baseline	**271**
Target (2018)	**222**

Compliance is evaluated in relation to the Compliance Table below (Table 7-16) and relative progress toward the goal will be acknowledged in Council Compliance Reports. The compliance tables are read as five increments with reporting goals relative to their first through fifth Compliance reports.

TABLE 7-16
ANNUAL COMPLIANCE TARGETS (IN GPCD)

Year	Compliance Report	Target	Highest Acceptable Bound
2010	1	254	271
2012	2	251	261
2014	3	241	251
2016	4	232	241
2018	5	222	222

The GPCD option for MOU compliance and the SBX7-7 targets are consistent with one another (Table 7-17) and VWC is currently building on the SCVWUESP as well as its WUEEP to implement programs that meet these goals.

TABLE 7-17
COMPLIANCE TARGETS

		Target GPCD		
	Baseline GPCD	2015	2018	2020
MOU/AB 1420	271		222	
SBX7-7	278	250		222

The SCVWUESP recognizes the need to expand conservation programs and efforts. The adoption of SBX7-7 and the twenty percent reduction goal has increased the urgency for

implementation. CLWA is in the process of reviewing its incentive programs and VWC is currently working with CLWA as well as the other purveyors to identify programs that could be implemented regionally. Conservation programs identified to meet future requirements combine financial incentives, regulations and informational elements, and build on the existing activities. Included in the programs considered for implementation are the following:

Financial Incentives

1) High-Efficiency Clothes Washers (HECWs): Clothes washer rebates are on the list of programs identified for implementation in the SCVWUESP. CLWA will be expanding its program to include clothes washer rebates in FY 2011/12 and VWC will participate.

2) Zero and Low-Flow Urinal Rebates: Rebates will include CII fixtures such as zero consumption and ultra low volume urinals as well as CII specific HETs. This program will launch in FY 2011/12.

3) Expansion of Fixture Rebates to CII and Multi-family Customers: Currently the CLWA toilet rebate program is only available to single-family residential customers. Starting 2011, the programs will be expanded to all customers and there will be increased focus on marketing to large HOA accounts.

4) Expand Rebates to Include a Larger Variety of Fixtures: Being considered for inclusion are hot water storage tanks, pressurized water brooms and high-pressure spray nozzles.

5) Cash for Grass Rebate: Customers would be provided with an incentive of up to $1 per square foot of turf removed and replaced with climate appropriate plants. The program is being considered for both residential and CII customers.

6) Expansion of Large Landscape Program: The purveyors will be evaluating the effectiveness of the current landscape program in FY 2011/12 and making adjustments depending on the results. If the program is found to be successful at meeting reduction targets, the program will be accelerated and more devices will be offered, such as Precision Nozzles.

Building Code/New Standards

The SCVWUESP developed a comprehensive list of new building standards beyond those currently in the building code. Code changes that improve the efficiency of fixtures and design account for about 60 percent of the expected reduction in demand, and will therefore be a significant program priority. Some of the proposed changes will be captured in the State Model Efficient Landscape Ordinance effective January 2010, CAL Green Building Code adopted in January 2011, and SB 407 and standard updates for toilets and washers that are being phased in.

In addition to conservation programs, VWC is committed to expanding recycled water in its service area to offset potable water use for landscape irrigation. Currently recycled water provides about 325 AFY. VWC plans to expand its recycled water use to 2,000 AFY by 2020.

The near term plans to expand recycled water are discussed in Section 6. Recycled water will be further expanded with the South End Recycled Water project (Phase 2C), which will expand the existing recycled water transmission and distribution system southerly to supply recycled

water to VWC, NCWD and SCWD customers. The project will result in the use of approximately 910 AFY of recycled water.

Information/Tracking

Information and tracking represents a new element to the existing programs focusing on collecting and processing information and ensuring that the programs are on track to meet the goals. VWC has already initiated this tool with the WaterSMART Allocation program for its individually metered residential customers. VWC will be expanding the WaterSMART Allocation program to its meters that are dedicated to irrigating landscapes. These activities will help program development by providing more robust information about customers and their water use patterns.

Evaluating Effectiveness of the DMMs

VWC will continue to track all program activities including outreach activities, rebate distribution, audits and leak interventions. Program effectiveness and per capita use will be monitored through the billing and consumption system.

VWC will monitor its WaterSMART Allocation program to measure its effectiveness in assisting customers to use water more efficiently.

Impacts of Conservation

It is not expected that, at this time, the conservation programs currently being implemented or scheduled for implementation will have any significant negative effect on water use within VWC's service area or affect VWC's ability to further reduce demand. The funding for current and future programs is being identified.

Economic Impacts

Analysis of the requirements for BMP compliance yields program costs of roughly $450,000 per year.

7.6 Newhall County Water District

NCWD is implementing programs locally as well as leveraging the conservation resources available through CLWA.

In 2002, NCWD became a signatory to the CUWCC MOU, establishing a firm commitment to the implementation of the BMPs or DMMs. Many of NCWD's conservation programs have been ongoing since 2003 or earlier.

NCWD subsequently joined CLWA and the other retail water purveyors in signing a 2007 MOU to prepare the SCVWUESP. The SCVWUESP recommended programs to reduce the overall valley wide water demand by ten percent by 2030 (see Section 7.2 for more information). These programs were designed to provide Valley residents with the tools and education to use water more efficiently.

NCWD is currently implementing all of the Foundational BMPs as required in the revised MOU and UWMP Act. The Programmatic BMPs are being implemented through a BMP approach. The BMP and SBX7-7 goals and implementation plan are discussed further in Sections 7.6.2 and 7.6.3.

7.6.1 Foundational BMPs

7.6.1.1 Utility Operations

Conservation Coordinator

NCWD has had a conservation coordinator since 2002, when it was half a full-time equivalent (FTE) position. The coordinator manages BMP implementation and other water conservation implementation and planning activities. Including the coordinator, NCWD has four FTE staff positions that focus part-time on conservation.

Water Waste Prohibition

NCWD adopted a water conservation ordinance in 1991. The ordinance was revised in 2005 due to water supply conditions at that time. The ordinance provides a water conservation plan to minimize the effect of water shortages on customers. It lists prohibited uses, sets irrigation hours and schedules to optimize water efficiency and states that inspection for leaks and repairs are everyone's responsibility. In addition, State of California, County of Los Angeles, and City of Santa Clarita ordinances also apply to NCWD customers.

Water Loss Control

NCWD conducts annual pre-screening system audits which calculate verifiable use as a percent of total production. NCWD also compares production and sales records monthly to identify losses.

NCWD has completed AWWA's M36 Water Loss analysis, which consists of a component analysis of leaks into "revenue" and "non-revenue" categories, among others, and an economic analysis of recoverable loss. NCWD's M36 'Reporting Worksheet' for 2010 is provided in Appendix E. Results of the preliminary analysis show an Infrastructure Leakage Index (ILI) of 1.8 and a score of 96, which indicates appropriate loss control. NCWD will continue its water loss practices and review the recommendations, which include annual audits and other incremental improvements.

Metering with Commodity Rates for all New Connections and Retrofit of Existing Connections

All of NCWD's customers are metered and billed volumetrically on a monthly basis. All meters have been replaced in the past ten years and NCWD is currently updating its maintenance plans.

Retail Conservation Pricing

Since 2005, NCWD has employed a four-tier increasing block rate structure for individually three-quarter inch metered residential accounts that is designed to promote water use efficiency and conservation. Rates range from $0.80 per CCF in the first tier to $1.456 per CCF in the fourth tier. The tiers are structured differently depending on meter size.

Non-residential accounts are charged for consumption at a uniform volumetric rate. All accounts are charged a flat fee for water availability, plus variable charges based on usage for energy, infrastructure and purchased water form CLWA. The proportion of revenue from variable charges meets the BMP requirement of 70 percent Table 7-18.

TABLE 7-18
REVENUE

	2006	2007	2008	2009	2010
Fixed: Service Charge	$2,160,400	$2,619,900	$2,808,100	$2,831,100	$2,834,600
Variable	$6,056,900	$7,166,200	$7,202,900	$6,982,900	$6,656,800
Total Revenue	$8,217,300	$9,786,100	$10,011,000	$9,814,000	$9,491,300
Percentage Variable	**74%**	**73%**	**72%**	**71%**	**70%**

7.6.1.2 Education

Public Information

NCWD has had a public information program since the late 1990s. Activities are summarized in Table 7-19. NCWD distributes conservation information to new residential customers as part of a welcome package and to children through free activity books. NCWD participates in community outreach events, mails its customers quarterly newsletters that include conservation tips and provide information on available rebate programs, conservation tips and links to other conservation resources on its website. Water bills were redesigned in 2010 to show water usage for the prior 13 months and suggest potential conservation actions.

Further outreach is implemented in coordination with CLWA. Refer to the Public Information section of CLWA's DMM summary for information on specific programs administered by CLWA.

TABLE 7-19
SUMMARY OF OUTREACH ACTIVITIES

Item	2006	2007	2008	2009	2010
Paid advertising	0	0	5	2	2
Bill Inserts / Newsletters / Brochures	4	4	4	4	4
Bill showing current water usage in comparison with prior year usage	Yes	Yes	Yes	Yes	Yes
Demonstration gardens	1	1	1	1	1
Special Events	3	3	3	4	4
Program to coordinate with other government agencies, industry, public interest groups and media	Yes	Yes	Yes	Yes	Yes

School Education

NCWD's school education program is implemented by CLWA at no cost to school districts and has reached over 10,000 students in NCWD's service area since 2006 (Table 7-20). Refer to the Section 7.2.2 for CLWA's DMM summary of detailed information on age-appropriate presentations, activities and field trips offered to schools, as well as the Water Challenge scholarship program.

TABLE 7-20
SCHOOL EDUCATION (NUMBER OF STUDENTS)

Grade Level	2006	2007	2008	2009	2010
K-3	1,325	1,345	1,224	1,271	1,333
4 - 6	954	623	700	779	973
7 - 8	100	30	0	255	221
9 - 12	0	0	0	0	0
Totals	**2,379**	**1,998**	**1,924**	**2,305**	**2,527**

7.6.2 Programmatic BMPs

The Programmatic BMPs are described below. NCWD is pursuing a GPCD approach to complying with the Programmatic BMPs. The following section describes NCWD program activities.

7.6.2.1 Residential Programs

The largest customer class in the NCWD service area is residential users, accounting for approximately 72 percent of total use.

1) **Residential Survey and Retrofit Programs**
In 2007, NCWD sent all of its single family residential customers a water use self survey that reflected the information requirements of BMPs 1 and 2. Each customer that returned a completed survey received $10 (Table 7-21). NCWD tracked the survey results with a database developed for that purpose.

TABLE 7-21
RESIDENTIAL SURVEYS AND RETROFITS

	2006	2007	2008	2009	2010
Accounts					
Surveys Offered	0	7,000	0	0	0
Surveys Completed	0	375	216	0	0
Devices					
Showerheads	105	400	171	263	312
Aerators	122	184	184	148	173

Water-saving devices are distributed by mail following surveys, or picked up at local events and from the District office; recipients of these devices are tracked in a database. NCWD customers

also receive devices from CLWA, which distributes free water-saving devices to Santa Clarita Valley residents at community events.

2) Residential Landscape Water Survey Program

NCWD's residential landscape water survey program was combined with the indoor water surveys described in Section 1), which are a combined indoor and landscape audit. NCWD has identified landscape conservation as a priority program and has developed various tools to address irrigation use.

NCWD offers its residential customers an ET Controller (Smart Sprinkler) Rebate Program, which started in 2006. The program is available to single family homeowners with a minimum of 1,200 square feet of irrigated landscapes and working in-ground irrigation systems operated by working timers and controllers. The rebate is $40 per active valve, up to a maximum of $480 per residence. NCWD also pays up to $120 for standard installation. At the end of 2010 there have been 48 WBICs installed and inspected within the NCWD service area.

NCWD also provides a free nozzle for each purchased spray head to replace all the sprinklers in a residential front yard turf area. These nozzles have 1/3 the flow of a conventional sprinkler and reduce irrigation application rates to less than 1 inch per hour. This reduces both water use and runoff losses. At the end of 2010 there have been 182 nozzles installed within the NCWD service area.

NCWD is also working with CLWA to offer a program that combines training and fixtures in the form of landscape classes and WBICs give-aways to its residential customers. The program offers homeowners and gardeners free landscape classes; after residents or their gardeners complete the training, they receive free WBICs. They also receive free inspections of their WBIC installations and programming to ensure they are properly installed. The classes are offered in both English and Spanish and have been very popular with residents. At the end of 2010, there have been six classes, and 13 WBICs have been installed and inspected within the NCWD service area.

After completing the training, attendees, as well as their gardeners, receive official certification for attending the workshop and committing to water efficient practices at their sites.

3) WaterSense Specification Toilets

NCWD participates in toilet rebate program sponsored by CLWA, which provides $50 per qualifying toilet. NCWD is also offering HET rebates of up to $115 for single family homes built prior to 1993. The EPA's list of WaterSense labeled products is used to identify qualifying equipment. As of 2008, NCWD had achieved about 65 percent saturation of ULFTs in single family homes and 48 percent in multi-family homes. A summary of rebates that have been issued is provided in Table 7-22. In 2006 NCWD stopped offering ULFT rebates and migrated its incentive program towards HETs.

Compliance with the BMP requires that NCWD rebate about 700 toilets over 10 years, for a total water savings of about 78 AF by 2020. Since 2008, NCWD rebates have been on track to meet the coverage requirement.

TABLE 7-22
TOILET REBATE PROGRAMS

Toilet Type	2006	2007	2008	2009	2010
HET (1.28 gal/flush)				126	227
ULFT Rebates (1.6 gal/flush)	26	13	126		

In addition, NCWD will be realizing the benefits SB 407, effective January 1, 2014. SB 407 requires that all pre-1994 residential, multi-family and commercial customers replace non-compliant plumbing fixtures (including toilets, faucets, and showerheads) with water-conserving fixtures when making certain improvements or alterations to a building. By 2017, all single-family homes must replace non-compliant plumbing fixtures, and by 2019, all multifamily and commercial buildings must have compliant water-conserving plumbing fixtures in place.

7.6.2.2 Commercial, Industrial, and Institutional (CII)

NCWD has about 470 CII accounts, which use about 1,300 AFY, or about 12 percent of NCWD's total water use. These accounts have been identified and ranked by water use.

NCWD provides free audits for CII customers through CLWA's Water Checkup Program. The audits focus on five areas: irrigation, plumbing fixtures, cooling towers (HVAC systems), manufacturing processes and other efficiency opportunities. After the audit is complete, a report is created that summarizes findings and suggestions, and these are discussed with the customer in-person. The report also identifies rebates that are available to provide motivation for implementing the recommended retrofits. Customers are eligible to receive financial incentives to offset any investment in efficiency opportunities in the amount of up to $300 per AF of water saved.

Customers are notified about the CLWA program through bill inserts, the District's website and direct contact from the contractor. Program participation and estimated savings are tracked by CLWA. To date two audits within the NCWD's service have been completed, both for schools.

7.6.2.3 Large Landscape

NCWD has about 230 dedicated irrigation meter accounts that use almost 1,700 AFY, or 15 percent of total use. NCWD customers can take advantage of CLWA's Water Use Efficiency Program for Large Landscapes. Currently 40 sites are enrolled in the program, including four within the NCWD service area where the focus is primarily HOA customers. The program offers large landscape customers such as HOAs, parks and landscape maintenance districts the opportunity to receive free water-use and cost-benefit analysis reports, free workshops for property management and landscapers, and rebates for water-saving measures and devices.

Targeted customers are contacted via phone to solicit participation. During the audit, the efficiency of the irrigation system is assessed and leaks and repair needs may be identified. Following the site visit, irrigation system efficiency is evaluated to determine an effective watering schedule, and a water budget is developed based on the size of the landscape. The audit report includes upgrade recommendations, available incentives, new irrigation schedules, the water budget and a benefit/cost analysis. The report is delivered in person to further educate the customer.

Customers are eligible to receive financial incentives to offset any investment in landscape efficiency in the amount of up to $300 per AF of water saved. CLWA works with its retailers to select sites that meet the large landscape specifications. To date, final reports have been generated for two sites.

Customers are notified about the program through bill inserts, the website and direct contact from the contractor. Program participation and estimated savings are tracked through the contractor administering the program.

7.6.3 NCWD DMM and SBX7-7 Implementation Plan

NCWD recognizes the need to expand conservation programs and efforts in order to meet both its SBX7-7 and DMM requirements.

The SBX7-7 baseline and target calculations are addressed in Chapter 2. The DMM GPCD goals, shown in Table 7-23 are determined by calculating the following:

1. *Baseline GPCD = average annual Potable Water GPCD for the years 1997 through 2006*

2. *2018 GPCD Target = Baseline GPCD multiplied by 0.82 (an 18% reduction)*

3. *Biennial GPCD Targets = Baseline GPCD multiplied by that year's Target (% Baseline). A retail water agency may choose a starting point as either its Baseline GPCD or its 2006 Potable Water GPCD.*

TABLE 7-23
DMM GPCD TARGET CALCULATIONS

Year	Per Capita Water Use (GPCD)
1997	242
1998	220
1999	249
2000	254
2001	243
2002	253
2003	242
2004	247
2005	230
2006	241
Baseline	**242**
Target (2018)	**199**

Compliance is evaluated in relation to the Compliance Table below (Table 7-24) and relative progress toward the goal will be acknowledged in Council Compliance Reports. The compliance tables are read as five increments with reporting goals relative to their first through fifth Compliance reports.

TABLE 7-24
ANNUAL COMPLIANCE TARGETS (GPCD)

Year	Compliance Report	Target	Highest Acceptable Bound
2010	1	228	242
2012	2	225	233
2014	3	216	225
2016	4	207	216
2018	5	199	199

The GPCD option for MOU compliance and the SBX7-7 targets are consistent with one another (Table 7-25).

TABLE 7-25
COMPLIANCE TARGETS

		Target GPCD		
	Baseline GPCD	2015	2018	2020
MOU/AB 1420	242		199	
SBX7-7	244	220		195

The regional plan, the SCVWUESP, recognizes the need to expand conservation programs and efforts. The adoption of SBX7-7 and the twenty percent reduction goal has increased the urgency for implementation. CLWA is in the process of reviewing its incentive programs, and NCWD is currently working with CLWA as well as the other purveyors to identify programs that could be implemented regionally.

Programs that NCWD has identified to meet future requirements combine financial incentives, advances in building codes and improved implementation tracking. NCWD is considering implementing of the following:

Financial Incentives

1) High-Efficiency Clothes Washers (HECWs): Clothes washer rebates are on the list of programs identified for implementation in the SCVWUESP. CLWA will be expanding its program to include clothes washer rebates in FY 2011/12 and NCWD will participate.

2) Zero and Low-Flow Urinal Rebates: Rebates will include CII fixtures such as zero consumption and ultra low volume urinals as well as CII specific HETs. This program will launch in FY 2011/12.

3) Expansion of Fixture Rebates to CII and Multi-family Customers: Currently the toilet rebate program is only available to single-family residential customers. Starting 2011, the programs will be expanded to all customers and there will be increased focus on marketing to large HOA accounts.

4) Expand Rebates to Include a Larger Variety of Fixtures: Being considered for inclusion are hot water distribution tanks, pressurized water brooms and high-pressure spray nozzles.

5) Cash for Grass Rebate: Customers will be provided with an incentive of up to $1 per acre-foot of turf removed and replaced with landscape appropriate plants. The program is being considered for both residential and CII customers.

6) Expansion of Large Landscape Program: The purveyors will be evaluating the effectiveness of the current landscape program in FY 2011/12 and adjusting depending on the results. If the program is found to be successful at meeting reduction targets, the program will be accelerated and more devices will be offered, such as Precision Nozzles.

Building Codes/New Standards

The SCVWUESP developed a comprehensive list of new building standards beyond those currently in the building code. Code changes that improve the efficiency of fixtures and design account for about 60 percent of the expected reduction in demand, and will therefore be a significant program priority. Some of the proposed changes will be captured in the State Model Efficient Landscape Ordinance effective January 2010, CAL Green Building Code, adopted in January 2011 and SB 407 and standard updates for toilets and washers that are being phased in.

Implementation Tracking

Tracking is intended to bring new accountability to existing programs. This is implemented by collecting and processing information to ensure that the programs are on track to meet the defined goals.

Evaluating Effectiveness of the DMMs

NCWD will continue to track all program activities including outreach activities, rebate distribution, audits, water-saving device distribution and ET controller distribution. Program effectiveness and per capita use will be monitored through the billing and consumption system.

Impacts of Conservation

It is not expected, at this time, that conservation programs that are currently being implemented or are scheduled for implementation will have any significant negative impact on water use within NCWD's service area or will affect NCWD's ability to further reduce demand. The funding for current and future programs is being identified.

Economic Impacts

Analysis of the requirements for BMP compliance yields program costs of roughly $430,000.

Section 8: Water Shortage Contingency Planning

8.1 Overview

Water supplies may be interrupted or reduced significantly in a number of ways, such as a drought that limits supplies, an earthquake that damages water delivery or storage facilities, a regional power outage or a toxic spill that affects water quality. This chapter of the Plan describes how CLWA and the retail water purveyors plan to respond to such emergencies promptly and equitably.

To date, both a Water Shortage Contingency Plan and a Drought Emergency Water Sharing Agreement have been prepared by CLWA and the retail purveyors. Prohibitions, penalties and financial impacts of shortages have been developed by SCWD, NCWD, and VWC and are summarized in this chapter.

8.2 Coordinated Planning

CLWA and the purveyors have coordinated efforts in the past to meet water shortages. During 1991 (the fifth year of a six-year drought), the purveyors and CLWA prepared a Water Shortage Contingency Plan. Since this plan was first prepared, the Valley has experienced two water shortages: in 1991-1992 due to the continuation of the 1987-1992 drought and in 1994 due to the January 17, 1994 Northridge earthquake. The plan worked extremely well in both instances, and minor updates were made to incorporate actual experience during these two periods. It is envisioned that the Water Shortage Contingency Plan will be implemented whenever needed in the future.

8.2.1 CLWA and the Retail Water Purveyors

During times of normal supply, the local water suppliers meet periodically to review total water supply and demand in the Valley and any new regulations affecting the water industry.

During the drought year of 1991, the local purveyors met more frequently (about once per month). Monthly water production and demand reports were produced and shared with the City of Santa Clarita Drought Committee. After the 1987-1992 drought, CLWA and the retail purveyors cooperated in sharing available water from all sources without regard to contractual or other water rights for the duration of the emergency, and to facilitate among themselves water transfers, exchanges and arrangements to use each others' distribution facilities. During the recent 2007 to 2009 drought period, the purveyors resumed the monthly meetings and monitored valley-wide water demand, and strengthened conservation planning and response planning.

8.3 Stages of Action to Respond to Water Shortages

The Saugus Formation has underground storage of approximately 1.65 MAF. In times of continued drought, the Saugus Formation can be pumped for temporary periods above its normal year production. During a dry year or an extended drought, the purveyors would temporarily increase pumping in the Saugus Formation above the normal-year production of 7,500 to 15,000 AFY, and plan to upgrade the pumping capacity of their wells, restore lost

capacity and drill additional wells to enable this increased pumping. As developed in the Valley's groundwater operating plan and presented in Table 3-5 in Section 3, production in the Saugus Formation can be as high as 25,000 to 35,000 AFY during multiple-dry year periods.

The Alluvium would be most affected by a continued local drought. As developed in the Valley's groundwater operating plan and further presented in Table 3-5, sustainable production during normal years can range from 30,000 to 40,000 AFY. However, due to operational constraints in the eastern part of the Basin, production would be reduced to approximately 30,000 to 35,000 AFY during locally dry years.

Table 8-1 presents the four-stage rationing and demand reduction goals for the Valley[24].

TABLE 8-1
RATIONING AND REDUCTION GOALS

Deficiency	Stage	Demand Reduction Goal	Type of Program
Up to 15%	1	15% reduction	Voluntary
15-25%	2	25% reduction	Mandatory
25-35%	3	35% reduction	Mandatory
35-50%	4	50+% reduction	Mandatory

Priorities for use of available water, based on Chapter 3 of the California Water Code, are:

- Health and Safety: Interior residential, sanitation and fire protection
- Commercial, Industrial, and Governmental: Maintain jobs and economic base
- Existing Landscaping: Especially trees and shrubs
- New Demand: Projects with permits when shortage declared

Water quantity calculations used to determine the interior household GPCD requirements for health and safety are provided in Table 8-2. As developed in Table 8-2, the California Water Code Stage 2, 3, and 4 health and safety allotments are 68 GPCD, or 33 CCF (100 cubic feet) per person per year. When considering this allotment and the Valley population of 286,750 in 2010 as presented in Section 2 (Table 2-8), the total annual water supply required to meet the first priority use during a water shortage is approximately 21,839 AFY.

[24] LACWWD has a nine-stage rationing and demand reduction method plan. Anticipated shortages that trigger the phases of action range from 10 percent to 50 percent, while associated conservation target reductions similarly range from 10 percent to 50 percent, with mandatory rationing after Stage 2.

TABLE 8-2
PER CAPITA HEALTH AND SAFETY WATER QUANTITY CALCULATIONS

	Non-Conserving Fixtures		Habit Changes		Conserving Fixtures	
Toilets	5 flushes x 5.5 gpf =	27.5	3 flushes x 5.5 gpf =	16.5	5 flushes x 1.6 gpf =	8.0
Showers	5 min x 4.0 gpm =	20.0	4 min x 3.0 gpm =	12.0	5 min x 2.0 gpm =	10.0
Washers	12.5 GPCD (1/3 load) =	12.5	11.5 GPCD (1/3 load) =	11.5	11.5 GPCD (1/3 load) =	11.5
Kitchens	4 GPCD =	4.0	4 GPCD =	4.0	4 GPCD =	4.0
Other	4 GPCD =	4.0	4 GPCD =	4.0	4 GPCD =	4.0
Total GPCD		68.0		48.0		37.5
CCF per capita per year		33.0		23.0		18.0

8.4 Minimum Water Supply Available During Next Three Years

The minimum water supply available during the next three years would occur during a three-year multiple-dry year event between the years 2011 and 2013. As shown in Table 8-3, the total water supply available during each of the next three years is about 128,400 AFY. When comparing these supplies to the demand projections provided in Chapter 2 of this Plan, CLWA and the purveyors have adequate supplies available to meet projected demands should a multiple-dry year period occur during the next three years.

TABLE 8-3
ESTIMATE OF MINIMUM SUPPLY FOR THE NEXT THREE YEARS

	Supply (AF)		
Source	**2011**	**2012**	**2013**
Wholesale (Imported)			
SWP Table A Supply[a]	30,700	30,700	30,700
Buena Vista-Rosedale	11,000	11,000	11,000
Nickel Water - Newhall Land	1,607	1,607	1,607
Flexible Storage Account (CLWA)[b]	1,560	1,560	1,560
Flexible Storage Account (Ventura County)[b]	460	460	460
Total Imported Supplies	*45,327*	*45,327*	*45,327*
Local Supplies			
Groundwater Supplies			
Alluvial Aquifer[c]	20,425	20,425	20,425
Saugus Formation[c]	19,700	19,700	19,700
Recycled Water	325	325	325
Total Local Supplies	*40,450*	*40,450*	*40,450*
Banking Programs			
Semitropic Water Bank[d]	15,300	15,300	15,300
Rosedale-Rio Bravo[e]	20,000	20,000	20,000
Semitropic Water Bank - Newhall Land[e]	4,950	4,950	4,950
Total Banking Programs	*40,250*	*40,250*	*40,250*
Total Supplies	**126,027**	**126,027**	**126,027**

Notes:
(a) SWP supplies to CLWA based on detailed delivery results provided by DWR from the analyses presented in DWR's *2009 SWP Delivery Reliability Report*, for the worst case three-year dry period of 1990-1992. SWP deliveries to CLWA over this three year period average 32% of CLWA's 95,200 AF of Table A Amount.
(b) Based on total amount of storage available divided by 3 (3-year dry period).
(c) Based on existing groundwater supplies available during a multiple-dry year period.
(d) Based on total amount of water currently in storage (45,920 AF) divided by 3 (3-year dry period).
(e) Based on maximum annual pumpback capacity.

8.5 Actions to Prepare for Catastrophic Interruption

8.5.1 General

The Valley is located approximately 20 miles southwest of the San Andreas Fault, which traverses the length of the southern San Joaquin Valley. A major earthquake along this portion of the San Andreas Fault would affect the Valley. The California Division of Mines and Geology has stated that two of the aqueduct systems that import water to southern California (including the California Aqueduct) could be ruptured by displacement on the San Andreas Fault. The situation would be further complicated by physical damage to pumping equipment and local loss of electrical power.

DWR has an Aqueduct Outage Plan for restoring the California Aqueduct to service should a major break occur, which it estimates would take approximately four months to repair.

Limitations on supplies of groundwater and/or imported water for an extended period, due to power outages and/or equipment damage, could result in severe water shortages until the supplies could be restored.

Combined water storage of the local water suppliers totals approximately 190 MG of water in storage tanks, which can be gravity fed to Valley businesses and residences, even if there is a power outage. The public would be asked to reduce consumption to minimum health and safety levels, extending the supply to a minimum of seven days. This would provide sufficient time to restore a significant amount of groundwater production. After the groundwater supply is restored, the pumping capacity of the four retail purveyors could meet the reduced demand until such time that the imported water supply was reestablished. Updates on the water situation would be made as often as necessary.

The Valley's water sources are generally of good quality, and no insurmountable problems resulting from industrial or agricultural contamination are foreseen. If contamination did result from a toxic spill or similar accident, the contamination would be isolated and should not significantly impact the total water supply. In addition, such an event would be covered by the purveyors Emergency Response Plan.

8.5.2 SWP Emergency Outage Scenarios

In addition to earthquakes, the SWP could experience other emergency outage scenarios. Past examples include slippage of aqueduct side panels into the California Aqueduct near Patterson in the mid-1990s, the Arroyo Pasajero flood event in 1995 (which also destroyed part of Interstate 5 near Los Banos) and various subsidence repairs needed along the East Branch of the Aqueduct since the 1980s. All these outages were short-term in nature (on the order of weeks), and DWR's Operations and Maintenance Division worked diligently to devise methods to keep the Aqueduct in operation while repairs were made. Thus, the SWP contractors experienced no interruption in deliveries.

One of the SWP's important design engineering features is the ability to isolate parts of the system. The Aqueduct is divided into "pools." Thus, if one reservoir or portion of the California Aqueduct is damaged in some way, other portions of the system can still remain in operation. The principal SWP facilities are shown on Figure 8-1.

FIGURE 8-1
PRIMARY SWP FACILITIES

Other events could result in significant outages and potential interruption of service. Examples of possible nature-caused events include a levee breach in the Delta near the Harvey O. Banks Pumping Plant, a flood or earthquake event that severely damages the Aqueduct along its San Joaquin Valley traverse, or an earthquake event along either the West or East Branches. Such events could impact some or all SWP contractors south of the Delta.

The response of DWR, CLWA and other SWP contractors to such events would be highly dependent on the type and location of any such events. In typical SWP operations, water flowing through the Delta is diverted at the SWP's main pumping facility, located in the southern Delta, and is pumped into the California Aqueduct. During the relatively heavier runoff period in the winter and early spring, Delta diversions generally exceed SWP contractor demands and the excess is stored in San Luis Reservoir. Storage in SWP aqueduct terminal reservoirs, such as Pyramid and Castaic Lakes, is also refilled during this period. During the summer and fall, when diversions from the Delta are generally more limited and less than contractor demands, releases from San Luis Reservoir are used to make up the difference in deliveries to contractors. The SWP share of maximum storage capacity at San Luis Reservoir is 1,062,000 AF.

CLWA receives its SWP deliveries through the West Branch of the California Aqueduct at Castaic Lake. The only other contractors receiving deliveries from the West Branch are Metropolitan and Ventura County Watershed Protection District (formerly known as the Ventura County Flood Control District). The West Branch has two terminal reservoirs, Pyramid Lake and Castaic Lake, which were designed to provide emergency storage and regulatory storage (i.e., storage to help meet peak summer deliveries) for CLWA and the other two West Branch contractors. Maximum operating capacity at Pyramid and Castaic lakes is 169,900 and 323,700 AF, respectively.

In addition to SWP storage south of the Delta in San Luis and the terminal reservoirs, a number of contractors have stored water in groundwater banking programs in the San Joaquin Valley, and many also have surface and groundwater storage within their own service areas.

Three scenarios that could impact the delivery to CLWA of its SWP supply, previously banked supplies or other supplies delivered to it through the California Aqueduct are described below. For each of these scenarios, it was assumed that an outage of six months could occur. CLWA's ability to meet demands during the worst of these scenarios is presented following the scenario descriptions.

8.5.2.1 Scenario 1: Levee Breach Near Banks Pumping Plant

As demonstrated by the June 2004 Jones Tract levee breach and previous levee breaks, the Delta's levee system is fragile. The SWP's main pumping facility, Banks Pumping Plant, is located in the southern Delta. Should a major levee in the Delta near these facilities fail catastrophically, salt water from the eastern portions of San Francisco Bay would flow into the Delta, displacing the fresh water runoff that supplies the SWP. All pumping from the Delta would be disrupted until water quality conditions stabilized and returned to pre-breach conditions. The re-freshening of Delta water quality would require large amounts of additional Delta inflows, which might not be immediately available, depending on the time of year of the levee breach. The Jones Tract repairs took several weeks to accomplish and months to complete; a more severe breach could take much longer, during which time pumping from the Delta might not be available on a regular basis.

Assuming that the Banks Pumping Plant would be out of service for six months, DWR could continue making at least some SWP deliveries to all southern California contractors from water stored in San Luis Reservoir. The water available for such deliveries would be dependent on the storage in San Luis Reservoir at the time the outage occurred and could be minimal if it occurred in the late summer or early fall when San Luis Reservoir storage is typically low. In addition to supplies from San Luis Reservoir, water from the West Branch terminal reservoirs would also be available to the three West Branch contractors, including CLWA. CLWA water stored in groundwater banking programs in the San Joaquin Valley may also be available for withdrawal and delivery to CLWA.

8.5.2.2 Scenario 2: Complete Disruption of the California Aqueduct in the San Joaquin Valley

The 1995 flood event at Arroyo Pasajero demonstrated vulnerabilities of the California Aqueduct (the portion that traverses the San Joaquin Valley from San Luis Reservoir to Edmonston Pumping Plant). Should a similar flood event or an earthquake damage this portion of the aqueduct, deliveries from San Luis Reservoir could be interrupted for a period of time. DWR has informed the SWP contractors that a four-month outage could be expected in such an event. CLWA's assumption for this Plan is a more conservative six-month outage.

Arroyo Pasajero is located downstream of San Luis Reservoir and upstream of the primary groundwater banking programs in the San Joaquin Valley. Assuming an outage at a location near Arroyo Pasajero that takes the California Aqueduct out of service for six months, supplies from San Luis Reservoir would not be available to those SWP contractors located downstream of that point. However, CLWA water stored in groundwater banking programs in the San Joaquin Valley could be withdrawn and delivered to CLWA, and water from the West Branch terminal reservoirs would also be available to the three West Branch contractors, including CLWA. Assuming an outage at a location on the California Aqueduct south of the groundwater banking programs in the San Joaquin Valley, these supplies would not be available to CLWA, but water from the West Branch terminal reservoirs would be available to the three West Branch contractors, including CLWA.

8.5.2.3 Scenario 3: Complete Disruption of the West Branch of the California Aqueduct

The West Branch of the California Aqueduct begins at a bifurcation of the Aqueduct south of Edmonston Pumping Plant, which pumps SWP water through and across the Tehachapi Mountains. From the point of bifurcation, the West Branch is an open canal through Quail Lake, a small flow regulation reservoir, to the Peace Valley Pipeline, which conveys water into Pyramid Lake. From Pyramid Lake, water is released into the Angeles Tunnel, through Castaic Powerplant into Elderberry Forebay, and then into Castaic Lake.

If a major earthquake (an event similar to or greater than the 1994 Northridge earthquake) were to damage a portion of the West Branch, deliveries could be interrupted. The exact location of such damage along the West Branch would be key to determining emergency operations by DWR and the three West Branch SWP contractors. For this scenario, it was assumed that the West Branch would suffer a single-location break and deliveries of SWP water from north of the Tehachapi Mountains or of CLWA water stored in groundwater banking programs in the San Joaquin Valley would not be available. It was also assumed that Pyramid and Castaic dams would not be damaged by the event and that water in Pyramid and Castaic Lakes would be available to the three West Branch SWP contractors, including CLWA.

In any of these three SWP emergency outage scenarios, DWR and the SWP contractors would coordinate operations to minimize supply disruptions. Depending on the particular outage scenario or outage location, some or all of the SWP contractors south of the Delta might be affected. But even among those contractors, potential impacts would differ given each contractor's specific mix of other supplies and available storage. During past SWP outages, the SWP contractors have worked cooperatively to minimize supply impacts among all contractors. Past examples of such cooperation have included certain SWP contractors agreeing to rely more heavily on alternate supplies, allowing more of the outage-limited SWP supply to be delivered to other contractors, and exchanges among SWP contractors, allowing delivery of one contractor's SWP or other water to another contractor, with that water being returned after the outage was over.

8.5.2.4 Assessment of Worst-Case Scenario

Of these three SWP outage scenarios, the West Branch outage scenario presents the worst-case scenario for the CLWA service area. In this scenario, the water suppliers would rely on local supplies and water available to CLWA from Pyramid and Castaic Lakes. See Section 8.5.3 below regarding recommendations for emergency outage storage using co-agreements with other SWP contractors and individual groundwater banking programs. An assessment of the supplies available to meet demands in CLWA's service area during a six-month West Branch outage and the additional levels of conservation projected to be needed are presented in Table 8-4 for 2010 through 2050.

During an outage, the local supplies available would consist of groundwater from the Alluvial Aquifer and the Saugus Formation, as well as recycled water. It was assumed that local well production would be unimpaired by the outage and that the outage would occur during a year when average/normal supplies would be available from the Alluvial Aquifer. Pumping from the Saugus was assumed to be one-half of the single-dry year supplies. Note that adequate well and aquifer capacity exists to pump at levels higher than those assumed in this assessment, particularly during a temporary period such as an outage. However, to be conservative, groundwater production was assumed to be one-half of annual supplies. Based on the assumption that additional voluntary conservation could reduce the amount of waste discharge, and therefore the amount of recycled water available, the amount of recycled water available is assumed to be available 25 percent less than average/normal year supplies.

The water available to CLWA from Pyramid and Castaic Lakes includes flexible storage available to CLWA at Castaic Lake and emergency and potentially regulatory storage available in both Pyramid and Castaic Lakes. Regulatory storage, which is used to help meet high peak summer deliveries, may or may not be available depending on what time of year an outage occurs. For this assessment, regulatory storage was assumed to be unavailable. The amount of emergency storage assumed to be available to CLWA was based on CLWA's proportionate share of usable storage in each reservoir, where usable storage is maximum operating storage, less regulatory and dead pool storage. At Castaic Lake, this usable storage determination also excludes the three West Branch contractors' total Flexible Storage Accounts. CLWA's proportionate share of usable storage was assumed to be slightly less than three percent, based on its share of capital cost repayment at each reservoir. On this cost repayment basis, the proportionate shares of the Metropolitan and Ventura County Watershed Protection District are about 96 percent and one percent, respectively.

Table 8-4 shows that, for a six-month emergency outage, additional conservation beyond SBX7-7 conservation objectives described in Chapter 2 would be required, with the additional

demand reductions ranging from one to 11 percent of total demand beginning in 2035. It is likely that potential cooperation among SWP contractors and/or temporarily increased purveyor groundwater production during such an outage could increase supplies so that lower amounts, or even no amount, of additional conservation would be needed. Further, the acquisition of emergency storage, as discussed in Section 8.5.3, could reduce or eliminate the need for additional conservation. However, even without such supply increases, these levels of additional conservation would be readily achievable. In an emergency such as this, these levels of additional conservation would likely be achieved through voluntary conservation, but mandatory measures would be enacted if needed.

TABLE 8-4
PROJECTED SUPPLIES AND DEMANDS DURING SIX MONTH DISRUPTION OF IMPORTED SUPPLY (AF)[a]

Water Supply Sources	2015	2020	2025	2030	2035	2040	2045	2050
Existing Supplies								
Groundwater								
Alluvial Aquifer[b]	12,000	12,000	12,000	12,500	12,500	12,500	12,500	12,500
Saugus Formation[c]	10,200	10,200	10,200	10,200	10,200	10,200	10,200	10,200
Recycled Water[d][e]	120	120	120	120	120	120	120	120
Planned Supplies								
Future Groundwater								
Alluvial Aquifer[b]	-	500	1,000	1,500	2,000	2,500	3,000	3,500
Saugus Formation (Restored Well)[c]	425	1,900	1,900	1,900	1,900	1,900	1,900	1,875
Saugus Formation (New Wells)[c]	1,475	4,950	4,950	4,950	4,950	4,950	4,950	4,975
Recycled Water[d]	370	1,020	1,960	2,920	3,850	5,170	6,480	7,870
Total Existing and Planned Supplies	***24,590***	***30,690***	***32,130***	***34,090***	***35,520***	***37,340***	***39,150***	***41,040***
SWP West Branch Storage Available								
SWP Flexible Storage Accounts[f]	6,060	4,680	4,680	4,680	4,680	4,680	4,680	4,680
Emergency Storage								
Pyramid Lake[g]	4,370	4,370	4,370	4,370	4,370	4,370	4,370	4,370
Castaic Lake[h]	3,370	3,370	3,370	3,370	3,370	3,370	3,370	3,370
Total West Branch Storage	***13,800***	***12,420***	***12,420***	***12,420***	***12,420***	***12,420***	***12,420***	***12,420***
Total Local Supplies and West Branch Storage	**38,390**	**43,110**	**44,550**	**46,510**	**47,940**	**49,760**	**51,570**	**53,460**
Demands[i]								
Total Demand w/o Conservation	40,035	44,242	48,449	52,656	56,863	61,070	65,277	69,484
20x2020 Reduction	4,514	9,813	10,583	11,385	12,171	12,957	13,743	14,529
Reduction from Recycled Water	650	1,525	2,775	4,050	5,300	7,050	8,800	10,650
Reduction from Water Conservation	3,864	8,288	8,331	8,374	8,417	8,460	8,503	8,546
Total Demand w/ Conservation	**36,172**	**35,954**	**40,118**	**44,282**	**48,447**	**52,611**	**56,775**	**60,939**
Additional Conservation Required[j]	0	0	0	0	507	2,851	5,205	7,479
Additional Conservation as Percent of Demand[k]	0%	0%	0%	0%	1%	5%	8%	11%

Notes:
(a) Assumes complete disruption in SWP supplies and in deliveries through the California Aqueduct for six months.
(b) Pumping from the Alluvial Aquifer is assumed to be one-half of the average normal year supplies (see Table 6-2).
(c) Pumping from the Saugus Formation is assumed to be one-half of the single-dry year supplies (see Table 6-3).
(d) Recycled water supply is based on one-half of projected use.
(e) Assumes 25% reduction in waste discharge, and therefore in recycled water availability, due to additional voluntary conservation.
(f) Includes both CLWA and Ventura County entities flexible storage accounts. Initial term of agreement with the Ventura County entities expires after 2015.
(g) CLWA's share of usable storage at Pyramid Lake, based on its 2.817% proportionate share of capital cost repayment of the reservoir, and assumed usable storage of 155,100 AF.
(h) CLWA's share of usable storage at Castaic Lake, based on its 2.927% proportionate share of capital cost repayment of the reservoir, and assumed usable storage of 115,100 AF.
(i) All demand data are assumed to be one-half of average/normal year Regional Summary demands from Table 2-22.
(j) Additional Conservation Required is difference between Total Demand w/ Conservation and Total Local Supplies and West Branch Storage. A portion or all of this could be met with the acquisition of emergency storage (see Section 8.5.3).
(k) Expressed as percent of Total Demand w/o Conservation.

8.5.3 Recommendations for Emergency Storage

The various outage scenarios described in Section 8.5.2 highlight the benefit of CLWA having water stored in multiple banking programs south of the Delta. Banking programs located in Kern County, which have access to the California Aqueduct, are ideally suited to meet at least part of CLWA's emergency needs. The worst-case scenario described above (a complete disruption on the West Branch of the aqueduct) demonstrates the desirability that CLWA also has water stored in at least one water banking program geographically located south of the Tehachapi Mountains.

Storage located south of the Tehachapi Mountains may necessitate an exchange agreement with another West Branch contractor so that the contractor could be served from CLWA's banked water, and CLWA could be served by a portion of the contractor's water in Pyramid or Castaic Lake (this worst case scenario also assumes that CLWA has access to its full Flexible Storage Account in Castaic Lake, in addition to emergency storage).

The most likely and utilizable arrangement would be with the Metropolitan Water District, which retains a significant portion of the storage capacity in Castaic Lake. CLWA could store varying amounts of its water in groundwater storage or banking programs within or adjacent to Metropolitan's service area. In the event of an outage or other emergency, Metropolitan would serve its customers with CLWA's stored water and CLWA would serve its customers with a like amount of Metropolitan's water in Castaic Lake. Amounts of storage required and locations of potential banking programs are as follows:

- Emergency outage storage capacity: 5,000 AF of storage capacity in 2010, increasing to approximately 14,000 AF by 2050.
- Emergency pumpback capacity: approximately 1,000 AF per month of pumpback capacity in 2010, increasing to 2,300 AF per month by 2050.

Potential banking programs, where CLWA could be served by a portion of the contractor's water in Pyramid or Castaic Lake for a potential exchange of emergency outage storage include the following locations:

- **Semitropic-Rosamond Water Bank Authority**
  - This project is located in eastern Kern County, in the northern portion of the Antelope Valley. It is adjacent to both the East Branch of the California Aqueduct and the Los Angeles Aqueduct. This program is active and is seeking participants.
- **Antelope Valley-East Kern Water Agency Water Supply Stabilization Program and Groundwater Recharge Project**
  - This is a project proposed by the Antelope Valley-East Kern Water Agency (AVEK), a SWP wholesaler located in the Antelope Valley area of southeastern Kern County and northern Los Angeles County. The project is adjacent to the East Branch of the California Aqueduct. AVEK is conducting the environmental analysis for the proposed project.
- **Calleguas Municipal Water District Las Posas Groundwater Recharge Project**
  - This project is an in-lieu and Aquifer Storage and Recovery project located in central Ventura County, within the service area of Metropolitan. CLWA could purchase or store water in the program and in the event of an emergency outage, would

exchange the water for use in Metropolitan's service area. CLWA would then utilize a like amount of Metropolitan's water stored in Castaic Lake. This is a conceptual project.

8.5.4 Regional Power Outage Scenarios

For a major emergency such as an earthquake, Southern California Edison (Edison) has declared that in the event of an outage, power would be restored within a 24 hour period. Following the Northridge earthquake, Edison was able to restore power within 19 hours. Edison experienced extensive damage to several key power stations, yet was still able to recover within a 24-hour timeframe.

8.5.4.1 CLWA

To specifically address the concern of water outages due to loss of power, CLWA has equipped its two treatment plants with generators to produce power for treating water to comply with the California Safe Drinking Water Act and the Health and Safety Code. The Rio Vista Water Treatment Plant and Intake Pump Station emergency generator system provides electrical power to treat 30 MGD for 72 hours without fuel replacement. The Earl Schmidt Filtration Plant emergency generator system provides electrical power to treat 33 MGD for 72 hours without fuel replacement.

8.5.4.2 SCWD

SCWD has prepared emergency operations procedures for the effective use of resources during various emergency situations. Emergency situations include but are not limited to earthquakes, major fire emergencies, water outages due to loss of power, localized flooding, water contamination and acts of sabotage.

To specifically address the concerns of water outages due to loss of power, SCWD has purchased and maintains five mobile generators and has the ability to obtain emergency access to others. The current generators are trailer mounted and have the capability of supplying up to 450 Kilovolt-Amperes (KVA). This capacity provides the capability to run any facility within its service area. Most primary pumping facilities are equipped with emergency transfer switches and SCWD employees are trained regularly to install and operate the generators. The generator's run time is only limited by the amount of available diesel fuel.

SCWD has an above-ground diesel fuel storage tank with a capacity of 1,000 gallons located at its warehouse in the City of Santa Clarita. SCWD also has the assistance of a commercial fuel supplier when needed. SCWD maintains a trailer-mounted 100-gallon diesel tank that will be deployed as required to preserve services. SCWD would respond to power outages on a prioritized basis and would continue its response to the power emergency as long as necessary. In addition to the generators, SCWD has a gas driven pump capable of delivering a maximum 2,000 gpm. This pump can be installed at select facilities and run as required.

8.5.4.3 NCWD

NCWD has procedures for earthquakes, major fire emergencies, water outages due to loss of power, localized flooding, water contamination and acts of sabotage. To specifically address the concerns of water outages due to loss of power, NCWD has purchased and maintains three

mobile generators. The generators are trailer mounted and have the following capacities: 600 KVA; 300 KVA; and 180 KVA.

These capacities provide the capability to run any facility within NCWD's service area. All primary pumping facilities are equipped with emergency transfer switches, and NCWD employees are trained regularly to maximize the speed to install and operate the generators. The generator run time is only limited by the amount of available diesel fuel.

NCWD has an above ground diesel fuel storage tank with a capacity of 1,000 gallons located at its main office in the City of Santa Clarita. Multiple crew trucks are equipped with 100 gallon diesel tanks and the necessary fueling equipment to refill the generators. NCWD would respond to power outages on a prioritized basis and would continue its response to the power emergency as long as necessary. In addition to the generators, NCWD has one gas driven pump and one diesel driven pump capable of delivering 600 gpm and 1,200 gpm, respectively. All NCWD pumping facilities have been equipped with the necessary appurtenances to quickly connect the portable pumps to restore pumping operations.

8.5.4.4 VWC

In the event that a power outage occurs, VWC has two mobile generators capable of powering any of VWC's wells, turnouts or booster stations. VWC would use the generators as back-up to ensure water service remained until Edison was able to restore power. Besides the significant fuel storage capacity of each generator, VWC has access multiple sources for fuel as needed. For regional power outages, VWC would rely on Edison's reliability criteria for restoring service with the longest outage assumed not to exceed 24 hours. This length of outage would not have a significant impact on water service.

8.6 Mandatory Prohibitions During Shortages

All Valley residents live within the boundaries of the City of Santa Clarita or Los Angeles County. Several ordinances were passed in 1991, during the last long-term drought, by the various governmental entities in the Santa Clarita Valley outlawing wasteful water practices. It is expected that, if the Valley experienced another dry-year period, the same ordinances passed in 1991 would be reactivated, as follows:

- On February 14, 1991, the NCWD Board of Directors adopted Resolution No. 101 outlawing wasteful water practices. The ordinance was amended on October 15, 1991, with the adoption of Ordinance No. 102, and further amended on July 14, 2005, with the adoption of Ordinance No. 112.

- On March 13, 1991, the City of Santa Clarita adopted Ordinance No. 91-16 outlawing wasteful water practices and calling for voluntary water conservation. The ordinance was amended on October 8, 1991 by the adoption of Ordinance No. 91-48.

- On March 21, 1991, the Los Angeles County Board of Supervisors adopted Ordinance No. 91-0046U, which prohibits wasteful water practices. The Water Conservation Requirements (Ordinance No. 2008-00052U) was amended by the Los Angeles County Board of Supervisors on October 7, 2008.

Most of the ordinances mentioned above had sunset provisions that were effective January 1, 1992; however, these ordinances could be reinstituted as needed. During more recent conditions of limited supply, in 2008, CLWA adopted Resolution No. 2605 mandating a voluntary program of water conservation in the Santa Clarita Valley.

8.7 Consumptive Reduction Methods During Restrictions

8.7.1 Supply Shortage Triggering Levels

The Santa Clarita Valley water suppliers will manage water supplies to minimize the social and economic impact of water shortages. The supply shortage strategy is designed to provide a minimum 50 percent of normal supply during a severe or extended water shortage.

Demand reduction stages may be triggered by a shortage in any one of the water sources in the Valley or by shortages in a combination of supplies. The guidelines for triggering the stages are listed in Table 8-5. However, circumstances may arise where the purveyors may deviate from these guidelines, such as in a case where the Governor declares a water shortage emergency and/or institutes a statewide rationing program.

TABLE 8-5
WATER DEFICIENCY TRIGGERING LEVELS

Stage	Percent Shortage
1	Up to 15% water deficiency
2	15 to 25% water deficiency
3	25 to 35% water deficiency
4	35 to 50+% water deficiency

8.7.2 Consumption Limits

The Valley-wide consumption allocation method for each customer type is as follows:

- Single Family Hybrid of Per-capita and Percentage Reduction
- Multi Family Hybrid of Per-capita and Percentage Reduction
- Commercial Percentage Reduction
- Industrial Percentage Reduction
- Governmental Percentage Reduction
- Recreational Percentage Reduction
- Irrigation Percentage Reduction

The percentage reductions at each stage and for each customer type correspond to the figures listed in Table 8-5. In a drought situation (multiple-dry year period), individual customer allotments will be based on a normal year consumption table. The water purveyors will classify each customer and calculate each customer's allotment according to Table 8-5. Each customer will be notified of its classification and allotment by mail before the implementation of a mandatory program. New customers and connections will be notified at the time service

commences if a mandatory program is in effect. Any customer may appeal its classification on the basis of use or the allotment on the basis of incorrect calculation.

In a disaster, prior notice of allotment may not be possible. Notice will be provided by the most efficient means available, if necessary, through the terms of the water suppliers' emergency response plans.

8.7.3 New Demand

During any declared water shortage emergency requiring mandatory rationing, CLWA and the retail purveyors recommend that the City and County building departments continue to process applications for grading and building permits, but not issue the actual permits until mandatory rationing is rescinded. In Stages 3 and 4, it may be necessary to discontinue all use of grading water, even if permits have been issued, and consider banning all use of water for non-essential uses, such as new landscaping and pools.

8.8 Penalties for Excessive Use

The following section provides a summary of the penalties, if any, that are implemented for excessive water use for SCWD, NCWD and VWC.

8.8.1 SCWD

In September 2009, the CLWA Board of Directors adopted Resolution No. 2678 establishing retail water rates that encourage the responsible use of water resources. These rates took effect January 1, 2010. For single family residential customers, SCWD implemented a three tiered rate structure allowing every customer the choice to use water efficiently or pay a premium. Excessive water use results in higher cost per unit of water. Irrigation customers have a separate uniform water rate comparable to the highest Tier 3 (conservation) rate for the single family. All other customers have a uniform flat rate equal to the Tier 2 rate for the single family.

This rate structure is designed to minimize water waste; other than the rate structure, there are no excessive use penalties in place.

8.8.2 NCWD

In July 2005, NCWD's Board of Directors adopted Ordinance No. 112, which addresses water conservation, shortage, drought and emergency response procedures. NCWD's Water Conservation Action Plan states that no water user shall waste water or make, cause or permit the use of water for any purpose contrary to any provision of Ordinance No. 112, or in quantities in excess of the use permitted by the conservation stage in effect. If excessive use (water leaks and/or waste) is detected from any water user, the following enforcement plan will be followed:

- **Efficient Water Use and Stage 1 Enforcement:**
  - Any sign of water leaks and/or waste will be documented.
  - NCWD will then determine the appropriate level of action to inform the water user of the guidelines in Ordinance No. 112 and will encourage more efficient water use.

- **Stages 2, 3, and 4 Enforcement:**
  - First Violation: NCWD shall issue a verbal warning to the water user and recommend corrective action.
  - Second Violation: NCWD shall issue a written warning to the water user, and a fine of $40 shall be added to the water user's bill if the corrective action is not taken within 30 days after receiving the written warning.
  - Third Violation: A fine of $100 shall be added to the water user's bill if the corrective action is not taken within 30 days after receiving the written warning. In addition, the NCWD Board or General Manager may require installation of a flow-restricting device on the water user's service connection.
  - Fourth Violation: For the fourth and any additional violations, a fine of $250 shall be added to the water user's bill at the property where the violation occurred. NCWD may also discontinue the water user's water service at the property where the violation occurred. Reconnection shall be permitted only when there is reasonable protection against future violations, such as a flow-restricting device on the customer's service connection, as determined at NCWD's discretion.

- **NCWD Enforcement Costs:**
  - NCWD shall be reimbursed for its costs and expenses in enforcing the provisions of Ordinance No. 112, including costs incurred for staff to investigate and monitor the water user's compliance with the terms of the Ordinance. Charges for installation of flow-restricting devices or for discontinuing or restoring water service, as NCWD incurs those charges, shall be added to the water user's bill at the property where the enforcement costs were incurred.

8.8.3 VWC

VWC is regulated by the PUC. During times of threatened or actual water shortage, the PUC will require that VWC apportion its available water supply among its customers. In the absence of direction from the PUC, VWC will apportion the supply in the manner that appears most equitable under circumstances then prevailing and with the cooperation of the Valley water purveyors with due regard to public health and safety.

The PUC's methodology for water utilities to implement Water Conservation Plans is documented in Standard Practice U-40-W, "Instructions for Water Conservation, Rationing, and Service Connection Moratoria." Water shortage contingency plans must be approved by the PUC prior to implementation by VWC. As stated in the Standard Practice U-40-W, the PUC shall authorize mandatory conservation and rationing by approving Schedule No. 14.1, Mandatory Water Conservation and Rationing. Schedule No. 14.1 sets forth water use violation fines, charges for removal of flow restrictors, and the period during which mandatory conservation and rationing measures will be in effect.

8.9 Financial Impacts of Actions During Shortages

The following section addresses the financial impacts of actions during water shortages for SCWD, NCWD and VWC.

8.9.1 SCWD

SCWD's rates were developed to meet the cost of service. The retail water bill includes two components: a meter service charge and a commodity charge. For the FY 2010/11 Budget, the meter service charge accounts for 31 percent of SCWD's revenues and the commodity charge accounts for 69 percent of SCWD's revenues. The meter service charge is fixed and is based on the meter size. The commodity charge is variable and includes the cost for water consumption and pass-through charges for purchased water and electricity for pumping. Variable costs increase or decrease in direct proportion with the increase or decrease of water used by customers. Customers who use more water will pay a proportionately higher percentage of these costs.

Approximately 44 percent of SCWD's expenses are variable and will be reduced proportionately with any reduction of sales. Since 69 percent of SCWD's revenues are estimated to come from the commodity charges, a supply reduction of 25 percent or more would affect the financial stability of SCWD and impact its ability to meet payment obligations. A Rate Stabilization Fund was established in January 2004 and is to be funded over a ten year period. This fund is to be used when there are variations in water sales resulting from unusual seasons, major consumption reduction due to voluntary or mandatory conservation or to correct for a net loss of revenues in the event of a catastrophic loss of imported water supplies. The Rate Stabilization Fund is used to defer rate increases due to temporary reductions in water sales. Currently the Rate Stabilization Fund is set at 2 percent of annual revenues.

8.9.2 NCWD

NCWD's rates are designed with the intent that NCWD will generate adequate revenues to meet the costs of operating the water system. For FY 2010/11, it is expected that 28 percent of NCWD's total water revenues will come from the service charge and about 72 percent of the total revenues will come from the commodity charge. The service charge is based on meter size and the commodity charge is based on the quantity of water consumed.

The nature of NCWD's operation (as with any water utility) is that the majority of the operating costs are fixed in nature and do not increase or decrease in direct proportion with increases or decreases in water use by customers. For NCWD, fixed costs constitute about 57 percent of its total operating costs in a normal year. If water availability issues or shortages cause NCWD to request a voluntary reduction in the customer's water use, 57 percent of the operating costs will remain the same even though less water is sold. This would result in a substantial revenue shortfall.

In an effort to address this shortfall, NCWD established a reserve policy (Resolution 2009-10) that includes a "rate stabilization" fund to be used in situations where actual consumption of water is reduced as a direct result of a water shortage situation as defined in Table 8-1 of this Plan.

In the event of a declaration of a water shortage situation, NCWD's Board of Directors will consider options and actions intended to replenish the rate stabilization reserve to its ideal level. These actions may include but are not limited to rate increases or surcharges, per customer assessments and utilization of other reserve funds.

8.9.3 VWC

The PUC allows the investor owned water utilities it regulates to track and seek recovery of lost revenues and expense increases due to mandatory or voluntary water rationing during a drought. PUC regulated utilities' rates are set based on an assumed level of customer water usage during normal weather conditions. Therefore, when a drought occurs and customers conserve water, a utility's revenue declines and it is difficult for the utility to fully fund its operating expenses. In order to provide an incentive for utilities to promote water conservation during periods of drought, the PUC developed a mechanism whereby utilities can track lost revenues, net of reduced water production costs, as well as increases in expenses due to drought conditions. Utilities can then recover a portion of their lost revenues and expense increases via a surcharge to customers. This reduces the financial strain conservation programs place on investor owned utilities while furthering the statewide goal of water conservation during periods of drought.

8.10 Water Shortage Contingency Resolution

If a water shortage crisis reoccurs, such as the 1987-1992 drought, the Santa Clarita Valley water suppliers would call a public hearing to declare a water shortage pursuant to Sections 351 and 352 of the California Water Code.

The Los Angeles County Board of Supervisors (on behalf of LACWWD 36) and NCWD's and CLWA's (including SCWD) respective Boards of Directors would adopt ordinances, similar to those adopted in 1991, implementing the Water Shortage Contingency Plan. In February 1991 the CLWA Board of Directors adopted Resolution No. 804, which recognized reductions in requested delivery of SWP supply and mandated water conservation in the Valley.

VWC would file an advice letter with the CPUC implementing the Water Shortage Contingency Plan. The Water Shortage Contingency would become VWC's Schedule 14.1.

8.11 Mechanism to Determine Reductions in Water Use

8.11.1 Demand

NCWD, SCWD, and VWC bill their customers on a monthly basis. The prior year's consumption is included on most customer bills. This allows comparison of the total consumption from each billing period to the same billing period from the prior year.

8.11.2 Production

Under normal conditions, CLWA, NCWD, SCWD, and VWC prepare monthly production reports, which are reviewed and compared to production reports and pumping statistics from the same period of the prior year. Under water shortage conditions, these production reports could be prepared as often as daily.

8.11.3 Stage 1 and 2 Water Shortages

During Stages 1 and 2 Water Shortages, retail purveyors would review selected production reports on a daily basis, and CLWA would provide each retail purveyor with a copy of its daily

production report. The water suppliers would meet as frequent a basis as necessary to review water supply and demand in the Valley. Billing reports would be reviewed to identify users who are not abiding by the plan.

8.11.4 Stage 3 and 4 Water Shortages

During Stages 3 and 4 Water Shortages, the retail purveyors would review all production reports and pumping statistics on a daily basis. The water suppliers would continue to monitor the supply and demand in the Valley. Water transfers and agreements to use each other's distribution facilities would be implemented as needed. Billing reports would be reviewed to identify users who are not abiding by the plan.

8.11.5 Disaster Shortage

During a disaster shortage, the Santa Clarita Valley water suppliers would continually monitor production figures, and will work to transfer water and use each other's distribution facilities where feasible.

Section 9: References

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Appendix A

DWR Checklist

APPENDIX A
Urban Water Management Plan Checklist (Organized by Legislation)

No.	UWMP requirement [a]	Calif. Water Code Reference	UWMP Location by Retail Purveyor			
			Castaic Lake Water Agency	Newhall County Water District	CLWA Santa Clarita Water Division	Valencia Water Company
1	Provide baseline daily per capita water use, urban water use target, interim urban water use target, and compliance daily per capita water use, along with the bases for determining those estimates, including references to supporting data.	10608.20(e)	NA, Wholesale District	2.6.2, Tables 2-15 & 2-16, pgs 2-18 & 2-19	2.6.2, Tables 2-17 & 2-18, pg 2-19	2.6.2, Tables 2-19 & 2-20, pg 2-20
2	*Wholesalers:* Include an assessment of present and proposed future measures, programs, and policies to help achieve the water use reductions. *Retailers:* Conduct at least one public hearing that includes general discussion of the urban retail water supplier's implementation plan for complying with the Water Conservation Bill of 2009.	10608.36 10608.26(a)	7.2, 7.3	1.3.3, Table 1-2, 7.6.3, pgs 1-6 to 1-8 & 7-32 to 7-34	1.3.3, Table 1-2, 7.4.3, pgs 1-6 to 1-8 & 7-11 to 7-14	1.3.3, Table 1-2, 7.5.3, pgs 1-6 to 1-8 & 7-23 to 7-26
3	Report progress in meeting urban water use targets using the standardized form.	10608.4	NA	NA	NA	NA
4	Each urban water supplier shall coordinate the preparation of its plan with other appropriate agencies in the area, including other water suppliers that share a common source, water management agencies, and relevant public agencies, to the extent practicable.	10620(d)(2)	1.3.1 & 1.3.3, Table 1-1, pgs 1-3 to 1-8	1.3.1 & 1.3.3, Table 1-1, pgs 1-3 to 1-8	1.3.1 & 1.3.3, Table 1-1, pgs 1-3 to 1-8	1.3.1 & 1.3.3, Table 1-1, pgs 1-3 to 1-8
5	An urban water supplier shall describe in the plan water management tools and options used by that entity that will maximize resources and minimize the need to import water from other regions.	10620(f)	1.3.4, pg 1-8	1.3.4, pg 1-8	1.3.4, pg 1-8	1.3.4, pg 1-8
6	Every urban water supplier required to prepare a plan pursuant to this part shall, at least 60 days prior to the public hearing on the plan required by Section 10642, notify any city or county within which the supplier provides water supplies that the urban water supplier will be reviewing the plan and considering amendments or changes to the plan. The urban water supplier may consult with, and obtain comments from, any city or county that receives notice pursuant to this subdivision.	10621(b)	1.3.3, Table 1-1, pgs 1-3 to 1-8, Appendix B	1.3.3, Table 1-1, pgs 1-3 to 1-8, Appendix B	1.3.3, Table 1-1, pgs 1-3 to 1-8, Appendix B	1.3.3, Table 1-1, pgs 1-3 to 1-8, Appendix B
7	The amendments to, or changes in, the plan shall be adopted and filed in the manner set forth in Article 3 (commencing with Section 10640).	10621(c)	1.3.1 & 1.3.3, Table 1-1, pgs 1-3 to 1-8	1.3.1 & 1.3.3, Table 1-1, pgs 1-3 to 1-8	1.3.1 & 1.3.3, Table 1-1, pgs 1-3 to 1-8	1.3.1 & 1.3.3, Table 1-1, pgs 1-3 to 1-8
8	Describe the service area of the supplier	10631(a)	1.4.1, Fig. 1-1, pgs 1-8 to 1-11	1.4.2, Fig. 1-1, pgs 1-10 to 1-11	1.4.2, Fig. 1-1, pgs 1-10 to 1-11	1.4.2, Fig. 1-1, pgs 1-10 to 1-11
9	(Describe the service area) climate	10631(a)	1.5, Table 1-4, pgs 1-12 to 1-13	1.5, Table 1-4, pgs 1-12 to 1-13	1.5, Table 1-4, pgs 1-12 to 1-13	1.5, Table 1-4, pgs 1-12 to 1-13
10	(Describe the service area) current and projected population . . . The projected population estimates shall be based upon data from the state, regional, or local service agency population projections within the service area of the urban water supplier . . .	10631(a)	2.5; Tables 2-7, 2-8, & 2-9; pgs 2-9 to 2-14	2.5; Tables 2-7, 2-8, & 2-9; pgs 2-9 to 2-14	2.5; Tables 2-7, 2-8, & 2-9; pgs 2-9 to 2-14	2.5; Tables 2-7, 2-8, & 2-9; pgs 2-9 to 2-14
11	. . . (population projections) shall be in five-year increments to 20 years or as far as data is available.	10631(a)	Table 2-9, pg 2-13	Table 2-9, pg 2-13	Table 2-9, pg 2-13	Table 2-9, pg 2-13
12	Describe . . . other demographic factors affecting the supplier's water management planning	10631(a)	2.2, pgs 2-1 to 2-2	2.2, pgs 2-1 to 2-2	2.2, pgs 2-1 to 2-2	2.2, pgs 2-1 to 2-2

APPENDIX A
Urban Water Management Plan Checklist (Organized by Legislation)

No.	UWMP requirement [a]	Calif. Water Code Reference	UWMP Location by Retail Purveyor			
			Castaic Lake Water Agency	Newhall County Water District	CLWA Santa Clarita Water Division	Valencia Water Company
13	Identify and quantify, to the extent practicable, the existing and planned sources of water available to the supplier over the same five-year increments described in subdivision (a).	10631(b)	Table 3-1, pg 3-2	Table 3-1, pg 3-2	Table 3-1, pg 3-2	Table 3-1, pg 3-2
14	(Is) groundwater . . . identified as an existing or planned source of water available to the supplier . . .?	10631(b)	□3.3, pgs 3-15 to 3-37	□3.3, pgs 3-15 to 3-37	□3.3, pgs 3-15 to 3-37	□3.3, pgs 3-15 to 3-37
15	(Provide a) copy of any groundwater management plan adopted by the urban water supplier, including plans adopted pursuant to Part 2.75 (commencing with Section 10750), or any other specific authorization for groundwater management. Indicate whether a groundwater management plan been adopted by the water supplier or if there is any other specific authorization for groundwater management. Include a copy of the plan or authorization.	10631(b)(1)	Appendix G, □3.3.2, pg 3-15	Appendix G, □3.3.2, pg 3-15	Appendix G, □3.3.2, pg 3-15	Appendix G, □3.3.2, pg 3-15
16	(Provide a) description of any groundwater basin or basins from which the urban water supplier pumps groundwater.	10631(b)(2)	□□3.3.1 & 3.3.2, Fig. 3-1, pgs 3-15 to 3-33	□□3.3.1 & 3.3.2, Fig. 3-1, pgs 3-15 to 3-33	□□3.3.1 & 3.3.2, Fig. 3-1, pgs 3-15 to 3-33	□□3.3.1 & 3.3.2, Fig. 3-1, pgs 3-15 to 3-33
17	For those basins for which a court or the board has adjudicated the rights to pump groundwater, (provide) a copy of the order or decree adopted by the court or the board	10631(b)(2)	NA	NA	NA	NA
18	(Provide) a description of the amount of groundwater the urban water supplier has the legal right to pump under the order or decree.	10631(b)(2)	NA	NA	NA	NA
19	For basins that have not been adjudicated, (provide) information as to whether the department has identified the basin or basins as overdrafted or has projected that the basin will become overdrafted if present management conditions continue, in the most current official departmental bulletin that characterizes the condition of the groundwater basin, and a detailed description of the efforts being undertaken by the urban water supplier to eliminate the long-term overdraft condition.	10631(b)(2)	□3.3.2, pgs 3-15 to 3-33	□3.3.2, pgs 3-15 to 3-33	□3.3.2, pgs 3-15 to 3-33	□3.3.2, pgs 3-15 to 3-33
20	(Provide a) detailed description and analysis of the location, amount, and sufficiency of groundwater pumped by the urban water supplier for the past five years. The description and analysis shall be based on information that is reasonably available, including, but not limited to, historic use records.	10631(b)(3)	□□3.3.2.2 & 3.3.2.3; Table 3-6; pgs 3-22, 3-24 to 3-33	□□3.3.2.2 & 3.3.2.3; Table 3-6; pgs 3-22, 3-24 to 3-33	□□3.3.2.2 & 3.3.2.3; Table 3-6; pgs 3-22, 3-24 to 3-33	□□3.3.2.2 & 3.3.2.3; Table 3-6; pgs 3-22, 3-24 to 3-33
21	(Provide a) detailed description and analysis of the amount and location of groundwater that is projected to be pumped by the urban water supplier. The description and analysis shall be based on information that is reasonably available, including, but not limited to, historic use records.	10631(b)(4)	□3.3.2; Tables 3-5 & 3-7; pgs 3-15 to 3-33	□3.3.2; Tables 3-5 & 3-7; pgs 3-15 to 3-33	□3.3.2; Tables 3-5 & 3-7; pgs 3-15 to 3-33	□3.3.2; Tables 3-5 & 3-7; pgs 3-15 to 3-33
22	Describe the reliability of the water supply and vulnerability to seasonal or climatic shortage, to the extent practicable, and provide data for each of the following: (A) An average water year, (B) A single dry water year, (C) Multiple dry water years.	10631(c)(1)	□□3.2.1.1.3, 3.2.1.2; pgs 3-5 to 3-9, □□3.3.2.2, 3.3.2.3, 6.4.1, 6.4.2, 6.4.3; pgs 3-24 to 3-33 & 6-6 to 6-14, Appendix C	□□3.2.1.1.3, 3.2.1.2; pgs 3-5 to 3-9, □□3.3.2.2, 3.3.2.3, 6.4.1, 6.4.2, 6.4.3; pgs 3-24 to 3-33 & 6-6 to 6-14, Appendix C	□□3.2.1.1.3, 3.2.1.2; pgs 3-5 to 3-9, □□3.3.2.2, 3.3.2.3, 6.4.1, 6.4.2, 6.4.3; pgs 3-24 to 3-33 & 6-6 to 6-14, Appendix C	□□3.2.1.1.3, 3.2.1.2; pgs 3-5 to 3-9, □□3.3.2.2, 3.3.2.3, 6.4.1, 6.4.2, 6.4.3; pgs 3-24 to 3-33 & 6-6 to 6-14, Appendix C

APPENDIX A
Urban Water Management Plan Checklist (Organized by Legislation)

No.	UWMP requirement [a]	Calif. Water Code Reference	UWMP Location by Retail Purveyor			
			Castaic Lake Water Agency	Newhall County Water District	CLWA Santa Clarita Water Division	Valencia Water Company
23	For any water source that may not be available at a consistent level of use - given specific legal, environmental, water quality, or climatic factors - describe plans to supplement or replace that source with alternative sources or water demand management measures, to the extent practicable.	10631(c)(2)	3.3.2.2, 3.3.2.3; pgs 3-28 to 3-29, 3-33, 5.7; pgs 5-12 to 5-13; 6.2; pgs 6-1 to 6-2	3.3.2.2, 3.3.2.3; pgs 3-28 to 3-29, 3-33, 5.7; pgs 5-12 to 5-13; 6.2; pgs 6-1 to 6-2	3.3.2.2, 3.3.2.3; pgs 3-28 to 3-29, 3-33, 5.7; pgs 5-12 to 5-13; 6.2; pgs 6-1 to 6-2	3.3.2.2, 3.3.2.3; pgs 3-28 to 3-29, 3-33, 5.7; pgs 5-12 to 5-13; 6.2; pgs 6-1 to 6-2
24	Describe the opportunities for exchanges or transfers of water on a short-term or long-term basis.	10631(d)	3.4, pgs 3-37 & 3-38	3.4, pgs 3-37 & 3-38	3.4, pgs 3-37 & 3-38	3.4, pgs 3-37 & 3-38
25	Quantify, to the extent records are available, past and current water use, and projected water use (over the same five-year increments described in subdivision (a)), identifying the uses among water use sectors, including, but not necessarily limited to, all of the following uses: (A) Single-family residential; (B) Multifamily; (C) Commercial; (D) Industrial; (E) Institutional and governmental; (F) Landscape; (G) Sales to other agencies; (H) Saline water intrusion barriers, groundwater recharge, or conjunctive use, or any combination thereof;(I) Agricultural.	10631(e)(1)	NA	2.4.1, Table 2-4, pg 2-6	2.4.1, Table 2-5, pg 2-7	2.4.1, Table 2-6, pg 2-8
26	(Describe and provide a schedule of implementation for) each water demand management measure that is currently being implemented, or scheduled for implementation, including the steps necessary to implement any proposed measures, including, but not limited to, all of the following: (A) Water survey programs for single-family residential and multifamily residential customers; (B) Residential plumbing retrofit; (C) System water audits, leak detection, and repair; (D) Metering with commodity rates for all new connections and retrofit of existing connections; (E) Large landscape conservation programs and incentives; (F) High-efficiency washing machine rebate programs; (G) Public information programs; (H) School education programs; (I) Conservation programs for commercial, industrial, and institutional accounts; (J) Wholesale agency programs; (K) Conservation pricing; (L) Water conservation coordinator; (M) Water waste prohibition;(N) Residential ultra-low-flush toilet replacement programs.	10631(f)(1)	7.2 & 7.3, pgs 7-2 to 7-5	7.6, pgs 7-26 to 7-34	7.4, pgs 7-6 to 7-14	7.5, pgs 7-14 to 7-26
27	A description of the methods, if any, that the supplier will use to evaluate the effectiveness of water demand management measures implemented or described under the plan.	10631(f)(3)	7.2 & 7.3, pgs 7-2 to 7-5	7.6.3, pg 7-34	7.4.3, pg 7-14	7.5.3, pg 7-26
28	An estimate, if available, of existing conservation savings on water use within the supplier's service area, and the effect of the savings on the supplier's ability to further reduce demand.	10631(f)(4)	7.2 & 7.3, pgs 7-2 to 7-5	7.6.3, pg 7-34	7.4.3, pg 7-14	7.5.2.3, pg 7-26
29	An evaluation of each water demand management measure listed in paragraph (1) of subdivision (f) that is not currently being implemented or scheduled for implementation. In the course of the evaluation, first consideration shall be given to water demand management measures, or combination of measures, that offer lower incremental costs than expanded or additional water supplies. This evaluation shall do all of the following: (1) Take into account economic and noneconomic factors, including environmental, social, health, customer impact, and technological factors; (2) Include a cost-benefit analysis, identifying total benefits and total costs; (3) Include a description of funding available to implement any planned water supply project that would provide water at a higher unit cost; (4) Include a description of the water supplier's legal authority to implement the measure and efforts to work with other relevant agencies to ensure the implementation of the measure and to share the cost of implementation.	10631(g)	7.2 & 7.3, pgs 7-2 to 7-5	7.6.2, pgs 7-29 to 7-32, NCWD is using GPCD approach to comply with CUWCC MOU	7.4.2, pgs 7-9 to 7-11, SCWD is using GPCD approach to comply with CUWCC MOU	7.5.2, pgs 7-18 to 7-23, VWC is using GPCD approach to comply with CUWCC MOU

APPENDIX A
Urban Water Management Plan Checklist (Organized by Legislation)

No.	UWMP requirement [a]	Calif. Water Code Reference	UWMP Location by Retail Purveyor			
			Castaic Lake Water Agency	Newhall County Water District	CLWA Santa Clarita Water Division	Valencia Water Company
30	(Describe) all water supply projects and water supply programs that may be undertaken by the urban water supplier to meet the total projected water use as established pursuant to subdivision (a) of Section 10635. The urban water supplier shall include a detailed description of expected future projects and programs, other than the demand management programs identified pursuant to paragraph (1) of subdivision (f), that the urban water supplier may implement to increase the amount of the water supply available to the urban water supplier in average, single-dry, and multiple-dry water years. The description shall identify specific projects and include a description of the increase in water supply that is expected to be available from each project. The description shall include an estimate with regard to the implementation timeline for each project or program.	10631(h)	3.4, 3.5, & 3.6; pgs 3-37 to 3-41; 4.4, Table 4-3, pgs 4-8 to 4-9	3.4, 3.5, & 3.6; pgs 3-37 to 3-41; 4.4, Table 4-3, pgs 4-8 to 4-9	3.4, 3.5, & 3.6; pgs 3-37 to 3-41; 4.4, Table 4-3, pgs 4-8 to 4-9	3.4, 3.5, & 3.6; pgs 3-37 to 3-41; 4.4, Table 4-3, pgs 4-8 to 4-9
31	Describe the opportunities for development of desalinated water, including, but not limited to, ocean water, brackish water, and groundwater, as a long-term supply.	10631(i)	3.7, pgs 3-41 to 3-42	3.7, pgs 3-41 to 3-42	3.7, pgs 3-41 to 3-42	3.7, pgs 3-41 to 3-42
32	Include the annual reports submitted to meet the Section 6.2 requirement (of the MOU), if a member of the CUWCC and signer of the December 10, 2008 MOU.	10631(j)	7, Appendix E	7	7	7
33	Urban water suppliers that rely upon a wholesale agency for a source of water shall provide the wholesale agency with water use projections from that agency for that source of water in five-year increments to 20 years or as far as data is available. The wholesale agency shall provide information to the urban water supplier for inclusion in the urban water supplier's plan that identifies and quantifies, to the extent practicable, the existing and planned sources of water as required by subdivision (b), available from the wholesale agency to the urban water supplier over the same five-year increments, and during various water-year types in accordance with subdivision (c). An urban water supplier may rely upon water supply information provided by the wholesale agency in fulfilling the plan informational requirements of subdivisions (b) and (c).	10631(k)	Table 3-4, pg 3-15	NA	NA	NA
34	The water use projections required by Section 10631 shall include projected water use for single-family and multifamily residential housing needed for lower income households, as defined in Section 50079.5 of the Health and Safety Code, as identified in the housing element of any city, county, or city and county in the service area of the supplier.	10631.1(a)	2.6.3.1, pg 2-23 to 2-24	2.6.3.1, Table 2-23, pgs 2-23 to 2-24	2.6.3.1, Table 2-23, pgs 2-23 to 2-24	2.6.3.1, Table 2-23, pgs 2-23 to 2-24
35	Stages of action to be undertaken by the urban water supplier in response to water supply shortages, including up to a 50 percent reduction in water supply, and an outline of specific water supply conditions which are applicable to each stage.	10632(a)	8.3, Table 8-1, pgs 8-1 to 8-3	8.3, Table 8-1, pgs 8-1 to 8-3	8.3, Table 8-1, pgs 8-1 to 8-3	8.3, Table 8-1, pgs 8-1 to 8-3
36	Provide an estimate of the minimum water supply available during each of the next three water years based on the driest three-year historic sequence for the agency's water supply.	10632(b)	8.4, Table 8-3, pg 8-3	8.4, Table 8-3, pg 8-3	8.4, Table 8-3, pg 8-3	8.4, Table 8-3, pg 8-3
37	(Identify) actions to be undertaken by the urban water supplier to prepare for, and implement during, a catastrophic interruption of water supplies including, but not limited to, a regional power outage, an earthquake, or other disaster.	10632(c)	8.5, pgs 8-4 to 8-12	8.5, pgs 8-4 to 8-12	8.5, pgs 8-4 to 8-12	8.5, pgs 8-4 to 8-12
38	(Identify) additional, mandatory prohibitions against specific water use practices during water shortages, including, but not limited to, prohibiting the use of potable water for street cleaning.	10632(d)	8.6, pg 8-12	8.6, pg 8-12	8.6, pg 8-12	8.6, pg 8-12
39	(Specify) consumption reduction methods in the most restrictive stages. Each urban water supplier may use any type of consumption reduction methods in its water shortage contingency analysis that would reduce water use, are appropriate for its area, and have the ability to achieve a water use reduction consistent with up to a 50 percent reduction in water supply.	10632(e)	8.7, pgs 8-13 to 8-14	8.7, pgs 8-13 to 8-14	8.7, pgs 8-13 to 8-14	8.7, pgs 8-13 to 8-14

APPENDIX A
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No.	UWMP requirement [a]	Calif. Water Code Reference	UWMP Location by Retail Purveyor			
			Castaic Lake Water Agency	Newhall County Water District	CLWA Santa Clarita Water Division	Valencia Water Company
40	(Indicated) penalties or charges for excessive use, where applicable.	10632(f)	8.8.1, pg 8-14	8.8.2, pgs 8-14 to 8-15	8.8.1, pg 8-14	8.8.3, pg 8-15
41	An analysis of the impacts of each of the actions and conditions described in subdivisions (a) to (f), inclusive, on the revenues and expenditures of the urban water supplier, and proposed measures to overcome those impacts, such as the development of reserves and rate adjustments.	10632(g)	Appendix F	8.9.2, pg 8-16	8.9.1, pg 8-15 to 8-16	8.9.3, pg 8-16
42	(Provide) a draft water shortage contingency resolution or ordinance.	10632(h)	Appendix F	Appendix F	Appendix F	Appendix F
43	(Indicate) a mechanism for determining actual reductions in water use pursuant to the urban water shortage contingency analysis.	10632(i)	8.11, pgs 8-17 to 8-18	8.11, pgs 8-17 to 8-18	8.11, pgs 8-17 to 8-18	8.11, pgs 8-17 to 8-18
44	Provide, to the extent available, information on recycled water and its potential for use as a water source in the service area of the urban water supplier. The preparation of the plan shall be coordinated with local water, wastewater, groundwater, and planning agencies that operate within the supplier's service area	10633	4.4, Table 4-3, pgs 4-8 to 4-9	4.4, Table 4-3, pgs 4-8 to 4-9	4.4, Table 4-3, pgs 4-8 to 4-9	4.4, Table 4-3, pgs 4-8 to 4-9
45	(Describe) the wastewater collection and treatment systems in the supplier's service area, including a quantification of the amount of wastewater collected and treated and the methods of wastewater disposal.	10633(a)	4.2, pgs 4-4 to 4-5	4.2, pgs 4-4 to 4-5	4.2, pgs 4-4 to 4-5	4.2, pgs 4-4 to 4-5
46	(Describe) the quantity of treated wastewater that meets recycled water standards, is being discharged, and is otherwise available for use in a recycled water project.	10633(b)	4.2, Table 4-3, pgs 4-4 to 4-5 and 4-9	4.2, Table 4-3, pgs 4-4 to 4-5 and 4-9	4.2, Table 4-3, pgs 4-4 to 4-5 and 4-9	4.2, Table 4-3, pgs 4-4 to 4-5 and 4-9
47	(Describe) the recycled water currently being used in the supplier's service area, including, but not limited to, the type, place, and quantity of use.	10633(c)	4.2 and 4.7, pgs 4-4 to 4-5 & 4-13	4.2 and 4.7, pgs 4-4 to 4-5 & 4-13	4.2 and 4.7, pgs 4-4 to 4-5 & 4-13	4.2 and 4.7, pgs 4-4 to 4-5 & 4-13
48	(Describe and quantify) the potential uses of recycled water, including, but not limited to, agricultural irrigation, landscape irrigation, wildlife habitat enhancement, wetlands, industrial reuse, groundwater recharge, indirect potable reuse, and other appropriate uses, and a determination with regard to the technical and economic feasibility of serving those uses.	10633(d)	4.6, pg 4-12	4.6, pg 4-12	4.6, pg 4-12	4.6, pg 4-12
49	(Describe) The projected use of recycled water within the supplier's service area at the end of 5, 10, 15, and 20 years, and a description of the actual use of recycled water in comparison to uses previously projected pursuant to this subdivision.	10633(e)	4.4 & 4.7, Table 4-3, pgs 4-8 to 4-11 & 4-13	4.4 & 4.7, Table 4-3, pgs 4-8 to 4-11 & 4-13	4.4 & 4.7, Table 4-3, pgs 4-8 to 4-11 & 4-13	4.4 & 4.7, Table 4-3, pgs 4-8 to 4-11 & 4-13
50	(Describe the) actions, including financial incentives, which may be taken to encourage the use of recycled water, and the projected results of these actions in terms of acre-feet of recycled water used per year.	10633(f)	4.8, pg 4-13	4.8, pg 4-13	4.8, pg 4-13	4.8, pg 4-13
51	(Provide a) plan for optimizing the use of recycled water in the supplier's service area, including actions to facilitate the installation of dual distribution systems, to promote recirculating uses, to facilitate the increased use of treated wastewater that meets recycled water standards, and to overcome any obstacles to achieving that increased use.	10633(g)	4.4.1, pgs 4-11 to 4-12, 4.9, pgs 4-13 to 4-14, 4.10, pgs 4-15 to 4-19	4.4.1, pgs 4-11 to 4-12, 4.9, pgs 4-13 to 4-14, 4.10, pgs 4-15 to 4-19	4.4.1, pgs 4-11 to 4-12, 4.9, pgs 4-13 to 4-14, 4.10, pgs 4-15 to 4-19	4.4.1, pgs 4-11 to 4-12, 4.9, pgs 4-13 to 4-14, 4.10, pgs 4-15 to 4-19
52	The plan shall include information, to the extent practicable, relating to the quality of existing sources of water available to the supplier over the same five-year increments as described in subdivision (a) of Section 10631, and the manner in which water quality affects water management strategies and supply reliability.	10634	5.7, Table 5-2, pg 5-12-13, Appendix I	5.7, Table 5-2, pg 5-12-13, Appendix I	5.7, Table 5-2, pg 5-12-13, Appendix I	5.7, Table 5-2, pg 5-12-13, Appendix I

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No.	UWMP requirement [a]	Calif. Water Code Reference	UWMP Location by Retail Purveyor			
			Castaic Lake Water Agency	Newhall County Water District	CLWA Santa Clarita Water Division	Valencia Water Company
53	Every urban water supplier shall include, as part of its urban water management plan, an assessment of the reliability of its water service to its customers during normal, dry, and multiple dry water years. This water supply and demand assessment shall compare the total water supply sources available to the water supplier with the total projected water use over the next 20 years, in five-year increments, for a normal water year, a single dry water year, and multiple dry water years. The water service reliability assessment shall be based upon the information compiled pursuant to Section 10631, including available data from state, regional, or local agency population projections within the service area of the urban water supplier.	10635(a)	6.4, Tables 6-2 to 6-4, pgs 6-6 to 6-15, Appendix C	6.4, Tables 6-2 to 6-4, pgs 6-6 to 6-15, Appendix C	6.4, Tables 6-2 to 6-4, pgs 6-6 to 6-15, Appendix C	6.4, Tables 6-2 to 6-4, pgs 6-6 to 6-15, Appendix C
54	The urban water supplier shall provide that portion of its urban water management plan prepared pursuant to this article to any city or county within which it provides water supplies no later than 60 days after the submission of its urban water management plan.	10635(b)	1.3.3, pgs 1-6 to 1-8, Appendix B	1.3.3, pgs 1-6 to 1-8, Appendix B	1.3.3, pgs 1-6 to 1-8, Appendix B	1.3.3, pgs 1-6 to 1-8, Appendix B
55	Each urban water supplier shall encourage the active involvement of diverse social, cultural, and economic elements of the population within the service area prior to and during the preparation of the plan.	10642	1.3.1 &1.3.3, Table 1-2, pgs 1-3 to 1-8	1.3.1 &1.3.3, Table 1-2, pgs 1-3 to 1-8	1.3.1 &1.3.3, Table 1-2, pgs 1-3 to 1-8	1.3.1 &1.3.3, Table 1-2, pgs 1-3 to 1-8
56	Prior to adopting a plan, the urban water supplier shall make the plan available for public inspection and shall hold a public hearing thereon. Prior to the hearing, notice of the time and place of hearing shall be published within the jurisdiction of the publicly owned water supplier pursuant to Section 6066 of the Government Code. The urban water supplier shall provide notice of the time and place of hearing to any city or county within which the supplier provides water supplies. A privately owned water supplier shall provide an equivalent notice within its service area.	10642	1.3.1 & 1.3.3, Table 1-2, pgs 1-3 to 1-8, Appendix B	1.3.1 & 1.3.3, Table 1-2, pgs 1-3 to 1-8, Appendix B	1.3.1 & 1.3.3, Table 1-2, pgs 1-3 to 1-8, Appendix B	1.3.1 & 1.3.3, Table 1-2, pgs 1-3 to 1-8, Appendix B
57	After the hearing, the plan shall be adopted as prepared or as modified after the hearing.	10642	1.3.2, Table 1-2, pgs 1-6 to 1-7	1.3.2, Table 1-2, pgs 1-6 to 1-7	1.3.2, Table 1-2, pgs 1-6 to 1-7	1.3.2, Table 1-2, pgs 1-6 to 1-7
58	An urban water supplier shall implement its plan adopted pursuant to this chapter in accordance with the schedule set forth in its plan.	10643	1.3, pgs 1-3 to 1-8	1.3, pgs 1-3 to 1-8	1.3, pgs 1-3 to 1-8	1.3, pgs 1-3 to 1-8
59	An urban water supplier shall submit to the department, the California State Library, and any city or county within which the supplier provides water supplies a copy of its plan no later than 30 days after adoption. Copies of amendments or changes to the plans shall be submitted to the department, the California State Library, and any city or county within which the supplier provides water supplies within 30 days after adoption.	10644(a)	Table 1-2, pg 1-7	Table 1-2, pg 1-7	Table 1-2, pg 1-7	Table 1-2, pg 1-7
60	Not later than 30 days after filing a copy of its plan with the department, the urban water supplier and the department shall make the plan available for public review during normal business hours.	10645	1.3.3, pgs 1-6 to 1-8	1.3.3, pgs 1-6 to 1-8	1.3.3, pgs 1-6 to 1-8	1.3.3, pgs 1-6 to 1-8

Appendix B

Public Outreach Materials

Public Outreach Record

2010 Santa Clarita Valley
Urban Water Management Plan

Master List for 2010 SCV UWMP Notification of Workshops and Draft Availability

Jarrod Degonia Assemblymember Cameron Smyth 23734 Valencia Blvd. #303 Santa Clarita, CA 91355		Ernie Villegas Assemblymember Jeff Gorell 2659 Townsgate Road, Suite 236 Westlake Village, CA 91361
Dana Nielsen Assemblymember Audra Strickland 2659 Townsgate Road, Suite 236 Westlake Village, CA 91361		Kevin Korenthal Associated Builders & Contractors of CA; ABC-CCC 28005 Smyth Dr., Suite 129 Valencia, CA 91355
Holly Schroeder BIA - Los Angeles/Ventura Chapter 28480 Avenue Stanford, Suite 240 Santa Clarita, CA 91355		Sandy Sanchez BIA - Los Angeles/Ventura Chapter 28481 Avenue Stanford, Suite 240 Santa Clarita, CA 91355
David Inouye CA Department of Water Resources 770 Fairmont Avenue, Suite 102 Glendale, CA 91203-1035		Robert Kelly Castaic Area Town Council P.O. Box 325 Castaic, CA 91310
Mike Murphy City of Santa Clarita 23920 Valencia Blvd.#300 Santa Clarita, CA 91355		Jason Smisko City of Santa Clarita 23920 Valencia Blvd.#300 Valencia, CA 91355
Bruce Fortine College of the Canyons 24153 Tossano Drive Valencia, CA 91355-2010		Bob Haueter Congressman Howard McKeon 26650 The Old Road # 203 Santa Clarita, CA 91355
Chris Stephens County of Ventura Resource Management Agency 800 South Victoria Ave Ventura, CA 93009		Ron Bottorff Friends of the Santa Clara River 660 Randy Drive Newbury Park, CA 91320-3036

Mark Pestrella LA County Department of Public Works 900 South Fremont Ave Alhambra, CA 91803		Richard Bruckner LA County Department of Regional Planning 1390 Hall of Records, 320 West Temple Street Los Angeles, CA 90012
Jessica Bunker LA County WWD P.O. Box 1460 Alhambra, CA 91802-1460		Lynn Plambeck Santa Clarita Organization for Planning the Environment - SCOPE P.O. Box 1182 Canyon Country, CA 91386-1182
Robert Fleck Santa Clarita Valley Well Owners Association 16654 Soledad Canyon Road Santa Clarita, CA 91387		Terry Kingery SCV Chamber of Commerce 27451 Tourney Road, #160 Santa Clarita, CA 91355
Ed Masterson SCV Chamber of Commerce 27451 Tourney Road, #160 Santa Clarita, CA 91355		Sierra Club Angeles Chapter 3435 Wilshire Blvd # 320 Los Angeles, CA 90010-1904
Mark Butala Southern CA Association of Governments 818 W. Seventh Street, 12th Floor Los Angeles, CA 90017		Jackie Bick State Senator George Runner 23920 Valencia Blvd. Ste. 250 Santa Clarita, CA 91355
Jackie Bick State Senator Sharon Runner 23920 Valencia Blvd. Ste. 250 Santa Clarita, CA 91355		Scott Wilk Jr. State Senator Tony Strickland 2655 First St., Suite 230 Simi Valley, CA 93065
David Perry Supervisor Michael Antonovich, 5th District 23920 Valencia Blvd. # 265 Santa Clarita, CA 91355		Rosalind Wayman Supervisor Michael Antonovich, 5th District 23920 Valencia Blvd. # 265 Valencia, CA 91355

E. Michael Solomon United Water Conservation District 106 N 8th Street Santa Paula, CA 93060		Kathy Norris Valley Industrical Association of Santa Clarita (VIA) 25709 Rye Cyn Rd #105 Santa Clarita, CA 91355
Ron Mechsner West Ranch Town Council 25876 The Old Road #213 Stevenson Ranch, CA 91381		*** Orgs shaded above will receive letter return receipt requested

May 2010 UWMP Workshop
Public Outreach Record

2010 Santa Clarita Valley
Urban Water Management Plan

Stacy Miller
PUBLIC AFFAIRS
Creative Solutions to Complex Situations

May 10, 2010

«AddressBlock»

Subject: 2010 Urban Water Management Plan

«GreetingLine»

The Santa Clarita Valley's water agencies, Castaic Lake Water Agency, CLWA Santa Clarita Water Division, Newhall County Water District and Valencia Water Company have begun to prepare the 2010 Urban Water Management Plan (UWMP). The Urban Water Management Plan, mandated by the State of California, presents a picture of the valley's water situation through the year 2035. It describes the long-range water needs of the community and the means to supply the necessary water.

In an effort to ensure all interested parties are fully informed and involved in our process, we have scheduled the first of several community workshops as follows:

Date:	Tuesday, May 25, 2010
Time:	4:00 pm
Location:	Castaic Lake Water Agency 27234 Bouquet Canyon Road

The purpose of this kick-off workshop is to present an overview of the state requirements and outline of the contents of the 2010 Urban Water Management Plan. I encourage your participation and look forward to seeing you then. If you have any questions, please feel free to contact me.

Sincerely,

Stacy Miller
Public Outreach Manager
2010 SCV UWMP

Government Affairs, Public Relations & Communication
P.O. Box 55745, Valencia, CA 91385 [818] 402-5806 [661] 222-9733 Fax stacy@StacyMillerPA.com
www.StacyMillerPA.com

Santa Clarita Valley
2010 Urban Water Management Plan

Castaic Lake Water Agency
CLWA Santa Clarita Water Division
Newhall County Water District
Valencia Water Company

The Signal
5-18-10

Announce the preparation of the
2010 Urban Water Management Plan

The Urban Water Management Plan. mandated by the State of California, presents a picture of the valley's water situation through the year 2035. It describes the long-range water needs of the community and the means to supply the necessary water. We encourage your input, interest and involvement.

Kick Off Community Workshop

Date: **Tuesday, May 25, 2010**

Time: **4:00 pm**

Location: **Castaic Lake Water Agency**
27234 Bouquet Canyon Road

Purpose:

This kick-off workshop will present an overview of the state requirements and provide an outline of the content of the 2010 UWMP. Our team will provide an overview of the many opportunities for public comment and will also be available for questions. We encourage public participation and input.

For more information
please call (661) 297-1600

Castaic Lake Water Agency
CLWA Santa Clarita Water Division
Newhall County Water District
Valencia Water Company

Santa Clarita Valley
2010 Urban Water Management Plan

Castaic Lake Water Agency
CLWA Santa Clarita Water Division
Newhall County Water District
Valencia Water Company

The Signal
Sunday
5-23-2010

Announce the preparation of the
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Castaic Lake Water Agency
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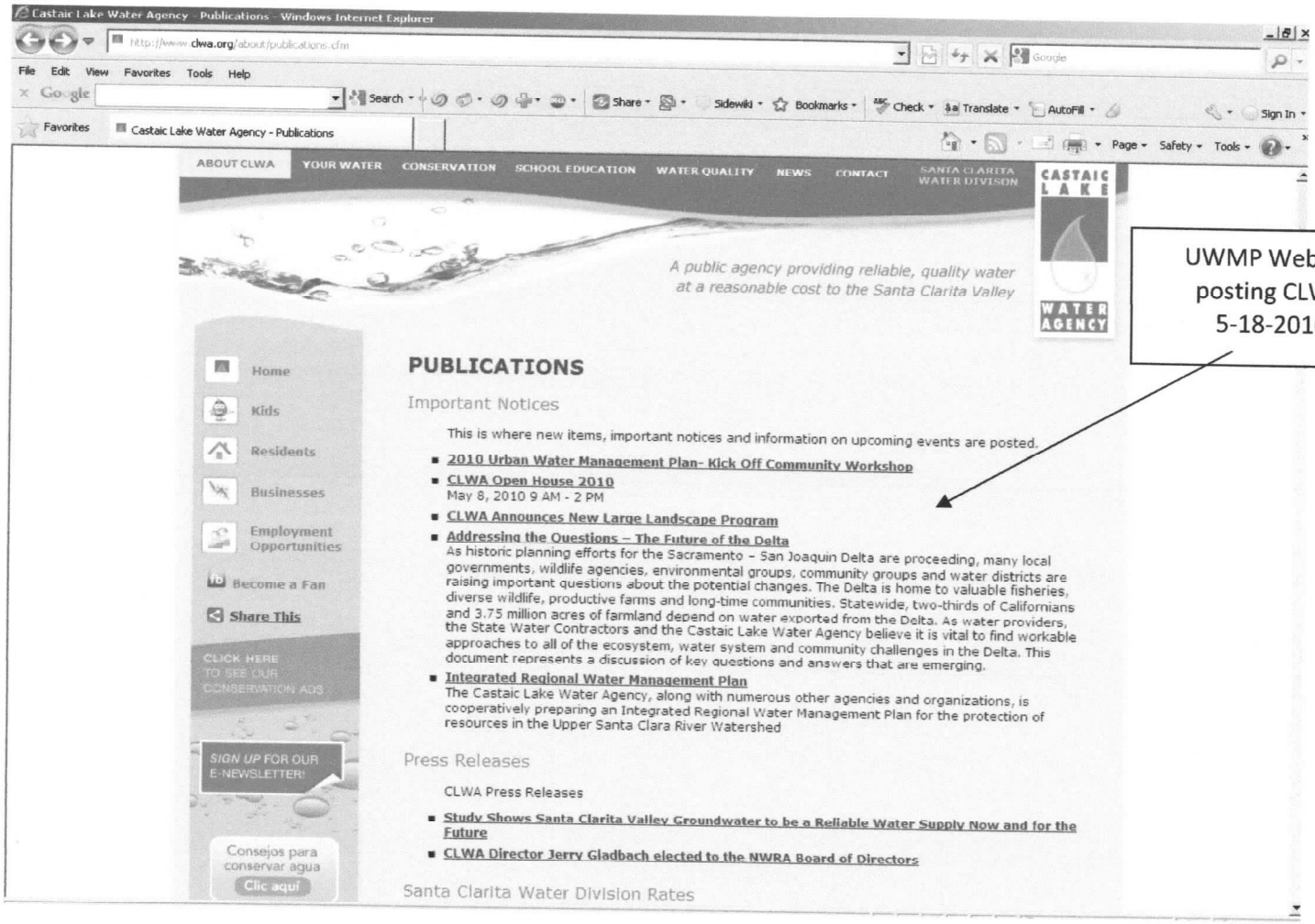
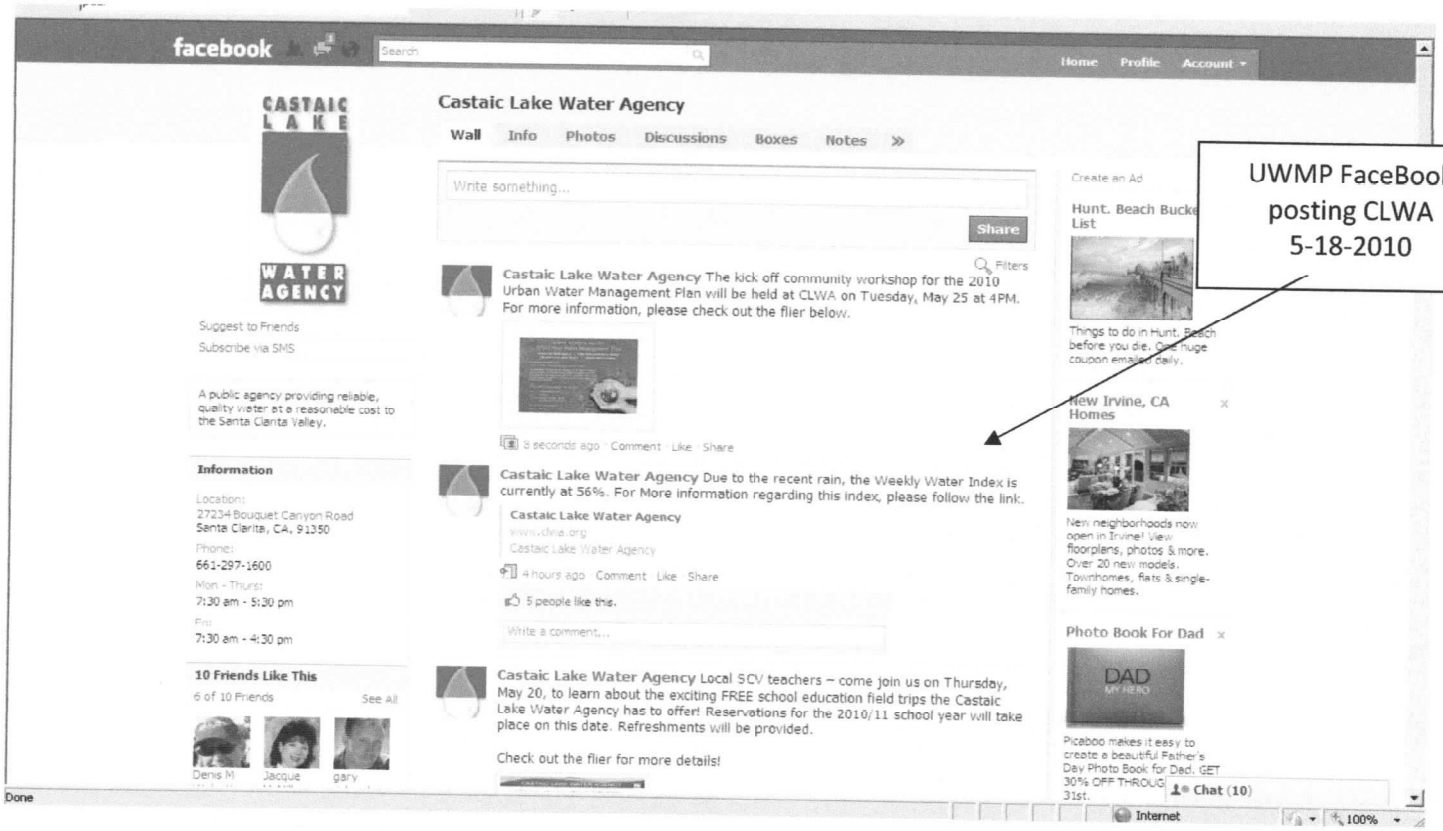
UWMP May 25, 2010 Kick-off workshop
CLWA website & FaceBook postings



UWMP Website posting CLWA 5-18-2010



UWMP FaceBook posting CLWA 5-18-2010

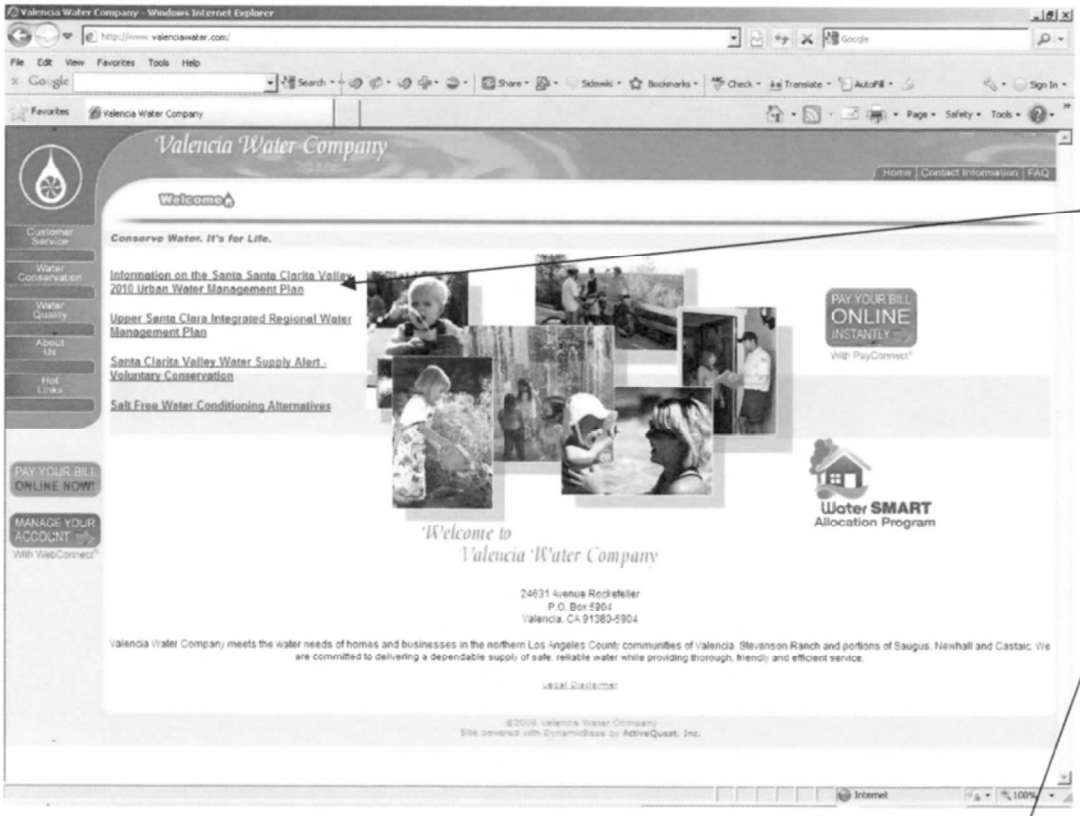
UWMP May 25, 2010 Kick-off workshop
Newhall County Water District Website & FaceBook posting

UWMP Website & FaceBook posting NCWD - 5-17-2010

UWMP May 25, 2010 Kick-off workshop
Santa Clarita Water Division (SCWD) website postings

Valencia Water Co Website Posting

May 25, 2010 - UWMP Kick Off Community Workshop



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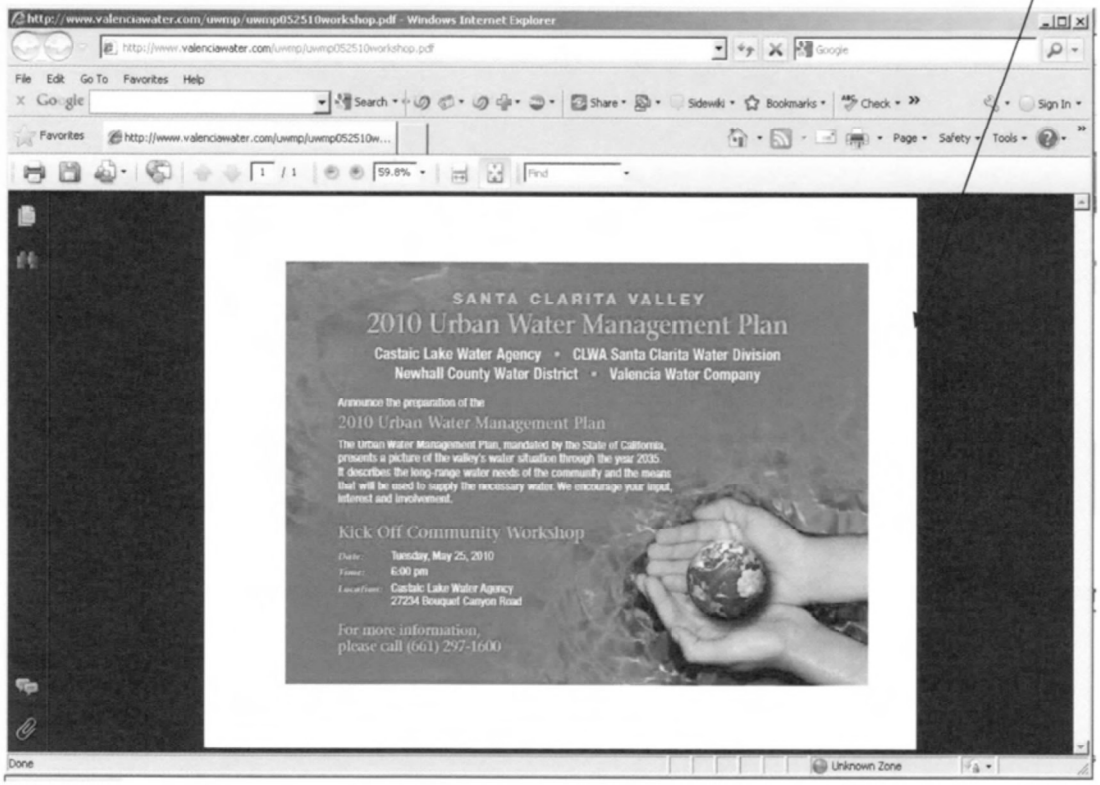
5-17-2010



SANTA CLARITA VALLEY

2010 Urban Water Management Plan

Castaic Lake Water Agency • CLWA Santa Clarita Water Division
Newhall County Water District • Valencia Water Company

Announce the preparation of the

2010 Urban Water Management Plan

The Urban Water Management Plan, mandated by the State of California, presents a picture of the valley's water situation through the year 2035. It describes the long-range water needs of the community and the means that will be used to supply the necessary water. We encourage your input, interest and involvement.

Kick Off Community Workshop

Date: Tuesday, May 25, 2010
Time: 4:00 pm
Location: Castaic Lake Water Agency
27234 Bouquet Canyon Road

For more information,
please call (661) 297-1600

UWMP Kick-Off Workshop Agenda

- Introductions
- What is an UWMP?
- Who is required to submit an UWMP?
- Why are UWMPs developed?
- When are the UWMPs developed?
- Existing and new requirements of UWMPs
- Q&A

Enduring Relationships - Trusted Expertise - Promises Delivered

What is an Urban Water Management Plan?

- An Urban Water Management Plan is a comprehensive planning process whereby urban water suppliers describe and evaluate sources of water supply, efficient uses of water, demand management measures, implementation strategy and schedule, and other relevant information and programs.

Enduring Relationships - Trusted Expertise - Promises Delivered

Who is required to prepare an UWMP?

- Publicly or privately owned water suppliers (including wholesalers), providing water for municipal purposes either directly or indirectly to more than 3,000 customers or supplying more than 3,000 acre-feet annually.

Enduring Relationships - Trusted Expertise - Promises Delivered

Why are UWMPs Developed?

- In adherence to the 1983 Urban Water Management Planning (UWMP) Act and subsequent legislation
- To develop a framework for agencies to integrate programs and projects that enhance the quality and quantity of regional water supplies
- To identify gaps between supply and demand through time (20-year analysis required)
- To provide detailed description of all supply sources (surface, recycled, groundwater)

Enduring Relationships - Trusted Expertise - Promises Delivered

Why are UWMPs Developed? (Cont'd.)

- To identify Demand Management Measures (water conservation programs)
- To address water quality issues
- To develop water shortage contingency planning
- To describe how demand will be met through time, in all hydrologic year types (normal, multiple dry, critical dry)

Enduring Relationships - Trusted Expertise - Promises Delivered

When are UWMP Plans Developed?

- Suppliers are required to update UWMP every five-years (years ending in 0 or 5).
- 2010 – current update
- July 1, 2011 for retailers (SBx7-7 extended UWMP deadline for retailers but silent on extension for wholesalers.)
  - Under current UWMP Act, wholesalers should complete UWMP by December 31, 2010. But "cleanup legislation" (AB 2776 and SB 1478) anticipated that will extend deadline to July 1, 2011 for wholesalers.

Coordination and Notification Requirements

"Each urban water supplier shall coordinate the preparation of its plan with other appropriate agencies in the area, including other water suppliers that share a common source, water management agencies, and relevant public agencies, to the extent practical."

Coordination and Notification Requirements

Other:

- Must hold public hearing prior to adoption of UWMP
- Must give cities and counties in service area 60 days notice prior to public hearing
- Must provide cities and counties and LAFCO in service area with copies of UWMP within 30 days of adoption

Penalties

- Ineligible for State Grant and Loan Funding (at least until plan is completed to DWR satisfaction)

What, Who, Why, When, etc…

- Q&A/Discussion

New Requirements for 2010 UWMP

- New Law: SBX7-7 ("20% x 2020"), reporting starts with 2010 UWMPs
  - Base gross water use in gpcd: must be calculated using one of three methodologies
  - Target reduction from base by 2020: reporting requirements differ for retailers vs. wholesalers
  - Must be calculated using one of four methodologies
  - Agencies must hold public hearing to explain how targets will be met (can be held as part of UWMP hearing)

New UWMP Requirements

- Base gross water use in gpcd: calculation

  Total volume of water (treated or not) entering the retail distribution system, divided by the total population of the service area

  (Excludes: recycled water, net volume into long-term storage, water conveyed to another retailer, agricultural water)

New UWMP Requirements

- Base gross water use in gpcd: methodologies
  - 10-year average
    - *ending no earlier than 2004 – no later than 2010*
  - 15-year average if 10% of 2008 demand met by recycled water
    - *get to add 5 years to calculation*
  - 5-year average if agency is already close to target
    - *100 gpcd; at least 5% reduction*
    - *ending no earlier than 2007 – no later than 2010*

New UWMP Requirements

- Base gross water use in gallons per capita per day (gpcd)
  - Averages are determined on a rolling basis
  - Should review demands over various periods to determine hydrologic and demand year types
  - Recent economic impacts and drought response may have reduced demand!

New UWMP Requirements

- Target reduction methodology options
  1. 20% reduction from base (i.e., 80% of average gross water use in gpcd)
  2. Combination of state standards:
     - 55 gpcd indoor residential + landscape use at 70% -80% ETo + 10% reduction in commercial/industrial/institutional use
  3. DWR 20x2020 hydrologic region target (South Coast region = 149 gpcd)
  4. Option to be developed by October 2010

New UWMP Requirements

- Reduction Target Option 4
  - Subject to DWR public process during 2010
  - Will identify targets to achieve cumulative statewide 20% reduction
  - Must allow flexibility for water supplier service area characteristics

New UWMP Requirements

- Proposals for Option 4
  - DWR: developing a methodology for public review
  - CA Urban Water Conservation Council: all agencies in CA follow terms and options of the Urban MOU
  - ACWA: submitted Option 4 proposal
    - Relies on comparison to a Reference Area (an area that has met/nearly met hydrologic region target).

New UWMP Requirements

- Issues: DWR will derive methodologies for calculations: population, base water use, gross water use, sector water use, Option 4, others
  - If DWR derives new methodology standards, agencies may be required to use them
  - Won't be final until October 2010 (ps. December)
  - If work has already been done, it may need to be repeated
  - If agency has already adopted UWMP, it may need to be amended
  - = Reason for UWMP deadline extension to July 1, 2011

New UWMP Requirements

- Other
  - SB 1087 (Florez) - requires an UWMP to include projected water use for single-family and multi-family residential housing for lower income households as identified in the housing element of any city, county, or city and county in the service area of the supplier.

Consultant Team

- Kennedy/Jenks Consultants
- Luhdorff and Scalmanini
- Nancy Clemm, P.E.
- Stacy Miller Public Affairs

Santa Clarita Valley Urban Water Management Plan
May 25, 2010 - Community Workshop Sign In Sheet

	PRINT NAME	ORGANIZATION	TITLE	PHONE	EMAIL
1.	David Inouye	DWR. So. Region	Chief, Water Conserv. Sec.	(818) 500-1615, x 246	davidi@water.ca.gov
2.	RONALD MECHSNER	WEST RANCH TOWN COUNCIL	PRESIDENT	661.753.6182	RMECHSNER@westranchtowncouncil.com
3.	Cathy Holloman	SCWD	Assoc	661-259-2737	cholloman@scwater.org
4.	Mauricio Guardado	SCWD	Retail MGR	"	MGuardado@scwater.org
5.	Mary Lu Cotter	KCS			
6.	Patrick Bryant	City of Santa Clarita	Admin. Analyst	661-255-4902	pbryant@santa-clarita.com
7.	Jeggian Bunker	LADWP	CIVIL ENG - Water Resources Unit	626-300-3315	jbunker@ladpw.org
8.	Bruce Fortine	COC	Trustee	661-253-0060	fortine@earthlink.net
9.	Keo in Korenthal	AVL-CCC	E.D.	(661) 310-0769	kkorenthal@avlchamber.org
10.	JANET KEITH	VWC	CONSER COORD.	661 295-6531	jkeith@valenciawater.com
11.	Brett Walter	Buck McKeon	Senior Field Rep	661-254-2111	brett.walter@mail.house.gov
12.	Jason Swisloo	Santa Clarita	Senior Planner	661-255-4306	jswisloo@santa-clarita.com
13.	Jerry Gladbach	CLWA			
14.	DIANA SHAW	DIANA SHAW for 38th Assembly	candidate		ElectDianaShaw.com
15.	Bob Diprimio	Valencia Water Co.	President	(661) 295-6501	rdiprimio@valenciawater.com
16.	ED MASTERSON	SCV CHAMBER	PRES. / CEO	(661) 702-6977	EMASTERSON@SCVCHAMBER.COM
17.	Jackie Bick	Sen. Runner	Dist Rep	661-286-1471	JACKIE.BICK@SEN.CA.GOV
18.					

July 2010 UWMP Workshop
Public Outreach Record

2010 Santa Clarita Valley
Urban Water Management Plan

Stacy Miller
PUBLIC AFFAIRS
Creative Solutions to Complex Situations

July 6, 2010

«AddressBlock»

Subject: 2010 Urban Water Management Plan Workshop

«GreetingLine»

The Santa Clarita Valley's water agencies, Castaic Lake Water Agency, CLWA Santa Clarita Water Division, Newhall County Water District and Valencia Water Company are currently preparing the 2010 Urban Water Management Plan (UWMP).

In an effort to ensure all interested parties are fully informed and involved in this process, we have scheduled our second community workshop as follows and welcome your participation:

Date:	Tuesday, July 27, 2010
Time:	4:00 pm
Location:	Castaic Lake Water Agency 27234 Bouquet Canyon Road

The Urban Water Management Plan presents a picture of the valley's water situation through the year 2035, describes the long-range water needs of the community and the means to supply the necessary water. This workshop will provide the most current information on components of the 2010 UWMP.

I encourage your participation and look forward to seeing you then. If you have any questions, please feel free to contact me.

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2010 SCV Urban Water Management Plan

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Post card sent to all entities with water connections in the CLWA, CLWA SCWD, VWC and NCWD service areas

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2010 Urban Water Management Plan

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Upcoming Community Workshops

Date: Tuesday, July 27, 2010
Time: 4:00 pm
Location: Castaic Lake Water Agency
27234 Bouquet Canyon Road

Date: Tuesday, September 28, 2010
Time: 4:00 pm
Location: Castaic Lake Water Agency
27234 Bouquet Canyon Road

For more information, please call (661) 297-1600

SANTA CLARITA VALLEY

2010 Urban Water Management Plan

COMMUNITY WORKSHOP

The Signal 7-25-10

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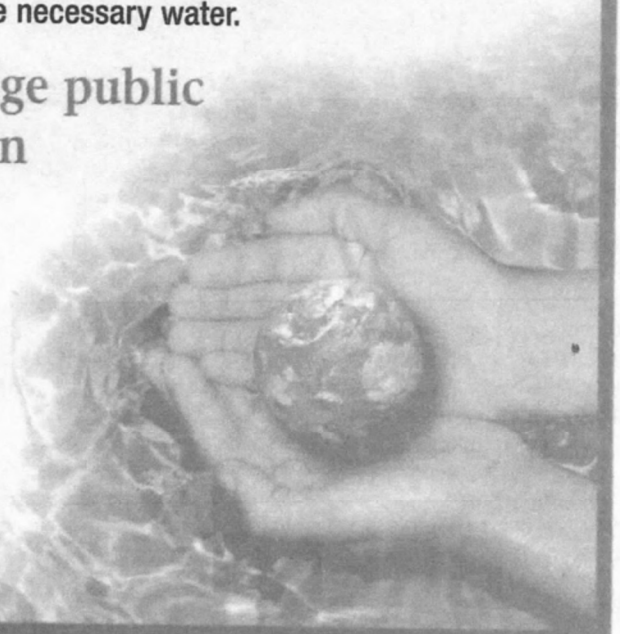

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Castaic Lake Water Agency
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Newhall County Water District
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SANTA CLARITA VALLEY

2010 Urban Water Management Plan

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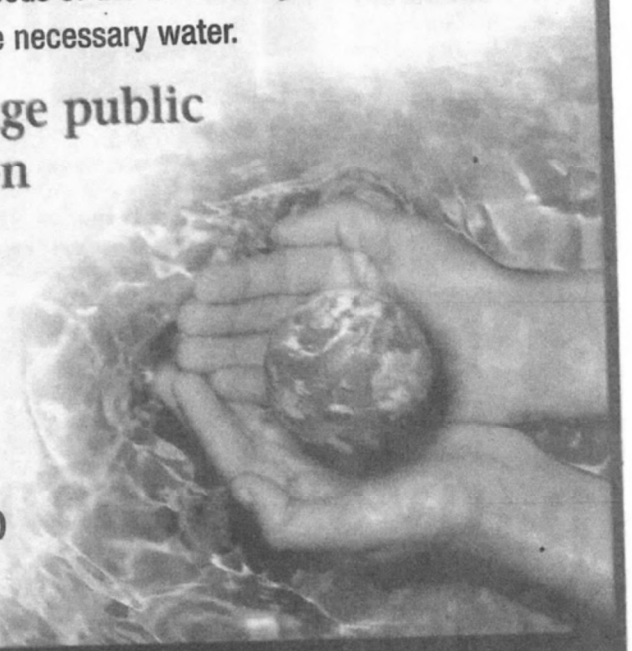

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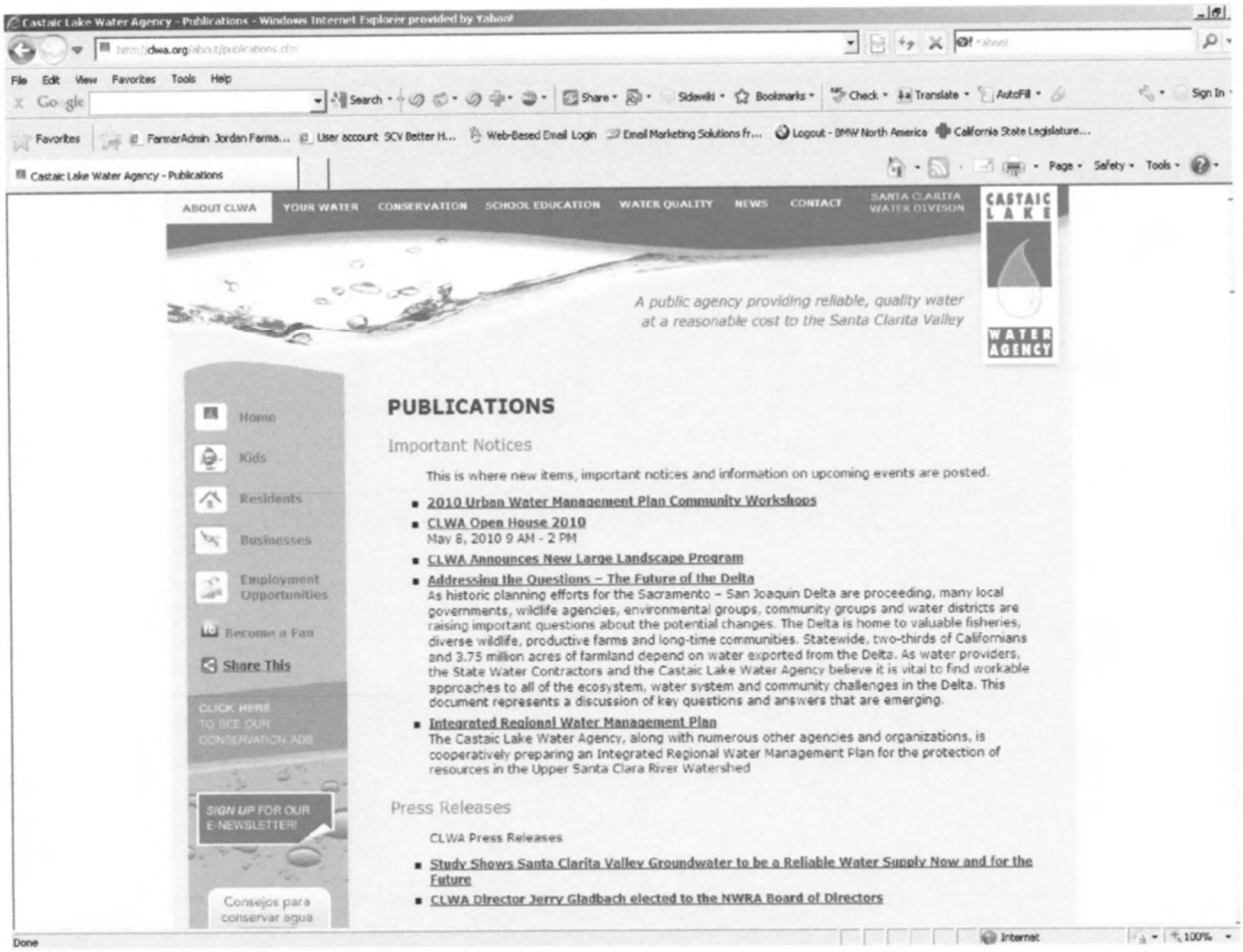
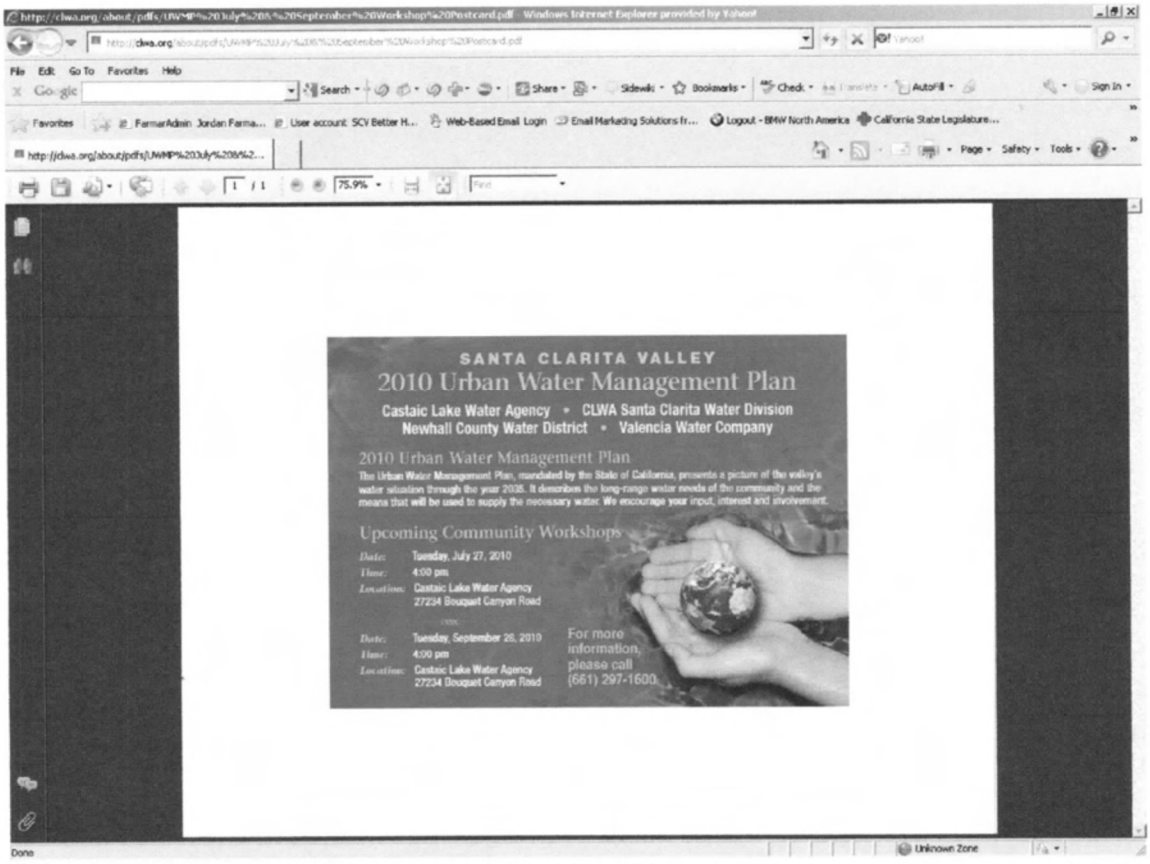
UWMP July & September 2010 Community Workshop Announcements
CLWA Website - June 28, 2010





UWMP July & September 2010 Community Workshop Announcements
CLWA Facebook Post - June 28, 2010

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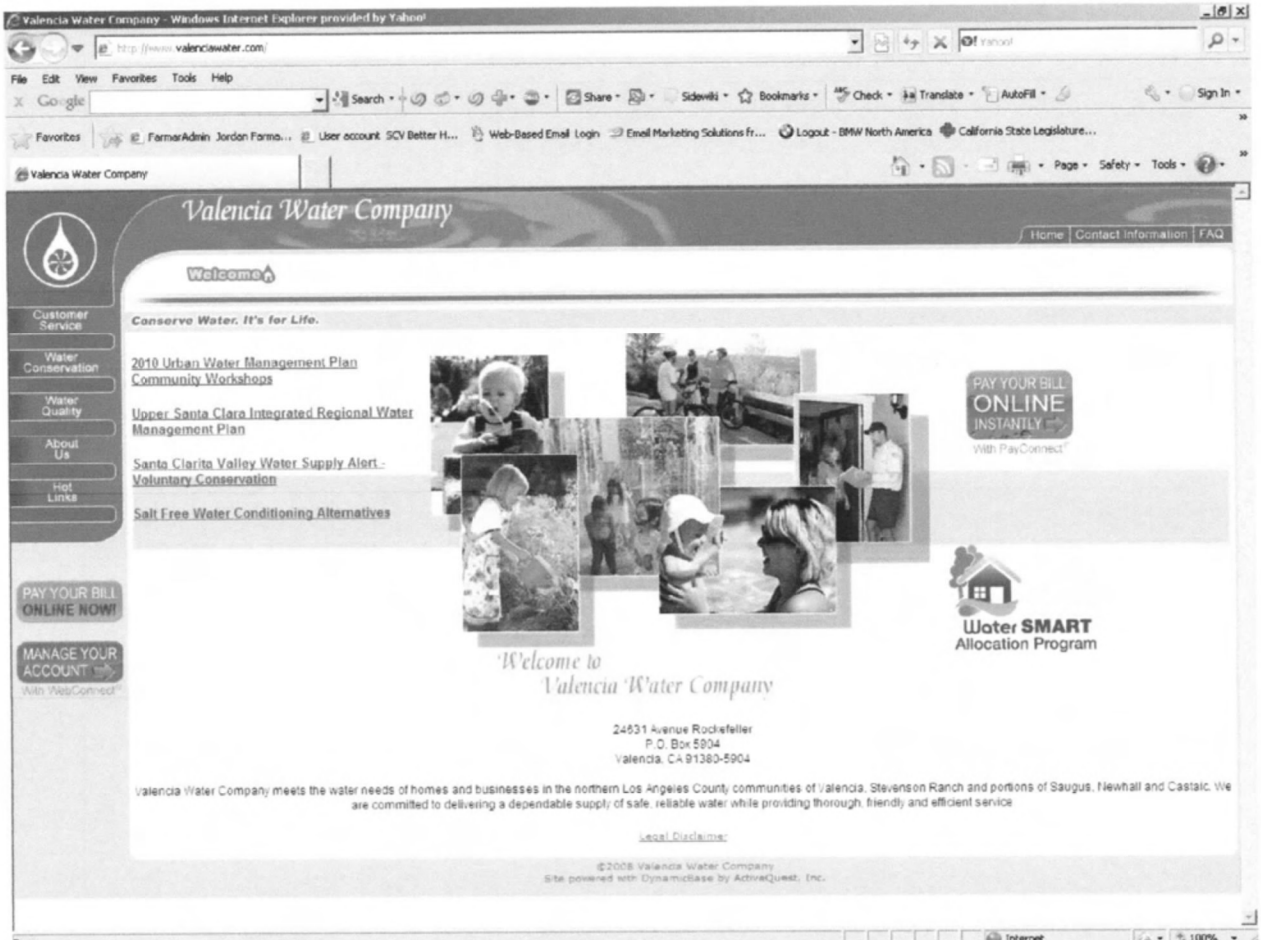

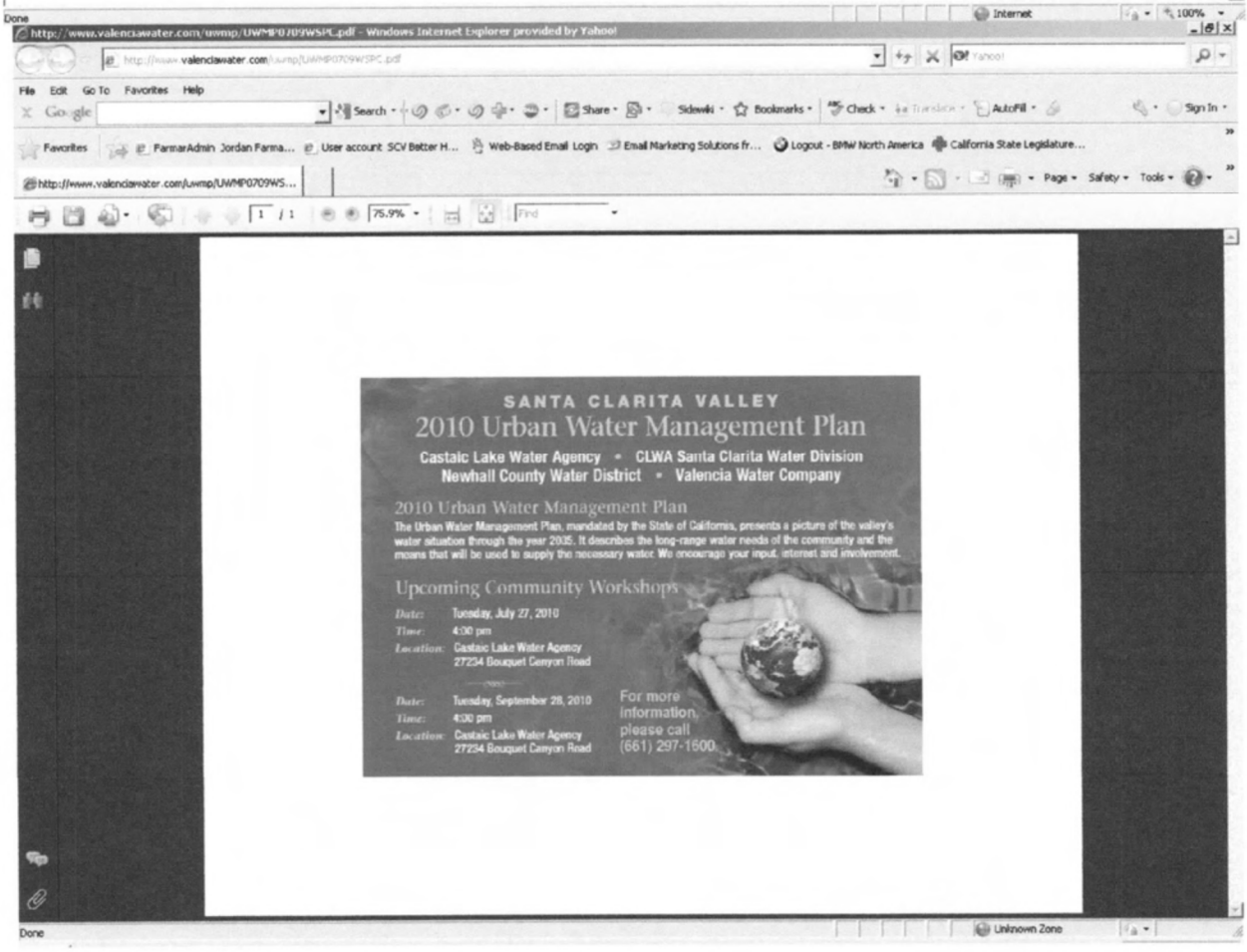

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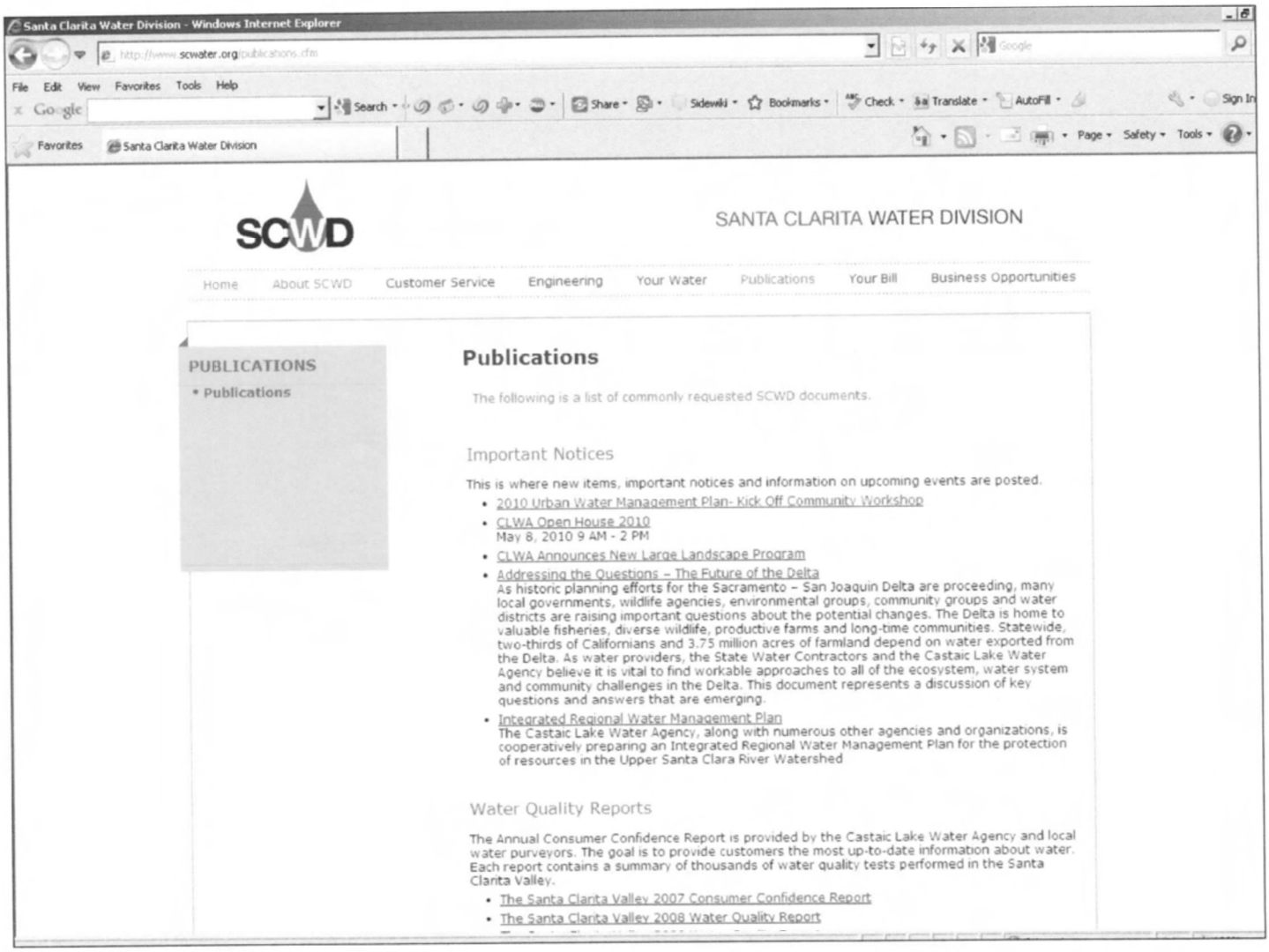

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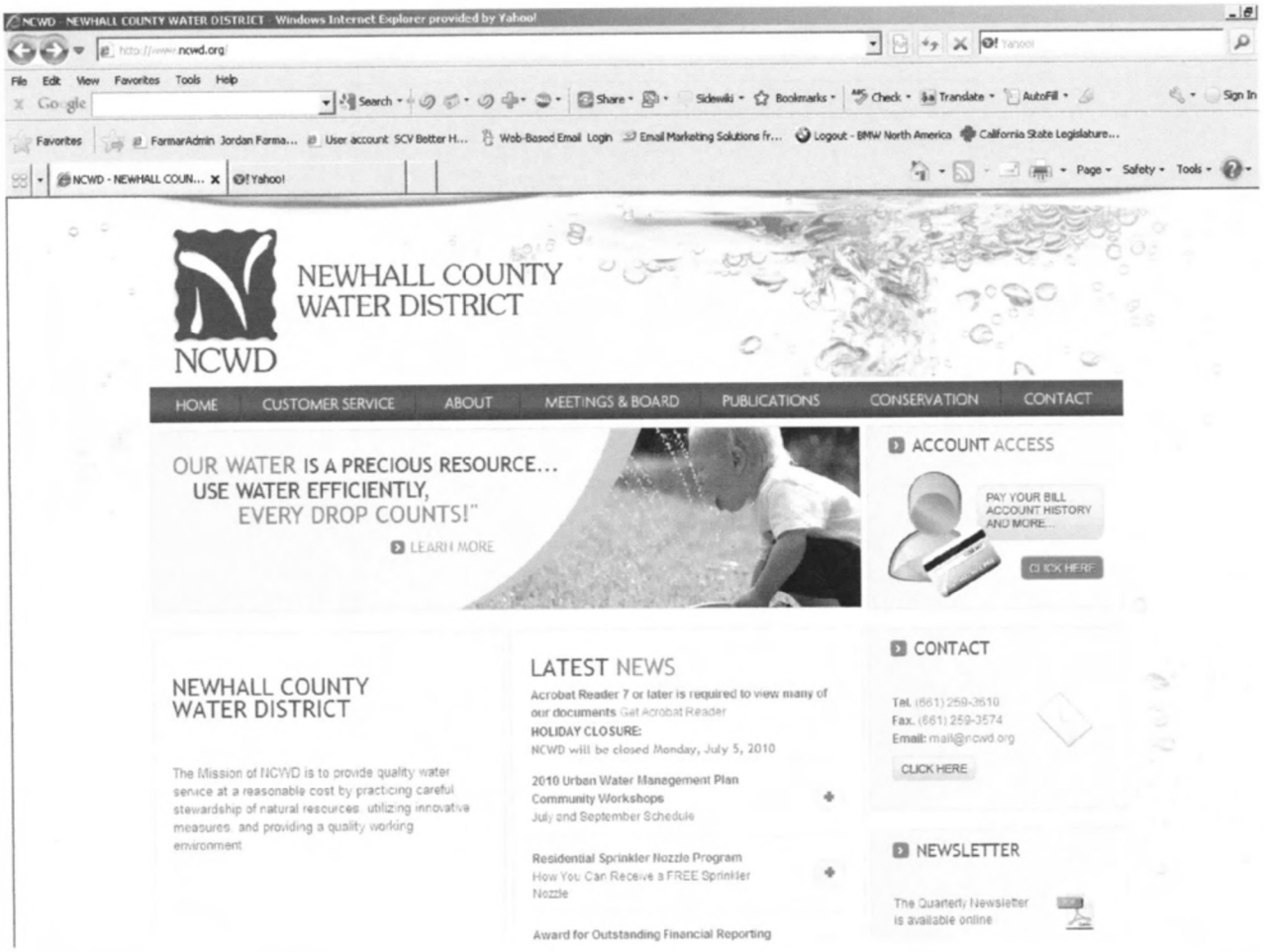

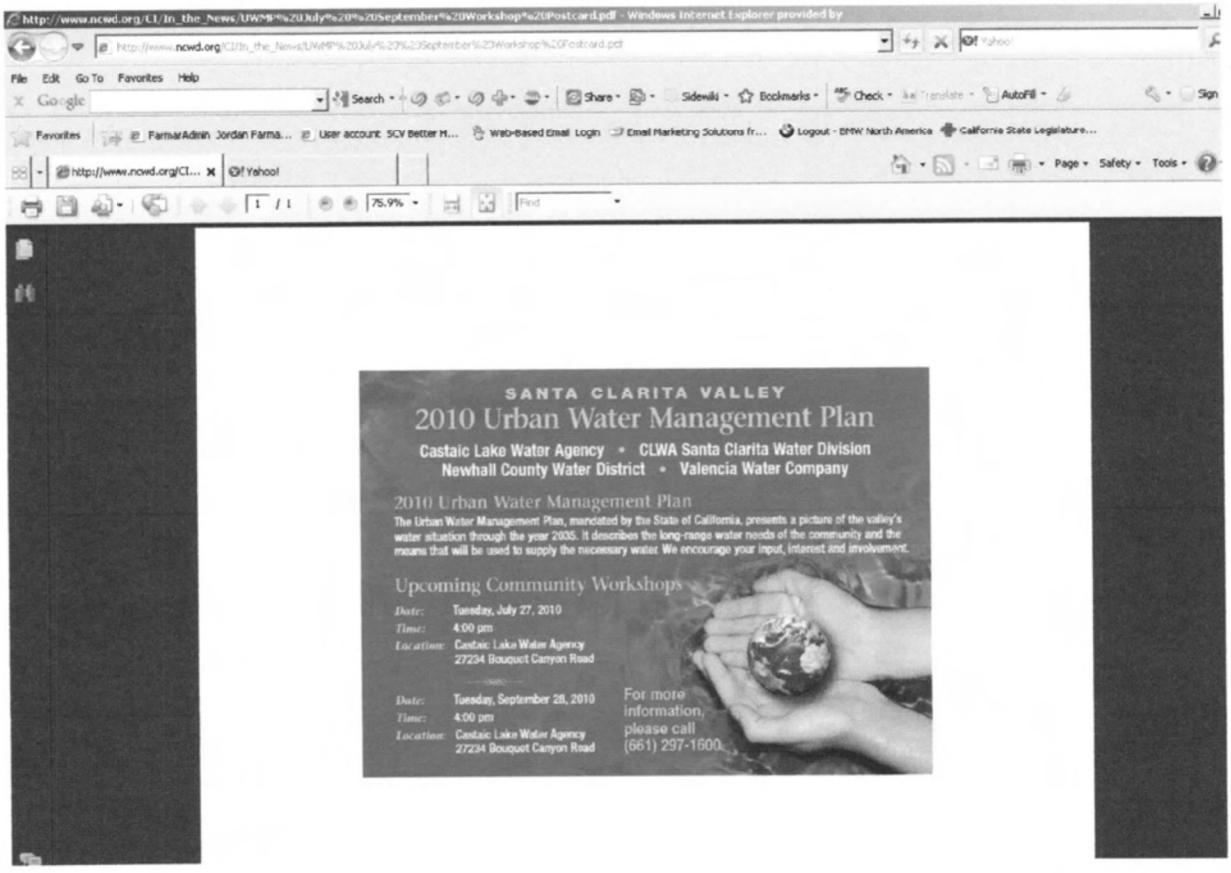

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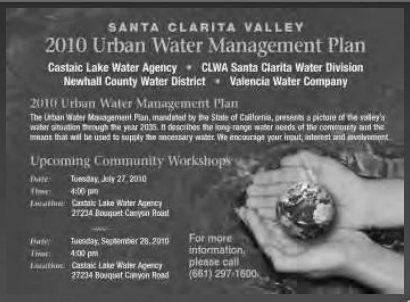

Enduring Relationships - Trusted Expertise - Promises Delivered

Kennedy/Jenks Consultants

Agenda

- Welcome & Introductions
- SBX7-7 Requirements
- Recycled Water
- Groundwater Supplies
- State Water Project Reliability
- Questions & Answers
- Next Workshop & Timelines

Enduring Relationships - Trusted Expertise - Promises Delivered

Kennedy/Jenks Consultants

2010 UWMP SBX7-7

- Mary Lou Cotton, Kennedy/Jenks Consultants

Enduring Relationships - Trusted Expertise - Promises Delivered

Kennedy/Jenks Consultants

2010 UWMP

- New Law: SBX7-7 ("20% x 2020"), reporting starts with 2010 UWMPs, applies to retailers
  - Base gross water use in gpcd: must be calculated using one of three methodologies
  - Target reduction from base by 2020: must be calculated using one of four methodologies
  - Supplier must hold public hearing to explain how targets will be met (can be held as part of UWMP hearing)

2010 UWMP

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  - 10-year average
    - *ending no earlier than 2004 – no later than 2010*
  - 15-year average if 10% of 2008 demand met by recycled water
    - *get to add 5 years to calculation*
  - *And*: 5-year average
    - *ending no earlier than 2007 – no later than 2010*
    - *100 gpcd; at least 5% reduction for all agencies in CA over 100 gpcd*

2010 UWMP

- Target reduction methodology options
  1. 20% reduction from base (i.e., 80% of average gross water use in gpcd)
  2. Combination of state standards:
     - 55 gpcd indoor residential + landscape use at 70% ETo + 10% reduction in commercial/industrial/institutional use
  3. DWR 20x2020 hydrologic region target (South Coast region = 149 gpcd)
  4. Option to be developed by October 2010

2010 UWMP

- Reduction Target Option 4
  - Subject to DWR public process during 2010
  - Will identify targets to achieve cumulative statewide 20% reduction
  - Must allow flexibility for water supplier service area characteristics

2010 UWMP

- Wholesalers (such as CLWA) must describe in the UWMP "an assessment of present and proposed future measures, programs and polices to help achieve the water use reductions required" of retailers in their service areas.

2010 UWMP

- DWR Public Process Issues
  - DWR will derive methodologies for SBX7-7 calculations: population, base gross water use, compliance levels, sector water use, others
  - If DWR derives new standards, agencies will be required to use them
  - Won't be final until October 2010
  - Option 4 method won't be final until December 2010.

2010 UWMP

- DWR Public Process Issues, (cont'd.)
  - If work has already been done, it may need to be repeated;
  - If agency has already adopted UWMP, it may need to be amended
  - = Reason for UWMP deadline extension to July 1, 2011 (Note: wholesaler UWMPs still due by Dec 31, 2010; legislation in process to apply extension to them)

SBX7-7 Methodologies Status

- DWR has convened the Urban Stakeholder Committee ("USC")
  - Co-chaired by DWR and CUWCC
- Has formed an Agency Team: DWR, SWRCB, CPUC, CDPH, CBDA, USBR
- Has hired a consultant team (mainly economists and statisticians)

SBX7-7 Methodologies Status

- USC has held three meetings to date (next: tomorrow, 7/28/10)
- DWR has defined several technical methodologies efforts, based on statute
- DWR Legal has reviewed statute and provided guidance to DWR staff and consultant team
- Developed a set of Issue Papers for each methodology in statute
- Has created groupings according to task:

SBX7-7 Methodologies Status

- U3:
  - Gross water use
  - Service area population
  - Base daily per capita use
  - Compliance daily per capita use
  - Landscape area water use
  - Baseline CII use
  - Compliance year adjustment criteria
  - Indoor residential use

SBX7-7 Methodologies Status

- U4:Target Reduction Option 4
  - Proposal from ACWA
  - Two proposals from various CUWCC members (IRWD/City of San Luis Obispo/City of Long Beach; and Western Municipal Water District)
  - DWR/Consulting Team proposal
- U4 Workgroup set up, focus on how to formulate methodology

SBX7-7 Methodologies Status

- U5: Process Water
  - Use by Commercial, Industrial, Institutional customers
- U6: Regional Compliance
  - Guidance for Regional UWMPs and Conservation Target Reductions

SBX7-7 Methodologies Status

- Schedule:
  - June 22 & 23 USC and U4 Meetings at IEUA
  - July 28 USC Meeting
  - **August 5 & 6 U3 Public Workshops**
  - August 26 USC Meeting
  - September 21 USC Meeting
  - October 1 finalize U3 methodologies
  - **October 27 & 29 U4 Public Meetings**
  - November 15 USC Meeting
  - December 31 U4 method finalized

2010 UWMP- SBX7-7

- SBX7-7 Questions?

Recycled Water

- Lynn Takaichi, Kennedy/Jenks Consultants

Recycled Water

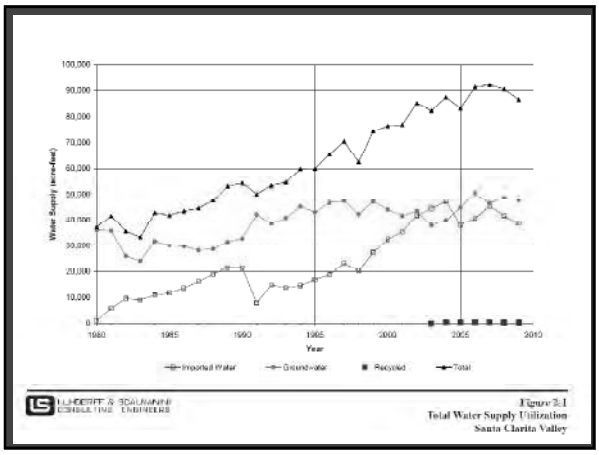
- Based on 2002 Recycled Water Master Plan and 2006 Programmatic EIR
  - Modified Phasing and Pipeline Alignments
  - Both VWRP and SWRP Utilized
  - Potential Onsite RW Production
- Current Production = 430 AFY
- Ultimate Production = 17,400 AFY, plus 5,344 AFY from Newhall Ranch WRP
- Will Help the SCV Meet 20x2020 Goals

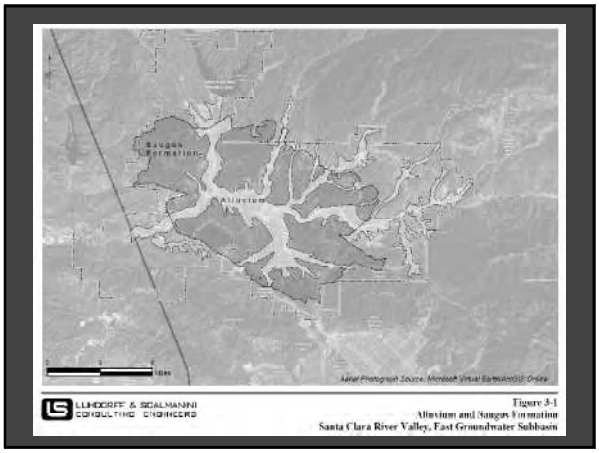
Groundwater Supplies

- Joe Scalmanini - Luhdorff and Scalmanini

Groundwater Component of Water Supplies 2010 Urban Water Management Plan

- Castaic Lake Water Agency • CLW larita Water Division
- Los Angeles County Waterworks District 36
- Newhall County Water District • Valencia Water Company





Groundwater Management Plan (2003)

Management Objectives (Goals) for the Basin

- development of integrated surface water, groundwater, and recycled water supply to meet existing and projected uses
- determination of operational groundwater yield to avoid overdraft = sustainability
- preservation of groundwater quality, including solution of contamination problems
- preservation of interrelated surface water resources = maintenance of surface water flows and non-degradation of quality

Groundwater Management Plan (2003)

Elements

- groundwater monitoring
- surface water monitoring
- basin yield analysis
- regular and dry year water supplies
- continued conjunctive use
- long-term salinity management
- integration of recycled water
- mitigate contamination
- local, state and federal relationships
- public education and water conservation
- recharge wellhead protection areas
- well construction and destruction policies
- provisions to add additional components

Annual Water Reports (1998-present)

Annual Water Requirements and Supplies
- actual water use
- sources of supply to meet actual use

Groundwater
- Alluvial and Saugus aquifer conditions

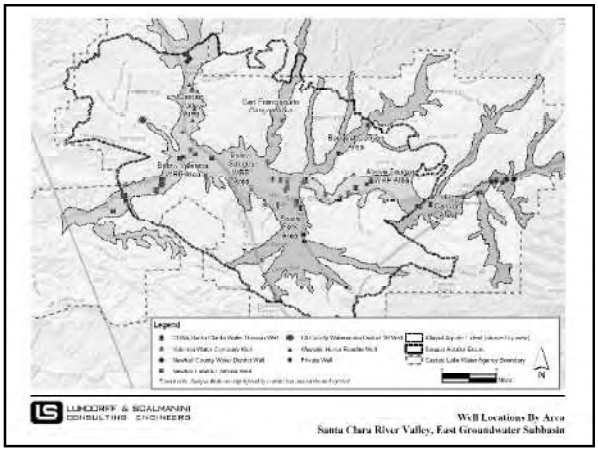
Supplemental Water Supplies
- State Water Project
- banking and other programs

Water Quality

Recycled Water

Santa Clara River
- outflows from Santa Clarita Valley

Short-Term (one year) Outlook
- water requirements adjusted from UWMP
- surface water, groundwater and recycled water supplies
- adequacy of water supplies



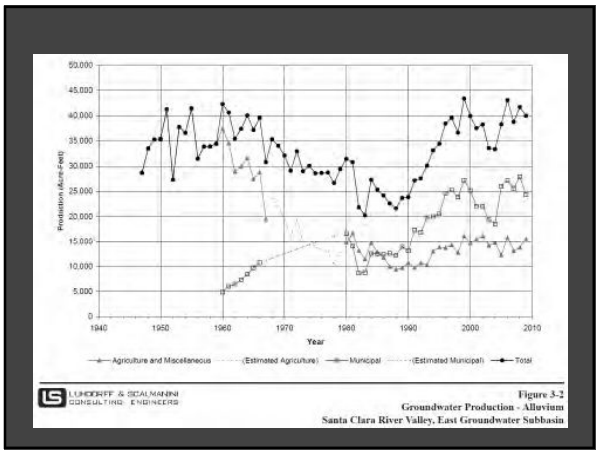


Figure 3-2
Groundwater Production - Alluvium
Santa Clara River Valley, East Groundwater Subbasin

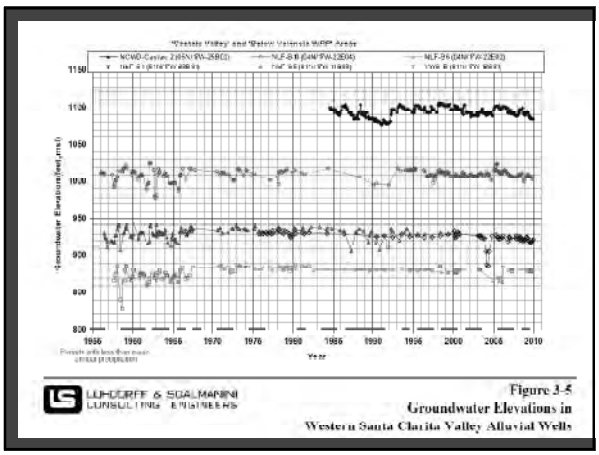


Figure 3-5
Groundwater Elevations in
Western Santa Clarita Valley Alluvial Wells

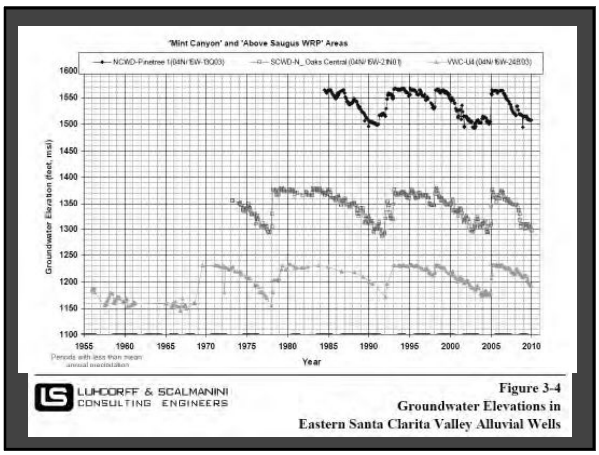
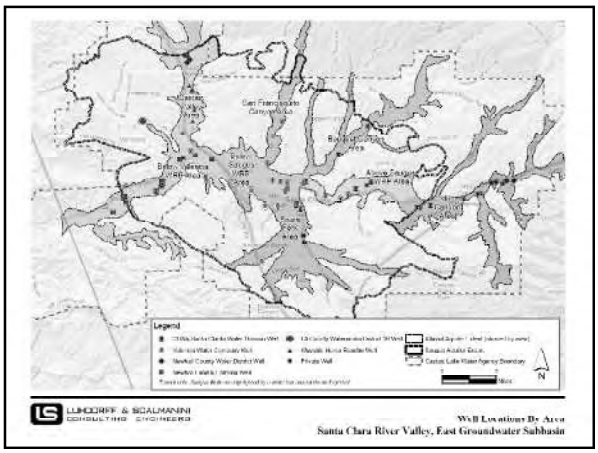
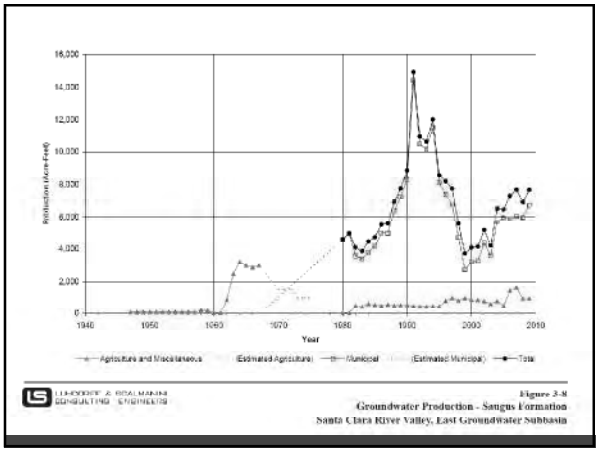
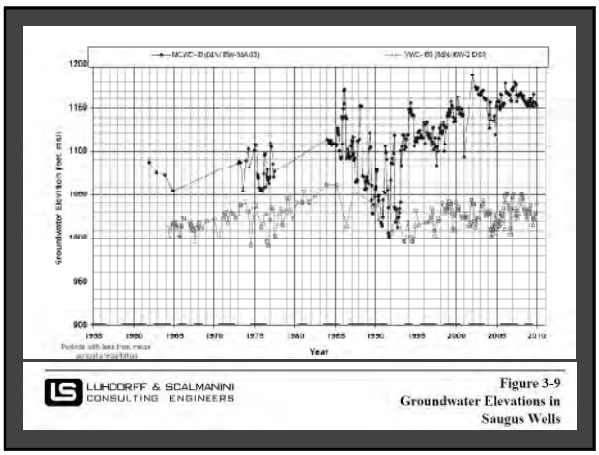


Figure 3-4
Groundwater Elevations in
Eastern Santa Clarita Valley Alluvial Wells

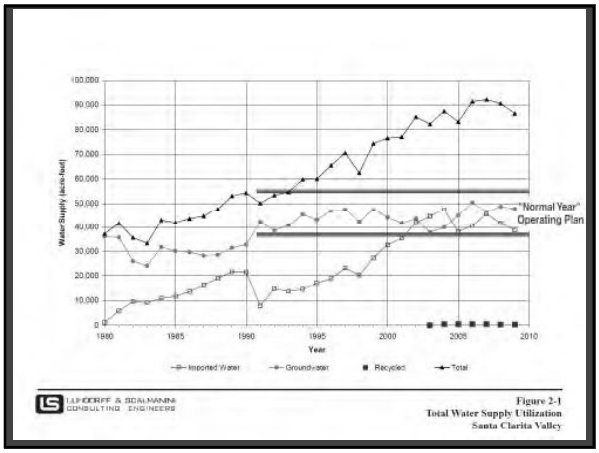

Legend
LUHDORFF & SCALMANINI
CONSULTING ENGINEERS
Well Locations By Area
Santa Clara River Valley, East Groundwater Subbasin


Year
Agriculture and Miscellaneous
(Estimated Agriculture)
Municipal
(Estimated Municipal)
Total
LUHDORFF & SCALMANINI
CONSULTING ENGINEERS
Figure 3-8
Groundwater Production - Saugus Formation
Santa Clara River Valley, East Groundwater Subbasin


Year
LUHDORFF & SCALMANINI
CONSULTING ENGINEERS
Figure 3-9
Groundwater Elevations in
Saugus Wells

2008 Groundwater Operating Plan

Groundwater Pumping 2010 UWMP				
Aquifer	**Normal Y**			
Alluvium	30,000-40,000 (38,600)	30,000-35,000 (36,500)	30,000-35,000 (34,850)	30,000-35,000 (34,850)
Saugus	7,500-15,000 (12,485)	15,000-25,000 (19,125)	21,000-25,000 (25,227)	21,000-35,000 (34,977)



Sustainability and Achievability

Sustainability

"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" (86 years: 1922-2007)

"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"

Achievability

maintenance of groundwater levels above, or only temporarily slightly into, the intake (screened or perforated) sections of production wells

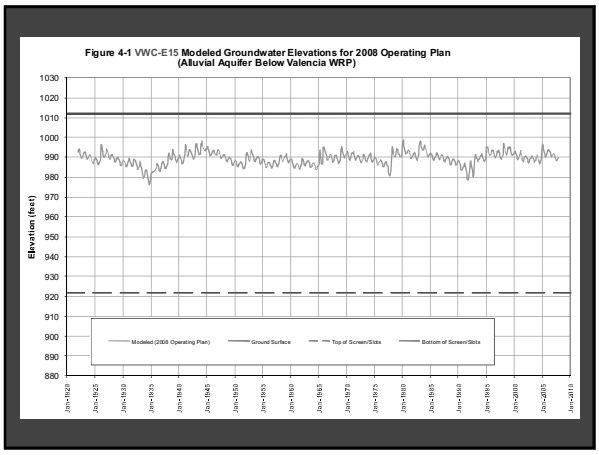


Figure 4-1 VWC-E15 Modeled Groundwater Elevations for 2008 Operating Plan
(Alluvial Aquifer Below Valencia WRP)
Elevation (feet)
Modeled (2008 Operating Plan)
Ground Surface
Top of Screen/Slots
Bottom of Screen/Slots

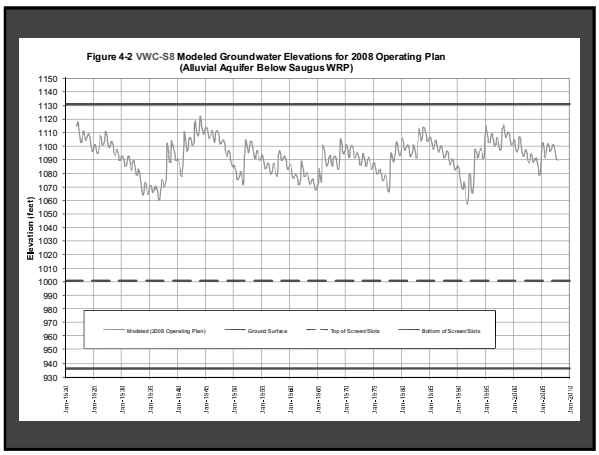


Figure 4-2 VWC-S8 Modeled Groundwater Elevations for 2008 Operating Plan
(Alluvial Aquifer Below Saugus WRP)
Elevation (feet)
Modeled (2008 Operating Plan)
Ground Surface
Top of Screen/Slots
Bottom of Screen/Slots

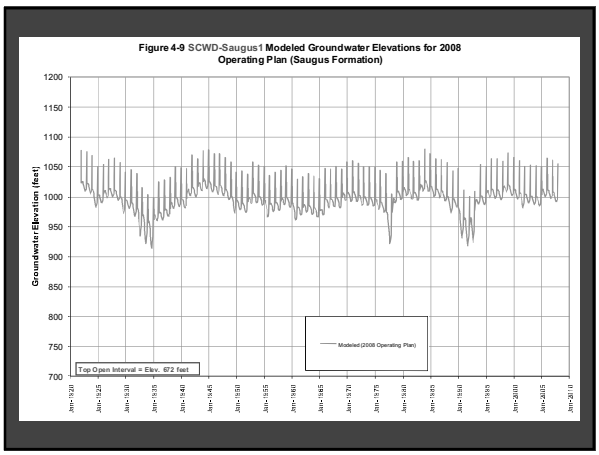
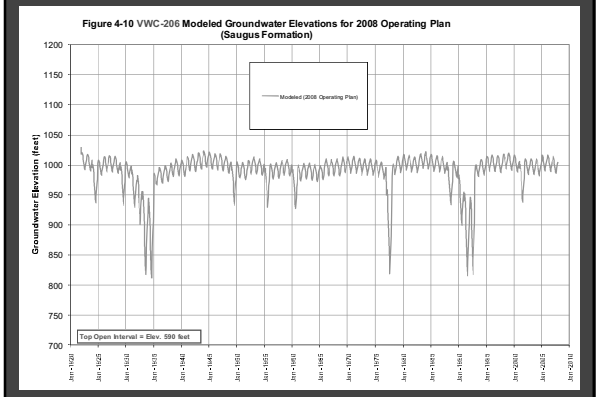


Figure 4-9 SCWD-Saugus1 Modeled Groundwater Elevations for 2008
Operating Plan (Saugus Formation)
Groundwater Elevation (feet)
Modeled (2008 Operating Plan)
Top Open Interval = Elev. 672 feet



2008 Operating Plan Conclusions

Operating Plan is fully sustainable (no chronic groundwater level declines; no depleted stream flow) and mostly achievable (limited dry-period declines in eastern part of Valley)

Achievability issues in extended dry periods can be resolved by redistribution of some pumping to the west

- with redistribution, retain dry-period Alluvial pumping near 35,000 afy
- without redistribution, dry-period Alluvial pumping closer to 30,000 afy

Climate Change Impacts

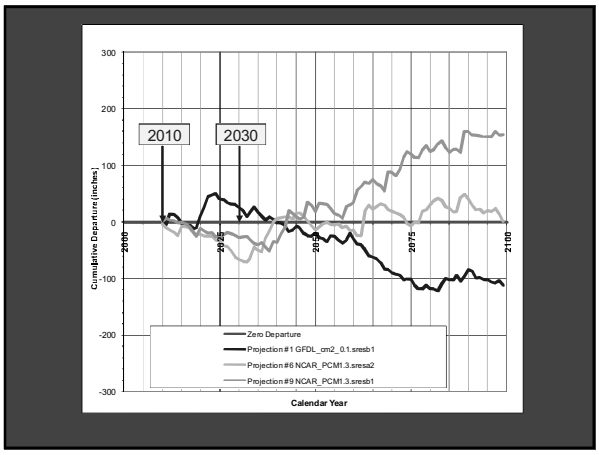
Studied 9 of 112 published climate change projections; same 9 projections as evaluated by DWR for reliability of SWP

Selected 3 projections for variety of rainfall cycles during UWMP planning horizon and beyond

- #1 = considerable fluctuation and generally wetter through UWMP, then long-term drying of climate
- #9 = less fluctuation and generally drier through UWMP, then sustained long-term wetting of climate
- #6 = less fluctuation and generally drier through UWMP, then long-term fluctuating cycles of below-normal and above-normal rainfall

Simulated customized operating plan for 86 years: 2010-2095

- simulated revised infiltration of precipitation, storm water, River inflow and Castaic Creek for three climate projections
- varied year-to-year Alluvial pumping dependant on prior year hydrology


2010
2030
Cumulative Departure (inches)
Calendar Year
Zero Departure
Projection #1 GFDL_cm2_0.1.sresb1
Projection #6 NCAR_PCM1.3.sresa2
Projection #9 NCAR_PCM1.3.sresb1

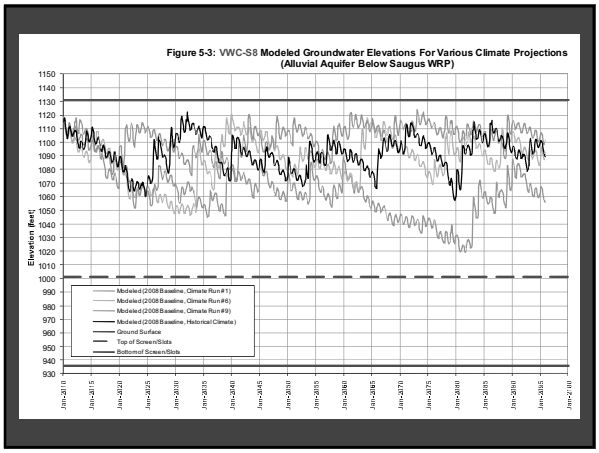
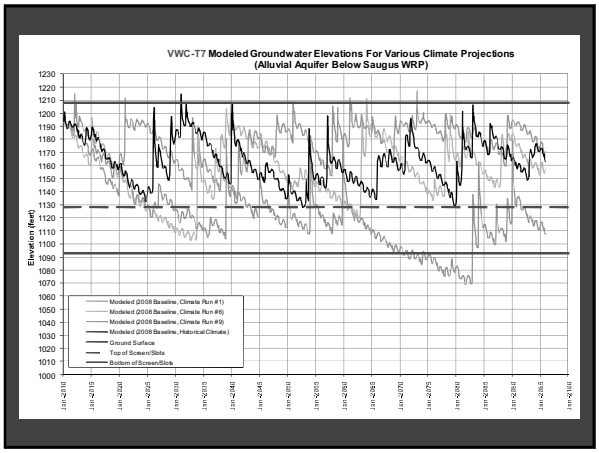


Figure 5-3: VWC-S8 Modeled Groundwater Elevations For Various Climate Projections
(Alluvial Aquifer Below Saugus WRP)
Elevation (feet)
Modeled (2008 Baseline, Climate Run #1)
Modeled (2008 Baseline, Climate Run #6)
Modeled (2008 Baseline, Climate Run #9)
Modeled (2008 Baseline, Historical Climate)
Ground Surface
Top of Screen/Slots
Bottom of Screen/Slots


VWC-T7 Modeled Groundwater Elevations For Various Climate Projections
(Alluvial Aquifer Below Saugus WRP)
Elevation (feet)
Modeled (2008 Baseline, Climate Run #1)
Modeled (2008 Baseline, Climate Run #6)
Modeled (2008 Baseline, Climate Run #9)
Modeled (2008 Baseline, Historical Climate)
Ground Surface
Top of Screen/Slots
Bottom of Screen/Slots

Climate Change "Conclusions"

No assurance of nature of potential climate change

For broad range of climate change possibilities, Operating Plan sustainable and achievable through shorter-term horizon of UWMP

Broad range of potential climate change extends from long-term dry to wet

- Operating Plan sustainable through average to wetter "changed" climate
- Operating Plan unsustainable through long-term drying climate due to decreased local recharge and resultant declining groundwater levels

Total Groundwater Supply Santa Clarita Valley

	Normal Y		
	Alluvium (afy)	Saugus Fm. (afy)	Total (afy)
Municipal Purveyors	25,850	11,485	37,335
Agriculture & Others	12,750	1,000	13,750
Total	**38,600**	**12,485**	**51,085**

	Multiple Dry Years		
	Alluvium (afy)	Saugus Fm. (afy)	Total (afy)
Municipal Purveyors	23,800-22,250	18,125-33,975	41,975-56,225
Agriculture & Others	12,700-12,600	1,000	13,700-13,600
Total	**36,500-34,850**	**19,125-34,975**	**55,675-69,825**

State Water Project Supply Reliability

Nancy Clemm, P.E.

State Water Project Supply Reliability

- Source: "Draft State Water Project Delivery Reliability Report 2009," Department of Water Resources (DWR).
- Includes estimates of current (2009) and future (2029) water delivery reliability of the State Water Project (SWP).
- Delivery estimates made using DWR's operations simulation model of SWP/Central Valley Project system.

Model Studies in 2009 SWP Reliability Report

Current (2009)

- Represents estimates of current reliability under existing conditions.
- Based on historical hydrology, existing SWP facilities, existing operating constraints, and current demands.

Future (2029)

- Represents estimates of future reliability if no change to SWP facilities or operating constraints.
- Based on hydrology adjusted to reflect effect of climate change, and increased future demands.

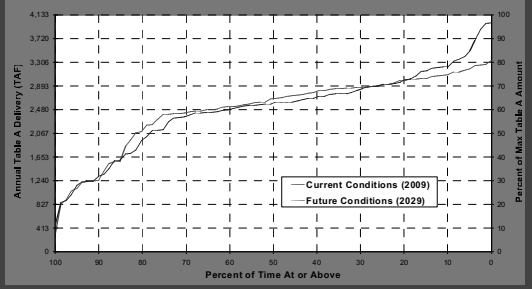
Modeling Assumptions in 2009 SWP Reliability Report

	Current (2009)	Future (2029)
Hydrology	Historical (based on 1922-2003)	Historical, adjusted for effect of climate change
SWP Facilities	Existing	Same
Operating Criteria	SWRCB D-1641 FWS Biological Opinion NMFS Biological Opinion	Same
SWP Demands		
Table A water	3.0 – 4.1 MAF	4.1 MAF (Max Table A amount)
Article 21 water	414 or 214 TAF/mo	Same

Changes Since 2005 Reliability Report: Modeling Assumptions

- Extended hydrologic period: now 1922-2003.
- Inclusion of effects of climate change in future study.
- Addition of operational constraints from FWS and NMFS Biological Opinions.
- Higher SWP demands (both Table A and Article 21 water).
- Inclusion of contractor carryover.

Results from 2009 Reliability Report: SWP Table A Delivery Probability



Results from 2009 Reliability Report: Average and Dry Period Deliveries

Total SWP Table A Delivery from Delta (in percent of max Table A amount*)						
Study	Average (1922-2003)	Single dry year (1977)	2-year drought (1976-77)	4-year drought (1931-34)	6-year drought (1987-92)	6-year drought (1929-34)
Current (2009)	60%	7%	36%	34%	35%	34%
Future (2029)	60%	11%	38%	35%	32%	36%

* Total maximum Table A amount from Delta is 4,133 TAF.

Comparison to 2005 Reliability Report: Delivery Results

- Lower average SWP deliveries.
- Higher single dry year deliveries (1977).
- Variable effect on multiple dry year deliveries.

Total SWP Table A Delivery from Delta (in percent of max Table A amounts)						
Study	Average (1922-94/2003)	Single dry year (1977)	2-year drought (1976-77)	4-year drought (1931-34)	6-year drought (1987-92)	6-year drought (1929-34)
2005 Report						
Current	68%	4%	41%	32%	42%	37%
Future	77%	5%	40%	33%	42%	38%
2009 Report						
Current	60%	7%	36%	34%	35%	34%
Future	60%	11%	38%	35%	32%	36%

Applying SWP Reliability Report Results to Castaic Lake Water Agency

- SWP Reliability Reports show total SWP deliveries.
- Prior to 2009 report, DWR directed SWP contractors to determine their share of total deliveries as the proportion of their agency's Table A amount to sum of all contractors' Table A amounts.
- In 2009 report, DWR directs using this same method for average deliveries, but recommends using contractor-specific delivery data for single year or short periods.

Applying SWP Reliability Report Results to Castaic Lake Water Agency (con't)

- In studies for 2009 report, delivery results differ by contractor due to differing contractor demands and inclusion of modeling of contractor carryover water.
- Carryover water is Table A water allocated to a contractor in one year which, if storage is available in SWP's San Luis Reservoir, can be "carried over" for delivery to that contractor the following year.
- Carryover can provide additional supply in dry years, but availability and usability differ by contractor.
- CLWA service area demands are currently low relative to its Table A amount, so carryover is likely to provide dry-year supply in near term.

Results from 2009 Reliability Report Studies: Deliveries to CLWA

Total SWP Table A Delivery to CLWA (including carryover)						
Study	Average (1922-2003)	Single dry year (1977)	2-year drought (1976-77)	4-year drought (1931-34)	6-year drought (1987-92)	6-year drought (1929-34)
Current (2009)						
Delivery (TAF)	58.3	12.8	44.0	32.8	34.4	33.4
% of Table A*	61%	13%	46%	34%	36%	35%
Future (2029)						
Delivery (TAF)	57.4	9.1	34.1	33.0	29.6	33.8
% of Table A*	60%	10%	36%	35%	31%	36%
* CLWA Table A amount is 95.2 TAF.						

Comparison to 2005 Reliability Report: Deliveries to CLWA

- Lower average SWP deliveries.
- Higher single dry year deliveries (1977).
- Variable effect on multiple dry year deliveries.

Total SWP Table A Delivery to CLWA						
Study	Average (1922-94/2003)	Single dry year (1977)	2-year drought (1976-77)	4-year drought (1931-34)	6-year drought (1987-92)	6-year drought (1929-34)
2005 Report						
Current	64.7	3.8	39.0	30.5	40.0	35.2
Future	73.3	4.8	38.1	31.4	40.0	36.2
2009 Report						
Current*	58.3	12.8	44.0	32.8	34.4	33.4
Future	57.4	9.1	34.1	33.0	29.6	33.8
* Includes deliveries of carryover water.						

State Water Project Supply Reliability

Q & A -

Urban Water Management Plan 2010

Questions and Answers

Consultant Team

- Kennedy/Jenks Consultants
- Luhdorff and Scalmanini
- Nancy Clemm, P.E.
- Stacy Miller Public Affairs

Future Meeting Dates and Times

- Public Workshops
  - May 25, 2010
  - July 27, 2010
  - September 28, 2010
- Hearings (Tentative)
  - October 1
  - November 30
- Adoption (Tentative)
  - CLWA December 31, 2010?
  - Purveyors June 2011?

(ORIGINAL)

Santa Clarita Valley Urban Water Management Plan
July 27, 2010 - Community Workshop Sign In Sheet

	PRINT NAME	ORGANIZATION	TITLE	PHONE	EMAIL
1.	MARSHALL PASTER			(661) 252 6057	20701 Soledad Cyn Rd 358 Canyon Country CA 91351
2.	Stacy Miller	SCMPA			
3.	Dirk Marks	CLWA	WRM		
4.	Mary Lou Cotton	K/J			
5.	Matt Dickens	VWC	Resource Conservation Manager	661-25[illegible]5132	MDickens@valleywater.org
6.	JANICE THOMAS	private		661 222-7450	22pupperwolf@att.net
7.	Kevin Korenthal	Self		(661) 310-0769	—
8.	Cathy Hollomon	SCWA	Assoc WR Planner	661-259-2737	chollomon@scwater.org
9.	Harold Geiger	private	Homeowner	661 254 6478	htgeiger@sbcglobal.net
10.	Kendra Geiger	"	"	" " "	"
11.	PAUL BSTRICKLAND	ASSEMBLYMAN CAMDEN SMYTH	FIELD REP	661 714 6999	LUCK4US@ca.rr.com
12.	Patrick Bryant	City of SC	Admin Analyst	661-255-4902	pbryant@santa-clarita.com
13.	mari johnson	Self		661 360 8178	marijohns7@yahoo.com
14.	Steve Cole	NEWS	G.M		SCOLE@NEWS.ORG
15.	L Adams	HOA			
16.	S Moss	HOA			
17.	B Bothara	HOA			
18.	Jorge H Aguila	Aguila Landscaping	owner	661-259-5641	aguilaland@sbcglobal.net

Santa Clarita Valley Urban Water Management Plan
July 27, 2010 - Community Workshop Sign In Sheet

	PRINT NAME	ORGANIZATION	TITLE	PHONE	EMAIL
1.	Maureen Wade	Interested Citizen		661-254-2370	mobrownies@cc.rr.c
2.	Ronald Wynn	SDS			
3.	JEFF SAUNDERS	RESIDENT			JBSAWNDERS@AOL
4.	JASON SMISKO	Santa Clarita			
5.	Rebecca Correa	Waterwise			rcorrea@waterwise-consulting.com
6.	DAN RAMLER	SANTA CLARITA			
7.	Robert DiPrimio	Valencia Water			rdiprimio@valenciawater.
8.	David Fryhm	self			engrdave@mac.com
9.	Julie Molinare	Grass Greener Landscape Designs			
10.	Jackie Bick	Sen. M. Runner			
11.	Henry Schultz	SELF		661-284 5613	HENRYSO@PACBELL.NET
12.	JESSICA BUNKER	LAC WWD		626-300-3315	jbunker@dpw.lacounty.gov
13.	RAY ARSNOW	HOMEOWNER		———	IRSTEAMERR@yhoo.com
14.					
15.					
16.					
17.					
18.					

Santa Clarita Valley Urban Water Management Plan
July 27, 2010 - Community Workshop Sign In Sheet

	PRINT NAME	ORGANIZATION	TITLE	PHONE	EMAIL
1.	Sally Bowler	Self	4	661-313-8324	salbowler@yahoo
2.	Sandra Cattell	Sierra Club		661 2590433	Sumcatt@yahoo.com
3.	Carole Jurbes	SCV Fair Elections		661-755 3772	Carolelutness@att.net
4.	DAN MASNADA	CLWA	G.M.	661 297 1600	
5.	Danny Andrews	Retired DWR		661-295-6771	
6.	Frank Smathers	customer		661-296-0511	thunder1road@gmail.com
7.					
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17.					
18.					

September 2010 UWMP Workshop Notification of Postponement

Public Outreach Record

2010 Santa Clarita Valley Urban Water Management Plan

Stacy Miller
PUBLIC AFFAIRS
Creative Solutions to Complex Situations

September 14, 2010

«AddressBlock»

Subject: **September 2010 UWMP Workshop Postponed**

«GreetingLine»

Thank you for your interest in the 2010 Urban Water Management Plan (UWMP) and/or your attendance at one of the recent community workshops.

This is to notify you that the originally scheduled **September 28, 2010 UWMP workshop** has been **postponed** as we are awaiting UWMP document guidelines from the State of California which will not be released until the end of October, 2010.

The next 2010 UWMP community workshop will provide the most current information on components of the 2010 planning document and will take place as follows:

Date:	Tuesday, November 16, 2010
Time:	4:00 pm
Location:	Castaic Lake Water Agency 27234 Bouquet Canyon Road

The Urban Water Management Plan presents a picture of the valley's water situation through the year 2035 and describes the long-range water needs of the community and the means to supply the necessary water.

I encourage your participation at the November community workshop and look forward to seeing you then. If you have any questions, please feel free to contact me.

Sincerely,

Stacy Miller
Public Outreach Manager
2010 SCV Urban Water Management Plan

Government Affairs, Public Relations & Communication
P.O. Box 55745, Valencia, CA 91385 [818] 402-5806 [661] 222-9733 Fax stacy@StacyMillerPA.com
www.StacyMillerPA.com

SANTA CLARITA VALLEY

2010 Urban Water Management Plan

COMMUNITY WORKSHOP

POSTPONED

Friday 9-24-10 Signal

The originally scheduled September 28, 2010 UWMP workshop has been postponed as we are awaiting UWMP document guidelines from the State of California which will not be released until the end of October, 2010.

The next 2010 UWMP community workshop will provide the most current information on components of the 2010 planning document and will take place as follows:

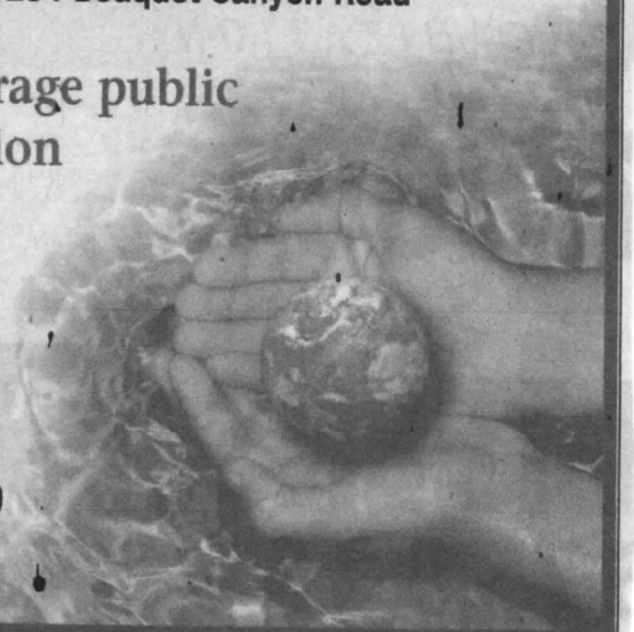
New Workshop Date is:

Date: Tuesday, November 16, 2010

Time: 4:00 pm

Location: Castaic Lake Water Agency
27234 Bouquet Canyon Road

We encourage public participation and input



For more information, please call (661) 297-1600

Castaic Lake Water Agency
CLWA Santa Clarita Water Division
Newhall County Water District
Valencia Water Company

November IRWM Stakeholder Presentation

Public Outreach Record

2010 Santa Clarita Valley Urban Water Management Plan

November 9 Upper Santa Clara River IRWM Stakeholders Meeting Notification

To: Jeff Ford
Cc: Jeff Ford
Subject: RE: November 9 Upper Santa Clara River IRWM Stakeholders Meeting

From: Jeff Ford
Sent: Thursday, October 28, 2010 7:55 AM
To: Jeff Ford
Subject: November 9 Upper Santa Clara River IRWM Stakeholders Meeting

Dear Upper Santa Clara River IRWM Stakeholders:

Our next meeting will be one week from today at the City's Activities Center. We have had several meetings at this location now, but you can go to the City's website if you need directions, or map the address (20880 Centre Pointe Parkway, Santa Clarita, California 91350). On the agenda is an update of our grant applications, an update of the activities of the Invasive Weeds Task Force and an overview of the 2010 Urban Water Management Plan for the Santa Clarita Valley presented by the consultants working on it (an agenda is attached). We will start as usual at 2:30 p.m., but probably end a little later than normal given the items on the agenda.

Hope to see you all there.

Regards,

Jeff Ford
Principal Water Resources Planner
Castaic Lake Water Agency
(661) 513-1281

Urban Water Management Plan

Upper Santa Clara River Watershed
Integrated Regional Water Management Plan
Stakeholder Meeting
Tuesday, November 9, 2010

Enduring Relationships - Trusted Expertise - Promises Delivered

IRWMP Stakeholder Meeting
UWMP Overview

- What is an UWMP?
- Who is required to submit an UWMP?
- Why are UWMPs developed?
- When are the UWMPs developed?
- Existing and new requirements of UWMPs
- Q&A

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What is an Urban Water Management Plan?

- An Urban Water Management Plan is a comprehensive planning process whereby urban water suppliers describe and evaluate sources of water supply, efficient uses of water, demand management measures, implementation strategy and schedule, and other relevant information and programs.

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Who is required to prepare an UWMP?

- Publicly or privately owned water suppliers (including wholesalers), providing water for municipal purposes either directly or indirectly to more than 3,000 customers or supplying more than 3,000 acre-feet annually.

CASTAIC LAKE WATER AGENCY | NCWD | SCWD

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Kennedy Jenks

Why are UWMPs Developed?

- In adherence to the 1983 Urban Water Management Planning (UWMP) Act and subsequent legislation
- To develop a framework for agencies to integrate programs and projects that enhance the quality and quantity of regional water supplies
- To identify gaps between supply and demand through time (20-year analysis required)
- To provide detailed description of all supply sources (surface, recycled, groundwater)

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Kennedy Jenks

Why are UWMPs Developed? (Cont'd.)

- To identify Demand Management Measures (water conservation programs)
- To address water quality issues
- To develop water shortage contingency planning
- To describe how demand will be met through time, in all hydrologic year types (normal, multiple dry, critical dry)

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Kennedy Jenks

When are UWMP Plans Developed?

- Suppliers are required to update UWMP every five-years (years ending in 0 or 5).
- 2010 – current update
- July 1, 2011 for retailers (SBx7-7 extended UWMP deadline for retailers but silent on extension for wholesalers.)
  - Under current UWMP Act, wholesalers should complete UWMP by December 31, 2010. But "cleanup legislation" (AB 2776 and SB 1478) extended deadline to July 1, 2011 for wholesalers.

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Coordination and Notification Requirements

"Each urban water supplier shall coordinate the preparation of its plan with other appropriate agencies in the area, including other water suppliers that share a common source, water management agencies, and relevant public agencies, to the extent practical."

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Coordination and Notification Requirements

Other:

- Must hold public hearing prior to adoption of UWMP
- Must give cities and counties in service area 60 days notice prior to public hearing
- Must provide cities and counties and LAFCO in service area with copies of UWMP within 30 days of adoption

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Penalties

- Ineligible for State Grant and Loan Funding (at least until plan is completed to DWR satisfaction)
- Vital to the IRWMP process!

What, Who, Why, When, etc…

- Q&A/Discussion

New Requirements for 2010 UWMP

- New Law: SBX7-7 ("20% x 2020"), reporting starts with 2010 UWMPs
  - Base gross water use in gpcd: must be calculated using one of three methodologies
  - Target reduction from base by 2020: reporting requirements differ for retailers vs. wholesalers
  - Must be calculated using one of four methodologies
  - Agencies must hold public hearing to explain how targets will be met (can be held as part of UWMP hearing)

New UWMP Requirements

- Base gross water use in gpcd: calculation

  Total volume of water (treated or not) entering the retail distribution system, divided by the total population of the service area

  (Excludes: recycled water, net volume into long-term storage, water conveyed to another retailer, agricultural water)

New UWMP Requirements

- Base gross water use in gpcd: methodologies
  - 10-year average
    - *ending no earlier than 2004 – no later than 2010; OR*
  - 15-year average if 10% of 2008 demand met by recycled water
    - *get to add 5 years to calculation; AND*
  - 5-year average
    - *at least 5% reduction if agency is already close to 100 gpcd*
    - *ending no earlier than 2007 – no later than 2010*

New UWMP Requirements

- Base gross water use in gallons per capita per day (gpcd)
  - Averages are determined on a rolling basis
  - Should review demands over various periods to determine hydrologic and demand year types
  - Recent economic impacts and drought response may have reduced demand!

16

New UWMP Requirements

- Target reduction methodology options
  1. 20% reduction from base (i.e., 80% of average gross water use in gpcd)
  2. Combination of state standards:
     - 55 gpcd indoor residential + landscape use at 70% -80% ETo + 10% reduction in commercial/industrial/institutional use
  3. DWR 20x2020 hydrologic region target (South Coast region = 149 gpcd)
  4. Option to be developed by October 2010

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New UWMP Requirements

- Reduction Target Option 4
  - Subject to DWR public process during 2010
  - Will identify targets to achieve cumulative statewide 20% reduction
  - Must allow flexibility for water supplier service area characteristics

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18

New UWMP Requirements

- Issues: DWR will derive methodologies for calculations: population, base water use, gross water use, sector water use, Option 4, others
  - As DWR derives new methodology standards, agencies may be required to use them
  - Won't be final until December 2010
  - If work has already been done, it may need to be repeated
  - = Reason for UWMP deadline extension to July 1, 2011

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New UWMP Requirements

- Other
  - SB 1087 (Florez) - requires an UWMP to include projected water use for single-family and multi-family residential housing for lower income households as identified in the housing element of any city, county, or city and county in the service area of the supplier.

Consultant Team

- Kennedy/Jenks Consultants
- Luhdorff and Scalmanini
- Nancy Clemm, P.E.
- Stacy Miller Public Affairs

Questions, Answers and Discussion

22
Future Meeting Dates and Times
Public Workshops
May 25, 2010
July 2, 2010
November 16, 2010
January 11, 2011 (tentative)
March 8, 2011 (tentative)
Public Hearings
January 26, 2011 (tentative)
March 23, 2011 (tentative)
April 27, 2011 (tentative)
Adoption
June 2011
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Kennedy Jenks

Upper Santa Clara River Watershed
Integrated Regional Water Management Plan

Stakeholder Meeting #18
Tuesday, November 9, 2010
2:30 pm –4:30 pm
City of Santa Clarita Activities Center
20880 Centre Pointe Parkway
Santa Clarita, California 91350

Meeting Objectives:

- Updates on Grants
- Invasive Weeds Task Force Report
- 2010 Urban Water Management Plan Workshop

AGENDA

2:30	**I.**	**Welcome and Introductions**
		A. Meeting purpose and outcomes
		B. Stakeholder self-introductions
		Jeff Ford, CLWA
2:35	**II.**	**Project Updates/Prioritzation**
		A. Planning Grant Update
		B. Planning Grant Schedule
		C. Implementation Grant Update
		D. Final Suite of Projects
		E. Implementation Grant Schedule
		Jeff Ford, CLWA
2:45	**III**	**Santa Clara River Invasive Weeds Task Force**
		A. Results of October Meeting
		B. Future Activites
		Heather Merenda, City of Santa Clarita
3:00	**IV.**	**2010 Urban Water Management Plan**
4:30	**V.**	**Close**

UPPER SANTA CLARA RIVER
INTEGRATED REGIONAL WATER MANAGEMENT PLAN

Stakeholder Meeting #18

November 9, 2010
City of Santa Clarita, Activities Center

Meeting Summary

PURPOSE AND MEETING OVERVIEW

The purpose of this 18th stakeholder meeting was to:

- Update Stakeholders on Grants
- Report on the Invasive Weeds Task Force
- Hold a Workshop on the 2010 Urban Water Management Plan

Stakeholders representing public agencies and private, non-profit organizations attended this meeting.

UPDATE ON THE IRWM PROCESS

Jeff Ford provided a recap and explanation of the progress on grant applications for both the Planning Grant and the Implementation Grant including:

- Overview of new Plan requirements
- The submittal of a Planning Grant application in September and the schedule for DWR to award.
- Progress on preparing an Implementation Grant application and the expected schedule for DWR to accept applications and make awards.
- Review of the final project suite in the Implementation Grant application and approval of including a project not in the adopted IRWMP: the Valencia Water Company's Santa Clarita Valley Southern End Recycled Water Project.

UPDATE ON THE SANTA CLARA RIVER INVASIVE WEEDS TASK FORCE

Heather Merenda from the City of Santa Clarita discussed the Task Force's progress to date and gave an overview of the goals of the Task Force. She noted that the next meeting was scheduled for January in Filmore. More details will be sent to the stakeholders as they become available, but interested parties were encouraged to join the Task Force directly.

OVERVIEW OF THE 2010 URBAN WATER MANAGEMENT PLAN

Stacy Miller of Stacy Miller Public Affairs and Mary Lou Cotton of Kennedy/Jenks Consultants gave an overview of the requirements of the UWMP Act, the contents of the UWMP and the progress to date on the 2010 UWMP. They detailed the schedule of workshops and hearings leading the adoption of the UWMP in June of 2011.

OTHER ITEMS

Jeff Ford announced that the next Stakeholders Meeting is tentatively scheduled for January at a location TBD. Meeting notices will be emailed to stakeholders once a date is determined.

IRWMP Invitee & Attendee List - 11-9-10

Organization	Telephone Number	Fax Number	e-mail address	Initial
LA County Regional Planning	(213) 974-6476		madams@planning.lacounty.gov	
DWR, Glendale, CA	(818, 500-1645		ljurkevi@water.ca.gov	
California Native Plant Society				
LA Co Flood Control District Meherva Ariki	626-458-4314		mariki@dpw.lacounty.gov	
Atkins Environmental	(661) 266-2260	(661) 253-3555	bj@atkinsenvironmental.com	
Building Industry Association	(661) 257-5046		nayala@biaglav.org	
Acton Town Council	(661) 269-2588		Airspecial@aol.com	
UCCE Water Quality Program				
West Ranch Town Council				
Senator George Runner	(661) 286-1471		jackie.bick@sen.ca.gov	
Los Angeles Sheriffs Department			wfbennet@lasd.org	
California Dept. of Water Resources				
UCCE - Los Angeles				
California Dept. of Water Resources				
California Regional Water Quality Control Board	(213) 576-6679		sbirosik@waterboards.ca.gov	
LA County Flood Control District			HBORDAS@dpw.lacounty.gov	
CDFG	(661)259-3750			
Friends of the Santa Clara River	(805) 498-4373		bottorffm@verizon.net	
UCCE Center for Water Resources				
U.A.P. Timberland				
California Coastal Conservancy				
NRCS-Somis				
U.S. Army Corps of Engineers	(213) 452-4057		darrell.w.buxton@usace.army.mil	
VCRCD-Wildscape Restoration	(805) 644-6852	(805) 642-2127	noreen@wildscaperestoration.com	
Los Angeles County DPW	(661) 947-7173		mcaddick@dpw.lacounty.gov	
USDA Forest Service			jcapell@fs.fed.us	
California Dept of Fish and Game	(805) 640-1852		mcardenas@dfg.ca.gov	
MIG Associates			joanc@migcom.com	
Newhall County Water District	(661) 259-3610		scole@ncwd.org	
Acton Town Council	(661) 269-5675			
The Nature Conservancy				
Kennedy/Jenks Consultants	(805) 658-0607		MaryLouCotton@KennedyJenks.com	
California Dept. of Fish and Game	(661) 263-8306		bcourtney@dfg.ca.gov	
Kennedy/Jenks Consultants	(805) 658-0607		MeredithClement@kennedyjenks.com	
	(818) 365-9847		d r crane@hotmail.com	
LA County DPW	(626) 458-3524	(626) 458-3534	ascruz@dpw.lacounty.gov	
Valley Crest Tree Company	(818) 737-2697		rcrudup@vctree.com	
Acton Town Council	(661) 269-3682	(661) 269-3683	wdavis289@hughes.net	
Assemblyman Cameron Smith	(661) 286-1565		jarrod.degoria@asm.ca.gov	
LA Co DPW	(626) 458-4313		bdepoto@dpw.lacounty.gov	
Valencia Water Company	(661) 294-0828		rdiprimio@valencia.com	

Organization	Telephone Number	Fax Number	e-mail address	Initial
The Nature Conservancy			tdoherty@tnc.org	
University of California Cooperative Extension	(323) 266-3404		sldrill@ucdavis.edu	
University of California, Santa Barbara	(805) 893-2911		tdudley@msi@uscsb.edu	
	(661) 251-9729	(661) 259-1845	water@dslextreme.com	
Santa Clarita Valley Well Owners Association	(661) 298-2000		rfleck@socal.rr.com	
Castaic Lake Water Agency	(661) 513-1281		jford@clwa.org	
LA Co DPW	(626) 458-6158		afuentes@dpw.lacounty.gov	
LA Co DPW Waterworks	(626) 300-3324	(626) 300-3358	hgallardy@dpw.lacounty.gov	
			avrcd@carcd.org	
LA Co Dept. of Regional Planning	(213) 974-6417		rglaser@planning.lacounty.gov	
Acton Town Council				
			tgrant@ladpw.org	
Los Angeles County Sanitation Disrict			fguerrero@lacsd.org	
West Ranch Town Council	(661) 254-6116		grf497@aol.com	
SCWD				
Los Angeles County Sanitation Disrict	(562) 908-4288 x 2832		fguerrero@lacsd.org	
Santa Clarita Valley Environmental Coalition			mgutzeit@ca.rr.com	
LA County Public Works Department	(626) 458-5918		bhamamo@ladpw.org	
California DFG			spharris@cdfg.ca.gov	
Director Regional Planning				
L.A. County Supv'r Mike				
CLWA	(661) 513-1253		Thawes@clwa.org	
Agua Dulce Town Council	(661) 268-1731			
Agua Dulce Town Council	(661) 268-1731		BH33605@AOL.com	
	(661) 295-7300		John@gruber-systems.com	
SCWD	(661) 259-2737		chollomon@scwater.org	
County of Ventura			Susan.Hughes@Ventura.org	
U.S. Army Corps of Engineers	(213) 452-3826		james.d.hutchison@spl01.usace.army.mil	
Agua Dulce Town Council			jjennings3570@sbcglobal.net	
Evironmental Protection Agency				
Vulcan Materials Co.,				
CalTrans, District 7 - IGR/CEQA Branch	(213) 897-1346		edwin_kapmann@dot.ca.gov	
Valencia Industrial Association				
LA County DPW	(626) 458-4350		fkim@dpw.lacountry.gov	
LA County Waterworks	(626) 300-3327		tjkim@dpw.lacounty.gov	
Castaic Area Town Council				
LA County Flood Control District	(626) 458-4350		Fkuo@dpw.lacounty.gov	
City of Santa Clarita	(661) 255-4337		TLANGE@santa-clarita.com	
Lakes Town Council	(661) 724-0150		cedar91@verizon.net	
			redraggles2@earthlink.net	
NRCS	(661) 945-2604 X 110		jae.lee@causda.gov	

Organization	Telephone Number	Fax Number	e-mail address	Initial
Angeles National Forest			mlambardo@fs.fed.us	
SCOPE				
Los Angeles County Sanitation Disrict	(562) 699-7411 X 2802		blouie@lacsd.org	
Santa Clarita Valley Chamber of Commerce	(661) 702-6977		Lmankin@scvchamber.com	
Castaic Lake Water Agency				
Aqua Dulce Town Council				
Ventura Cty Watershed Protection District				
LA County Dept. of Public Works	(661) 947-7173		mcaddick@dpw.lacounty.gov	
The Nature Conservancy	(805) 642-0345 ext. 502		cmccalvin@tnc.org	
L. A. County Regional Planning				
United Water Conservation District				
City of Santa Clarita	(661) 284-1413		hmerenda@santa-clarita.com	
County of Ventura Ag. Commisioner's Office				
The Nature Conservancy	(661) 642-0345 X 502		smatsumoto@tnc.org	
United Water Conservation District				
Valencia Water Company	(661) 295-6512		gmilleman@valencia.com	
City of Santa Clarita	(661) 284-1413		hmerenda@santa-clarita.com	
Ventura County Resource Conservation District (VCRCD)	(805) 386-4685	(805) 386-4890	marty.melvin@vcred.org	
County of Ventura				
Kennedy/Jenks Consultants				
City of Santa Clarita	(661) 255-4959		cmonde@santa-clarita.com	
NRCS				
County of Los Angeles, Department of Parks and Recreation				
			TNGOV@dpw.lacounty.gov	
SCOPE	(661) 255-7112			
Ventura Cty Watershed Protection District			kirk.norman@ventura.org	
			kathy@via.org	
Stillwater Sciences	(510) 848-8098 ext. 111		bruce@stillwatersci.com	
Tataviam Band of Mission Indians				
	(661)251-6113		DOJTRUM@SOCAL.RR.COM	
South Coast Wildlands Project				
Newhall Land	(661)257-1095		cperez@newhall.com	
Association of Water Agencies of Ventura County				
Supervisor Antonovich's Office	(661) 287-3657		dperry@lacbos.org	
Los Angeles County Flood Control District	(805) 57-0497			
SCOPE				
Well Owner	(661) 297-4401			
			avconservancy@yahoo.com	
SCV Well Owners Association				
The Sierra Club, Angeles Chapter				
County of Ventura	(805) 654-2455		lynn.rodriguez@ventura.org	

Organization	Telephone Number	Fax Number	e-mail address	Initial
Ventura Cty Watershed Protection District				
County of Ventura				
Newhall County Water District	(661) 259-3610		krussell@ncwd.org	
LA County Waterworks District #36 & 37			DRYDMAN@dpw.lacounty.gov	
Rivers and Mountains Conservancy	(626) 458-4315		fsimpson@rmc.ca.gov	
Aqua Dulce/Acton Country Journal	(661) 269-5804	(661) 269-5532	countryjournal@bigplanet.com	
Friends of the Santa Clara River	(661) 644-2802		rsweet46@hotmail.com	
Santa Monica Mountains Conservancy				
Sierra Club	(661) 296-1212		kms39005@csun.edu	
US Fish and Wildlife Service	(805) 644-1766 X 339		Steurer_denise@fws.gov	
Wetlands Recovery Project				
Rivers and Mountains Conservancy	(626) 815-1019 x110		ltorres@rmc.ca.gov	
Foothill Associates	(661) 284-3018		jeff.trow@foothill.com	
Mountains Recreation and Conservation Authority				
Ventura Cty Watershed Protection District				
Friends of the Santa Clara River				
Supervisor Antonovich's Office	(661) 287-3657		rwayman@lacbos.org	
	(661) 251-7790			
Councilmember, City Of Santa Clarita				
West Ranch Town Council	(661) 799-8089		rg@rgwinter.com	
United Water Conservation District				
LA County-DPW	(626) 458-6159		alwong@dpw.lacounty.gov	AWW
State of California, Dept of Water Resources	(916) 651-9283		bwycoff@water.ca.gov	
Santa Clarita Valley Sanitation District	(562) 699-7411 X 2820		mzauner@lacsd.org	
LA County-Dept. Water Resources	(626) 456-6188		kzimmer@ladpw.gov	

SMPA - Stacy Meller 818402-5806 Stacy@StacyMellerPA.com

Mark Dickens - Valencia water 661-510-9733 mDickens@Valleywater.com

K Russell NCWD 661-2593610

D. Marks CLWA

Roger A. Harris CCA 805-641-3781 rah@agriculturesucss.com

November 2010 UWMP Workshop
Public Outreach Record

2010 Santa Clarita Valley
Urban Water Management Plan

Stacy Miller
PUBLIC AFFAIRS
Creative Solutions to Complex Situations

November 3, 2010

*** Orgs shaded above will receive letter return receipt requested See Attached

Subject: 2010 Urban Water Management Plan November Workshop

Dear Sir or Madam,

The Santa Clarita Valley's water agencies, Castaic Lake Water Agency, CLWA Santa Clarita Water Division, Newhall County Water District and Valencia Water Company are currently preparing the 2010 Urban Water Management Plan (UWMP).

In an effort to ensure all interested parties are fully informed and involved in this process, the water agencies have scheduled their third community workshop on November 16, 2010 and welcome your participation. This workshop will provide the most current information on components of the 2010 UWMP.

Date:	Tuesday, November 16, 2010
Time:	4:00 pm
Location:	Castaic Lake Water Agency 27234 Bouquet Canyon Road

The Urban Water Management Plan presents a picture of the valley's water situation through the year 2035, describes the long-range water needs of the community and the means to supply the necessary water.

I encourage your participation and look forward to seeing you then. If you have any questions, please feel free to contact me.

Sincerely,

Stacy Miller
Public Outreach Manager
2010 SCV Urban Water Management Plan

Government Affairs, Public Relations & Communication
P.O. Box 55745, Valencia, CA 91385 [818] 402-5806 [661] 222-9733 Fax stacy@StacyMillerPA.com
www.StacyMillerPA.com

SANTA CLARITA VALLEY

2010 Urban Water Management Plan

COMMUNITY WORKSHOP

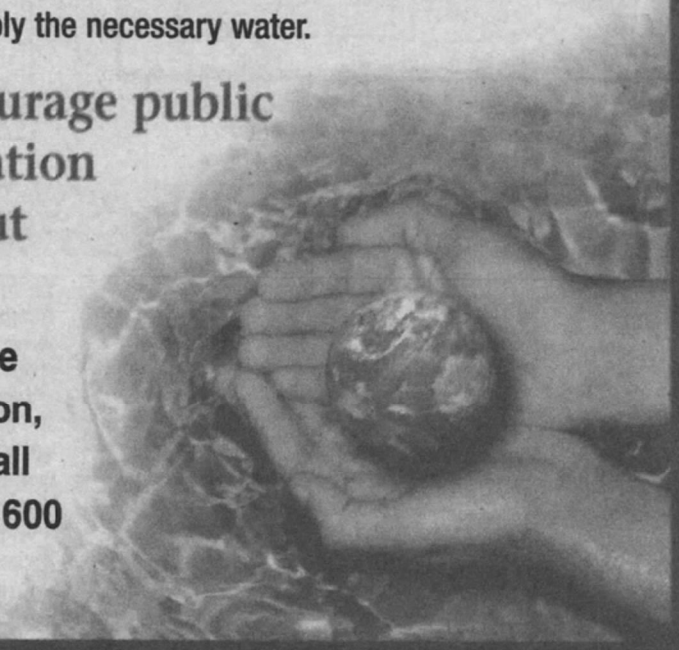
The Signal
11-9-10

Date: Tuesday, November 16, 2010
Time: 4:00 pm
Location: Castaic Lake Water Agency
27234 Bouquet Canyon Road

This workshop will provide the most current information on components of the 2010 UWMP. Our team will provide an overview of the opportunities for public comment and will also be available for questions.

The Urban Water Management Plan, mandated by the State of California, presents a picture of the valley's water situation through the year 2035. It describes the long-range water needs of the community and the means to supply the necessary water.

We encourage public participation and input



For more information, please call (661) 297-1600

Castaic Lake Water Agency
CLWA Santa Clarita Water Division
Newhall County Water District
Valencia Water Company

SANTA CLARITA VALLEY

2010 Urban Water Management Plan

COMMUNITY WORKSHOP

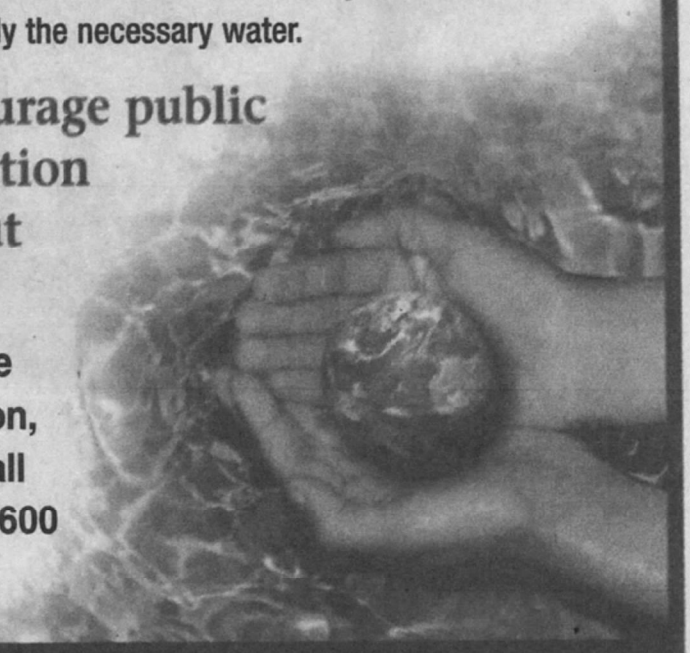
The Signal
11-14-10

Date: Tuesday, November 16, 2010
Time: 4:00 pm
Location: Castaic Lake Water Agency
27234 Bouquet Canyon Road

This workshop will provide the most current information on components of the 2010 UWMP. Our team will provide an overview of the opportunities for public comment and will also be available for questions.

The Urban Water Management Plan, mandated by the State of California, presents a picture of the valley's water situation through the year 2035. It describes the long-range water needs of the community and the means to supply the necessary water.

We encourage public participation and input



For more information, please call (661) 297-1600

Castaic Lake Water Agency
CLWA Santa Clarita Water Division
Newhall County Water District
Valencia Water Company

URBAN WATER MANAGEMENT PLAN UPDATE

2010 UWMP offers creative solutions to SCV water issues

The California Urban Water Planning Act requires water utilities to update and submit an Urban Water Management Plan (UWMP) every five years. CLWA and the local water retailers are preparing a draft of the Santa Clarita Valley 2010 Urban Water Management Plan for review this winter and spring of 2011. All California urban water suppliers having more than 3,000 service connections or selling more than 3,000 acre-feet of water annually are required by the California Water Code to prepare a UWMP every five years.

CLWA is one of approximately 450 water suppliers in California preparing such a plan. CLWA, Santa Clarita Water Division, Newhall County Water District (NCWD) and Valencia Water Company are working together to prepare a draft of the 2010 plan for the valley. The Los Angeles County Waterworks District No. 36 is participating on an ad hoc basis, as the Los Angeles County Department of Public Works must prepare its own UWMP.

Every Drop Counts

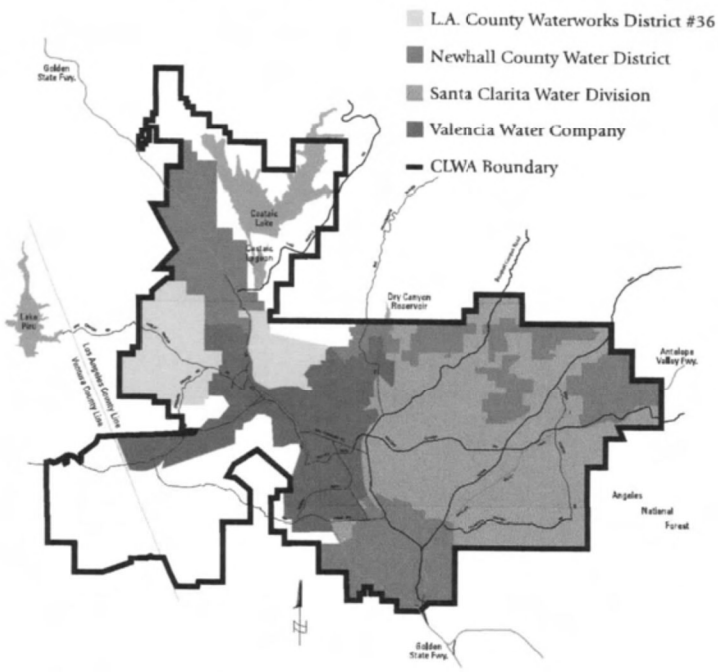
A UWMP must consider projected demands and supplies for a minimum 20-year period, in five-year increments. It must also assess water supply and demand scenarios for average/normal water years (i.e, periods of normal precipitation), a single dry year, and multiple dry years.

The draft 2010 UWMP for the valley will identify current local and imported water supply sources, as well as potential future sources. Current sources include the State Water Project, other sources of imported water, local groundwater and recycled water. Future potential sources include all of these plus water transfers and additional recycled water. The 2010 UWMP will also address the required levels of water conservation both to meet state law and ensure adequate supplies.

The plan will identify future demand based on growth projections. By assessing projected demand along with projected supply, the 2010 UWMP will show how the valley will meet its water needs through at least 2035.

There have been public workshops held to explain the UWMP and the process, and there will be several more along with a least two public hearings in 2011 by the CLWA and NCWD Boards of Directors. Public participation at all of these events is encouraged. The UWMP must be adopted no later than June 30, 2011.

Castaic Lake Water Agency Service Area



YOUR QUESTIONS AND COMMENTS ARE IMPORTANT TO US
PLEASE CALL (661) 297-1600 OR EMAIL US AT MAIL@CLWA.ORG

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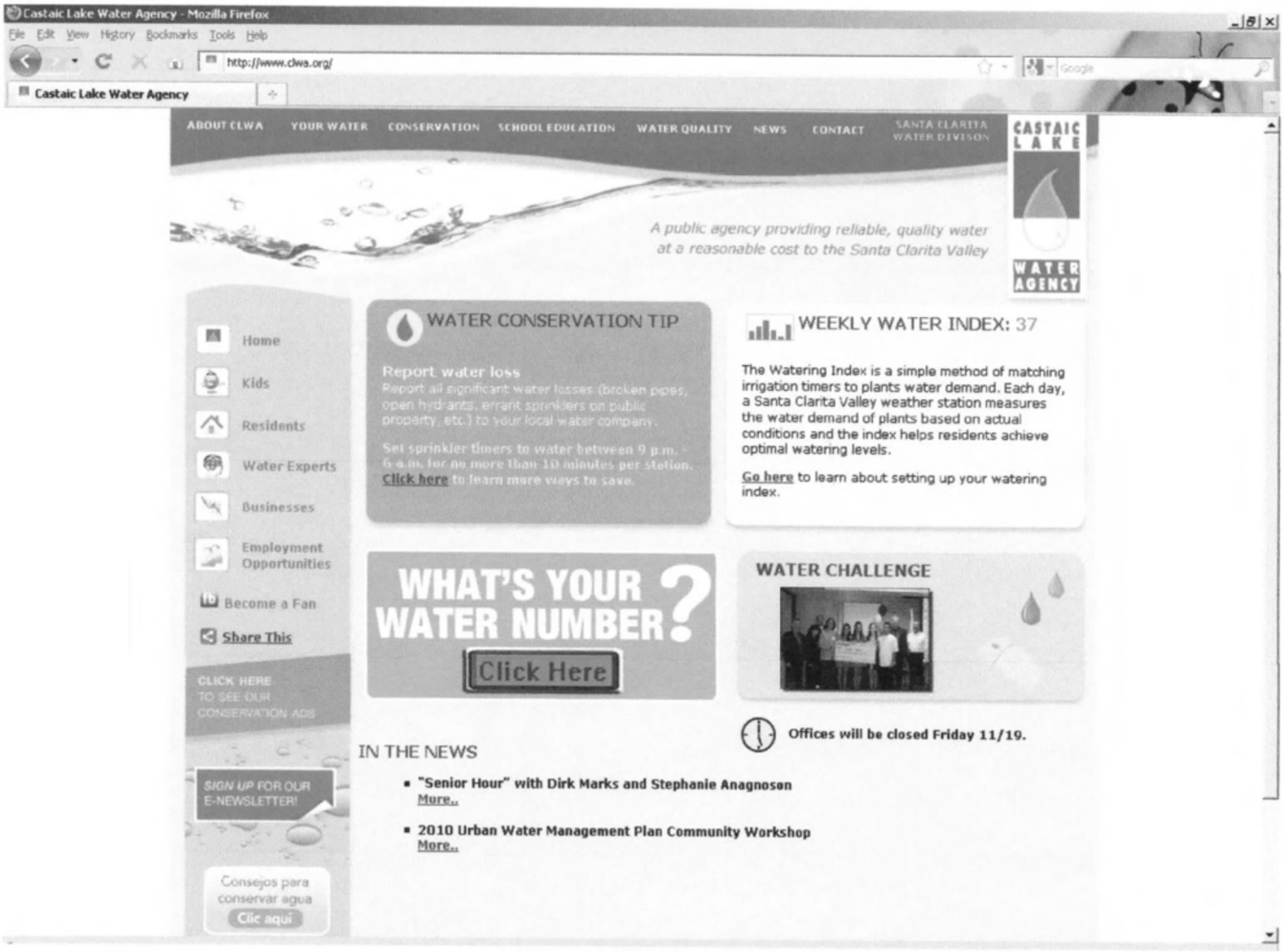
CASTAIC LAKE WATER AGENCY

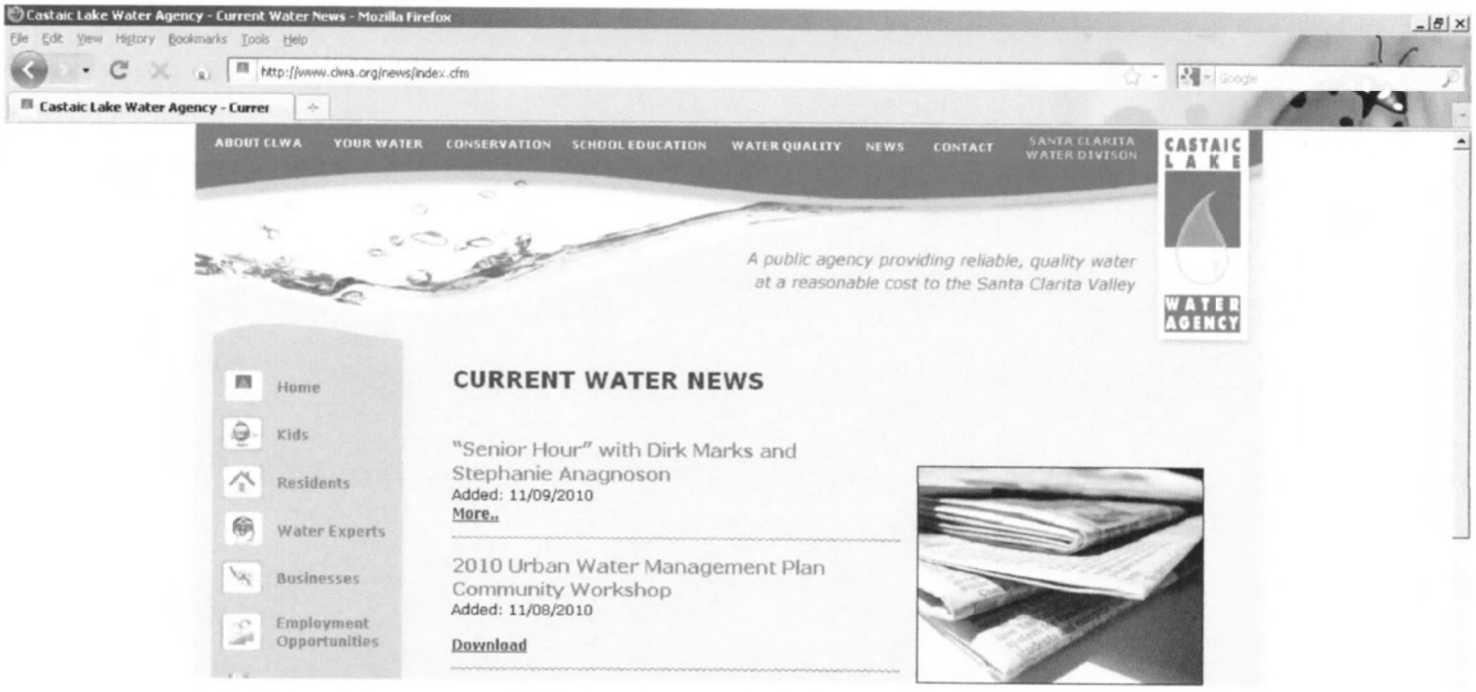
CASTAIC LAKE WATER AGENCY
27234 BOUQUET CANYON ROAD
SANTA CLARITA, CALIFORNIA
91350
(661) 297-1600
WWW.CLWA.ORG

Water Currents Newsletter
Fall 2010

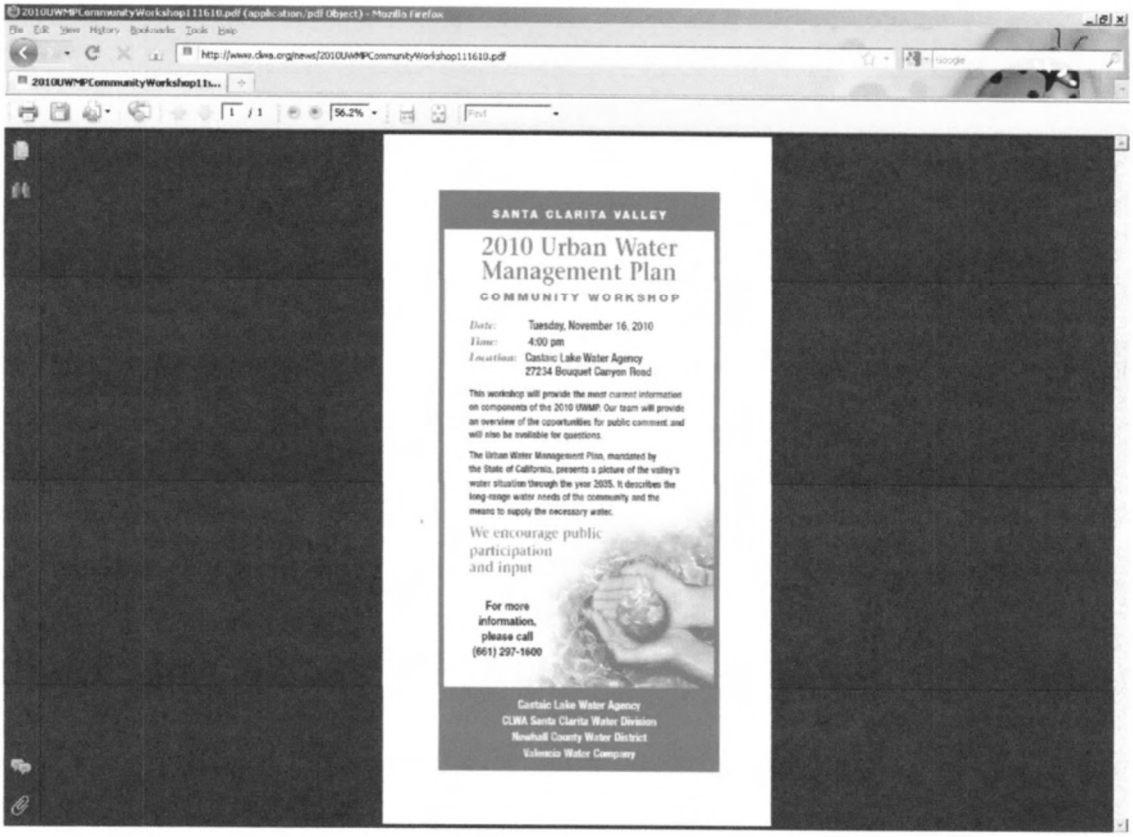
PRINTED ON RECYCLED PAPER. EACH TON OF RECYCLED PAPER SAVES 7,000 GALLONS OF WATER.

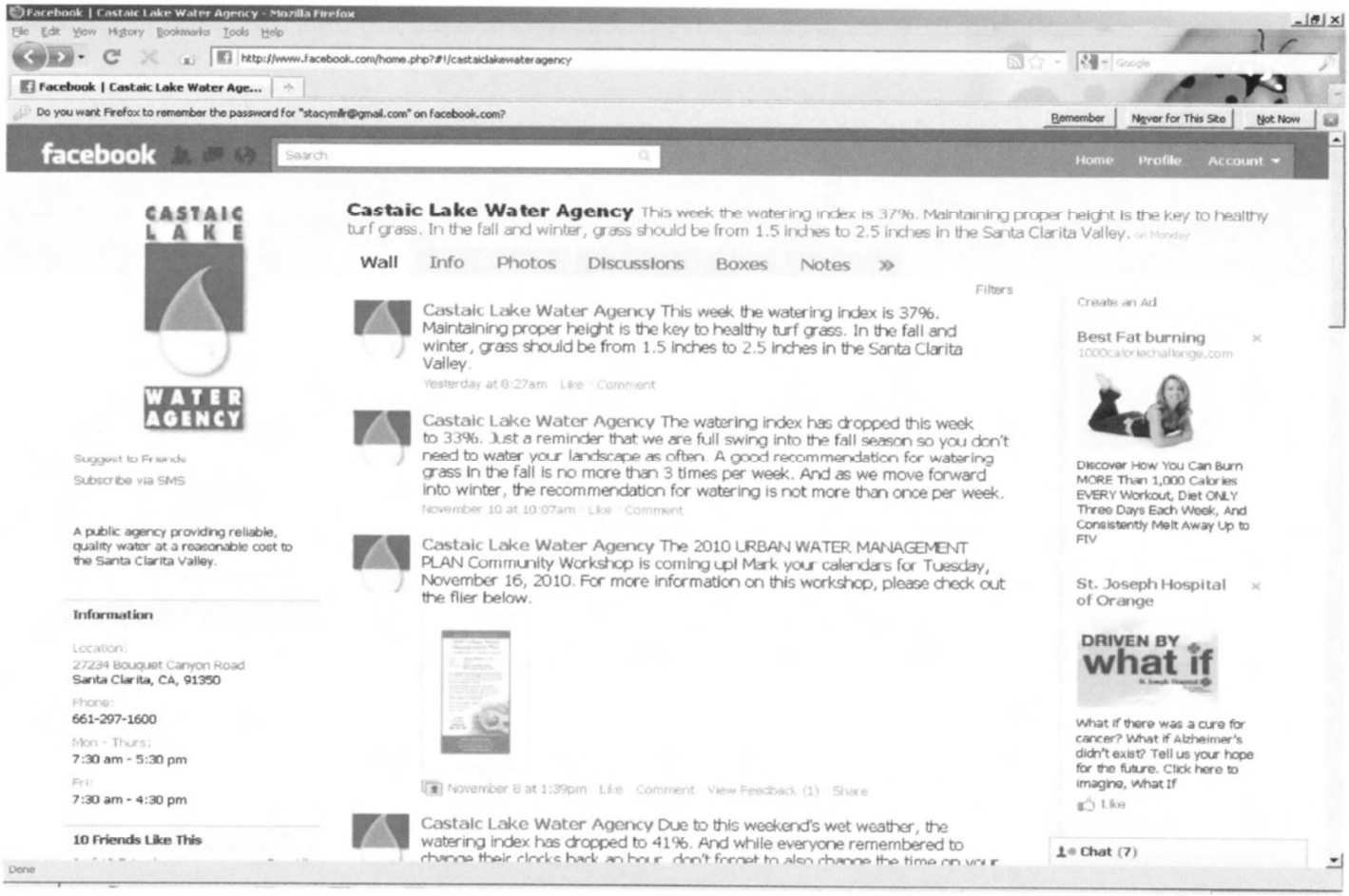
Castaic Lake Water Agency
Webpage & Facebook Posting – November 2010 UWMP Workshop
Monday, November 08, 2010



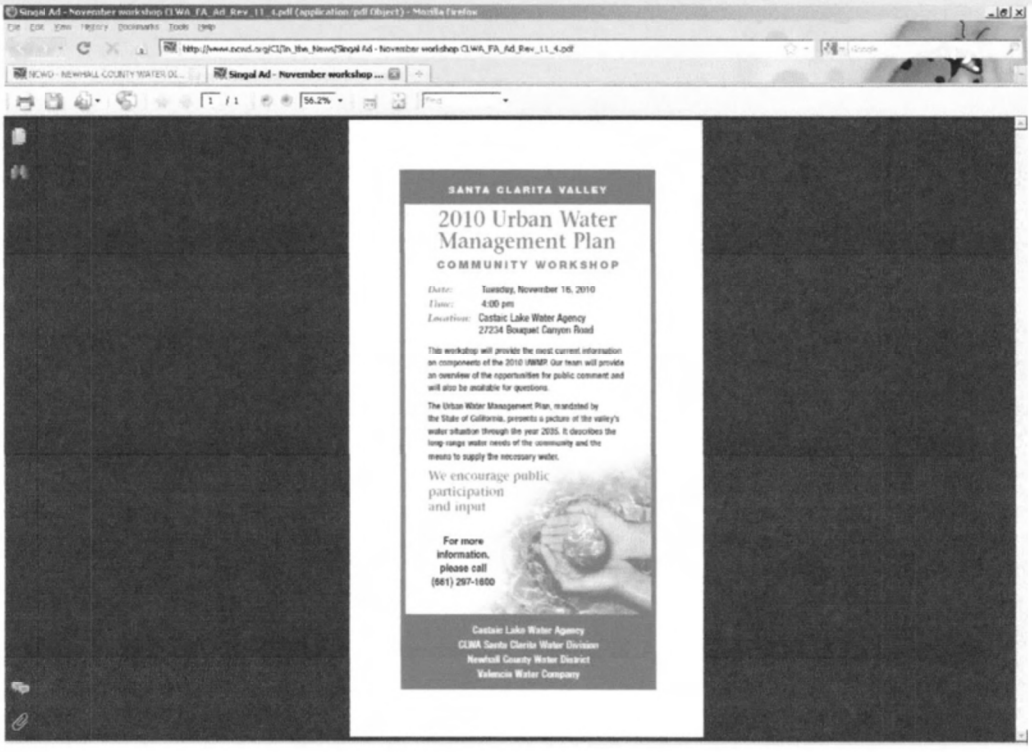


Castaic Lake Water Agency
Webpage & Facebook Posting – November 2010 UWMP Workshop
Monday, November 08, 2010





Newhall County Water District
Webpage & Facebook posting – November 2010 UWMP Workshop
Monday, November 08, 2010



Facebook | Newhall County Water District - Mozilla Firefox

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http://www.facebook.com/home.php?#!/pages/Newhall-CA/Newhall-County-Water-District/217086150470

Facebook | Newhall County Water Di...

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NCWD

NEWHALL COUNTY WATER DISTRICT

Suggest to Friends

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Our water is a precious resource... Use water efficiently, Every Drop Counts!

Information

Location:
23780 N Pine Street
Newhall, CA, 91321

Phone:
661-259-3610

Mon - Fri:
8:00 am - 5:00 pm

Newhall County Water District

Wall | Info | Photos | Discussions | Notes | Video

Write something...

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Newhall County Water District + Others | Just Newhall County Water District | Just Others

Newhall County Water District Reg Board Mtg Wed Nov 17, 10 @ 6:30 pm

http://www.ncwd.org/OB/Agendas/regular-meeting-Nov17-2010.pdf
www.ncwd.org

November 10 at 10:29am · Like · Comment · Share

Newhall County Water District 2010 Urban Water Management Plan Community Workshop Nov 16, 10

http://www.ncwd.org/CI/In_the_News/Singal%20Ad%20-%20November%20workshop%20CLWA_FA_Ad_Rev_11_4.pdf
www.ncwd.org

November 8 at 11:03am · Like · Comment · Share

Newhall County Water District Notice of Holiday Closure

http://www.ncwd.org/CI/In_the_News/Holiday%20Closure.pdf
www.ncwd.org

November 4 at 10:09am · Like · Comment · Share

Newhall County Water District SCV Water Committee Mtg on Tue Nov 2, 10 @ 2pm @ City Hall of Santa Clarita

http://www.ncwd.org/OB/Agendas/SCV%20Comm%20Agenda%20Nov%202%2010.pdf

Create an Ad

4 Diet Foods to Never
thedietsolutionprogram...

Some "diet" foods can actually increase stomach fat. Learn to avoid these hidden junk foods. The Diet Solution Program

St. Joseph Hospital of Orange

What if there was a cure for cancer? What if Alzheimer's didn't exist? Tell us your hope for the future. Click here to imagine, What If

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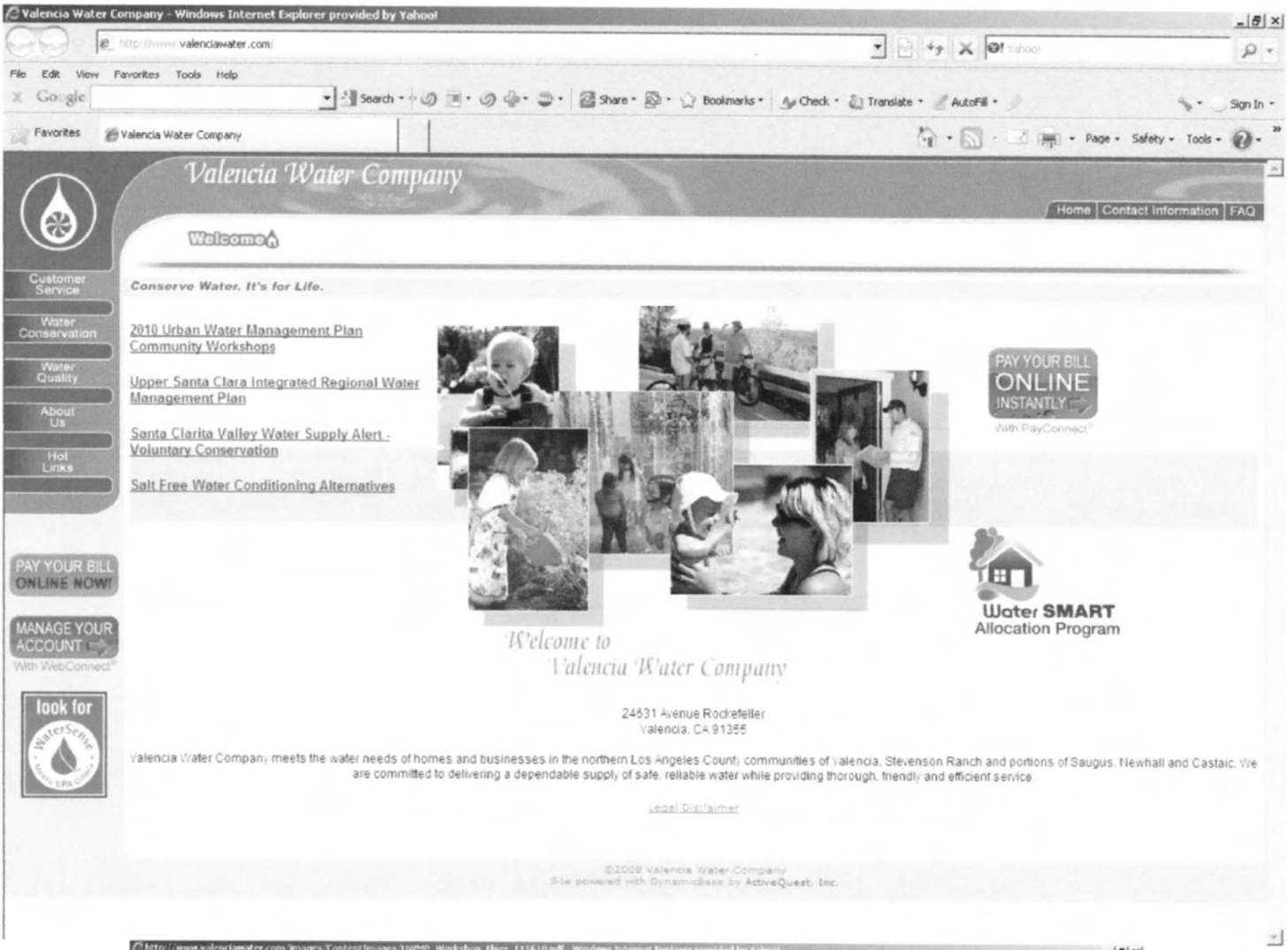
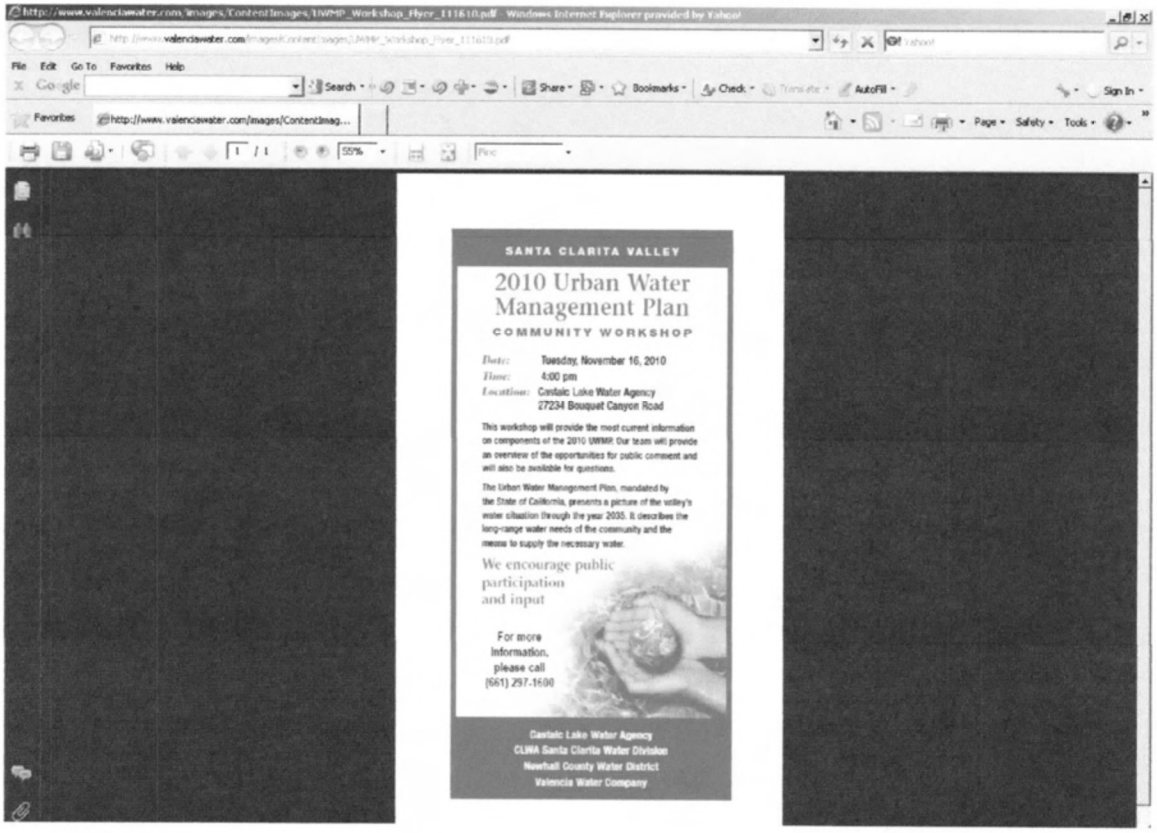
Valencia Water Company
Webpage posting – November 2010 UWMP Workshop
Friday, November 05, 2010





Santa Clarita Valley Urban Water Management Plan

Community Workshop

November 16, 2010
4:00 pm
Castaic Lake Water Agency

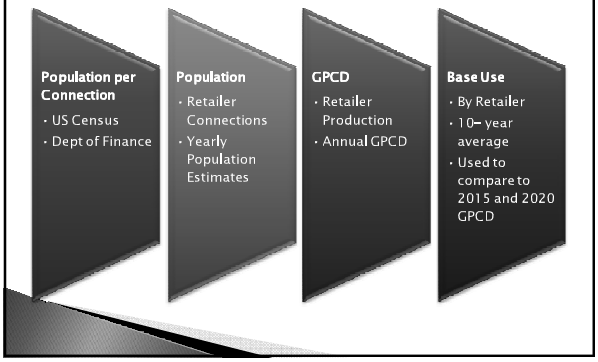
Agenda

- Introductions
- Review/status of UWMP process
- SBX7-7 GPCD population assumptions and calculations, and targets by retailer
- Questions and Answers

New Law: SBX7-7 ("20% x 2020")

- 20% demand reduction statewide by 2020
- Sets mandatory demand reduction goal for each retail water supplier
- Reporting starts with 2010 UWMPs
  - Base gross water use in gallons per capita per day (GPCD): must be calculated using one of three methodologies
  - Target reduction from base by 2020: must be calculated using one of four methodologies
  - Supplier must hold public hearing to explain how targets will be met (can be held as part of UWMP hearing)

Process for Determining SBX7-7 Base Gross Water Use (in GPCD)



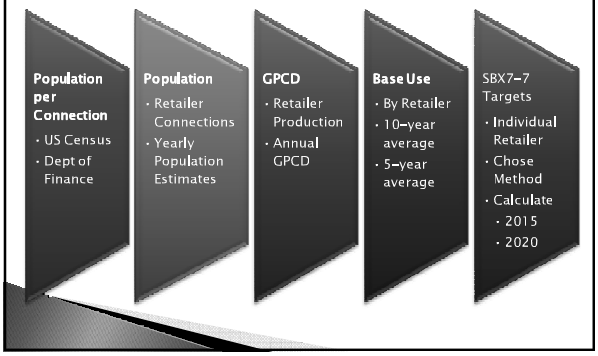
Base Gross Water Use Method

- Base water use in GPCD: methodologies
  - 10-year average
    - ending no earlier than Dec 31, 2004 – no later than Dec 31, 2010 *OR*:
  - 15-year average if 10% of 2008 demand met by recycled water
    - get to add 5 years to calculation (SCV retailers do not qualify)
  - And: 5-year average
    - ending no earlier than Dec 31, 2007 – no later than Dec 31, 2010
    - 100 gpcd; at least 5% reduction for all agencies in CA over 100 gpcd

Example: Newhall County Water District Draft GPCD Calculation

Year	Single Family	Multi-Family	People per Unit	Population	Production (AF)	GPCD	10-year Average
1995	5,680	4,552	3.020	30898	7,755	224	240
1996	5,723	4,589	3.038	31323	7,887	225	241
1997	6,035	4,612	3.056	32533	8,801	242	242
1998	6,037	4,622	3.074	32764	8,087	220	243
1999	6,202	4,651	3.092	33561	9,348	249	244
2000	6,255	4,713	3.111	34121	9,718	254	
2001	6,428	4,768	3.130	35041	9,525	243	
2002	6,777	4,823	3.149	36526	10,362	253	
2003	7,199	4,852	3.168	38178	10,351	242	
2004	7,873	4,870	3.187	40618	11,217	247	
2005	8,163	4,875	3.207	41814	10,756	230	
2006	8,292	4,875	3.227	42490	11,470	241	
2007	8,431	4,875	3.247	43206	11,975	247	
2008	8,450	4,875	3.267	43539	11,340	233	
2009	8,492	4,875	3.288	43951	10,559	214	
2010	8,529	4,875	3.288	43951	10,559	214	

Process for Determining SBx7-7 Base Use and GPCD Reduction Targets



Draft Base Gross Water Use Results

Agency	5-year GPCD	10-year GPCD
CLWA Santa Clarita Water Division	230	235
Newhall County Water District	241	244
Valencia Water Company	258	278

Target Demand Reduction Methodology Options

- 1.) 20% reduction from base (i.e., 80% of average gross water use in GPCD)
- 2.) Combination of state standards:
  - 55 gpcd indoor residential + landscape use at 70% ETo + 10% reduction in commercial/ industrial/institutional use
- 3.) DWR 20x2020 hydrologic region target (South Coast region = 149 GPCD)
- 4.) Option to be developed by DWR Public Process

Draft GPCD Target Demand Reductions Option 1: 80% of base use

Agency	2015 Objective	2020 Objective	2009 GPCD (current)
VWC	250	222	240
NCWD	219	195	214
SCWD	211	188	201
Regional	219	195	219

Method normalizes for:

- Low economic activity
- High vacancy rates
- Year to year weather variances

Note: Note: 2009 is 3rd year of drought

Fut *l demands*

Consultant Team

- Kennedy/Jenks Consultants
- Luhdorff and Scalmanini
- Nancy Clemm, P.E.
- Stacy Miller Public Affairs

Questions and Answers

Public Workshops and Hearings

- **Public Workshops**
  - May 25, 2010
  - July 2, 2010
  - November 9, 2010 (IRWMP Stakeholders)
  - November 16, 2010
  - January 11, 2011 (tentative)
  - March 8, 2011 (tentative)
- **Public Hearings**
  - January 26, 2011 (tentative)
  - March 23, 2011 (tentative)
  - April 27, 2011 (tentative)
- **Adoption**
  - June 2011

Santa Clarita Valley Urban Water Management Plan
November 16, 2010 - Community Workshop Sign In Sheet

	PRINT NAME	ORGANIZATION	TITLE	PHONE	EMAIL
1.	JOSE ZEGARRA	COC		(661) 287 4403	JOSEZEGARRAS@HOTMAIL
2.	Genaro Vallejo	COC		323-243-2638	genarovallejo@att.net
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4.	Cathy Holloman	SCWD	Assoc Water Res Planner	661-259-2737	cholbman@scwater.org
5.	KEITH ABERCROMBIE	VWC	GM	661-295-6501	KABercrombie@Valleyh2o
6.	GENE MUTO	COC		661 250-8414	GMUTO@BEVERLYHILLS.ORG
7.	BILL DEPOTO	LACFCD		626.458.4313	BDEPOTO@LADPW.ORG
8.	JIM WEIHERER	CLWA	PURCHASING TECH	661-297-1600	jweiherer@clwa.org
9.	ALBERT PETERSEN	GWP	APPRENTICE	818/468-7880	MARIVETTEPTRSN@AOL.COM
10.	Sharon Sorensen	City of Santa Clarita	Sr. Planner	661/267-5234	SSorensen@santaclarita.com
11.	JESSICA BUNKER	LACWWD NO. 36	Assoc. CE	626/300-3315	jbunker@ladpw.org
12.	Tom Worthington	Impact Sciences	President	805 443-5170	tomworthington@impactsciences.com
13.	KEVIN AGUILAR	COC		(661) 250-0737	K.Aguilar@SCVCHAMBER.COM
14.	Jeff Ford	CLWA	WR Planner	(661) 513-1281	Jford@clwa.org
15.	Dirk Marks	"	WR Manager	661 513 1257	dmarks@clwa.org
16.	BRIJESH MISRA	LA City	Inspector	(818) 830-0420	Brijeshcmisra@gmail.com
17.	BJ Atkins	Atkins Env. HELP	Owner	661 510 3663	bj@atkinsenvironmental.com
18.	STEVE MCLEAN	—	—	661-259-4767	MCLEAN.STEPHEN@CH.RR.COM

Santa Clarita Valley Urban Water Management Plan
November 16, 2010 - Community Workshop Sign In Sheet

	PRINT NAME	ORGANIZATION	TITLE	PHONE	EMAIL
1.	Francisco Guerrero	LACSD	Senior Engineer	562 903 4299 x 2532	FGuerrero@lacsd.org
2.	Stacey Miller	SMPA	Consult	818 403-5800	Smiller@SMP
3.	LUIS MARGHERITIS	CLWA	TECH.	(661) 510-4448	LMARGHERITIS@CLWA.ORG
4.	COLETTE HILLARD				
5.	GRANTS, ERIC			661-406-3219	ERICERIC@YAHOO.COM
6.	Linda Purpus	UWCD	Env. Scientist	805-525-4431	lindap@unitedwater.org
7.	Dusty Osmonson		Public	661-644-6546	lifted hockey@yahoo.com
8.	ERNI N		public	661-296 2775	nie.mani@yahoo.com
9.	Renee Sabol	Castaic Town Council	Council person	661-803 7123	ReneeSabol@AOL.com
10.	Sharren Naulls			661 862-9221	snaulls@avc.edu
11.	Betty Cameron			661 297-8116	
12.	Greg Kring	Burbank Water & Power	Pipefitter Apprentice	(626) 475-0413	Hailgeebus@Yahoo.com
13.	Chad Brightwell	BWP	"	(818) 621-5726	highryder98@yahoo.com
14.	FRANCK ROSENTHAL	C o C	STUDENT	818-261-2036	FRANCK-IE@YAHOO.COM
15.	Bonnie Deagon	———	Pubic	661-373-8341	Bjdhugs@aol.com
16.					
17.					
18.					

Santa Clarita Valley Urban Water Management Plan
November 16, 2010 - Community Workshop Sign In Sheet

	PRINT NAME	ORGANIZATION	TITLE	PHONE	EMAIL
1.	K. C. Valvo	BWP	App	818) 238-3500	
2.	JAMES ROWLANDS	BWP	APP	(818) 926-0978	
3.	Bonnie Deagon			661. 373-8341	
4.	Leah Schulman			661- 645-6344	leah.schulman@gmail.com
5.					
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January 2011 UWMP Workshop
Public Outreach Record

2010 Santa Clarita Valley
Urban Water Management Plan

Stacy Miller
PUBLIC AFFAIRS
Creative Solutions to Complex Situations

January 10, 2011

*** Orgs shaded above will receive letter return receipt requested (See attached)

Subject: January 2011 Workshop - 2010 Urban Water Management Plan

Dear Sir or Madam,

The Santa Clarita Valley water suppliers, Castaic Lake Water Agency, CLWA Santa Clarita Water Division, Newhall County Water District and Valencia Water Company, are currently preparing the 2010 Urban Water Management Plan (UWMP).

In an effort to ensure all interested parties are fully informed and involved in this process, the water agencies have scheduled their fourth community workshop on January 25, 2011 and welcome your participation. This workshop will provide the most current information on components of the UWMP.

Date:	Tuesday, January 25, 2011
Time:	4:00 pm
Location:	Castaic Lake Water Agency 27234 Bouquet Canyon Road

The Urban Water Management Plan presents a picture of the valley's future water situation, describes the long-range water needs of the community and the means to supply the necessary water.

I encourage your participation and look forward to seeing you then. If you have any questions, please feel free to contact me.

Sincerely,

Stacy Miller
Public Outreach Manager
2010 SCV Urban Water Management Plan

Government Affairs, Public Relations & Communication
P.O. Box 55745, Valencia, CA 91385 [818] 402-5806 [661] 222-9733 Fax stacy@StacyMillerPA.com
www.StacyMillerPA.com

or four years down the road? — but our government has *sarily those of The Signal.*

SANTA CLARITA VALLEY

2010 Urban Water Management Plan

COMMUNITY WORKSHOP

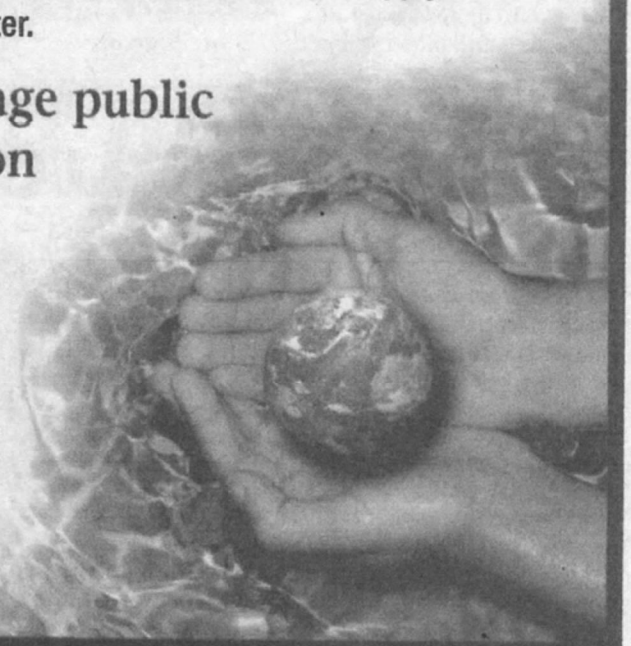
The Signal 1-18-11

Date: Tuesday, January 25, 2011
Time: 4:00 pm
Location: Castaic Lake Water Agency
27234 Bouquet Canyon Road

This workshop will provide the most current information on components of the 2010 UWMP. Our team will provide an overview of the opportunities for public comment and will also be available for questions.

The Urban Water Management Plan, mandated by the State of California, presents a picture of the valley's water situation, describes the long-range water needs of the community and the means to supply the necessary water.

We encourage public participation and input



For more information, please call (661) 297-1600

Castaic Lake Water Agency
CLWA Santa Clarita Water Division
Newhall County Water District
Valencia Water Company

SANTA CLARITA VALLEY

2010 Urban Water Management Plan

COMMUNITY WORKSHOP

The Signal 1-23-11

Date: Tuesday, January 25, 2011
Time: 4:00 pm
Location: Castaic Lake Water Agency
27234 Bouquet Canyon Road

This workshop will provide the most current information on components of the 2010 UWMP. Our team will provide an overview of the opportunities for public comment and will also be available for questions.

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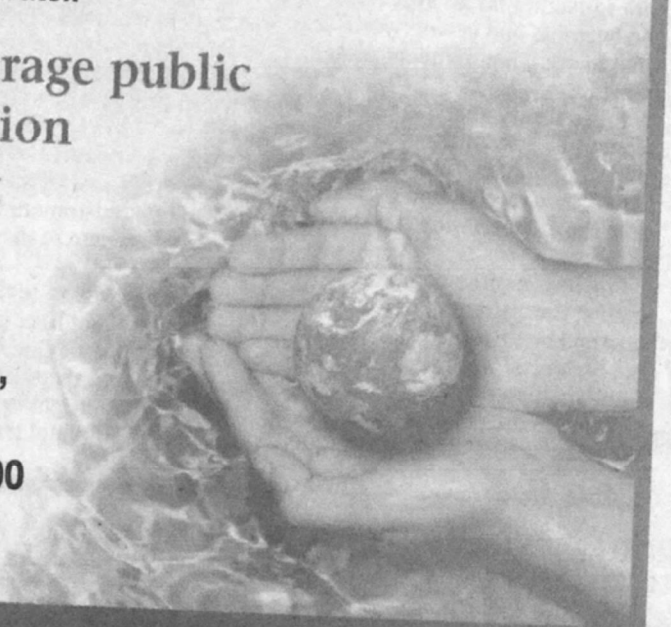
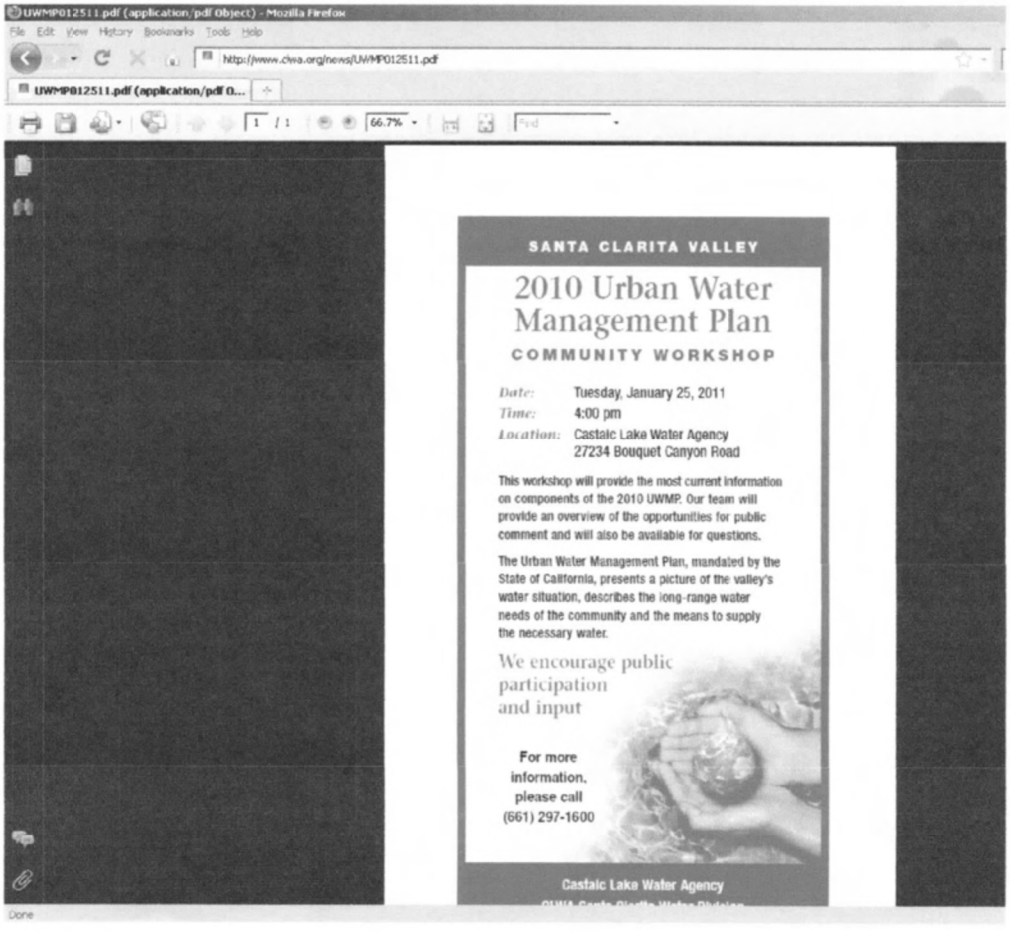


For more information, please call (661) 297-1600

Castaic Lake Water Agency
CLWA Santa Clarita Water Division
Newhall County Water District
Valencia Water Company

Castaic Lake Water Agency
Webpage & Facebook Posting – January 2011 UWMP Workshop

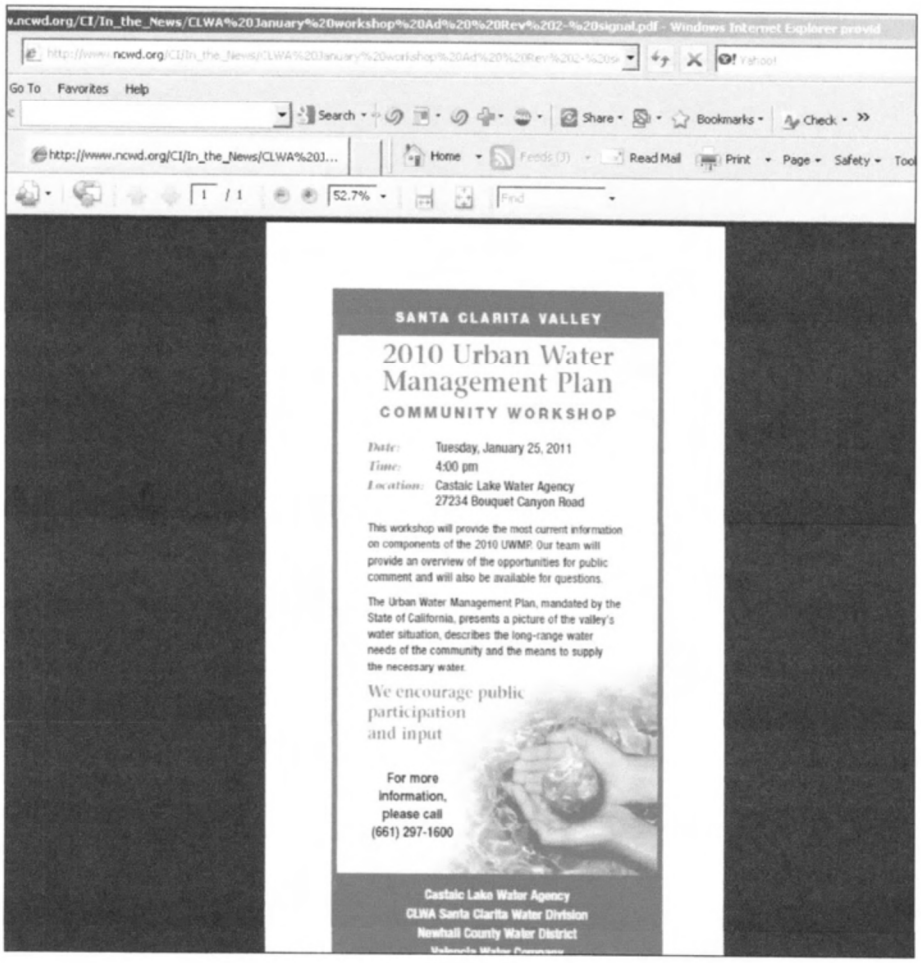


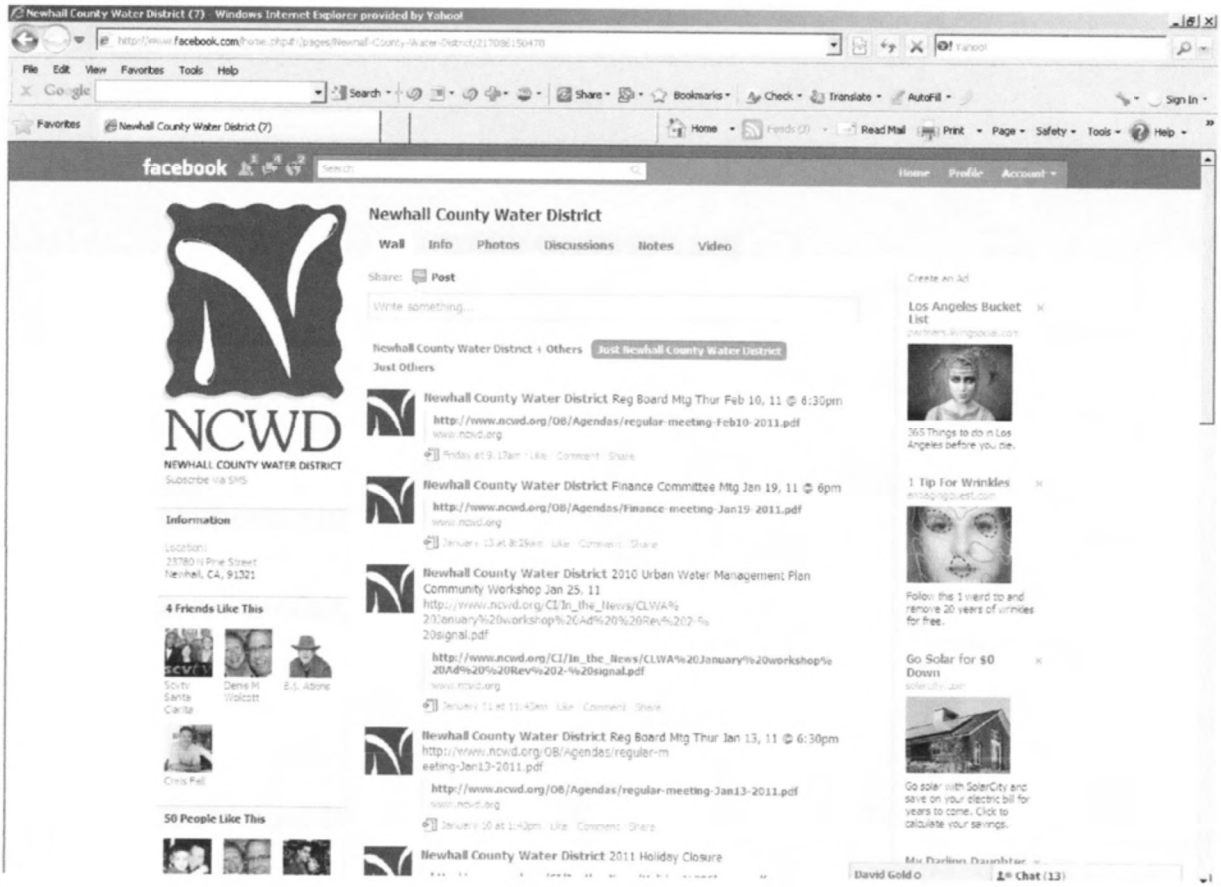
Castaic Lake Water Agency
Webpage & Facebook Posting – January 2011 UWMP Workshop

Newhall County Water District
Webpage & Facebook posting – January 2011 UWMP Workshop

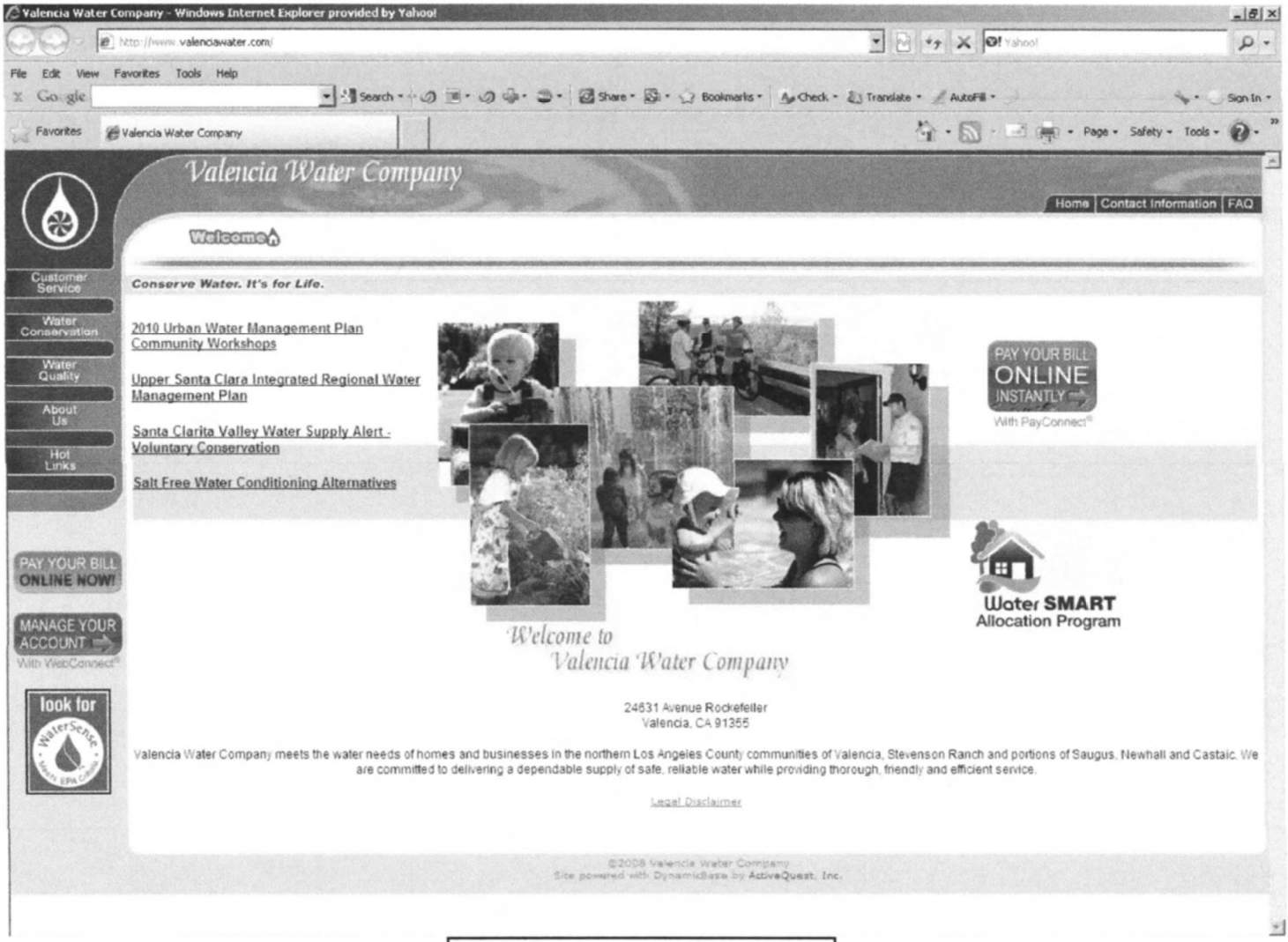
(next)

Newhall County Water District
Webpage & Facebook posting – January 2011 UWMP Workshop





Valencia Water Co
Website Posting – January 2011 UWMP Workshop



Santa Clarita Valley Urban Water Management Plan

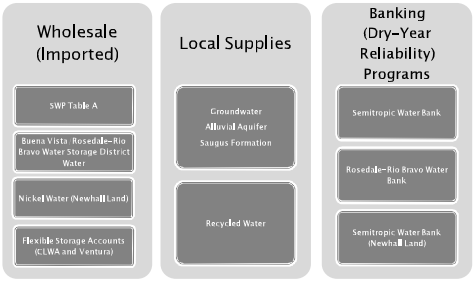
Community Workshop

January 25, 2011
4:00 pm
Castaic Lake Water Agency

Agenda

- Introductions
- Overview of water supplies
- SWP reliability update
- CLWA reliability planning update
- SBX7-7 ("20x2020") calculations and targets
- Overview of water supplies and demands
- Schedule
- Questions and Answers

Santa Clarita Valley Water Supplies



SWP Reliability Update

- DWR finalized the 2009 State Water Project Delivery Reliability Report
- Captures impacts on the SWP from recent regulatory and judicial decisions related to endangered species in the Delta
  - Average year long-term SWP deliveries = 60%
  - Single-dry year deliveries = 7%
  - Multiple-dry year deliveries = 34-36%

CLWA Reliability Planning Update

- Basis of the Plan:
  - Water Demand Projections by Purveyors
  - 2009 DWR SWP Delivery Reliability Report
  - Updated GW Operating Plan
  - Recycled Water Master Plan (as modified)

Preliminary Results Water Supply Reliability Plan Update

- At 95% confidence level:
  - 6-year pumpback = no storage needed with current practices
  - 1-year pumpback (most severe drought) = 20,000 AF
- Results consider the following variables:
  - Conservation
  - Levee failure in the Delta

Preliminary Results
Storage and Pumpback Requirements

1. No levee failure and no conservation

Percentile (%)	1-Year Pumpback (AFY)	6-Year Storage (AF)
90	34,000	83,000
95	38,000	100,000
99	51,000	164,000

2. Levee failure and no conservation

Percentile (%)	1-Year Pumpback (AFY)	6-Year Storage (AF)
90	60,000	136,000
95	61,000	153,000
99	62,000	219,000

Preliminary Results
Storage and Pumpback Requirements

3. Conservation and no levee failure

Percentile (%)	1-Year Pumpback (AFY)	6-Year Storage (AF)
90	9,000	0
95	13,000	0
100	24,000	17,000

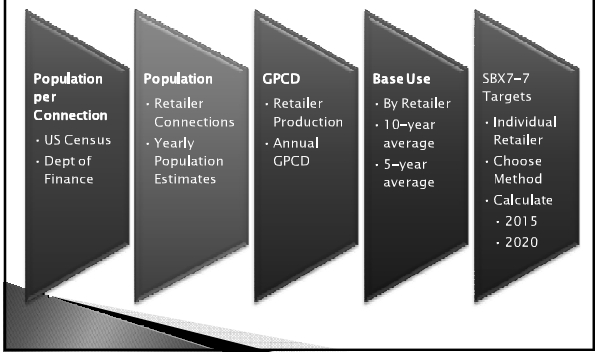
4. Conservation and levee failure

Percentile (%)	1-Year Pumpback (AFY)	6-Year Storage (AF)
90	20,000	0
95	20,000	0
100	21,000	28,000

Update on SBX7-7 ("20% x 2020") Calculations and Targets

- 20% demand reduction statewide by 2020
- Sets mandatory demand reduction goal for each retail water supplier
- Reporting starts with 2010 UWMPs
  - Base gross water use in gallons per capita per day (GPCD): must be calculated using one of three methodologies
  - Target reduction from base by 2020: must be calculated using one of four methodologies
  - Supplier must hold public hearing to explain how targets will be met (can be held as part of UWMP hearing)

Process for Determining SBx7-7 Base Use and GPCD Reduction Targets



GPCD Target Demand Reduction Options

1. 20% reduction from base (i.e., 80% of average gross water use in gpcd)
2. Combination of state standards:
   - 55 gpcd indoor residential + landscape use at 70% ETo + 10% reduction in commercial/industrial/institutional use
   - *Requires specific data not available in SCV*
3. DWR 20x2020 hydrologic region target (South Coast region = 149 gpcd)
4. *Option to be developed by October 2010: not completed by DWR and Urban Stakeholder Committee*

Updated (January 2011) GPCD Target Demand Reduction Calculations

Agency	Base Daily Per Capita Water Use (GPCD)	Compliance Year	Selected Urban Water Use Target Method Method 1– 80% of Base Daily Per Capita Water Use
VWC	278	2015	250
		2020	222
NWCD	244	2015	219
		2020	195
SCWD	235	2015	211
		2020	188

Santa Clarita Valley Existing Water Supplies– Avg / Normal Year (acre-feet)

EXISTING SUPPLIES	2015	2020	2030	2040	2050
Groundwater (Basin Yield)	*51,100*	*51,100*	*51,100*	*51,100*	*51,100*
Alluvial Aquifer	38,600	38,600	38,600	38,600	38,600
Saugus Formation	12,500	12,500	12,500	12,500	12,500
Projected Groundwater to Non–Purveyors	*15,400*	*14,400*	*11,000*	*9,000*	*7,5*
Il Land and Farming	10,500	9,500	7,500	5,500	4,000
Honor Ranch	3,400	3,400	2,000	2,000	2,000
Other Non–Purveyors	1,500	1,500	1,500	1,500	1,500
Projected Groundwater to Purveyors	**34,600**	**36,600**	**39,600**	**41,600**	**43,600**
Alluvial Aquifer	24,000	25,000	28,000	30,000	32,000
Saugus Formation	10,600	11,600	11,600	11,600	11,600
Projected Groundwater to Purveyors and Non–Purveyors	50,000	51,000	50,600	50,600	51,100
Recycled Water	**1,300**	**1,700**	**1,700**	**1,700**	**1,700**
Imported Water	**69,727**	**69,727**	**69,727**	**69,727**	**69,727**
SWP Table A Supply	57,120	57,120	57,120	57,120	57,120
Buena Vista–Rosedale	11,000	11,000	11,000	11,000	11,000
Nickel Water – Newhall Land	1,607	1,607	1,607	1,607	1,607
Total Supplies Available to Purveyors	**105,627**	**108,027**	**111,027**	**113,027**	**115,027**

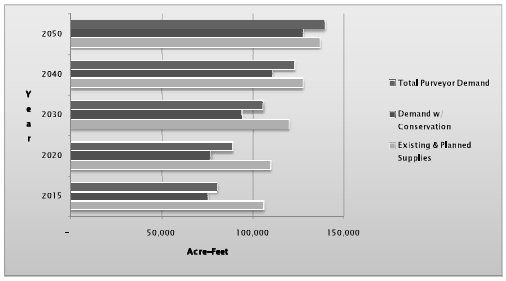
Santa Clarita Valley Existing and Planned Water Supplies– Avg / Normal Year (acre-feet)

PLANNED SUPPLIES	2015	2020	2030	2040	2050
Recycled Water	***0***	***1,350***	***7,900***	***13,900***	***21,100***
Recycled Water to Non–Purveyor (Honor Ranch)	0	0	1,500	1,500	1,500
Recycled Water to Purveyors	0	1,350	6,400	12,400	19,600
Total Planned Supplies	**0**	**1,350**	**7,900**	**13,900**	**21,100**
Total Supplies Available to Purveyors	**105,627**	**108,027**	**111,027**	**113,027**	**115,027**
Total Existing and Planned Supplies Available to Purveyors	**105,627**	**109,377**	**118,927**	**126,927**	**136,127**

Santa Clarita Valley Projected Water Demands – Avg / Normal Year (acre-feet)

SB7x7 DEMAND REDUCTION	2015	2020	2030	2040	2050
Total Purveyor Demand	80,070	88,484	105,312	122,140	138,968
Sum of Purveyor Demand Reductions	6,691	14,937	18,949	21,161	24,274
Reduction from Recycled Water	*1,300*	*3,050*	*9,6*	*5,600*	*22,8*
	,3 1	*11,8*	*11,8*	*11,887*	*11,887*
Total Action to Meet SB7x7	**6,691**	**14,937**	**21,487**	**27,487**	**34,687**
Demand w/ Conservation	**74,679**	**76,597**	**93,425**	**110,253**	**127,081**

Santa Clarita Valley Water Supplies and Demands – Avg / Normal Year



Schedule

- **Public Workshops and Hearings**
  - **Workshops**
    - May 25, 2010
    - July 27, 2010
    - November 9, 2010 (IR lders)
    - November 16, 2010
    - January 25, 2011
    - March 8, 2011
  - **Hearings**
    - March 23, 2011 (tentative)
    - April 27, 2011 (tentative)
- **Adoption**
  - June 2011 (due to DWR within 30 days after adoption)

Questions and Answers

CASTAIC LAKE WATER AGENCY

NCWD

SCWD

Santa Clarita Valley Urban Water Management Plan
January 25, 2011 - Community Workshop Sign In Sheet

	PRINT NAME	ORGANIZATION	TITLE	PHONE	EMAIL
1.	Stacy Meeler	SMPA	Pres	818 402-5806	Stacy@StacyMeelerPA.com
2.	Lauren Everett	KJ	planner	805-913-5706	laureneverett@kennedyjenks.
3.	Ed Colley	CLWA	Director	—	—
4.	Bonnie Deagon	—	—		
5.	Dirk Marks	CLWA	Water Resource Manager		
6.	Rosalind Wayman	SDS			
7.	Jarrod DeGonia	Asm. Smyth	District Director	(661) 286-1565	jarrod.degonia@asm.ca.gov
8.	Jeff Ford	CLWA	WR Planner	(661) 513-1281	jford@clwa.org
9.	DAN MASNADA	CLWA	C.M.	(661) 297 1600	dmasnada@clwa.org
10.	ERNIE VILLEGAS	ASM. GORELL	DIST. DIRECTOR	(805) 230-9167	ernie.villegas@asm.ca.gov
11.					
12.					
13.					
14.					
15.					
16.					
17.					
18.					

Santa Clarita Valley Urban Water Management Plan
January 25, 2011 - Community Workshop Sign In Sheet

	PRINT NAME	ORGANIZATION	TITLE	PHONE	EMAIL
1.	Marilyn Cotton ✓	RJ			
2.	Steve Cole ✓	NCWD	G.M.		SCOLE@NCWD.ORG
3.	CHARLES GILL ✓	IPSG		6612949355	CGILL@IPSGINC.COM
4.	Keith Abercrombie ✓	VWC	GM		
5.	Cathy Hollomon ✓	SCWA	Assoc WR Planner	626-259-2737	chollomon@scwater.org
6.	Sandy Sandy	BVA	G.A.D.	310-995-4456	ssandy@bialav.org
7.					
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18.					

Third & Final Public Hearing
June 22, 2011
Public Outreach Record

2010 Santa Clarita Valley
Urban Water Management Plan

June 8, 2011

Richard J. Bruckner, Director
LA County Dept. Regional Planning
Los Angeles County
1390 Hall of Records
320 West Temple Street
Los Angeles 90012

Subject: Revised Notification of Public Hearings for the 2010 Santa Clarita Valley Urban Water Management Plan

Dear Mr. Bruckner,

In a March 3, 2011, letter we notified you of the upcoming Public Hearings for the 2010 Santa Clarita Valley Urban Water Management Plan. As noted in the letter, the first public hearing was held on Wednesday, March 23, 2011. The second public hearing originally scheduled for Wednesday, May 4, 2011 at 6:15 p.m. was rescheduled to Wednesday, May 18, 2011 at 6:15 PM. The third public hearing has been scheduled on June 22, 2011 will take place at the CLWA Boardroom located on the 1st floor of the Administration Building at the Rio Vista Water Treatment Plant, 27234 Bouquet Canyon Road, Santa Clarita, California 91350.

For additional information regarding the public hearings, please contact me at (661) 297-1600.

Sincerely,

Dirk Marks,
Water Resources Manager

CASTAIC LAKE WATER AGENCY

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GENERAL COUNSEL
McCORMICK, KIDMAN & BEHRENS, LLP
SECRETARY
APRIL JACOBS

June 8, 2011

Mark Pestrella
LA County Dept. Public Works
Los Angeles County
P.O. Box 1460
Alhambra 91802-1460

Subject: Revised Notification of Public Hearings for the 2010 Santa Clarita Valley Urban Water Management Plan

Dear Mr. Pestrella,

In a March 3, 2011, letter we notified you of the upcoming Public Hearings for the 2010 Santa Clarita Valley Urban Water Management Plan. As noted in the letter, the first public hearing was held on Wednesday, March 23, 2011. The second public hearing originally scheduled for Wednesday, May 4, 2011 at 6:15 p.m. was rescheduled to Wednesday, May 18, 2011 at 6:15 PM. The third public hearing has been scheduled on June 22, 2011 will take place at the CLWA Boardroom located on the 1st floor of the Administration Building at the Rio Vista Water Treatment Plant, 27234 Bouquet Canyon Road, Santa Clarita, California 91350.

For additional information regarding the public hearings, please contact me at (661) 297-1600.

Sincerely,

Dirk Marks,
Water Resources Manager

CASTAIC LAKE WATER AGENCY

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DAN MASNADA
GENERAL COUNSEL
McCORMICK, KIDMAN & BEHRENS, LLP
SECRETARY
APRIL JACOBS

June 8, 2011

Chris Stevens, Director
Resource Management Agency
County of Ventura
800 South Victoria Avenue
Ventura, CA 93009-1740

Subject: Revised Notification of Public Hearings for the 2010 Santa Clarita Valley Urban Water Management Plan

Dear Mr. Stevens,

In a March 3, 2011, letter we notified you of the upcoming Public Hearings for the 2010 Santa Clarita Valley Urban Water Management Plan. As noted in the letter, the first public hearing was held on Wednesday, March 23, 2011. The second public hearing originally scheduled for Wednesday, May 4, 2011 at 6:15 p.m. was rescheduled to Wednesday, May 18, 2011 at 6:15 PM. The third public hearing has been scheduled on June 22, 2011 will take place at the CLWA Boardroom located on the 1st floor of the Administration Building at the Rio Vista Water Treatment Plant, 27234 Bouquet Canyon Road, Santa Clarita, California 91350.

For additional information regarding the public hearings, please contact me at (661) 297-1600.

Sincerely,

Dirk Marks,
Water Resources Manager

CASTAIC LAKE WATER AGENCY

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DAN MASNADA
GENERAL COUNSEL
McCORMICK, KIDMAN & BEHRENS, LLP
SECRETARY
APRIL JACOBS

June 8, 2011

Jason Smisko
Senior Planner
City of Santa Clarita Planning Division
23920 Valencia Blvd., Suite 300
Santa Clarita, CA 91355

Subject: Revised Notification of Public Hearings for the 2010 Santa Clarita Valley Urban Water Management Plan

Dear Mr. Smisko,

In a March 3, 2011, letter we notified you of the upcoming Public Hearings for the 2010 Santa Clarita Valley Urban Water Management Plan. As noted in the letter, the first public hearing was held on Wednesday, March 23, 2011. The second public hearing originally scheduled for Wednesday, May 4, 2011 at 6:15 p.m. was rescheduled to Wednesday, May 18, 2011 at 6:15 PM. The third public hearing has been scheduled on June 22, 2011 will take place at the CLWA Boardroom located on the 1st floor of the Administration Building at the Rio Vista Water Treatment Plant, 27234 Bouquet Canyon Road, Santa Clarita, California 91350.

For additional information regarding the public hearings, please contact me at (661) 297-1600.

Sincerely,

Dirk Marks

Dirk Marks,
Water Resources Manager

CASTAIC LAKE WATER AGENCY

BOARD OF DIRECTOR
PRESIDENT
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GENERAL COUNSEL
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SECRETARY
APRIL JACOBS

June 8, 2011

Mike Murphy
Intergovernmental Relations Officer
City of Santa Clarita
23920 Valencia Blvd., Suite 300
Santa Clarita, CA 91355

Subject: Revised Notification of Public Hearings for the 2010 Santa Clarita Valley Urban Water Management Plan

Dear Mr. Murphy,

In a March 3, 2011, letter we notified you of the upcoming Public Hearings for the 2010 Santa Clarita Valley Urban Water Management Plan. As noted in the letter, the first public hearing was held on Wednesday, March 23, 2011. The second public hearing originally scheduled for Wednesday, May 4, 2011 at 6:15 p.m. was rescheduled to Wednesday, May 18, 2011 at 6:15 PM. The third public hearing has been scheduled on June 22, 2011 will take place at the CLWA Boardroom located on the 1st floor of the Administration Building at the Rio Vista Water Treatment Plant, 27234 Bouquet Canyon Road, Santa Clarita, California 91350.

For additional information regarding the public hearings, please contact me at (661) 297-1600.

Sincerely,

Dirk Marks,
Water Resources Manager

CASTAIC LAKE WATER AGENCY

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THOMAS P. CAMPBELL
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WILLIAM C. COOPER
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GENERAL COUNSEL
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SECRETARY
APRIL JACOBS

June 8, 2011

Jeff W. Hogan, AICP
Interim Planning Manager
City of Santa Clarita Planning Division
23920 Valencia Blvd., Suite 300
Santa Clarita, CA 91355

Subject: Revised Notification of Public Hearings for the 2010 Santa Clarita Valley Urban Water Management Plan

Dear Mr. Hogan,

In a March 3, 2011, letter we notified you of the upcoming Public Hearings for the 2010 Santa Clarita Valley Urban Water Management Plan. As noted in the letter, the first public hearing was held on Wednesday, March 23, 2011. The second public hearing originally scheduled for Wednesday, May 4, 2011 at 6:15 p.m. was rescheduled to Wednesday, May 18, 2011 at 6:15 PM. The third public hearing has been scheduled on June 22, 2011 will take place at the CLWA Boardroom located on the 1st floor of the Administration Building at the Rio Vista Water Treatment Plant, 27234 Bouquet Canyon Road, Santa Clarita, California 91350.

For additional information regarding the public hearings, please contact me at (661) 297-1600.

Sincerely,

Dirk Marks,
Water Resources Manager

CASTAIC LAKE WATER AGENCY

BOARD OF DIRECTOR
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THOMAS P. CAMPBELL
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DAN MASNADA
GENERAL COUNSEL
McCORMICK, KIDMAN & BEHRENS, LLP
SECRETARY
APRIL JACOBS

June 8, 2011

Jessica Bunker, P.E.
Waterworks Division
P.O. Box 1460
Alhambra, CA 91802-1460

Subject: Revised Notification of Public Hearings for the 2010 Santa Clarita Valley Urban Water Management Plan

Dear Ms. Bunker,

In a March 3, 2011, letter we notified you of the upcoming Public Hearings for the 2010 Santa Clarita Valley Urban Water Management Plan. As noted in the letter, the first public hearing was held on Wednesday, March 23, 2011. The second public hearing originally scheduled for Wednesday, May 4, 2011 at 6:15 p.m. was rescheduled to Wednesday, May 18, 2011 at 6:15 PM. The third public hearing has been scheduled on June 22, 2011 will take place at the CLWA Boardroom located on the 1st floor of the Administration Building at the Rio Vista Water Treatment Plant, 27234 Bouquet Canyon Road, Santa Clarita, California 91350.

For additional information regarding the public hearings, please contact me at (661) 297-1600.

Sincerely,

Dirk Marks,
Water Resources Manager

CASTAIC LAKE WATER AGENCY

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PRESIDENT
THOMAS P. CAMPBELL
VICE PRESIDENT
WILLIAM C. COOPER
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DAN MASNADA
GENERAL COUNSEL
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APRIL JACOBS

June 8, 2011

Rosalind Wayman, Field Deputy
Los Angeles County
Fifth Supervisorial District
23920 Valencia Blvd., Suite 265
Santa Clarita, CA 91355

Subject: Revised Notification of Public Hearings for the 2010 Santa Clarita Valley Urban Water Management Plan

Dear Ms. Wayman,

In a March 3, 2011, letter we notified you of the upcoming Public Hearings for the 2010 Santa Clarita Valley Urban Water Management Plan. As noted in the letter, the first public hearing was held on Wednesday, March 23, 2011. The second public hearing originally scheduled for Wednesday, May 4, 2011 at 6:15 p.m. was rescheduled to Wednesday, May 18, 2011 at 6:15 PM. The third public hearing has been scheduled on June 22, 2011 will take place at the CLWA Boardroom located on the 1st floor of the Administration Building at the Rio Vista Water Treatment Plant, 27234 Bouquet Canyon Road, Santa Clarita, California 91350.

For additional information regarding the public hearings, please contact me at (661) 297-1600.

Sincerely,

Dirk Marks,
Water Resources Manager

CASTAIC LAKE WATER AGENCY

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THOMAS P. CAMPBELL
VICE PRESIDENT
WILLIAM C. COOPER
E.G. "JERRY" GLADBACH
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THE SIGNAL NEWSPAPER
24000 Creekside Rd
Valencia, Ca 91355

Proof of Publication
(2015.5 C.C.P.)

STATE OF CALIFORNIA,
COUNTY OF LOS ANGELES

I am a citizen of the United States,and a resident of the county aforesaid; I am over the age of eighteen years; and I am not a party to or interestedin the notice published. I am the chief legal advertising clerk of the publisher of the

SIGNAL NEWSPAPER

a newspaper of general circulation, printed and published **Daily** in the city of Santa Clarita County of Los Angeles, and which newspaper has been adjudged a newspaper of general circulation by the Superior Court of the County of Los Angeles State of California, under the date of **March 25, 1988**
Case number **NVC15880**, that the notice, of which the annexed is a printed copy, has been published in each regular and entire issue of said newspaper and not in any supplement thereof on the following dates, to-wit:

5/26, 6/2, 6/9, 6/16

All in the year 20 11

I certify (or declare) under penalty of perjury' that the foregoing is true and correct

Dated at Valencia, California, this
16th day of June, 20 11

Signature

NOTICE OF THIRD PUBLIC HEARING 2010 URBAN WATER MANAGEMENT PLAN

Castaic Lake Water Agency ("CLWA"), CLWA Santa Clarita Water Division, Newhall County Water District and Valencia Water Company have directed the preparation of a joint regional 2010 Urban Water Management Plan ("UWMP") for the Santa Clarita Valley, as encouraged by the Urban Water Management Planning Act ("Act"). Los Angeles County Waterworks District No. 36 is participating in the process on an ad hoc basis. Adoption of the 2010 UWMP is required under the Act by July 1, 2011.

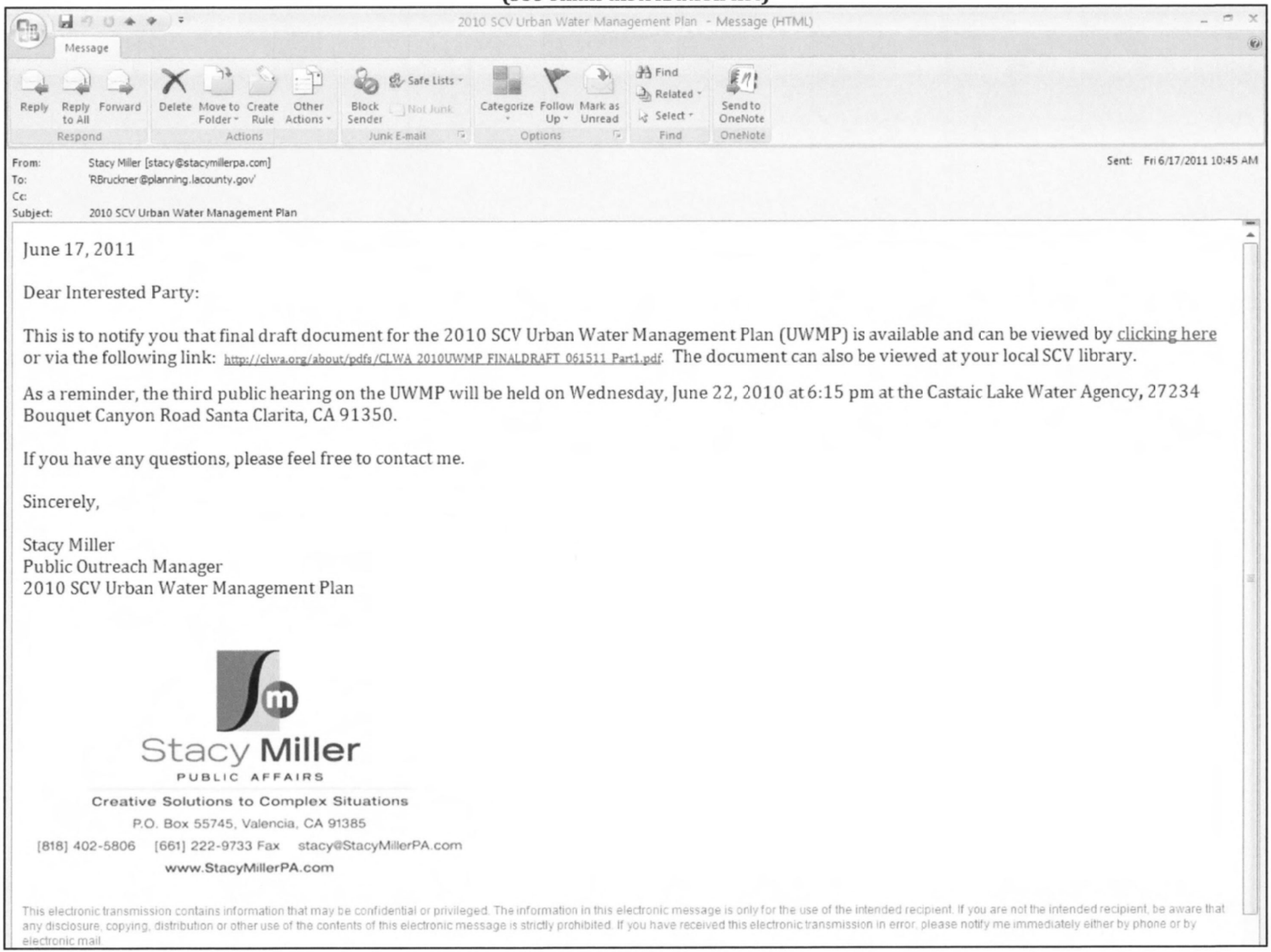
While the Act only requires that an urban water supplier hold one public hearing before adopting a plan, in order to ensure sufficient opportunity for public feedback, input and suggestions concerning the 2010 UWMP, a third public hearing has been scheduled.

The first public hearing was held on March 23, 2011and the second on May18, 2011. The third hearing will be held at 6:15 p.m. on Wednesday, June 22, 2011 and will take place at the CLWA Boardroom, located on the 1st floor of the Administration Building at the Rio Vista Water Treatment Plant, 27234 Bouquet Canyon Road, Santa Clarita, California 91350.

For additional information regarding the public hearings, please contact Dirk Marks, CLWA Water Resources Manager, at (661) 297-1600.

The Signal 5/26, 6/2 & 6/9 & 6/16 2011

Emails sent regarding
Final Draft Document Availability & 3rd Public Hearing Reminder
(See email distribution list)



2010 SCV Urban Water Management Plan - Message (HTML)

Message

Reply | Reply to All | Forward | Delete | Move to Folder | Create Rule | Other Actions | Block Sender | Safe Lists | Not Junk | Categorize | Follow Up | Mark as Unread | Find | Related | Select | Send to OneNote

Respond | Actions | Junk E-mail | Options | Find | OneNote

From: Stacy Miller [stacy@stacymillerpa.com]
To: 'RBruckner@planning.lacounty.gov'
Cc:
Subject: 2010 SCV Urban Water Management Plan

Sent: Fri 6/17/2011 10:45 AM

June 17, 2011

Dear Interested Party:

This is to notify you that final draft document for the 2010 SCV Urban Water Management Plan (UWMP) is available and can be viewed by clicking here or via the following link: http://clwa.org/about/pdfs/CLWA_2010UWMP_FINALDRAFT_061511_Part1.pdf. The document can also be viewed at your local SCV library.

As a reminder, the third public hearing on the UWMP will be held on Wednesday, June 22, 2010 at 6:15 pm at the Castaic Lake Water Agency, 27234 Bouquet Canyon Road Santa Clarita, CA 91350.

If you have any questions, please feel free to contact me.

Sincerely,

Stacy Miller
Public Outreach Manager
2010 SCV Urban Water Management Plan

Stacy Miller
PUBLIC AFFAIRS
Creative Solutions to Complex Situations
P.O. Box 55745, Valencia, CA 91385
[818] 402-5806 [661] 222-9733 Fax stacy@StacyMillerPA.com
www.StacyMillerPA.com

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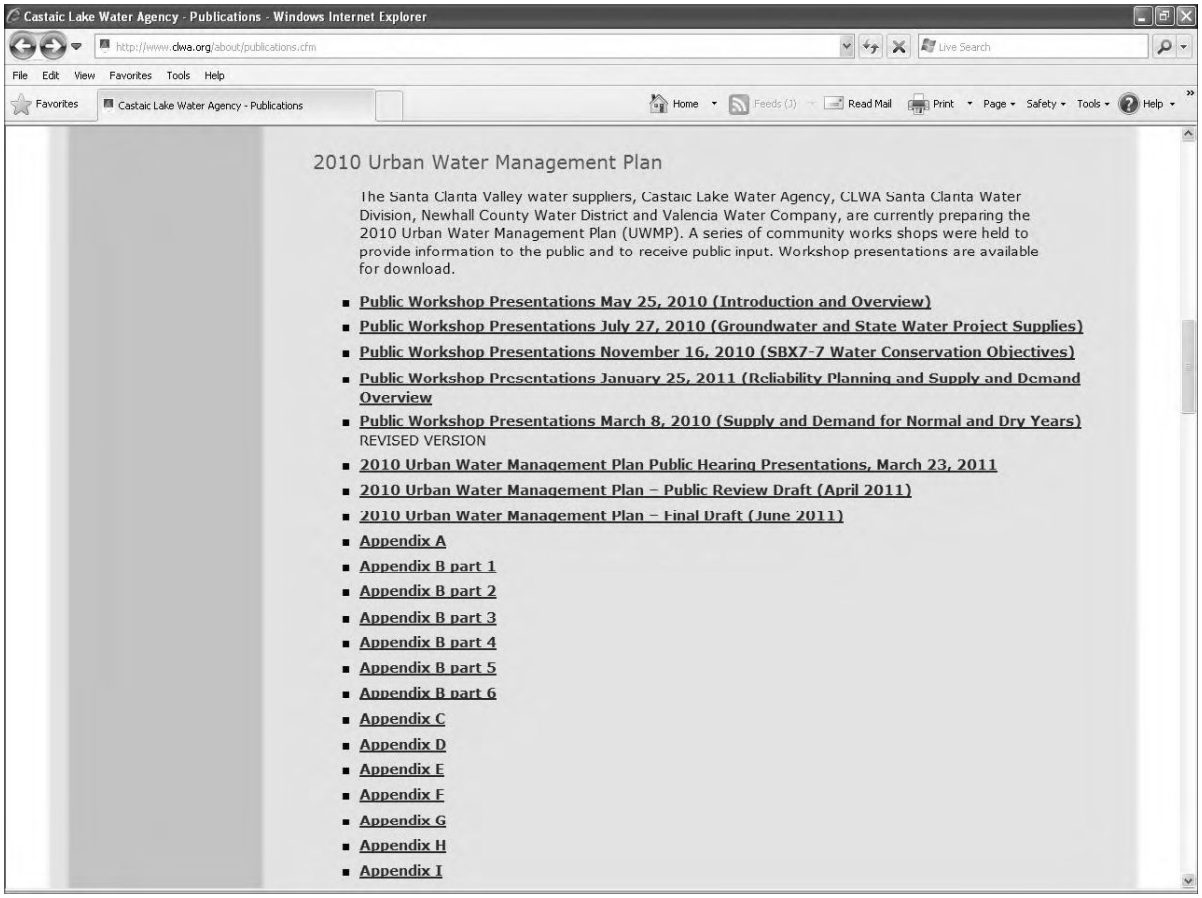
Master Email List
Extension of UWMP comment period and notification of revised draft document and next public hearing
Sent June 17, 2011

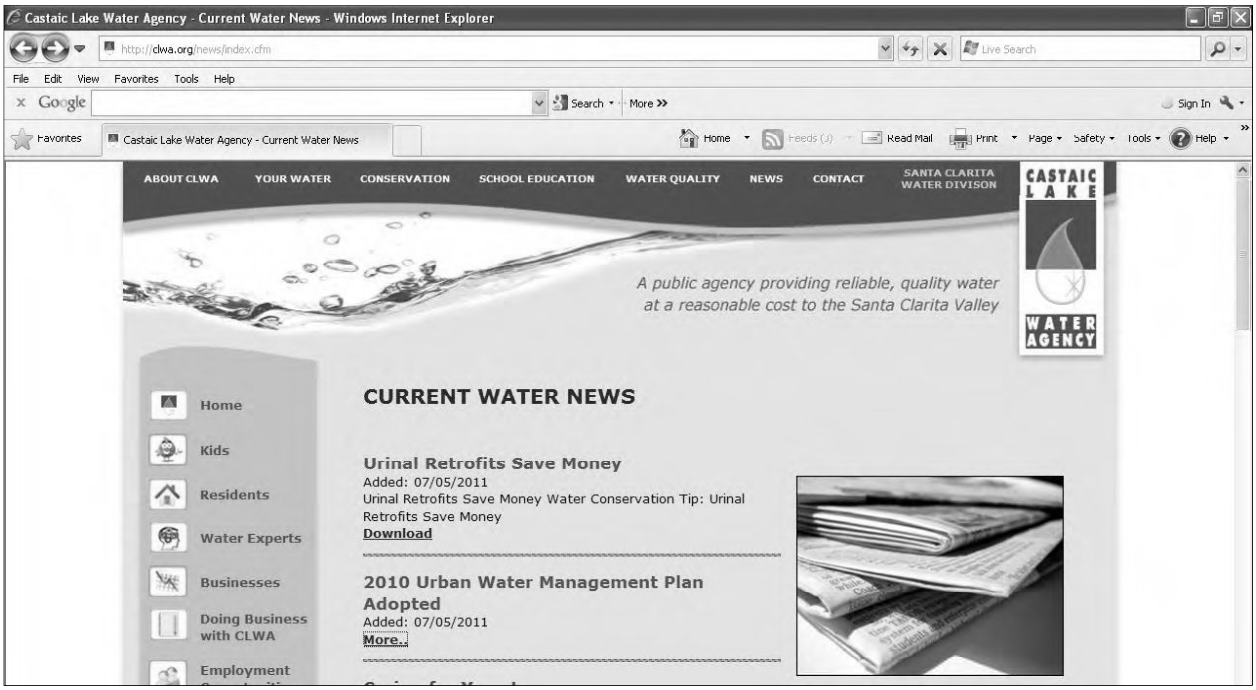
Jarrod Degonia Assemblymember Cameron Smyth Jarrod.DeGonia@asm.ca.gov	Ernie Villegas Assemblymember Jeff Gorell Ernie.Villegas@asm.ca.gov	Kevin Korenthal Associated Builders & Contractors of CA; ABC-CCC kkorenthal@abc-ccc.org
Holly Schroeder BIA - Los Angeles/Ventura Chapter hschroeder@bialav.org	Sandy Sanchez BIA - Los Angeles/Ventura Chapter ssanchez@bialav.org	David Inouye CA Department of Water Resources davidi@water.ca.gov
Robert Kelly Castaic Area Town Council RobertKelly@CastaicAreaTownCouncil.org	Mike Murphy City of Santa Clarita mmurphy@santa-clarita.com	Jason Smisko City of Santa Clarita JSmisko@santa-clarita.com
Bruce Fortine College of the Canyons fortine@earthlink.net	Bob Haueter Congressman Howard McKeon Bob.Haueter@mail.house.gov	Chris Stephens County of Ventura Resource Management Agency Chris.Stephens@ventura.org
Ron Bottorff Friends of the Santa Clara River bottorffm@verizon.net	Mark Pestrella LA County Department of Public Works mpestrel@dpw.lacounty.gov	Richard Bruckner LA County Department of Regional Planning RBruckner@planning.lacounty.gov
Jessica Bunker LA County WWD jbunker@ladpw.org	Lynn Plambeck Santa Clarita Organization for Planning the Environment - SCOPE lynne.plambeck@scope.org	Robert Fleck Santa Clarita Valley Well Owners Association rfleck@socal.rr.com
Terry Kingery SCV Chamber of Commerce tkingery@scvchamber.com	Sierra Club Angeles Chapter Contact.us@angeles.sierraclub.org	Mark Butala Southern CA Association of Governments butala@scag.ca.gov
Jackie Bick State Senator Sharon Runner Jackie.Bick@sen.ca.gov	Scott Wilk Jr. State Senator Tony Strickland scott.wilk@sen.ca.gov	David Perry Supervisor Michael Antonovich, 5th District dperry@lacbos.org
Rosalind Wayman Supervisor Michael Antonovich, 5th District rwayman@lacbos.org	E. Michael Solomon United Water Conservation District msolomon@unitedwater.org	Kathy Norris Valley Industrical Association of Santa Clarita (VIA) kathy@via.org
Ron Mechsner West Ranch Town Council Rmechsner@WestRanchTownCouncil.com	Carol Lutness SCV Fair Elections Committee santaclarita-info@caclean.org	Katherine Squires Sierra Club Angeles Chapter katherine.m.squires@csun.edu
Dunn Residents water@dslextreme.com	Mitch Glaser LA Co Department of Regional Planning mglaser@planning.lacounty.gov	Also sent via US Mail to • Mr. & Mrs. Dunn • Cam Nolltemeyer • Michael A. Naoum • Carol Lutness

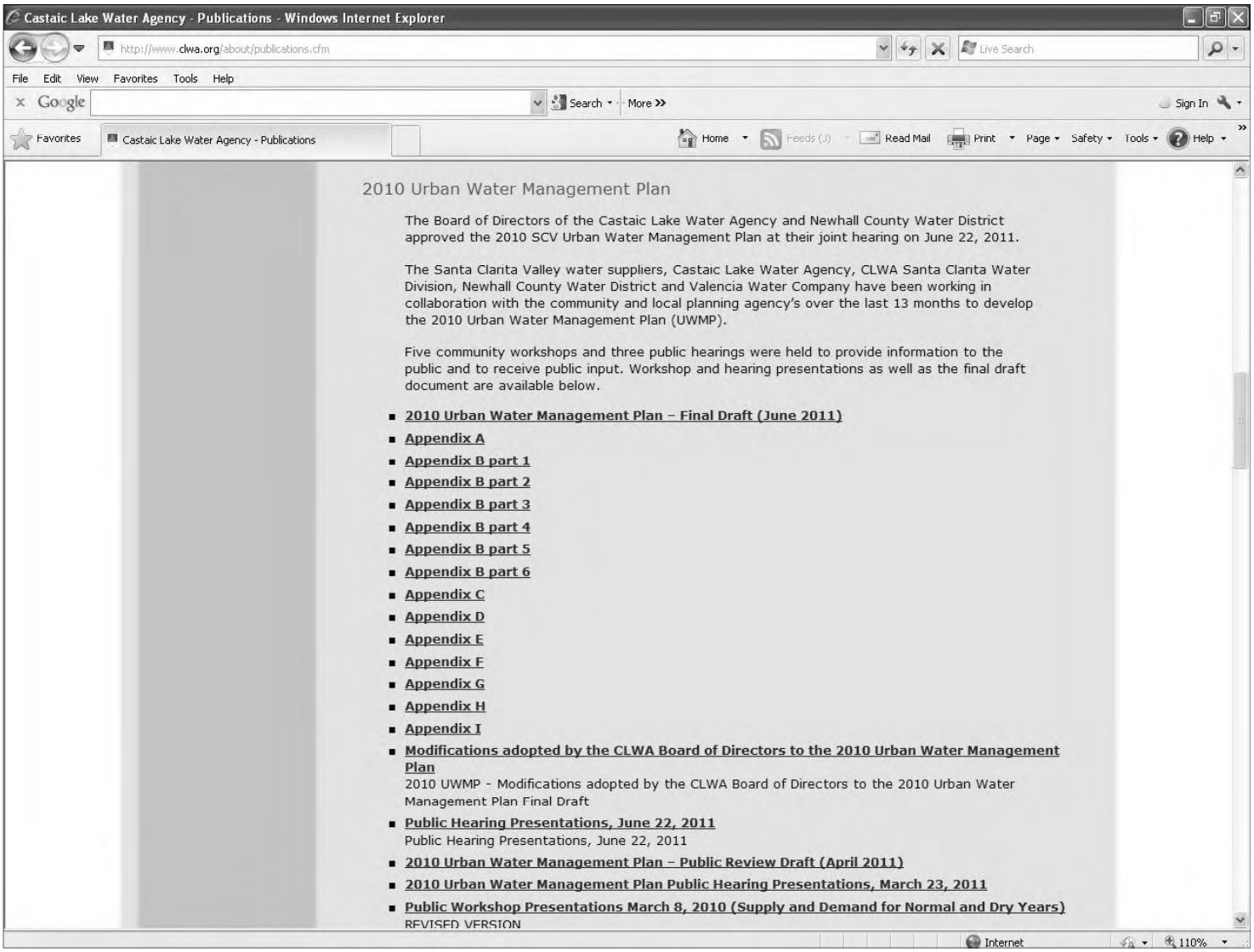
UWMP –June Hearing & Final Draft Document Notice
CLWA Website



UWMP –June Hearing & Final Draft Document Notice
NCWD Website

UWMP Adoption Notice
CLWA Website June 2011





2010 UWMP Adoption Notice
NCWD Website
June 2011

2010 UWMP Adoption Notice
SCWD Website
June 2011

NEWHALL COUNTY WATER DISTRICT

NCWD

New Regional Urban Water Management Plan Approved

Santa Clarita Valley Family of Water Suppliers Approve Critical Planning Tool

Santa Clarita, CA –The Boards of Directors of the Newhall County Water District and Castaic Lake Water Agency unanimously approved the 2010 Santa Clarita Valley Urban Water Management Plan at a joint public hearing on June 22, 2010.

"The approval by the two Boards is a testament to the quality of this document and the team that has worked so hard on its preparation," stated Daniel Mortensen, NCWD Board President.

The creation of the Santa Clarita Valley Urban Water Management Plan began in May 2010 and included opportunities for input from our community, water partners, environmental groups, elected officials, business groups and other community stakeholders during the five community workshops and three public hearings that were held on the plan.

"We have gone far beyond the public participation requirements cited in the Urban Water Management Plan regulations to ensure that all residents and interested parties had ample opportunity to participate, comment and weigh in on this important process," stated Tom Campbell, CLWA Board President.

The Urban Water Management Plan presents a picture of the valley's future water situation and describes the long-range water needs of our community and the means to supply the necessary water to the year 2050. Every five years, the water suppliers who deliver in excess of 3,000 acre feet of water or serve over 3,000 connections per year are required by law to prepare an Urban Water Management Plan.

The SCV Family of Water Suppliers partnered in this planning effort to ensure a collaborative planning approach. This plan is not a project-specific document, nor does it take the place of individual project requirements; rather it is a tool that helps guide the local water suppliers' actions and offers a broad perspective on a wide variety of water issues. The plan concludes that the combination of existing and

planned programs to increase supply and conservation will meet the Valley's water needs through 2050.

"I am proud of the tremendous amount of time and work that has been put into the development of this plan by the community, our staff, consultants and my fellow Board members," stated Bill Cooper, CLWA Board Vice President . "Our Urban Water Management Plan serves as the 'gold standard' of planning documents throughout the state and is followed closely for its content and thoroughness."

The final SCV Urban Water Management Plan will be delivered to the State Department of Water Resources before the end of July 2011. The final draft and additional amendments that were made at the recent board meetings are currently available for review online at www.ncwd.org.

Santa Clarita Valley Urban Water Management Plan

Public Hearing
June 22, 2011
Castaic Lake Water Agency

Agenda

- Open public hearing
- Review of public input process and public comment letters
- Public comment period
- Presentation on Groundwater Basin
- Presentations on Perchlorate Restoration, VWC Well 201
- Presentations on Water Banking, SWP reliability, Water Conservation, Chlorides/AWRM
- Board questions and answers
- Description of UWMP document finalization process
- Close hearing and next steps

UWMP Act Process

ACT REQUIREMENTS

- Coordinate preparation of UWMP with other appropriate agencies in the area.
- 60 days notice to city and counties, and may consult with, and obtain comments from, city and counties receiving notice.
- Encourage active involvement of diverse social, cultural, and economic elements of the population within the service area prior to and during the preparation of the plan.

ACT REQUIREMENTS EXCEEDED

- Draft Final UWMP, §§1.3.1 & 1.3.3, Table 1-1, pgs 1-3 to 1-8.
- Draft Final UWMP, §1.3.3, Table 1-1, pgs 1-3 to 1-8, Appendix B.
- Five Public Workshops between May 2010 and March 2011; three CLWA/NCWD joint public hearings; written public comment period; written public comment deadline extended; Draft Final UWMP, §§1.3.1 &1.3.3, Table 1-2, pgs 1-3 to 1-8.

UWMP Act Process

ACT REQUIREMENTS	ACT REQUIREMENTS EXCEEDED
Prior to adopting a plan, the urban water supplier shall make the plan available for public inspection.	Draft UWMP has been available since April 15, 2011; Final Draft UWMP, §§1.3.1 & 1.3.3, Table 1-2, pgs 1-3 to 1-8, Appendix B.
One Public hearing.	Three CLWA/NCWD joint public hearings.
Notice of hearing in compliance with Gov. Code § 6066.	Final Draft UWMP, §§1.3.1 & 1.3.3, Table 1- 2, pgs 1-3 to 1-8, Appendix B.

UWMP Act Process

ACT REQUIREMENTS	ACT REQUIREMENTS EXCEEDED
Notice of hearing to any city or county within which the supplier provides water supplies.	Final Draft UWMP, §§1.3.1 & 1.3.3, Table 1-2, pgs 1-3 to 1-8, Appendix B.
After the hearing, the plan shall be adopted as prepared or as modified after the hearing.	June 22, 2011 Joint Meeting and 3rd Joint Public Hearing

Past Workshops

May 2010
- UWMP purposed and process – What, Who, Why and When
- Existing and new requirements of UWMPs

July 2010
- SBX7-7 ("20x2020") Requirements
- Recycled Water
- Groundwater Supplies
- State Water Project Reliability

November 2010 –
- Presentation to IRWMP Stakeholders

Past Workshops (continued)

November 2010
- GPCD population assumptions and calculations
- SBX7-7 Targets by retailer

January 2011
- Overview of water supplies
- SWP reliability update
- CLWA reliability planning update
- SBX7-7 calculations and targets
- Overview of water supplies and demand

March 2011
- Water Supply and Demands

Public Hearings and Draft Document

1st public hearing March 23, 2011
- Public Draft document made available April 15, 2011
- Comment period through May 20, 2011

2nd public hearing May 18, 2011
- Comment period extended through May 27, 2011
- Final Draft document made available June 15, 2011

3rd public hearing June 22, 2011

Comment Letters Received

- Friends of the Santa Clara River
- Santa Clarita resident and Valencia Water ratepayer
- Sierra Club
- Mr. and Mrs. Dunn
- Mr. Naoum
- Mr. Dunn
- Sierra Club
- SCOPE
- Whittaker-Bermite Citizens Advisory Group
- Babak Naficy
- Santa Clarita Valley Fair Elections Committee

Broad Categories of Comments Received

- Groundwater overdraft claims
- Perchlorate and VWC Well 201
- Organic compounds
- Water banking program issues; State Water Project reliability and contingency planning
- Water conservation accounting
- Chloride water quality issues (TMDL/AWRM)

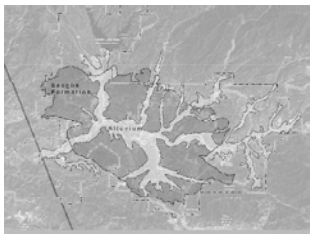
Santa Clarita Valley Urban Water Management Plan

Public Comment Period

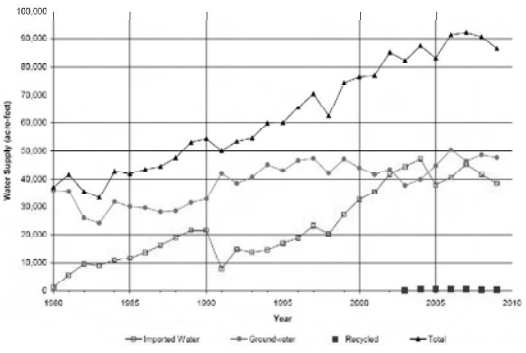
Groundwater Supplies and Related Issues, e.g. "Overdraft"

- Joe Scalmanini –
  Luhdorff and Scalmanini, Consulting Engineers

Groundwater Component of Water Supplies
2010 Urban Water Management Plan



• Castaic Lake Water Agency • CLWA Santa Clarita Water Division
• Los Angeles County Waterworks District 36
• Newhall County Water District • Valencia Water Company



LUHDORFF & SCALMANINI CONSULTING ENGINEERS

Figure 2-1
Total Water Supply Utilization
Santa Clarita Valley

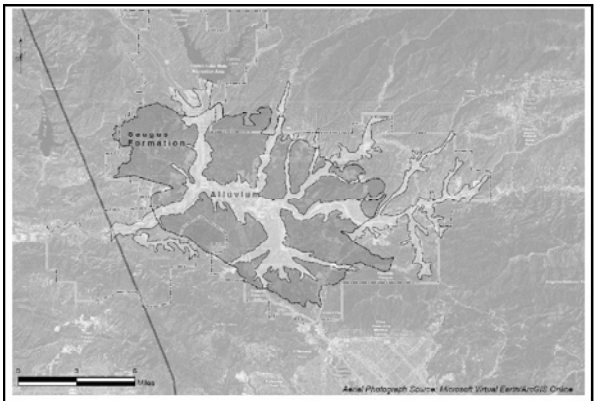


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Figure 3-1
Alluvium and Saugus Formation

Groundwater Management Plan (2003)

Management Objectives (Goals) for the Basin

- Development of integrated surface water, groundwater, and recycled water supply to meet existing and projected uses
- Determination of operational groundwater yield to avoid overdraft = sustainability
- Preservation of groundwater quality, including solution of contamination problems
- Preservation of interrelated surface water resources = maintenance of surface water flows and non-degradation of quality

Groundwater Management Plan (2003)

Elements

- Groundwater monitoring
- Surface water monitoring
- Basin yield analysis
- Regular and dry year water supplies
- Continued conjunctive use
- Long-term salinity management
- Integration of recycled water
- Mitigate contamination
- Local, state and federal relationships
- Public education and water conservation
- Recharge wellhead protection areas
- Well construction and destruction policies
- Provisions to add additional components

Annual Water Reports (1998-present)

Annual Water Requirements and Supplies

- Actual water use
- Sources of supply to meet actual use

Groundwater

- Alluvial and Saugus aquifer conditions

Supplemental Water Supplies

- State Water Project
- banking and other programs

Water Quality

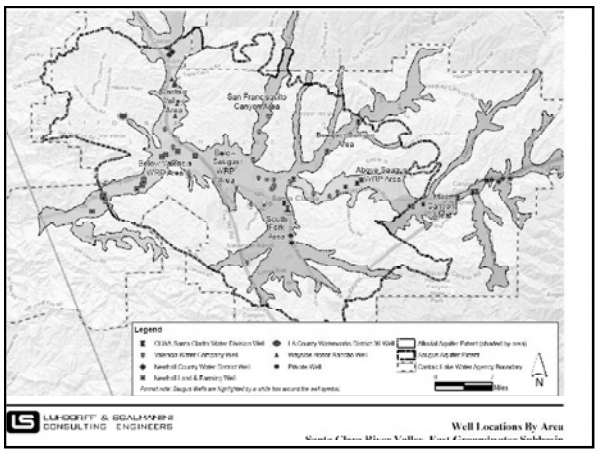
Recycled Water

Santa Clara River

- Outflows from Santa Clarita Valley

Short-Term (one year) Outlook

- Water requirements adjusted from UWMP
- Surface water, groundwater and recycled water supplies
- Adequacy of water supplies



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Well Locations By Area

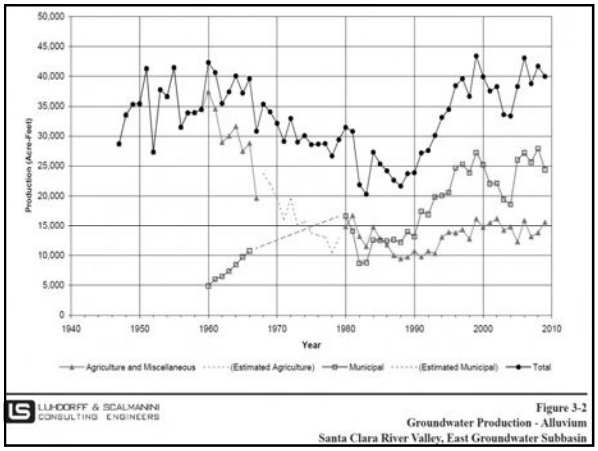

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Figure 3-2
Groundwater Production - Alluvium
Santa Clara River Valley, East Groundwater Subbasin

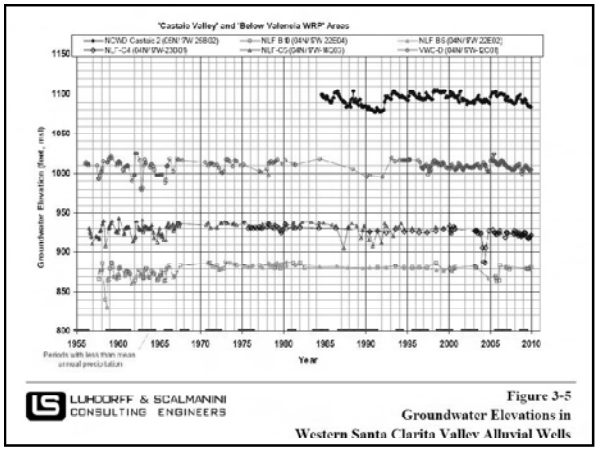

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Figure 3-5
Groundwater Elevations in
Western Santa Clarita Valley Alluvial Wells

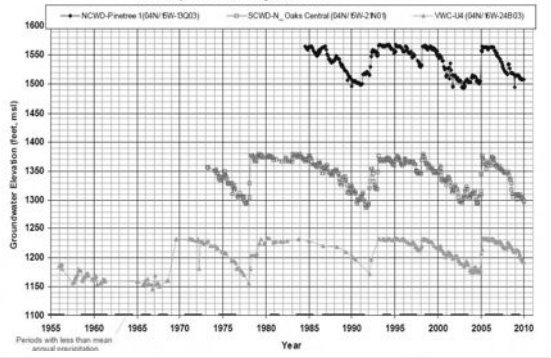

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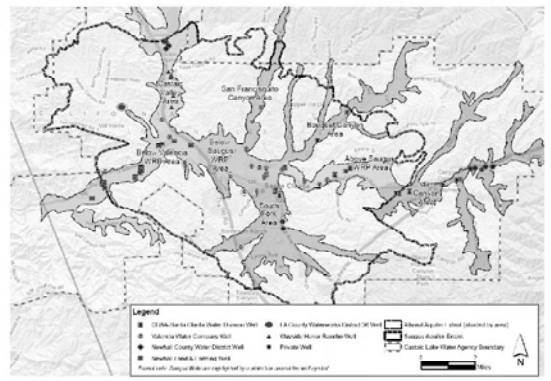
Figure 3-4
Groundwater Elevations in Eastern Santa Clarita Valley Alluvial Wells



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Well Locations By Area
Santa Clara River Valley, East Groundwater Subbasin

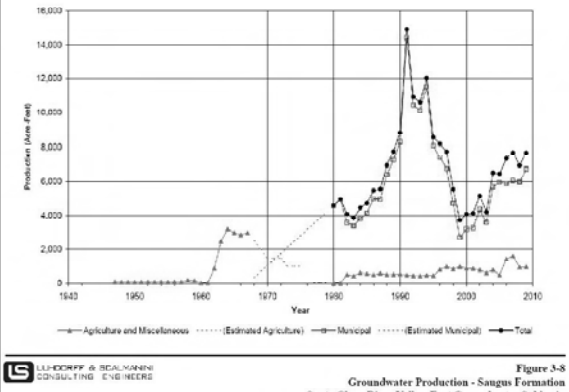

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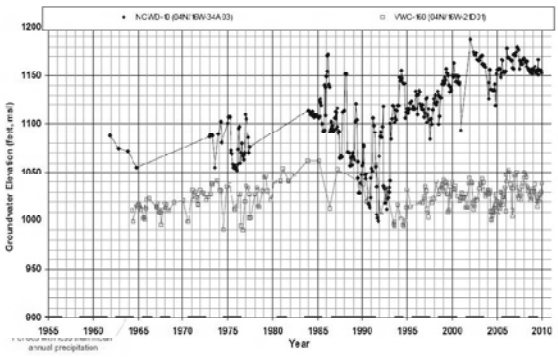
Figure 3-8
Groundwater Production - Saugus Formation
Santa Clara River Valley, East Groundwater Subbasin



LUHDORFF & SCALMANINI CONSULTING ENGINEERS

Figure 3-9
Groundwater Elevations in Saugus Wells

Total Groundwater Supply Santa Clarita Valley

	Normal Years		
	Alluvium (afy)	Saugus Fm. (afy)	Total (afy)
Municipal Purveyors	25,850	11,485	37,335
Agriculture & Others	12,750	1,000	13,750
Total	**38,600**	**12,485**	**51,085**

	Multiple Dry Years		
	Alluvium (afy)	Saugus Fm. (afy)	Total (afy)
Municipal Purveyors	23,800-22,250	18,125-33,975	41,975-56,225
Agriculture & Others	12,700-12,600	1,000	13,700-13,600
Total	**36,500-34,850**	**19,125-34,975**	**55,675-69,825**

2008 Groundwater Operating Plan

Groundwater Pumping 2010 UWMP				
Aquifer	**Normal Years**	**Dry Year 1**	**Dry Year 2**	**Dry Year 3+**
Alluvium	30,000-40,000 (38,600)	30,000-35,000 (36,500)	30,000-35,000 (34,850)	30,000-35,000 (34,850)
Saugus	7,500-15,000 (12,485)	15,000-25,000 (19,125)	21,000-25,000 (25,227)	21,000-35,000 (34,977)

from 2009 Basin Yield Update (LSCE & GSI), following 2001 Groundwater Update Report (Slade) & 2005 Basin Yield Analysis (CH2M Hill & LSCE)

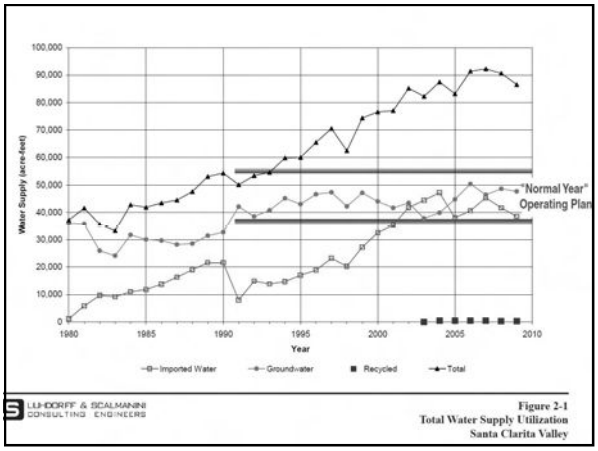


Figure 2-1
Total Water Supply Utilization
Santa Clarita Valley

Sustainability and Achievability

Sustainability

" 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" (86 years: 1922-2007)

"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"

Achievability

maintenance of groundwater levels above, or only temporarily slightly into, the intake (screened or perforated) sections of production wells

from 2009 Basin Yield Update (LSCE & GSI)

2008 Operating Plan Conclusions

Operating Plan is fully sustainable (no chronic groundwater level declines; no depleted stream flow), i.e. not overdraft, and mostly achievable (limited dry-period declines in eastern part of Valley)

Lack of any projected overdraft is consistent with actual historical basin response to the same range of groundwater pumping

Achievability issues in extended dry periods can be resolved by redistribution of some pumping to the west

- with redistribution, retain dry-period Alluvial pumping near 35,000 afy
- without redistribution, dry-period Alluvial pumping closer to 30,000 afy

Subsidence

In alluvial aquifers, results from "aquitard drainage" and resulting consolidation of the "aquitard"

- requires extensive, thick aquitard (fine-grained sediments, i.e. clay bed)
- requires chronically depressed groundwater levels (to allow clay to drain)

Santa Clarita Valley Alluvium

- up to 240 ft. thick, but lacking any extensive, thick aquitard => geology not conducive to subsidence, regardless of groundwater levels
- some near-constant and some fluctuating groundwater levels, but no chronically depressed groundwater levels anywhere => hydrology not conducive to subsidence.

No physical evidence of subsidence, e.g. lowering of land surface.

Small Private Pumping

Limited submittal of pumping-related data, approx. 5-6 years ago, for two tributary canyons; quantified less than 200 afy

No information submitted about well completions, e.g. whether in Alluvium or bedrock, pump capacities, water level records

No information about well failures, e.g. "going dry"

Extrapolated limited pumping data to conservatively estimate 500 afy of basin-wide small private pumping; included in Annual Water Report

Reported, and continue to expect, all private Alluvial wells to experience the same groundwater level fluctuations as monitored and reported in Annual Water Report

Monitoring

CA Health and Safety Code, Title 22

- Domestic Water Quality and Monitoring
- Waterworks Standards

CA Dept of Public Health

- Domestic Water Supply Permits
- Application of Health & Safety Code and DPH Policies

Santa Clarita Valley Purveyors

- Permitted and regulated as above
- In compliance with above for quantity and quality of water supplies

Perchlorate Treatment

- Groundwater Quality
  - Perchlorate treatment and restoration

Perchlorate

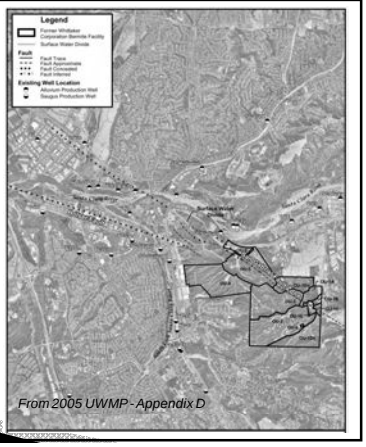
Year Perchlorate Detected	Purveyor Well	Groundwater Aquifer	Status
1997	SCWD Saugus 1	Saugus	DPH approved well return to service in January 2011; well in active service utilizing approved perchlorate treatment.
1997	SCWD Saugus 2	Saugus	DPH approved wells return to service in January 2011; well in active service utilizing approved perchlorate treatment.
1997	VWC Well 157	Saugus	Sealed and capacity replaced by new well.
1997	NCWD Well 11	Saugus	Out of service
2002	SCWD Stadium Well	Alluvium	Sealed and capacity replaced by new well.
2005	VWC Well Q2	Alluvium	DPH approved perchlorate treatment removal in 2007; treatment was installed in 2005 and relocated for potential future use; well remains in service.
2005	DTSC approved Interim Remedial Action Plan		
2006	NCWD Well NC-13	Saugus	DPH approved annual monitoring, results have always been below the detection limit for reporting; well remains in service.
2007	Settlement Agreement		
2010	VWC Well 201	Saugus	Out of service pending additional monitoring and evaluation of remediation alternatives.

Rapid Response Fund provides $10M in reimbursement funds to CLWA as fail-safe.

Perchlorate Impact

Valencia Water Company
Well 201

Site Location -- Former Whittaker Bermite Facility



From 2005 UWMP - Appendix D

Perchlorate Concentrations

Initial Detection (August, 2010) 5.0 ug/l
well removed from water supply service

Quarterly/Monthly Confirmation Sampling (November, 2010 – April, 2011) fluctuations between 5.7 and 12 ug/l

Logical Occurrence or Completely Unexpected?

Initial Perchlorate Contamination in Saugus Wells - 1997
Saugus 1 & 2; V 157; NCWD 11

Groundwater Flow
westerly gradient and flow direction – pre-1997 to 2010

Gradient Control = "Containment" via Restoration of Saugus 1 & 2
modeled – 2004
permitting, litigation, Settlement Agreement – 2007
design, construction – 2010
DPH water supply permit – 2010
start-up operations – 2010
full-time operation – January 2011

Valencia 201
first down-gradient Saugus well from original impacts
13-year elapsed time from initial impacts to V 201 impact
listed as "threatened" well in Settlement Agreement
while not a foregone conclusion, detection is a logical occurrence, and not completely unexpected

Water Supply Impact

Recent Operations

capture zone analysis – 2004
reduced pumping to avg. 180 afy – 2004-2010
replaced pumping with other Saugus well capacity

Saugus Formation

7,500 – 15,000 afy – normal year – water supply
15,000 – 35,000 afy – dry year – water supply

V 201

key well in dry years
3,777 afy of total – dry year – water supply
capacity needs to be restored before next potential dry year, i.e., within two years

V 201 Response

Removed from Water Supply Service at Initial Detection (August, 2010)

Quarterly-Monthly Confirmation Sampling

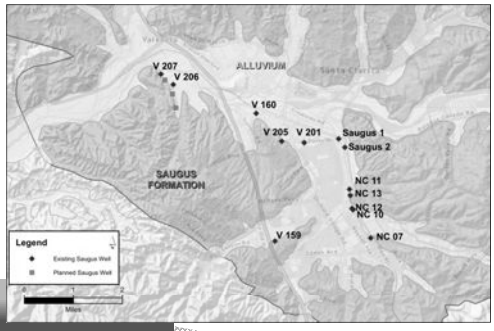
Alternatives
- restoration with – wellhead – treatment
- well replacement

Groundwater Modeling
- perchlorate migration
- need for secondary – containment –
- updated assessment of – threatened – wells

Dept. of Public Health Permitting

Design and Construction

Existing and Planned Saugus Well Locations



Organic Compounds

- Volatile and Synthetic Organic Compounds
  - Trichloroethylene (TCE) and Tetrachloroethylene (PCE)
    - Cleaning solvents, legacy contamination, urban stormwater runoff, septic systems
- CLWA annually monitors for these compounds;
  - TCE was found below the MCL in trace levels in groundwater in the Valley.
  - Not currently affecting production or needing treatment.

Water Banking Program Terms

Water Banking Programs

Banking Program	Extraction Capacity (AFY)	Contract Term
Rosedale Rio-Bravo	20,000	Through term of SWP contract
Semitropic interim programs	15,000	Through 2012/13 originally; through 2022/23 with Amendment
Semitropic - Newhall Land	4,950	Through 2035 with renewal by mutual agreement

State Water Project Reliability Comment Areas

- Supply Reliability
- Facility Reliability
- SWP and West Branch Conveyance
- Catastrophic Supply Interruption

SWP Supply Reliability

- Supply data from DWR's 2009 SWP Delivery Reliability Report.
- Based on model studies using 82 years of historical hydrology (1922 – 2003).
- Historical period includes several significant drought periods.
- Estimate for future (2029) includes adjustments to hydrology to reflect climate change.

SWP Facility Reliability

- Past SWP outages have been short-term (typically weeks in duration).
- Longest West Branch outage was planned three-month winter outage (Dec 1998 – Feb 1999).
- CLWA ideally located immediately downstream of two large SWP reservoirs – Pyramid and Castaic Lakes.
- Location allows deliveries to continue to CLWA and other West Branch Contractors even with outage in aqueduct upstream.
- No past SWP outages have impacted deliveries to CLWA.
- Potential supply impacts of future outage evaluated in UWMP Section 8.

SWP Conveyance

- SWP facilities are owned by State and operated by DWR.
- West Branch facilities, including aqueduct and Pyramid and Castaic Reservoirs, are part of SWP.
- CLWA and 28 other SWP Contractors each have a Water Supply Contract with DWR for water supply and delivery, with similar terms.
- Water Supply Contract:
  - Dictates terms for water delivery.
  - Provides for delivery of SWP water, supplies to and from out-of-service area banking programs, and non-SWP water.

SWP Conveyance (cont.)

- Each SWP Contractor has same priority for delivery within proportion of aqueduct capacity they pay for.
- Deliveries in excess of that capacity may be made through unused capacity of other Contractors.
- DWR requires separate delivery agreements for Contractor programs needing delivery through SWP facilities.
- CLWA has agreements with DWR for deliveries to and from its San Joaquin Valley banking programs and for delivery of its Buena Vista-Rosedale supply.

West Branch Conveyance

- DWR controls deliveries to each of three West Branch Contractors (CLWA, MWD, Ventura Co WPD).
- In dry years when SWP supplies are low, capacity normally used to convey SWP water is available to deliver other supplies.
- CLWA withdrawals from banking programs are planned only for dry years, when capacity would be available to convey it.

Catastrophic Supply Interruption

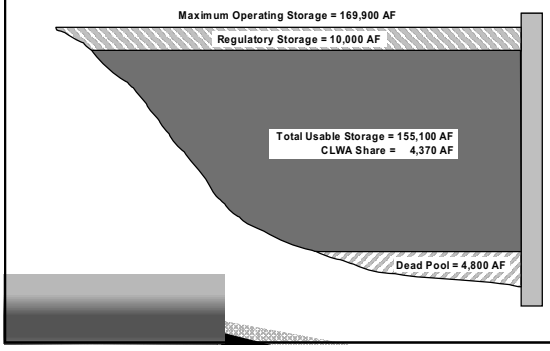
- Three SWP emergency outage scenarios considered:
  - Levee breach in Delta
  - California Aqueduct in San Joaquin Valley
  - West Branch Aqueduct
- Worst-case outage: West Branch Aqueduct
  - No SWP or other supplies through aqueduct
  - No supplies from groundwater banking in San Joaquin Valley

Catastrophic Supply Interruption

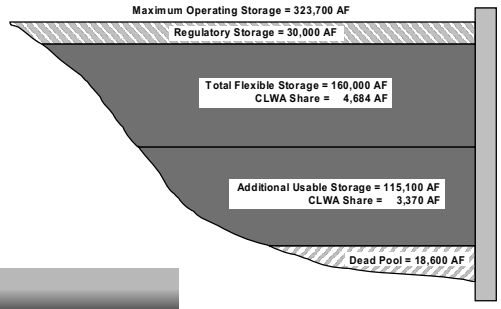
Outage assumptions:

- Six-month outage
- Occurs in normal/average year
- Supplies limited to:
  - Local Supplies
    - Groundwater
    - Recycled water
  - CLWA share of storage in West Branch reservoirs
    - Flexible storage
    - Emergency storage

Pyramid Lake Storage



Castaic Lake Storage



Six-Month West Branch Aqueduct Outage: Water Supplies and Demand (AF)

Water Supply Sources	2015	2020	2035	2050
Local Supplies				
Existing Supplies				
Groundwater	22,200	22,200	22,700	22,700
Recycled Water	120	120	120	120
Planned Supplies				
Future Groundwater	1,900	7,350	8,850	10,350
Recycled Water	370	1,020	3,850	7,870
Total Local Supplies	**24,590**	**30,690**	**35,520**	**41,040**
SWP West Branch Storage Available				
SWP Flexible Storage Accounts	6,060	4,680	4,680	4,680
Emergency Storage				
Pyramid Lake	4,370	4,370	4,370	4,370
Castaic Lake	3,370	3,370	3,370	3,370
Total West Branch Storage	**13,800**	**12,420**	**12,420**	**12,420**
Total Local Supplies and West Branch Storage	**38,390**	**43,110**	**47,940**	**53,460**
Demands				
Total Demand w/o Conservation	40,035	44,242	56,863	69,484
Total Demand w/ Conservation	**36,172**	**35,954**	**48,447**	**60,939**
Additional Supply and/or Conservation Required	**-**	**-**	**507**	**7,479**
As Percent of Demand	0%	0%	1%	11%

SBX7-7 Calculations and Water Conservation Accounting

SBX7-7 Calculations

- All values reported in UWMP by purveyors are required in statute passed in late 2009
- Methodologies developed through a DWR public committee process also required in statute; Kennedy/Jenks is a committee member
- Demand reduction targets calculated for each retail purveyor
- Purveyors may reach targets by combination of water conservation and recycled water programs

Water Conservation Accounting

- Estimates of future savings made by reviewing a wide variety of water conservation measures and programs, and then applying industry-accepted savings factors to them
- Saving factors are determined by in-depth technical studies, mainly done by the California Urban Water Conservation Council (CUWCC) and the American Waterworks Association
- CUWCC reports all savings calculations for its signatory agencies to SWRCB annually
- Detailed SCV Water Use Efficiency Strategic Plan is implementation plan for demand reductions

SBX7-7 Calculations and Water Conservation Accounting

- Document website links
  - SBX7-7 Methodologies: http://www.water.ca.gov/wateruseefficiency/sb7/committees/urban/u3/
  - CUWCC SWRCB Report: http://www.cuwcc.org/about/annual-reports
  - SCV Water Use Efficiency Strategic Plan: http://www.scvh2o.org/ http://www.clwa.org/about/publications.cfm

Chlorides/AWRM

- Imported Water Quality
  - Chloride TMDL
  - Alternative Water Resources Management Program (AWRM)
  - SWP Water Quality Modeling

Chlorides (continued)

- Imported Water Quality
  - Chloride TMDL (2005) – 100 mg/L from Saugus/Valencia WRPs
- Alternative Water Resources Management Program (AWRM) (2008)
  - Established conditional site specific objectives for chloride;
  - Provides water quality and water supply benefits, and protects biological resources;
  - SWP Water Quality Modeling

Santa Clarita Valley Urban Water Management Plan

Directors' Question and Answer Period

Santa Clarita Valley
Urban Water Management Plan

Next Steps

Consultant Team Resumes
Public Outreach Record

2010 Santa Clarita Valley
Urban Water Management Plan

Lynn M. Takaichi, P.E.

Chairman

Education

MS in Civil Engineering (Sanitary), University of California, Berkeley, 1972
BS in Civil Engineering, University of California, Berkeley, 1971
Special Study in Environmental Impact Assessment, University of California
Study in City and Regional Planning, University of California
Study in Water Resources Planning Civil Defense Preparedness Agency, Certificate of Achievement in Multi-Protection Design, University of Hawaii

Registration

Civil Engineer in California

Professional Summary

Mr. Takaichi is responsible for major planning and design projects, particularly assignments involving complex institutional and financial arrangements. He has directed a wide range of water projects including water resource studies, water system master plans, water treatment investigations, water facilities design and utility management plans. In addition, he has managed the preparation of numerous environmental impact assessments.

Mr. Takaichi has particular expertise in complex institutional arrangements and he works closely with specialized legal counsel, financial consultants, and water managers. His experience includes water agency formation, drafting of enabling legislation, negotiation of water supply and water service agreements, development of annexation policies and agreements, and management of a wide variety of water programs. He also has expertise in water system appraisals and has assisted numerous public agencies with the acquisition of investor-owned utilities.

Water Demand Models

- Comprehensive water system plan update for the Lakehaven Utility District.
- Modeling of water and reclaimed water systems for the Cambria Community Services District.
- Comprehensive water system master plan update for the City of Oxnard.
- Comprehensive water plan and capital improvement program ($380 million) for the Castaic Lake Water Agency.
- Water master plan for the City of Chino.
- Water Supply Reliability Plan Update and Optimization Model for the Castaic Lake Water Agency.
- Integrated Regional Water Management Plan for the Antelope Valley for the County of Los Angeles.
- Water Demand Model for the Mojave Water Agency.

Water Resource Studies

- Water Supply Reliability Evaluation for the San Gorgonio Pass Water Agency.
- Strategic planning consultant for local water resources development for the Los Angeles Department of Water & Power.

- Expert witness for water rights valuation for Squaw Creek Resort.
- Integrated Regional Water Management Plan for the Antelope Valley for the County of Los Angeles.
- Water Supply Reliability Plan Update and Optimization Model for the Castaic Lake Water Agency.
- Alternative Water Management Plan for the Santa Clara River for the Los Angeles County Sanitation Districts.
- Negotiation of numerous water transfer and exchange agreements for public and private clients.
- Evaluation of potential water marketing concepts at Lake Elizabeth for Ridgetop Ranch Properties.
- Peer review of SB 610/221 Water Supply Assessment for the Centennial Development (27,000 homes).
- Numerous groundwater evaluations and groundwater management plans.
- Preparation of numerous urban water management plans. Among these are plans for the Antelope Valley, Castaic Lake Water Agency, Hi-Desert Water District, City of Oxnard, City of Santa Paula, and Twentynine Palms Water District.
- Feasibility Evaluation of Alternative Spreading Facilities at the Cucamonga Spreading Grounds for the San Antonio Water Company.
- Evaluation of water banking requirements (Water Supply Reliability Plan) for the Castaic Lake Water Agency.
- Strategy Development for the Santa Ana River Recharge Facilities for the San Bernardino Valley Water Conservation District.
- Water resource evaluation of the Antelope Valley.
- West Ventura County water supply reliability study for the cities of Ventura and Oxnard.
- Water Resources Plan for the Cambria Community Services District.
- Concept Plan for the restoration of the Santa Rosa Basin for the Camrosa Water District.
- McGrath Lake preliminary watershed study for the McGrath State Beach Area Trustee Council.
- Water production alternatives study for the City of Camarillo.
- Evaluation of supplemental water supplies for the Nipomo Community Services District.
- Baseline water supply study for the Cambria Community Services District.
- Preliminary evaluation of the potential use of freeway dewatering water as a water supply for the City of Downey.
- Water resources study for the City of Santa Paula.
- Water Resources Element (LA County) of the Santa Clara River Enhancement and Management Plan for the Castaic Lake Water Agency.
- Optimization study of state water importation into Ventura County.
- Evaluation of potential water resources for the Hidden Valley Municipal Water District.
- Water resources evaluation and environmental assessment of 200,000 acres in Hawaii for the Soil Conservation Service.

Affiliations

American Society of Civil Engineers
American Water Works Association
National Society of Professional Engineers
Society of American Military Engineers
Water Environment Federation

National Association of Corrosion Engineers

Publications

Levi Brekke, Milton D. Larsen, Mary Ausburn, and Lynn Takaichi. 2002. *Suburban Water Demand Modeling Using Stepwise Regression.* Journal – American Water Work Association, October 2002.

Mary Lou Cotton, C.C.P.

Technical/Policy Advisor and QA/QC

Education

MS, Geological Sciences, University of Southern California
BS, Biological Sciences, University of Southern California

Registrations

Certified Water Conservation Practitioner, AWWA-CA/NV

Affiliations

California Urban Water Conservation Council
American Water Works Association, Water Conservation Certification Committee
Association of California Water Agencies, Water Use Efficiency and Communications Committees

Professional Summary

Mary Lou Cotton is a water resources planning and water conservation expert, with over 17 years of management experience with water agencies statewide, specifically in conducting water resource planning and management programs including surface water and groundwater investigations; water transfer, banking and exchange transactions and agreements; water conservation planning and management; master planning and design studies; water quality and hazardous waste investigations; and supporting the preparation of CEQA Compliance documents and obtaining project permits. Ms. Cotton is working in an advisory capacity for several clients on a wide variety of water banking (supply reliability) programs, as well as water transfers or exchanges for short-term and long-term water supplies. In addition, Ms. Cotton assists the State Water Contractors in an advisory capacity on Bay-Delta matters and is also serving as the General Manager of the State Water Project Contractors Authority.

Ms. Cotton has served on the California Urban Water Conservation Council for over a dozen years, as representative for Council members Kern County water Agency, Castaic Lake Water Agency and now Kennedy/Jenks Consultants. She has served on the Council Steering Committee for eight years, and is currently Secretary/Treasurer of the organization; this experience has made her extremely familiar with the requirements of the Memorandum of Understanding Regarding Urban Water Conservation in California (MOU). Ms. Cotton is also a member of the Association of California Water Agencies Water Use Efficiency and Communications Committees. She is an AWWA registered Level 1 Water Conservation Practitioner and currently serves on the AWWA Water Conservation Certification Committee.

This wide experience has made Ms. Cotton an expert on all aspects of California water management policy and practice. She has participated in numerous high-level efforts regarding water conservation in California, including the CALFED Bay-Delta Program Water Use Efficiency advisory committee and the Department of Water Resources Urban Water Management Plan guidebook advisory committee, and has worked on various pieces of conservation-related legislation. In addition, she has served on numerous CUWCC project advisory committees and participated in the 1997 and 2008 revisions of the MOU.

Project Experience

2010 Urban Water Management Plan Update, Castaic Lake Water Agency, Santa Clarita, CA. Project Manager for preparation of the 2010 regional Urban Water Management Plan (UWMP), which is being completed on behalf of CLWA and its four retail purveyors. The water supply analysis includes the SWP, local groundwater, reliability programs, other imported supplies and recycled water. The UWMP also includes an evaluation of the various alternative water management strategies and supplies available to the Valley and based on the evaluation, will recommend water supply strategies.

2010 Urban Water Management Plan Update, Mojave Water Agency, Apple Valley, CA. QA/QC. Kennedy/Jenks is currently providing planning services to product Mojave Water Agency's (MWA) 2010 UWMP with particular focus on Best Management Practices (BMPs) and new regulations. A State Water Project contractor, MWA's plan is to be completed in cooperation with numerous retailers from within their service area. This update will also include analysis of the various agencies' water conservation programs status for the purposes of evaluating compliance with AB 1420 and SBX7, in coordination with the local Alliance for Water Awareness and Conservation.

2010 Urban Water Management Plan Update, Western Municipal Water District, Riverside County, CA. QA/QC for preparation of the District's 2010 UWMP update, including water supplies, demands, and conservation measures.

2010 Urban Water Management Plan Update for Improvement District 4, Kern County Water Agency, Bakersfield, CA. Project Manager for preparation of the 2010 regional UWMP, for the Kern County Water Agency's (KCWA) Improvement District No. 4 (ID4), which represents the urban portion of KCWA's State Water Project wholesale service area. The water supply analysis includes the SWP, local groundwater, reliability programs, other imported supplies and recycled water. In addition to the water supply analyses required by the UWMP Act, this UWMP update will also include analysis of local water conservation program status for the purposes of evaluating compliance with AB 1420 and SBX7.

2010 Urban Water Management Plan Update, Port Hueneme Water Agency, Port Hueneme, CA. QA/QC for preparation of the Agency's 2010 UWMP update, which will include 25 years of water supply/demand analysis, new legislative requirements, water supply demand forecasting, Demand Management Measures review and analysis, and contingency planning.

2010 Urban Water Management Plan Update, City of Port Hueneme, CA. QA/QC for update of the City's 2010 UWMP. Project included review of the City's existing and future water supplies and demands, water supply reliability, summary of current conservation measures, an evaluation of recommended conservation measures, and an implementation plan.

2010 Urban Water Management Plan Update, San Bernardino Valley Municipal Water District, San Bernardino, CA. QA/QC for update of the District's 2010 UWMP with particular focus on Best Management Practices (BMP's) and new regulations. The work will also include coordination with California Department of Water Resources reviews and approvals.

2010 Urban Water Management Plan, Lake Arrowhead Community Services District, Lake Arrowhead, CA. Project Manager for production of this retail water purveyor's 2010 UWMP update.

2010 Urban Water Management Plan, North of the River Municipal Water District and Oildale Mutual Water Company, Kern County, CA. QA/QC for preparation of the 2010 UWMP update for Kern County Water Agency Improvement District No. 4's (ID4) participating retail purveyors, North of the River

Municipal Water District and Oildale Mutual Water Company. The UWMP update will provide information on ID4's wholesale service area and operations and will include data and information about the ID4 retail purveyor service areas and operations. The UWMP update will also include information on ID4 retail purveyor service areas that recover groundwater within ID4.

2010 Urban Water Management Plan, City of Ventura, CA. Project Manager for production of the City's 2010 UWMP update. The water supply analysis includes local groundwater, reliability programs, other imported supplies and recycled water. In addition to the water supply analyses required by the UWMP Act, this UWMP update will also include analysis of local water conservation program status for the purposes of evaluating compliance with AB 1420 and SBX7.

2010 Urban Water Management Plan, Central Coast Water Authority, Ventura County, CA. Currently providing QA/QC and third-party technical review for the CCWA's 2010 UWMP update.

2010 Urban Water Management Plan Update, Western Municipal Water District, Riverside County, CA. QA/QC for preparation of the District's 2010 UWMP update, including water supplies, demands, and conservation measures.

Water Use Efficiency Master Plan, Western Municipal Water District, Riverside County, CA: Project Manager. In concert with the growing emphasis on water use efficiency programs, WMWD commissioned the preparation of a Water Use Efficiency Master Plan to comprehensively address the long term use of water resources within their service area by adopting objectives, policies and programs designed to promote innovative emerging technologies and practices, as well as proven and cost-effective conservation measures. Ms. Cotton managed and authored several sections of the Plan, conducted an evaluation of water conservation measures through development of a weighted scoring matrix, and reviewed and assisted in the production of the Master Plan.

Water Conservation Master Plan, City of Riverside, Riverside County, CA: Technical Advisor & QA/QC. Recently selected for the preparation of a Water Conservation Master Plan to comprehensively address the long term use of water resources within the City's service area by adopting objectives, policies and programs designed to promote innovative emerging technologies and practices, as well as proven and cost-effective conservation measures.

Integrated Water Resources Management Plan (IWRMP), Western Municipal Water District, Riverside, CA: Project Team Member. Preparation of an integrated water resources plan for the Western Municipal Water District and retail agencies within the District (Riverside County). Project involved assistance to, and coordination of, a six member management group and approximately 20 stakeholders. Developed materials for stakeholder education, assisted with identification of water management objectives, and evaluation of projects put forth by stakeholders for consistency with objectives, financial feasibility, and compliance with State mandated requirements.

Upper Santa Clara Integrated Water Resources Management Plan, County of Los Angeles, CA: Project manager for the preparation of an integrated water resources plan for the Upper Santa Clara River Region (Los Angeles County). Project involves assistance to, and coordination of, an eight member management group and approximately 30 stakeholders. Develop materials for stakeholder education,

assist with identification of water management objectives, and evaluate projects put forth by stakeholders for consistency with objectives, financial feasibility, and compliance with State mandated requirements.

Hollister Area 2008 Urban Water Management Plan, Sunnyslope County Water District, City of Hollister, San Benito County Water District, CA. Provided QA/QC for a collaborative Urban Water Management Plan (UWMP) Update by the Sunnyslope County Water District (Sunnyslope), City of Hollister (City), and the San Benito County Water District (District). The latest amendment to the Plan incorporates a water shortage contingency plan, alternative water conservation measures and water reclamation programs.

Experience Prior to Kennedy/Jenks

Castaic Lake Water Agency, Water Resources Manager, Santa Clarita, CA. At the direction of the General Manager, work consisted of managing all aspects of the Agency's water resources projects, specifically dealing with water supply issues at the state and local levels. Prepared, facilitated, reviewed and submitted all water sale/transfer contracts, various agreements, and attendant resolutions to the Agency's Board of Directors and the Department of Water Resources. Prepared all documentation and conducted negotiations for three separate groundwater banking projects. Prepared in-house technical reports and other materials, including overseeing the production of the Agency's Urban Water Management Plan. Served in scientific advising capacity in reviewing all environmental regulatory documentation, particularly in regard to CEQA requirements, including consultant reports and other scientific documents. Served as the Agency's Water Conservation Coordinator; responsible for implementation of water conservation Best Management Practices as contained in the Memorandum of Understanding of the California Urban Water Conservation Council. Responsible for the Agency's public information program and oversee all its aspects. Represented the Agency on various committees, including several State Water Contractors standing committees, the California Urban Water Conservation Council Steering Committee, and the Association of California Water Agencies Communications and Program Committees.

Castaic Lake Water Agency, Assistant to the General Manager, Santa Clarita, CA. Worked at the direction of the General Manager, specifically dealing with water supply issues at the state and local levels. Prepared, facilitated, reviewed and submitted water sale/transfer contracts, various agreements, and attendant resolutions to the Agency's Board of Directors. Served in scientific advising capacity in reviewing environmental regulatory documentation, particularly in regard to the CALFED Bay-Delta Program; environmental impact reports; consultant reports and other scientific documents. Served as the Agency's Water Conservation Coordinator; responsible for implementation of water conservation Best Management Practices as contained in the Memorandum of Understanding of the California Urban Water Conservation Council. Responsible for the Agency's public information program. Prepared, compiled, wrote, and edited the Agency's quarterly newsletter and other Agency public information materials. Prepared in-house technical reports and other materials, including the Agency's Urban Water Management Plan. Represented the Agency on various committees, including several State Water

Contractors standing committees and the Association of California Water Agencies Communications and Program Committees.

Kern County Water Agency, Water Resources Planner, Bakersfield, CA. Attached to the Agency's Water Resources Department, specifically dealing with water supply issues, at both the state and local levels. Prepared, facilitated, reviewed and submitted water sale/transfer contracts, various agreements, and attendant resolutions to the Agency's Board of Directors. Served in scientific advising capacity in reviewing environmental regulatory documentation, particularly in regard to the CALFED Bay-Delta Program; environmental impact reports; consultant reports and other scientific documents. Served as the Agency's Water Conservation Coordinator; assist the Agency's Urban Bakersfield Advisory Committee. Responsible for implementation of water conservation Best Management Practices as contained in the Memorandum of Understanding of the California Urban Water Conservation Council. Also assisted with the Agency's participation in the AB3616 Agricultural Water Management Council. Responsible for majority of the Agency's public information program. Prepared, compiled, wrote, and edited the Agency's monthly newsletter. Prepared and wrote Agency public information materials. Prepared in-house technical reports and other materials including the Agency's Urban Water Management Plan. . Represented the Agency on various committees, including several State Water Contractors standing committees and budget review committee, the California Water Clearinghouse (for CALFED and Bay-Delta issues), the Association of California Water Agencies Communications (vice-chair) and Program Committees, and the Executive Committee of the Water Association of Kern County.

RESUME

Joseph C. Scalmanini

Specialization:

Forty-three years of practice in groundwater development and management, and oil and gas production. Assessments of groundwater resources and implementation of groundwater basin management in various areas throughout California; groundwater development and management encompassing well design, construction, operation, and maintenance; groundwater monitoring as part of basin management and as part of groundwater contamination investigations; artificial groundwater recharge facilities and practices; injection of industrial waste water; development of brackish and saline groundwater for municipal (desalination) and industrial water supply; water supply master planning.

Professional Registration:

Registered Civil Engineer, California, CE 28233

Academic Degrees:

M.E. Civil Engineering, University of California, Davis, CA	1984
B.S. Mechanical Engineering, University of Santa Clara, Santa Clara, CA	1967

Professional Experience:

Luhdorff and Scalmanini, Consulting Engineers, Woodland, CA	
President	2004 - Present
Principal Partner	1989 - 2004
Partner	1980 - 1989
University of California, Davis, Davis, CA	
Associate Development Engineer	1973 - 1979
Shell Oil Company	
Mechanical and Facilities Engineer	1967 - 1973

Representative Professional Assignments:

Consultant to water districts and utilities, municipalities, corporate and individual farming interests, corporate and private industry, and other engineering firms on groundwater development, utilization and management, including preparation and implementation of AB 3030 and other groundwater management plans, and plans for supplemental water supply and conjunctive use management. Consultation with public agencies, corporate and private concerns regarding groundwater contamination, its identification, monitoring, and management. Consultation with legal profession on technical aspects of groundwater development and utilization, including all aspects of groundwater basin yield and management, well design and construction, and application of pumping equipment.

Representative Professional Assignments continued:

Mr. Scalmanini directed and conducted a ground-water basin assessment in the Santa Maria Valley, including developing plans for conjunctive use of imported SWP water, recaptured return flows and increased artificial recharge of natural stream flow. After the adjudication of the Santa Maria Valley Groundwater Basin, he was appointed Basin Engineer, responsible for monitoring basin conditions and annually reporting to the court on the state of the basin.

Mr. Scalmanini directed the development of an alternative basin management plan for diversion of stream flow to replace coastal groundwater pumping and halt historical seawater intrusion in the Salinas Valley. He has developed several ground-water substitution programs for both public and private farming interests in Sacramento, Yolo and Sutter Counties, and authored Ground-Water Management Plans for these respective areas.

Mr. Scalmanini served as the court-appointed technical advisor to the Special Referee in the Chino Basin for development and implementation of an Optimum Basin Management Program to preserve and potentially increase the safe yield of the aquifer system, incorporate conjunctive use within storage limits in the aquifer, and make beneficial use of degraded water quality in the lower end of the basin by desalting ground water for future domestic water supply.

Mr. Scalmanini is directing ongoing engineering and hydrogeological analyses of local groundwater and imported State Water Project water supplies in the Upper Santa Clara River Area (Santa Clarita Valley) in Los Angeles County, including the preparation of annual Water Reports over the last eleven years. As part of that work, Mr. Scalmanini developed a cooperative technical program to integrate water resource analysis with the adjacent downstream basins, and has coordinated technical analysis of sustainable yield of the groundwater basin for ongoing agricultural, municipal, and other local water requirements since 2001. Mr. Scalmanini is the primary author of the AB3030 Groundwater Management Plan that has been adopted for the basin. He also prepared the Amendment to the 2000 Urban Water Management Plan for the State Water Contractor and all the water purveyors in the Valley to specifically address the adequacy of groundwater supplies in the wake of perchlorate contamination and the plan to contain contaminant migration while restoring contaminated wells to water supply service through the installation of wellhead treatment. He subsequently co-prepared an analysis of groundwater basin sustainable yield and a subsequent analysis of the adequacy of groundwater supply after another Alluvial well was impacted by perchlorate. He prepared the groundwater components of the 2005 Urban Water Management Plan, which was based on all the preceding analyses. Most recently, Mr. Scalmanini co-prepared an updated analysis of sustainable groundwater basin yield, including consideration of potential climate change impacts, for use in ongoing basin management and in the 2010 Urban Water Management Plan.

Mr. Scalmanini also currently serves as Chairman of the Ground-Water Committee that is developing and analyzing the potential for development of additional ground water throughout the Sacramento Valley as part of the Sacramento Valley Water Management Agreement reached in Phase 8 of the SWRCB Bay-Delta Water Rights Hearings.

Professional Affiliations:

National Ground Water Association
- Association of Ground Water Scientists and Engineers

American Water Works Association
California Groundwater Association
Groundwater Resources Association of California

Public Service:

- **Yolo County Aggregate Resources Committee (1975-79)**, Alternate delegate, hydrologist - analysis of impacts and development of management plans for extraction of aggregate from Cache Creek basin.
- **California Tenth Biennial Conference on Ground Water (1975)**, Member, Planning Committee
- **Chancellor's Campus (Univ. of Calif., Davis) Water Committee (1976-78)**, Staff Engineer - analysis of water supplies and uses, projection of requirements, development of conservation and management plans.
- **City of Davis Water Planning and Conservation Committee (1977-79)**, Chairman - analysis of water supplies and uses, projection of requirements, consideration of alternative supplies, development of conservation and management plans.
- **Yolo County Water Resources Task Force (1979)**, Member - development of county-wide master water plan.
- **Pacific Gas and Electric Co. ACT^2 Irrigation Pumping Demonstration Project (1992)**, Technical Advisor
- **Association of California Water Agencies (1994-1996)**, Member - Groundwater Committee
- **Cache Creek Conservancy**, **(2000-2002)**, Director

Teaching Activities:

Course Coordinator and Instructor University Extension Courses, University of California, Davis:

Concepts of Ground Water Management (1974, 1976, 1978, 1981)
Legal and Policy Considerations in Ground Water Management (1975, 1976, 1980)
Water Supply Wells and Pumps (1977, 1978,1981, 1983, 1985, 1986)
Groundwater Law, Hydrology and Management (2001-2010)

Instructor, University of California, Davis, Water Science 198, Introductory Hydraulics (1977, 1978, 1979)

Lecturer, University of California, Davis, Water Science 2, 140, 160; Ecology 230; Civil Engineering / Geology 175 (1975 - 1979)

Lecturer on Aquifer Characteristics, Well Hydraulics, and Groundwater Development, in Technical Training Classes at the U.S. Army Corps of Engineers' Hydraulic Engineering Center, Davis, CA.

Publications and Presentations:

Scott, V.H. and J.C. Scalmanini, **Water Wells and Pumps: Their Design, Construction, Operation, and Maintenance**, University of California Division of Agricultural Sciences Bulletin No. 1889, 1977.

Helweg, O.J., Scott, V.H., and J.C. Scalmanini, **Improving Well and Pump Efficiency**, American Water Works Association, 1983.

Publications and Presentations continued:

Scalmanini, J.C., and Scott V.H., **Design and Operational Criteria for Artificial Groundwater Recharge Facilities**, Water Science and Engineering Paper No. 2009, University of California, Davis, 1979.

Scalmanini, J.C., Scott, V.H., and O.J. Helweg, **Energy and Efficiency in Wells and Pumps**, presented at Twelfth Biennial Ground Water Conference, 1979.

Scalmanini, J.C., Johnson Jr., R.M., and E.E. Luhdorff Jr., **Development of a Groundwater Monitoring Program as a Basis for Coastal Groundwater Basin Management**, presented at the Fall Conference, American Water Works Association, CA-NV Section, 1983.
Scalmanini, J.C., **3030 Hindsight and 2020 Foresight, Actual Groundwater Management Experience Over the Last 15 Years, Soquel Creek Water District**, presented at the Association of California Water Agencies' Groundwater Management Conference, March 1994.

Scalmanini, J.C., **Legal and Technical Issues Related to Surface Water and Groundwater Interaction**, presented at the Groundwater Resources Association's California Ground Water & Efficient Usage for the Year 2000 and Beyond, October 1998.

Scalmanini, J.C., A. Schneider, and V. Cahill (panel presentation), **Groundwater Classification: Is the State Water Resources Control Board's Jurisdiction Over Ground Water Changing?**, presented at the Water Education Foundation's 2000 Update on Water Law and Policy, July 2000.

Scalmanini, J.C., **What the Heck's a Sub-Basin? Defining Basins and Sub-Basins**, presented at the Association of California Water Agencies' Groundwater Management: Will CalFed Help or Hinder Workshop, November 2000.

Scalmanini, J.C., **"Groundwater Law, Policy and Science: What can Be Done About The Disconnect",** presented at the Water Education Foundation's 2005 Water Law and Policy Briefing, San Diego, July 2005.

Nancy Clemm, P.E.

WORK SUMMARY

Nancy Clemm is a civil engineer with 30 years water resources planning experience, including 20 years working primarily on State Water Project (SWP) and Bay/Delta issues. Ms. Clemm is very familiar with SWP system operations, including reservoir, Delta, and conveyance facility operations, as well as with the Department of Water Resources (DWR) planning model used to estimate SWP delivery reliability. She has assisted in the preparation of numerous water supply planning documents, focused primarily on SWP supplies and facilities, including the 2005 and 2010 Urban Water Management Plans (UWMP) for Castaic Lake Water Agency (CLWA), the 1995 Regional Urban Water Management Plan and 1996 Integrated Water Resources Plan for the Metropolitan Water District of Southern California (MWD), and several environmental impact reports (EIR) dealing with SWP supplies and/or use of SWP conveyance facilities.

EXPERIENCE

WATER RESOURCES CONSULTANT, Los Angeles, California, 1999 - Present.
(Self-employed)

2005 and 2010 UWMPs: For CLWA, participated in preparation of 2005 and 2010 UWMPs, primarily focused on determining availability of SWP water supplies and assessing overall supply reliability.

Monterey Plus EIR: For MWD, provided technical support to SWP contractor representatives on advisory committee to DWR regarding water supply analyses and SWP contract issues, for preparation of new environmental document for Monterey Amendment to SWP water supply contract.

Water Program EIRs: For CLWA, assisted in preparation of EIRs for water programs involving use of SWP conveyance facilities, for CLWA's Rosedale Rio Bravo Water Storage District Water Banking Program, and its water acquisition from Buena Vista Water Storage District/Rosedale Rio Bravo Water Storage District.

SWP Table A Transfer EIR: For CLWA EIR for permanent transfer of SWP Table A amount, conducted SWP water supply reliability and water allocation analyses using data from DWR model studies, performed SWP aqueduct capacity rights and availability analysis, and prepared overall CLWA supply reliability assessment.

SWP Water Operations and Water Transfers: For State Water Contractors (SWC), participating in SWC Water Operations Committee, addressing SWP annual water supply and operational issues; and in SWC Water Transfers Committee, reviewing and providing recommendations regarding approval of proposed SWP contractor transfers and exchanges.

Reservoir Reoperation Report: For CALFED, drafted report on potential water supply and environmental benefits of reoperation of hydroelectric facilities in northern and central California.

Hydrologic Model: For Salt River Project, assisted with enhancements to runoff forecasting model, including making programming revisions, assisting with addition of user-interface, and writing user's manual and program documentation.

METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA, Los Angeles, California, 1991 - 98. (Senior Engineer, SWP Branch, 1993 - 98; Engineer, Bay Delta Branch, 1992; Engineer, SWP Branch, 1991)

SWP Water Supply Analyses: Assisted in preparation of several planning documents, including 1995 Regional Urban Water Management Plan and 1996 Integrated Water Resources Plan. Conducted numerous additional analyses to estimate future availability of SWP supplies, and to evaluate proposed SWP operational constraints, future water supply options, and SWP contract provisions.

SWP Supply Operations: Participated in SWC committee monitoring DWR's reservoir and Delta operations, addressing operational issues and various contractor issues such as equity and current supply versus risk of future shortage.

Water Contracts: Provided significant support in development of Monterey Amendment to SWP contract, including providing technical support for urban contractor negotiating team; assisting in amendment drafting and completion of environmental documentation; and resolution of implementation issues. Participated in drafting numerous agreements between MWD, DWR, and other agencies related to establishment of and water delivery to groundwater banking and exchange programs.

SWP Supply Planning: Participated in SWC committee monitoring DWR planning efforts to enhance SWP supplies, including review of proposed projects' feasibility, supply yield, water quality, environmental effects and mitigation, and costs.

SALT RIVER PROJECT, Phoenix, Arizona, 1981 - 90. (Senior Water Resources Analyst, 1985 - 90; Engineer III, 1983 - 84; Rotational Engineer, 1981 - 82)

Water Supply Analyses: Worked extensively with reservoir operations simulation model of Salt River Project system to conduct supply studies, to estimate future supplies and evaluate supply impacts given proposed physical and operational changes. Made major programming modifications and wrote program documentation.

Other Computer Modeling: Developed runoff forecasting model to estimate real-time runoff to reservoir system, including all model design, programming, and documentation. Assisted in development of water demand forecasting model based on land use, including model design, development, and implementation.

Water Contracts / Accounting: Developed detailed knowledge of existing water delivery and reservoir storage contracts. Participated in several negotiations for new water contracts, primarily concerning water delivery, accounting, and measurement.

EDUCATION

Bachelor of Science in Civil Engineering, Arizona State University, 1981.
Graduate courses in water resources modeling, Arizona State University.

REGISTRATION

Civil Engineer, California and Arizona

J. Lauren Everett

Water Resources Specialist

Education

B.S., Environmental Studies, University of California, Santa Barbara, 1999
M.S., Donald Bren School of Environmental Science and Management University of California, Santa Barbara, 2001

Professional Summary

Ms. Everett is a Water Resources Specialist, with over 8 years of experience in environmental and regulatory compliance providing technical planning support for a diverse range of water resource projects. Ms. Everett is currently involved with implementing DWR's Proposition 84 Integrated Regional Water Management Grant Program, urban water management planning, and supply and demand forecasting. Lauren has served as the liaison between planning, and engineering teams, and appreciates the teamwork and communication skills needed to successfully integrate planning and design concepts to meet regulatory requirements. She has also served as the project manager and project specialist for numerous water resource studies in Southern California.

Professional Experience

- *Castaic Lake Water Agency (CLWA), 2010 Urban Water Management Plan Update, Santa Clarita, CA:* Preparation of the 2010 regional Urban Water Management Plan (UWMP) is being completed on behalf of CLWA and its four retail purveyors. The water supply analysis includes the SWP, local groundwater, reliability programs, other imported supplies and recycled water. Ms. Everett is the technical lead on the UWMP development.

- *2010 Urban Water Management Plan Update for Improvement District 4, Kern County Water Agency, Bakersfield, CA.* Preparation of the 2010 regional UWMP, for the Kern County Water Agency's (KCWA) Improvement District No. 4 (ID4), which represents the urban portion of KCWA's State Water Project wholesale service area includes the SWP, local groundwater, reliability programs, other imported supplies and recycled water. Ms. Everett is the technical lead on the UWMP development.

- *Castaic Lake Water Agency (CLWA), Upper Santa Clara River IRWMP Proposition 84 Implementation Grant Application, Santa Clarita, CA:* The Project is the preparation of an Implementation Grant application requesting funds from the Proposition 84 Integrated Regional Water Management (IRWM) Implementation Grant Program for five Candidate Projects within the Upper Santa Clara River IRWM Plan. Ms. Everett managed the effort and was the technical lead on the application preparation.

- *Castaic Lake Water Agency (CLWA), Upper Santa Clara River IRWMP Proposition 84 Planning Grant Application, Santa Clarita, CA:* The Project is the preparation of a Planning Grant application requesting funds from the Proposition 84 IRWM Planning Grant Program for the 2010 Update of the Upper Santa Clara River IRWM Plan. Ms. Everett managed the effort and was the technical lead on the application preparation.

- *Los Angeles County Department of Public Works, Antelope Valley Integrated Regional Water Management Plan (Plan):* Ms. Everett managed the development of the Plan, which was

designed with a regional focus for the sustainable management of water resources in the Antelope Valley Region for the next twenty-five years. Over 40 agencies within the Antelope Valley participated in the planning process.

- *Los Angeles County Department of Public Works, Antelope Valley Integrated Regional Water Management Plan, Proposition 50 Round 2 Step 1 & Step 2 Grant Application, Antelope Valley, CA:* Kennedy/Jenks submitted a proposal for an implementation grant requesting $25 million for seven projects that targeted reducing the mismatch between supply and demand projected for the Region by 2035. Ms. Everett managed the preparation of the Step 1 and Step 2 grant applications.

- *Los Angeles County Department of Public Works, Antelope Valley Integrated Regional Water Management Plan, Region Acceptance Process (RAP) Application, Antelope Valley, CA:* Kennedy/Jenks submitted a proposal successfully defending the IRWMP Region's boundary to the Department of Water Resources allowing the IRWMP Region to remain in the Proposition 84 IRWMP Program. Ms. Everett managed the RAP effort.

- *Kern County Water Agency, Tulare Lake Basin Portion of Kern County Integrated Regional Water Management Plan (Plan), Kern County, CA:* Ms. Everett is currently assisting in the development of the integrated regional planning document, and providing assistant management responsibilities. Over 40 agencies within the Kern Region are participating in the Kern Region IRWM planning process.

- *Kern County Water Agency, Tulare Lake Basin Portion of Kern County Integrated Regional Water Management Plan, Region Acceptance Process Application, Kern County, CA:* Kennedy/Jenks submitted a proposal successfully defending the IRWMP Region's boundary to the Department of Water Resources allowing the IRWMP Region to remain in the Proposition 84 IRWMP Program. Ms. Everett managed the RAP effort.

- *Castaic Lake Water Agency (CLWA), Water Supply Reliability Plan Update, Santa Clarita, CA:* The plan and update are needed in order to evaluate the technical, environmental, and economic issues associated with potential water supply reliability projects. Ms. Everett's responsibilities include characterization of the water supply and demands for the region, and general report content.

- *Los Angeles County Department of Public Works, North Los Angeles/Kern County Regional Recycled Water Master Plan Environmental Impact Report, Antelope Valley, CA:* Kennedy/Jenks assisted Environmental Science Associates in preparing the hydrology, hazards and hazardous materials, and geology sections of the Environmental Impact Report. Ms. Everett managed the Kennedy/Jenks team on this effort.

- *Ventura County Waterworks District No. 8 Recycled Water Master Plan, Simi Valley, CA:* This project consists of the design of a recycled water distribution system to serve municipal and industrial customers within the City of Simi Valley. Ms. Everett's responsibilities included characterization of the environmental issues associated with implementing the system, identification of required permits and approvals, and general report coordination.

Dana Haasz

Project Manager

Education

M.S., Applied Geography, New Mexico State University, Las Cruces, NM
B.S., Geography and Environmental Science, McGill University, Montreal, Canada

Affiliations

California Urban Water Conservation Council
Western Water Alliance Steering Committee and Hiring Committee
Technical Advisor to CALFED Appropriate Water Measurement Panel/Agricultural and Urban
Environmental Justice Coalition for Water Steering Committee
Water Education Foundation, Water Leader (2003) and Water Leader Mentor (2009)

Professional Summary

Dana Haasz has 13 years experience in water conservation, demand modeling and resource planning. She currently manages the water use efficiency projects and programs for Kennedy/Jenks. Projects range from planning, program assessment, demand modeling and helping agencies to meet regulatory requirements, to the development of implementation programs, budgets, monitoring and quantification.

Dana spent the six years as the Water Conservation Administrator at San Francisco Public Utilities Commission. Ms. Haasz has extensive experience in regulatory compliance issues and long-term water supply planning for the retail and wholesale service areas, including planning, organizing, developing and administering retail water conservation programs including the identification, evaluation, and public promotion of conservation with industry, builders, developers, public agencies, customers, and community groups. Ms. Haasz's activities also extended to policy development, from legislative initiatives and statewide conservation issues to development of a revolving loan program and other efficiency-related activities at the local level.

In Ms. Haasz's six years at San Francisco Public Utilities Commission, she directly managed and implemented the growth of the Conservation department from a customer-service based residential rebate program to a multi-faceted approach that includes all customers, various types of incentives and services, outreach, education, policy and coordination with local, regional and state level activities. Her approach towards the expansion of the program was to merge public policy needs with solid business principles and quantified outcomes so as to make obvious and appropriate efficiency decisions for the customer as well as honoring the agency's responsibility to the ratepayer.

Prior to the SFPUC, Dana developed modeling and theoretical skills at the Pacific Institute for Water, Development and Environment where she co-authored an analysis quantifying water conservation potential for the state and policies and programs designed to achieve that goal.

Project Experience

2010 Urban Water Management Plans (18 water systems), Golden State Water Company, Rancho Cordova, CA. Currently providing water conservation services for GSWC's 2010 UWMP update for the 18 water systems that meet the criteria for the requirements of an UWMP. Updates will include analysis of water conservation programs status for the purposes of evaluating compliance with AB 1420 and SBX7, in coordination with the local Alliance for Water Awareness and Conservation.

2010 Urban Water Management Plan Update, Stockton East Water District, Stockton, CA. Currently providing water conservation services for preparation of the District's 2010 UWMP update, including water supplies, demands, and conservation measures, as well as addressing AB 1420 and SBX7-7 regulations.

The update will also include a water shortage contingency plan as it applies to Stockton East Water District being an urban water wholesaler.

Complete Water Conservation and Demand Reduction Program Evaluation, City of Roseville, Roseville, CA. Developed an implementation plan, including a review of past activities, identification of potential conservation measures, cost benefit analysis, program modeling and design to prepare conservation plan for City of Roseville, that meets the 20x2020 requirements.

Water Conservation Efficiency Master Plan, City of Riverside, Riverside, CA developed a conservation implementation program for the City of Riverside. Evaluated Riverside's past water use efficiency program, identified potential conservation measures, performed cost benefit analysis, modeled potential programs and developed a scored options matrix to assist Riverside with efforts to effectively comply the 20x2020 requirements and guide program design and implementation.

2010 Urban Water Management Plan Update, Castaic Lake Water Agency, Santa Clarita, CA. Currently providing water conservation services for preparation of the 2010 regional Urban Water Management Plan (UWMP), which is being completed on behalf of CLWA and its four retail purveyors. The water supply analysis includes the SWP, local groundwater, reliability programs, other imported supplies and recycled water. The UWMP also includes an evaluation of the various alternative water management strategies and supplies available to the Valley and based on the evaluation, will recommend water supply strategies.

2010 Urban Water Management Plan Update, Mojave Water Agency, Apple Valley, CA. Currently providing water conservation services to produce Mojave Water Agency's (MWA) 2010 UWMP with particular focus on Best Management Practices (BMPs) and new regulations. A State Water Project contractor, MWA's plan is to be completed in cooperation with numerous retailers from within their service area. This update will also include analysis of the various agencies' water conservation programs status for the purposes of evaluating compliance with AB 1420 and SBX7, in coordination with the local Alliance for Water Awareness and Conservation.

2010 Urban Water Management Plan Update, Western Municipal Water District, Riverside County, CA. Currently providing water conservation services for preparation of the District's 2010 UWMP update, including water supplies, demands, and conservation measures.

2010 Park Water Company Urban Water Management Plan and Water Use Efficiency Plan, CA. Currently providing water conservation services for preparation of the District's 2010 UWMP update, including water supplies, demands, and conservation measures.

2010 Suburban Water Systems Urban Water Management Plan, Oxnard, CA. Currently providing water conservation services for preparation of the District's 2010 UWMP update, including water supplies, demands, and conservation measures.

2010 Urban Water Management Plan Update for Improvement District 4, Kern County Water Agency, Bakersfield, CA. Currently providing water conservation services for preparation of the 2010 regional UWMP, for the Kern County Water Agency's (KCWA) Improvement District No. 4 (ID4), which represents the urban portion of KCWA's State Water Project wholesale service area. The water supply analysis includes the SWP, local groundwater, reliability programs, other imported supplies and recycled water. In addition to the water supply analyses required by the UWMP Act, this UWMP update will also include analysis of local water conservation program status for the purposes of evaluating compliance with AB 1420 and SBX7.

2010 Urban Water Management Plan Update, San Bernardino Valley Municipal Water District, San Bernardino, CA. Currently providing water conservation services for update of the District's 2010 UWMP with particular focus on Best Management Practices (BMP's) and new regulations. The work will also include coordination with California Department of Water Resources reviews and approvals.

2010 Urban Water Management Plan, Lake Arrowhead Community Services District, Lake Arrowhead, CA. Currently providing water conservation services for production of this retail water purveyor's 2010 UWMP update.

2010 Urban Water Management Plan, North of the River Municipal Water District and Oildale Mutual Water Company, Kern County, CA. Currently providing water conservation services for preparation of the 2010 UWMP update for Kern County Water Agency Improvement District No. 4's (ID4) participating retail purveyors, North of the River Municipal Water District and Oildale Mutual Water Company. The UWMP update will provide information on ID4's wholesale service area and operations and will include data and information about the ID4 retail purveyor service areas and operations. The UWMP update will also include information on ID4 retail purveyor service areas that recover groundwater within ID4.

2010 Urban Water Management Plan, City of Ventura, CA. Currently providing water conservation services for production of the City's 2010 UWMP update. The water supply analysis includes local groundwater, reliability programs, other imported supplies and recycled water. In addition to the water supply analyses required by the UWMP Act, this UWMP update will also include analysis of local water conservation program status for the purposes of evaluating compliance with AB 1420 and SBX7.

2010 Urban Water Management Plan, Central Coast Water Authority, Ventura County, CA. Currently providing QA/QC and third-party technical review regarding water conservation practices for the CCWA's 2010 UWMP update.

2010 Urban Water Management Plan Update, Western Municipal Water District, Riverside County, CA. Currently providing water conservation services for preparation of the District's 2010 UWMP update, including water supplies, demands, and conservation measures.

Project Experience Prior to Kennedy/Jenks

Water Conservation Administrator, San Francisco Public Utilities Commission

Water Saver Program: Developed market-based approach to conservation programs. The program aimed to secure permanent water savings for large commercial and industrial customers by providing technical support and financial incentive incentives based on the volume of saved water. The program allowed SFPUC to support larger process-oriented uses and other specific needs that are not part of the traditional fixture-based rebate programs. Participants included hotels, hospitals, colleges, and food growers.

Unaccounted for Water Analysis: Managed the first large urban agency implementation of the full AWWA M36 Water Loss process. The multi-phase analysis to discover, diagnose, and develop an implementation plan for capturing water system losses consisted of quantification and categorization of losses, identifying cost effective potential recovery and ,disaggregating city zones to prioritize and develop leak detection and repair implementation plan and providing leak detection training to City staff at the SFPUC.

Data Management: Managed design and development of database designed to improve the analytic capacity of conservation programs and link activities to water savings - actual and estimated – customer type, spatial information and more. The system also incorporated administrative tasks such as issuing rebates, mailings, inspection scheduling and follow up.

Low-income Direct Install Program: Developed high-efficiency toilet (HET) direct-installation and water audit program in coordination with community groups in order to save water in a hard to reach population and mitigate the impacts of rising water rates. The program provided free HETs to single family customers and a voucher program for multi-family residents in low-income communities. Local nonprofit groups were enlisted and community members trained in conservation principles in order to help market the program. program received two grants of $200,000 each, one from the California Department of Water Resources and one from the U.S. Bureau of Reclamation.

Education: Developed materials and an implementation plan for a water resources education program that would be compliant with both state and CUWCC requirements.

Municipal: Launched municipal audit program with detailed potential efficiency improvements, costs and implementation recommendations.

Conservation Legislation: Developed and worked to pass local conservation ordinances including a residential retrofit on resale for ordinance and a replacement ordinance for commercial accounts. Improvements include fixture replacement (toilets, showerheads aerators) and leak repair. Worked with the San Francisco Department of Building Inspection to train City inspectors, develop implementation materials and process.

Baseline Analysis: Participated in modeling of baseline use in San Francisco by customer type, potential demand reduction opportunities, costs and implementation options. Preferred alternative became the basis for SFPUC program activities.

California Urban Water Conservation Council: Represented Group 1 water agencies as convener of the CUWCC, 2005-2006 / Represented Group 2 Environmental Organizations as convener 2003-2004.

Third & Final Public Hearing
June 22, 2011
Public Outreach Record

2010 Santa Clarita Valley
Urban Water Management Plan

June 8, 2011

Richard J. Bruckner, Director
LA County Dept. Regional Planning
Los Angeles County
1390 Hall of Records
320 West Temple Street
Los Angeles 90012

Subject: Revised Notification of Public Hearings for the 2010 Santa Clarita Valley Urban Water Management Plan

Dear Mr. Bruckner,

In a March 3, 2011, letter we notified you of the upcoming Public Hearings for the 2010 Santa Clarita Valley Urban Water Management Plan. As noted in the letter, the first public hearing was held on Wednesday, March 23, 2011. The second public hearing originally scheduled for Wednesday, May 4, 2011 at 6:15 p.m. was rescheduled to Wednesday, May 18, 2011 at 6:15 PM. The third public hearing has been scheduled on June 22, 2011 will take place at the CLWA Boardroom located on the 1st floor of the Administration Building at the Rio Vista Water Treatment Plant, 27234 Bouquet Canyon Road, Santa Clarita, California 91350.

For additional information regarding the public hearings, please contact me at (661) 297-1600.

Sincerely,

Dirk Marks,
Water Resources Manager

CASTAIC LAKE WATER AGENCY

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June 8, 2011

Mark Pestrella
LA County Dept. Public Works
Los Angeles County
P.O. Box 1460
Alhambra 91802-1460

Subject: Revised Notification of Public Hearings for the 2010 Santa Clarita Valley Urban Water Management Plan

Dear Mr. Pestrella,

In a March 3, 2011, letter we notified you of the upcoming Public Hearings for the 2010 Santa Clarita Valley Urban Water Management Plan. As noted in the letter, the first public hearing was held on Wednesday, March 23, 2011. The second public hearing originally scheduled for Wednesday, May 4, 2011 at 6:15 p.m. was rescheduled to Wednesday, May 18, 2011 at 6:15 PM. The third public hearing has been scheduled on June 22, 2011 will take place at the CLWA Boardroom located on the 1st floor of the Administration Building at the Rio Vista Water Treatment Plant, 27234 Bouquet Canyon Road, Santa Clarita, California 91350.

For additional information regarding the public hearings, please contact me at (661) 297-1600.

Sincerely,

Dirk Marks,
Water Resources Manager

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June 8, 2011

Chris Stevens, Director
Resource Management Agency
County of Ventura
800 South Victoria Avenue
Ventura, CA 93009-1740

Subject: Revised Notification of Public Hearings for the 2010 Santa Clarita Valley Urban Water Management Plan

Dear Mr. Stevens,

In a March 3, 2011, letter we notified you of the upcoming Public Hearings for the 2010 Santa Clarita Valley Urban Water Management Plan. As noted in the letter, the first public hearing was held on Wednesday, March 23, 2011. The second public hearing originally scheduled for Wednesday, May 4, 2011 at 6:15 p.m. was rescheduled to Wednesday, May 18, 2011 at 6:15 PM. The third public hearing has been scheduled on June 22, 2011 will take place at the CLWA Boardroom located on the 1st floor of the Administration Building at the Rio Vista Water Treatment Plant, 27234 Bouquet Canyon Road, Santa Clarita, California 91350.

For additional information regarding the public hearings, please contact me at (661) 297-1600.

Sincerely,

Dirk Marks,
Water Resources Manager

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June 8, 2011

Jason Smisko
Senior Planner
City of Santa Clarita Planning Division
23920 Valencia Blvd., Suite 300
Santa Clarita, CA 91355

Subject: Revised Notification of Public Hearings for the 2010 Santa Clarita Valley Urban Water Management Plan

Dear Mr. Smisko,

In a March 3, 2011, letter we notified you of the upcoming Public Hearings for the 2010 Santa Clarita Valley Urban Water Management Plan. As noted in the letter, the first public hearing was held on Wednesday, March 23, 2011. The second public hearing originally scheduled for Wednesday, May 4, 2011 at 6:15 p.m. was rescheduled to Wednesday, May 18, 2011 at 6:15 PM. The third public hearing has been scheduled on June 22, 2011 will take place at the CLWA Boardroom located on the 1st floor of the Administration Building at the Rio Vista Water Treatment Plant, 27234 Bouquet Canyon Road, Santa Clarita, California 91350.

For additional information regarding the public hearings, please contact me at (661) 297-1600.

Sincerely,

Dirk Marks

Dirk Marks,
Water Resources Manager

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June 8, 2011

Mike Murphy
Intergovernmental Relations Officer
City of Santa Clarita
23920 Valencia Blvd., Suite 300
Santa Clarita, CA 91355

Subject: Revised Notification of Public Hearings for the 2010 Santa Clarita Valley Urban Water Management Plan

Dear Mr. Murphy,

In a March 3, 2011, letter we notified you of the upcoming Public Hearings for the 2010 Santa Clarita Valley Urban Water Management Plan. As noted in the letter, the first public hearing was held on Wednesday, March 23, 2011. The second public hearing originally scheduled for Wednesday, May 4, 2011 at 6:15 p.m. was rescheduled to Wednesday, May 18, 2011 at 6:15 PM. The third public hearing has been scheduled on June 22, 2011 will take place at the CLWA Boardroom located on the 1st floor of the Administration Building at the Rio Vista Water Treatment Plant, 27234 Bouquet Canyon Road, Santa Clarita, California 91350.

For additional information regarding the public hearings, please contact me at (661) 297-1600.

Sincerely,

Dirk Marks,
Water Resources Manager

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June 8, 2011

Jeff W. Hogan, AICP
Interim Planning Manager
City of Santa Clarita Planning Division
23920 Valencia Blvd., Suite 300
Santa Clarita, CA 91355

Subject: Revised Notification of Public Hearings for the 2010 Santa Clarita Valley Urban Water Management Plan

Dear Mr. Hogan,

In a March 3, 2011, letter we notified you of the upcoming Public Hearings for the 2010 Santa Clarita Valley Urban Water Management Plan. As noted in the letter, the first public hearing was held on Wednesday, March 23, 2011. The second public hearing originally scheduled for Wednesday, May 4, 2011 at 6:15 p.m. was rescheduled to Wednesday, May 18, 2011 at 6:15 PM. The third public hearing has been scheduled on June 22, 2011 will take place at the CLWA Boardroom located on the 1st floor of the Administration Building at the Rio Vista Water Treatment Plant, 27234 Bouquet Canyon Road, Santa Clarita, California 91350.

For additional information regarding the public hearings, please contact me at (661) 297-1600.

Sincerely,

Dirk Marks,
Water Resources Manager

CASTAIC LAKE WATER AGENCY

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June 8, 2011

Jessica Bunker, P.E.
Waterworks Division
P.O. Box 1460
Alhambra, CA 91802-1460

Subject: Revised Notification of Public Hearings for the 2010 Santa Clarita Valley Urban Water Management Plan

Dear Ms. Bunker,

In a March 3, 2011, letter we notified you of the upcoming Public Hearings for the 2010 Santa Clarita Valley Urban Water Management Plan. As noted in the letter, the first public hearing was held on Wednesday, March 23, 2011. The second public hearing originally scheduled for Wednesday, May 4, 2011 at 6:15 p.m. was rescheduled to Wednesday, May 18, 2011 at 6:15 PM. The third public hearing has been scheduled on June 22, 2011 will take place at the CLWA Boardroom located on the 1st floor of the Administration Building at the Rio Vista Water Treatment Plant, 27234 Bouquet Canyon Road, Santa Clarita, California 91350.

For additional information regarding the public hearings, please contact me at (661) 297-1600.

Sincerely,

Dirk Marks,
Water Resources Manager

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June 8, 2011

Rosalind Wayman, Field Deputy
Los Angeles County
Fifth Supervisorial District
23920 Valencia Blvd., Suite 265
Santa Clarita, CA 91355

Subject: Revised Notification of Public Hearings for the 2010 Santa Clarita Valley Urban Water Management Plan

Dear Ms. Wayman,

In a March 3, 2011, letter we notified you of the upcoming Public Hearings for the 2010 Santa Clarita Valley Urban Water Management Plan. As noted in the letter, the first public hearing was held on Wednesday, March 23, 2011. The second public hearing originally scheduled for Wednesday, May 4, 2011 at 6:15 p.m. was rescheduled to Wednesday, May 18, 2011 at 6:15 PM. The third public hearing has been scheduled on June 22, 2011 will take place at the CLWA Boardroom located on the 1st floor of the Administration Building at the Rio Vista Water Treatment Plant, 27234 Bouquet Canyon Road, Santa Clarita, California 91350.

For additional information regarding the public hearings, please contact me at (661) 297-1600.

Sincerely,

Dirk Marks,
Water Resources Manager

CASTAIC LAKE WATER AGENCY

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THE SIGNAL NEWSPAPER
24000 Creekside Rd
Valencia, Ca 91355

Proof of Publication
(2015.5 C.C.P.)

STATE OF CALIFORNIA,
COUNTY OF LOS ANGELES

I am a citizen of the United States,and a resident of the county aforesaid; I am over the age of eighteen years; and I am not a party to or interestedin the notice published. I am the chief legal advertising clerk of the publisher of the

SIGNAL NEWSPAPER

a newspaper of general circulation, printed and published **Daily** in the city of Santa Clarita County of Los Angeles, and which newspaper has been adjudged a newspaper of general circulation by the Superior Court of the County of Los Angeles State of California, under the date of **March 25, 1988**
Case number **NVC15880**, that the notice, of which the annexed is a printed copy, has been published in each regular and entire issue of said newspaper and not in any supplement thereof on the following dates, to-wit:

5/26, 6/2, 6/9, 6/16

All in the year 20 11

I certify (or declare) under penalty of perjury' that the foregoing is true and correct

Dated at Valencia, California, this
16th day of June, 20 11

Signature

NOTICE OF THIRD PUBLIC HEARING 2010 URBAN WATER MANAGEMENT PLAN

Castaic Lake Water Agency ("CLWA"), CLWA Santa Clarita Water Division, Newhall County Water District and Valencia Water Company have directed the preparation of a joint regional 2010 Urban Water Management Plan ("UWMP") for the Santa Clarita Valley, as encouraged by the Urban Water Management Planning Act ("Act"). Los Angeles County Waterworks District No. 36 is participating in the process on an ad hoc basis. Adoption of the 2010 UWMP is required under the Act by July 1, 2011.

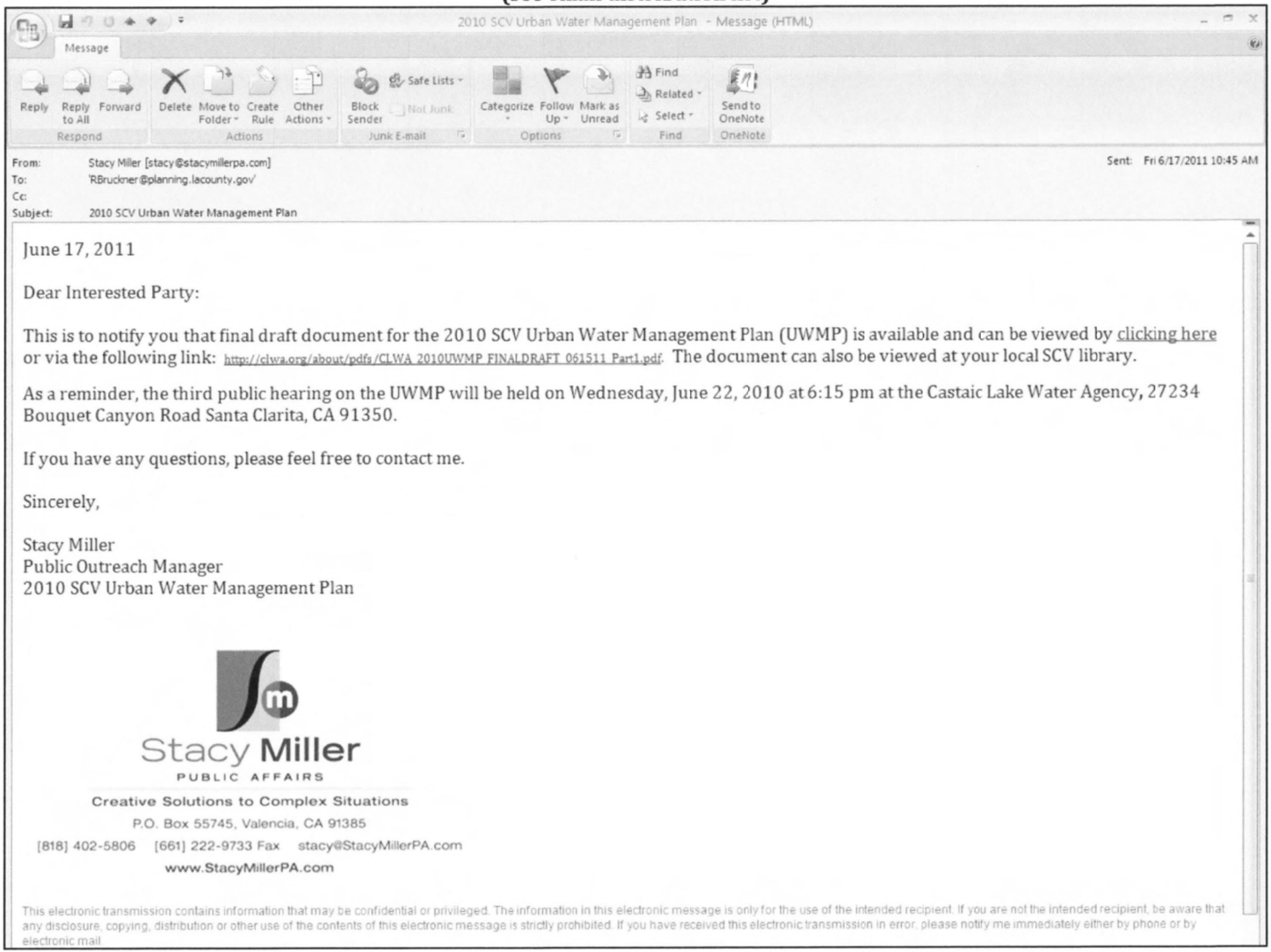
While the Act only requires that an urban water supplier hold one public hearing before adopting a plan, in order to ensure sufficient opportunity for public feedback, input and suggestions concerning the 2010 UWMP, a third public hearing has been scheduled.

The first public hearing was held on March 23, 2011and the second on May18, 2011. The third hearing will be held at 6:15 p.m. on Wednesday, June 22, 2011 and will take place at the CLWA Boardroom, located on the 1st floor of the Administration Building at the Rio Vista Water Treatment Plant, 27234 Bouquet Canyon Road, Santa Clarita, California 91350.

For additional information regarding the public hearings, please contact Dirk Marks, CLWA Water Resources Manager, at (661) 297-1600.

The Signal 5/26, 6/2 & 6/9 & 6/16 2011

Emails sent regarding
Final Draft Document Availability & 3rd Public Hearing Reminder
(See email distribution list)



2010 SCV Urban Water Management Plan - Message (HTML)

Message

Reply | Reply to All | Forward | Delete | Move to Folder | Create Rule | Other Actions | Block Sender | Safe Lists | Not Junk | Categorize | Follow Up | Mark as Unread | Find | Related | Select | Send to OneNote

Respond | Actions | Junk E-mail | Options | Find | OneNote

From: Stacy Miller [stacy@stacymillerpa.com]
To: 'RBruckner@planning.lacounty.gov'
Cc:
Subject: 2010 SCV Urban Water Management Plan

Sent: Fri 6/17/2011 10:45 AM

June 17, 2011

Dear Interested Party:

This is to notify you that final draft document for the 2010 SCV Urban Water Management Plan (UWMP) is available and can be viewed by clicking here or via the following link: http://clwa.org/about/pdfs/CLWA_2010UWMP_FINALDRAFT_061511_Part1.pdf. The document can also be viewed at your local SCV library.

As a reminder, the third public hearing on the UWMP will be held on Wednesday, June 22, 2010 at 6:15 pm at the Castaic Lake Water Agency, 27234 Bouquet Canyon Road Santa Clarita, CA 91350.

If you have any questions, please feel free to contact me.

Sincerely,

Stacy Miller
Public Outreach Manager
2010 SCV Urban Water Management Plan

Stacy Miller
PUBLIC AFFAIRS
Creative Solutions to Complex Situations
P.O. Box 55745, Valencia, CA 91385
[818] 402-5806 [661] 222-9733 Fax stacy@StacyMillerPA.com
www.StacyMillerPA.com

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Master Email List
Extension of UWMP comment period and notification of revised draft document and next public hearing
Sent June 17, 2011

Jarrod Degonia Assemblymember Cameron Smyth Jarrod.DeGonia@asm.ca.gov	Ernie Villegas Assemblymember Jeff Gorell Ernie.Villegas@asm.ca.gov	Kevin Korenthal Associated Builders & Contractors of CA; ABC-CCC kkorenthal@abc-ccc.org
Holly Schroeder BIA - Los Angeles/Ventura Chapter hschroeder@bialav.org	Sandy Sanchez BIA - Los Angeles/Ventura Chapter ssanchez@bialav.org	David Inouye CA Department of Water Resources davidi@water.ca.gov
Robert Kelly Castaic Area Town Council RobertKelly@CastaicAreaTownCouncil.org	Mike Murphy City of Santa Clarita mmurphy@santa-clarita.com	Jason Smisko City of Santa Clarita JSmisko@santa-clarita.com
Bruce Fortine College of the Canyons fortine@earthlink.net	Bob Haueter Congressman Howard McKeon Bob.Haueter@mail.house.gov	Chris Stephens County of Ventura Resource Management Agency Chris.Stephens@ventura.org
Ron Bottorff Friends of the Santa Clara River bottorffm@verizon.net	Mark Pestrella LA County Department of Public Works mpestrel@dpw.lacounty.gov	Richard Bruckner LA County Department of Regional Planning RBruckner@planning.lacounty.gov
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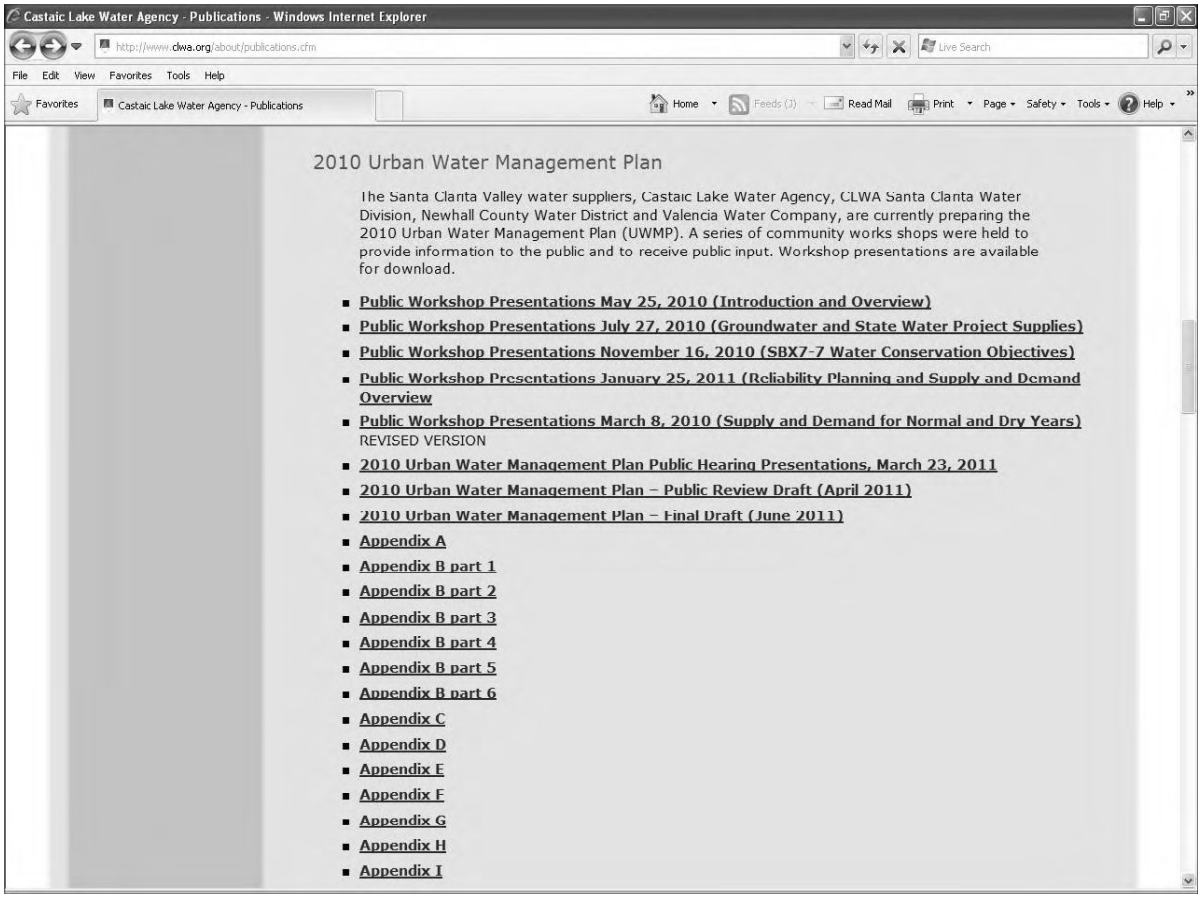
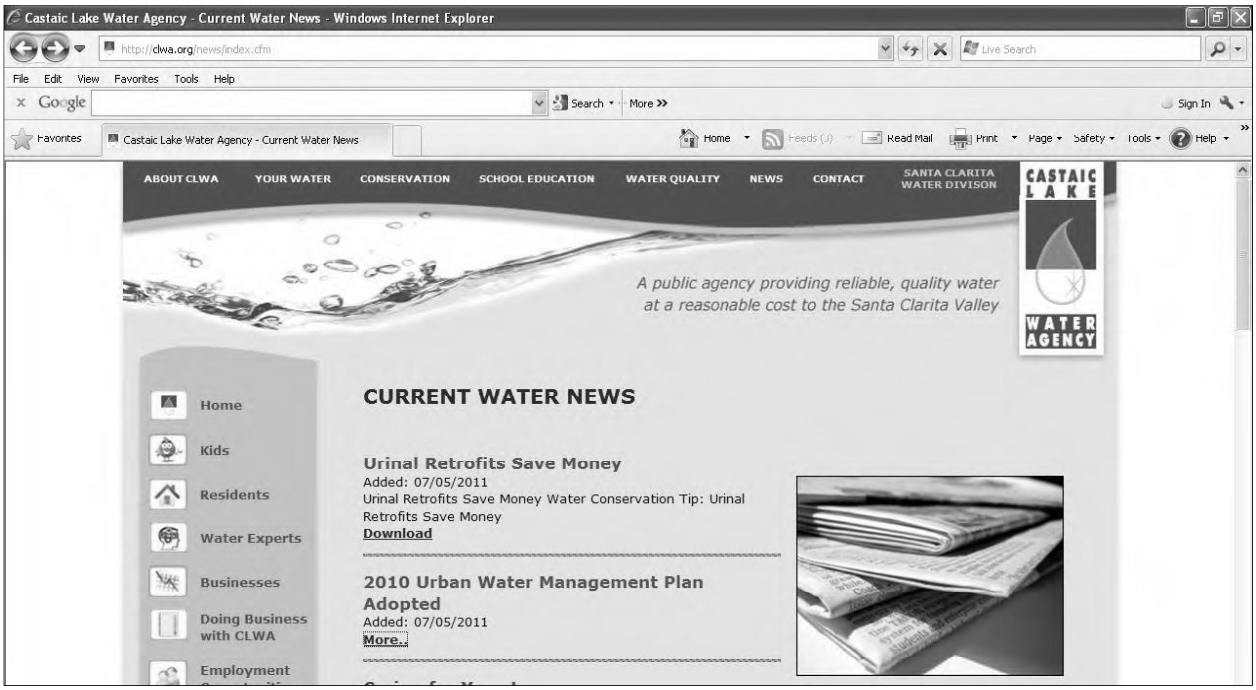
Terry Kingery SCV Chamber of Commerce tkingery@scvchamber.com	Sierra Club Angeles Chapter Contact.us@angeles.sierraclub.org	Mark Butala Southern CA Association of Governments butala@scag.ca.gov
Jackie Bick State Senator Sharon Runner Jackie.Bick@sen.ca.gov	Scott Wilk Jr. State Senator Tony Strickland scott.wilk@sen.ca.gov	David Perry Supervisor Michael Antonovich, 5th District dperry@lacbos.org
Rosalind Wayman Supervisor Michael Antonovich, 5th District rwayman@lacbos.org	E. Michael Solomon United Water Conservation District msolomon@unitedwater.org	Kathy Norris Valley Industrical Association of Santa Clarita (VIA) kathy@via.org
Ron Mechsner West Ranch Town Council Rmechsner@WestRanchTownCouncil.com	Carol Lutness SCV Fair Elections Committee santaclarita-info@caclean.org	Katherine Squires Sierra Club Angeles Chapter katherine.m.squires@csun.edu
Dunn Residents water@dslextreme.com	Mitch Glaser LA Co Department of Regional Planning mglaser@planning.lacounty.gov	Also sent via US Mail to • Mr. & Mrs. Dunn • Cam Nolltemeyer • Michael A. Naoum • Carol Lutness

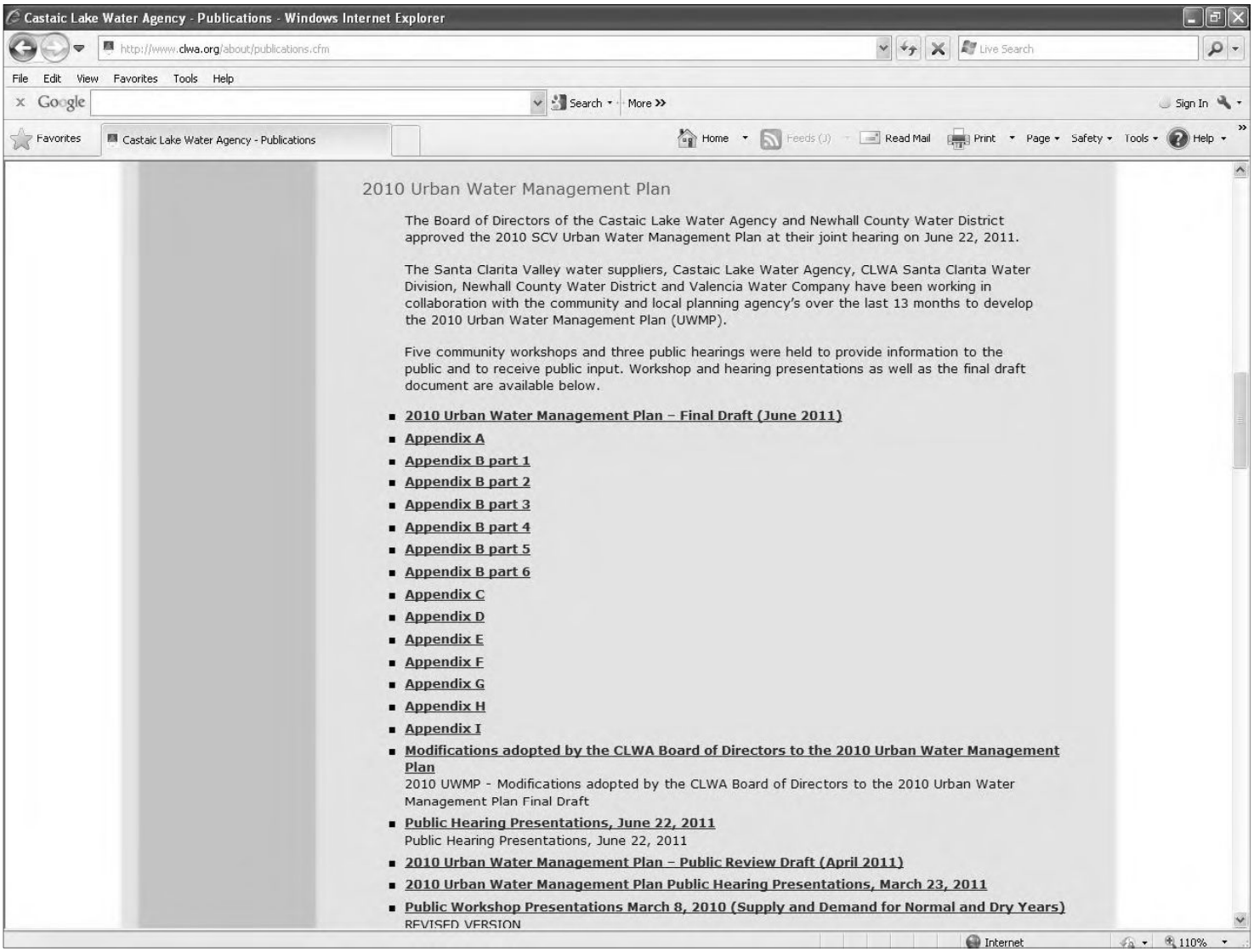
UWMP –June Hearing & Final Draft Document Notice
CLWA Website



UWMP –June Hearing & Final Draft Document Notice
NCWD Website

UWMP Adoption Notice
CLWA Website June 2011





2010 UWMP Adoption Notice
NCWD Website
June 2011

2010 UWMP Adoption Notice
SCWD Website
June 2011

NEWHALL COUNTY WATER DISTRICT

NCWD

New Regional Urban Water Management Plan Approved

Santa Clarita Valley Family of Water Suppliers Approve Critical Planning Tool

Santa Clarita, CA –The Boards of Directors of the Newhall County Water District and Castaic Lake Water Agency unanimously approved the 2010 Santa Clarita Valley Urban Water Management Plan at a joint public hearing on June 22, 2010.

"The approval by the two Boards is a testament to the quality of this document and the team that has worked so hard on its preparation," stated Daniel Mortensen, NCWD Board President.

The creation of the Santa Clarita Valley Urban Water Management Plan began in May 2010 and included opportunities for input from our community, water partners, environmental groups, elected officials, business groups and other community stakeholders during the five community workshops and three public hearings that were held on the plan.

"We have gone far beyond the public participation requirements cited in the Urban Water Management Plan regulations to ensure that all residents and interested parties had ample opportunity to participate, comment and weigh in on this important process," stated Tom Campbell, CLWA Board President.

The Urban Water Management Plan presents a picture of the valley's future water situation and describes the long-range water needs of our community and the means to supply the necessary water to the year 2050. Every five years, the water suppliers who deliver in excess of 3,000 acre feet of water or serve over 3,000 connections per year are required by law to prepare an Urban Water Management Plan.

The SCV Family of Water Suppliers partnered in this planning effort to ensure a collaborative planning approach. This plan is not a project-specific document, nor does it take the place of individual project requirements; rather it is a tool that helps guide the local water suppliers' actions and offers a broad perspective on a wide variety of water issues. The plan concludes that the combination of existing and

planned programs to increase supply and conservation will meet the Valley's water needs through 2050.

"I am proud of the tremendous amount of time and work that has been put into the development of this plan by the community, our staff, consultants and my fellow Board members," stated Bill Cooper, CLWA Board Vice President . "Our Urban Water Management Plan serves as the 'gold standard' of planning documents throughout the state and is followed closely for its content and thoroughness."

The final SCV Urban Water Management Plan will be delivered to the State Department of Water Resources before the end of July 2011. The final draft and additional amendments that were made at the recent board meetings are currently available for review online at www.ncwd.org.

Santa Clarita Valley Urban Water Management Plan

Public Hearing
June 22, 2011
Castaic Lake Water Agency

Agenda

- Open public hearing
- Review of public input process and public comment letters
- Public comment period
- Presentation on Groundwater Basin
- Presentations on Perchlorate Restoration, VWC Well 201
- Presentations on Water Banking, SWP reliability, Water Conservation, Chlorides/AWRM
- Board questions and answers
- Description of UWMP document finalization process
- Close hearing and next steps

UWMP Act Process

ACT REQUIREMENTS

- Coordinate preparation of UWMP with other appropriate agencies in the area.
- 60 days notice to city and counties, and may consult with, and obtain comments from, city and counties receiving notice.
- Encourage active involvement of diverse social, cultural, and economic elements of the population within the service area prior to and during the preparation of the plan.

ACT REQUIREMENTS EXCEEDED

- Draft Final UWMP, §§1.3.1 & 1.3.3, Table 1-1, pgs 1-3 to 1-8.
- Draft Final UWMP, §1.3.3, Table 1-1, pgs 1-3 to 1-8, Appendix B.
- Five Public Workshops between May 2010 and March 2011; three CLWA/NCWD joint public hearings; written public comment period; written public comment deadline extended; Draft Final UWMP, §§1.3.1 &1.3.3, Table 1-2, pgs 1-3 to 1-8.

UWMP Act Process

ACT REQUIREMENTS	ACT REQUIREMENTS EXCEEDED
Prior to adopting a plan, the urban water supplier shall make the plan available for public inspection.	Draft UWMP has been available since April 15, 2011; Final Draft UWMP, §§1.3.1 & 1.3.3, Table 1-2, pgs 1-3 to 1-8, Appendix B.
One Public hearing.	Three CLWA/NCWD joint public hearings.
Notice of hearing in compliance with Gov. Code § 6066.	Final Draft UWMP, §§1.3.1 & 1.3.3, Table 1- 2, pgs 1-3 to 1-8, Appendix B.

UWMP Act Process

ACT REQUIREMENTS	ACT REQUIREMENTS EXCEEDED
Notice of hearing to any city or county within which the supplier provides water supplies.	Final Draft UWMP, §§1.3.1 & 1.3.3, Table 1-2, pgs 1-3 to 1-8, Appendix B.
After the hearing, the plan shall be adopted as prepared or as modified after the hearing.	June 22, 2011 Joint Meeting and 3rd Joint Public Hearing

Past Workshops

May 2010
- UWMP purposed and process – What, Who, Why and When
- Existing and new requirements of UWMPs

July 2010
- SBX7-7 ("20x2020") Requirements
- Recycled Water
- Groundwater Supplies
- State Water Project Reliability

November 2010 –
- Presentation to IRWMP Stakeholders

Past Workshops (continued)

November 2010
- GPCD population assumptions and calculations
- SBX7-7 Targets by retailer

January 2011
- Overview of water supplies
- SWP reliability update
- CLWA reliability planning update
- SBX7-7 calculations and targets
- Overview of water supplies and demand

March 2011
- Water Supply and Demands

Public Hearings and Draft Document

1st public hearing March 23, 2011
- Public Draft document made available April 15, 2011
- Comment period through May 20, 2011

2nd public hearing May 18, 2011
- Comment period extended through May 27, 2011
- Final Draft document made available June 15, 2011

3rd public hearing June 22, 2011

Comment Letters Received

- Friends of the Santa Clara River
- Santa Clarita resident and Valencia Water ratepayer
- Sierra Club
- Mr. and Mrs. Dunn
- Mr. Naoum
- Mr. Dunn
- Sierra Club
- SCOPE
- Whittaker-Bermite Citizens Advisory Group
- Babak Naficy
- Santa Clarita Valley Fair Elections Committee

Broad Categories of Comments Received

- Groundwater overdraft claims
- Perchlorate and VWC Well 201
- Organic compounds
- Water banking program issues; State Water Project reliability and contingency planning
- Water conservation accounting
- Chloride water quality issues (TMDL/AWRM)

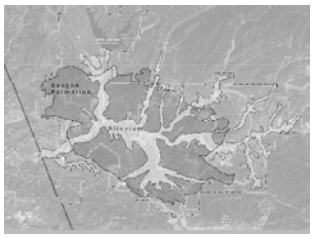
Santa Clarita Valley Urban Water Management Plan

Public Comment Period

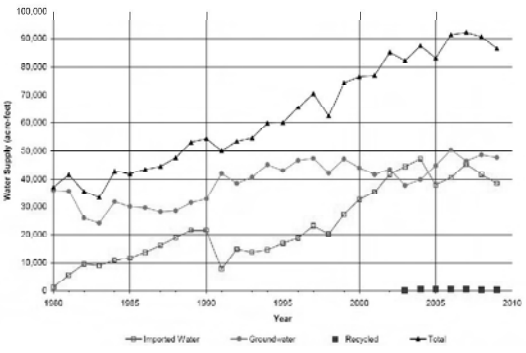
Groundwater Supplies and Related Issues, e.g. "Overdraft"

- Joe Scalmanini –
  Luhdorff and Scalmanini, Consulting Engineers

Groundwater Component of Water Supplies
2010 Urban Water Management Plan



• Castaic Lake Water Agency • CLWA Santa Clarita Water Division
• Los Angeles County Waterworks District 36
• Newhall County Water District • Valencia Water Company



LUHDORFF & SCALMANINI CONSULTING ENGINEERS

Figure 2-1
Total Water Supply Utilization
Santa Clarita Valley

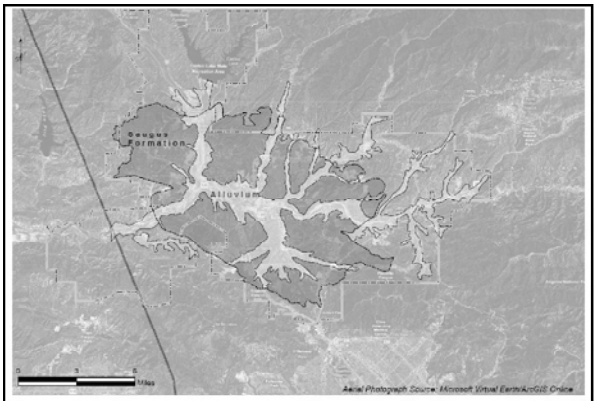


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Figure 3-1
Alluvium and Saugus Formation

Groundwater Management Plan (2003)

Management Objectives (Goals) for the Basin

- Development of integrated surface water, groundwater, and recycled water supply to meet existing and projected uses
- Determination of operational groundwater yield to avoid overdraft = sustainability
- Preservation of groundwater quality, including solution of contamination problems
- Preservation of interrelated surface water resources = maintenance of surface water flows and non-degradation of quality

Groundwater Management Plan (2003)

Elements

- Groundwater monitoring
- Surface water monitoring
- Basin yield analysis
- Regular and dry year water supplies
- Continued conjunctive use
- Long-term salinity management
- Integration of recycled water
- Mitigate contamination
- Local, state and federal relationships
- Public education and water conservation
- Recharge wellhead protection areas
- Well construction and destruction policies
- Provisions to add additional components

Annual Water Reports (1998-present)

Annual Water Requirements and Supplies

- Actual water use
- Sources of supply to meet actual use

Groundwater

- Alluvial and Saugus aquifer conditions

Supplemental Water Supplies

- State Water Project
- banking and other programs

Water Quality

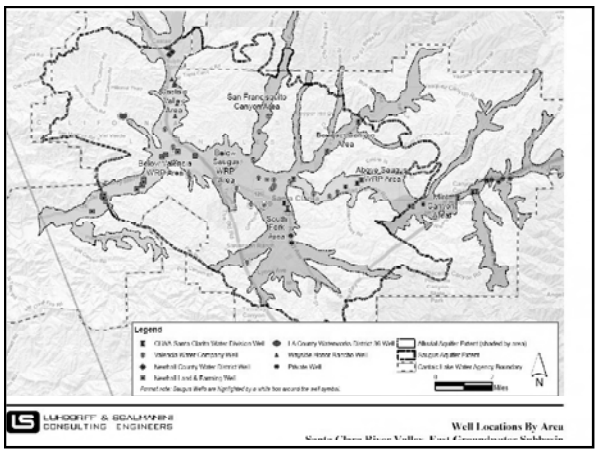
Recycled Water

Santa Clara River

- Outflows from Santa Clarita Valley

Short-Term (one year) Outlook

- Water requirements adjusted from UWMP
- Surface water, groundwater and recycled water supplies
- Adequacy of water supplies



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Well Locations By Area

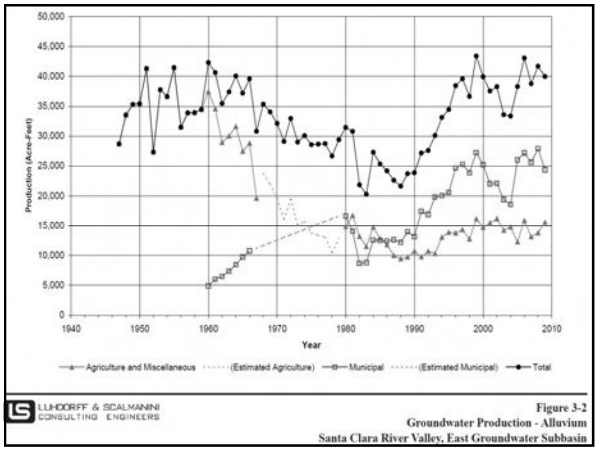

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Figure 3-2
Groundwater Production - Alluvium
Santa Clara River Valley, East Groundwater Subbasin

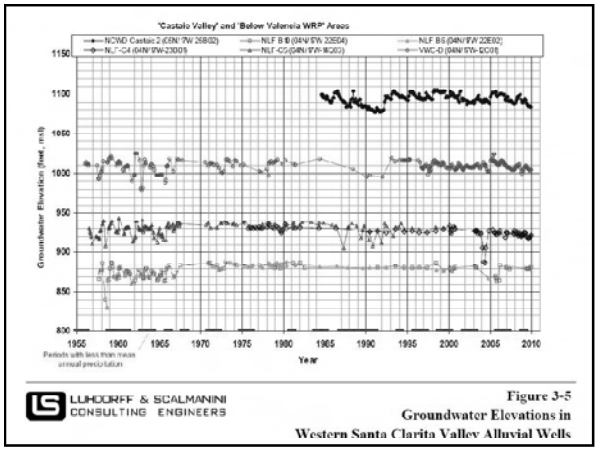

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Figure 3-5
Groundwater Elevations in
Western Santa Clarita Valley Alluvial Wells

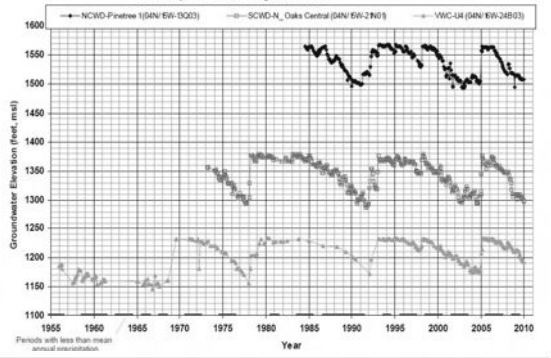

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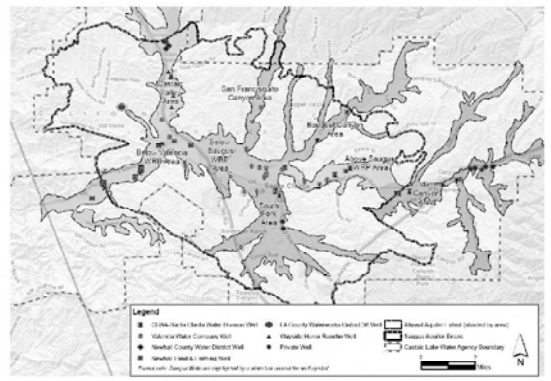
Figure 3-4
Groundwater Elevations in Eastern Santa Clarita Valley Alluvial Wells



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Well Locations By Area
Santa Clara River Valley, East Groundwater Subbasin

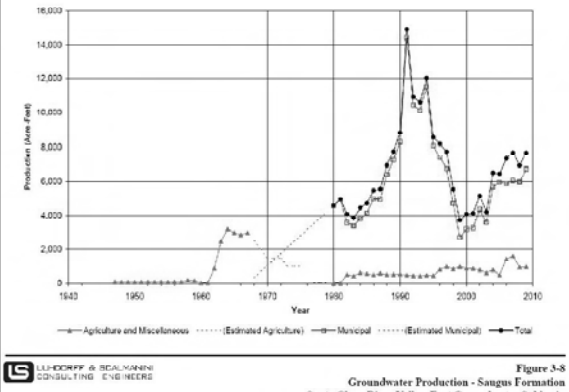

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Figure 3-8
Groundwater Production - Saugus Formation
Santa Clara River Valley, East Groundwater Subbasin

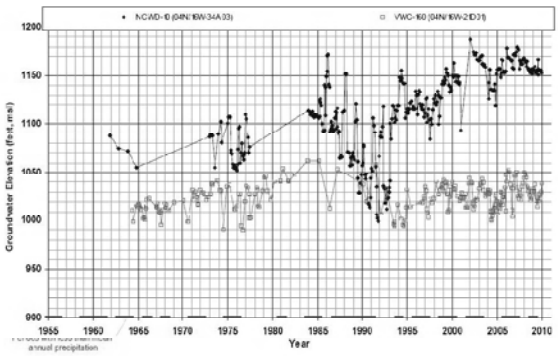

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Figure 3-9
Groundwater Elevations in Saugus Wells

Total Groundwater Supply Santa Clarita Valley

	Normal Years		
	Alluvium (afy)	Saugus Fm. (afy)	Total (afy)
Municipal Purveyors	25,850	11,485	37,335
Agriculture & Others	12,750	1,000	13,750
Total	**38,600**	**12,485**	**51,085**

	Multiple Dry Years		
	Alluvium (afy)	Saugus Fm. (afy)	Total (afy)
Municipal Purveyors	23,800-22,250	18,125-33,975	41,975-56,225
Agriculture & Others	12,700-12,600	1,000	13,700-13,600
Total	**36,500-34,850**	**19,125-34,975**	**55,675-69,825**

2008 Groundwater Operating Plan

Groundwater Pumping 2010 UWMP				
Aquifer	**Normal Years**	**Dry Year 1**	**Dry Year 2**	**Dry Year 3+**
Alluvium	30,000-40,000 (38,600)	30,000-35,000 (36,500)	30,000-35,000 (34,850)	30,000-35,000 (34,850)
Saugus	7,500-15,000 (12,485)	15,000-25,000 (19,125)	21,000-25,000 (25,227)	21,000-35,000 (34,977)

from 2009 Basin Yield Update (LSCE & GSI), following 2001 Groundwater Update Report (Slade) & 2005 Basin Yield Analysis (CH2M Hill & LSCE)

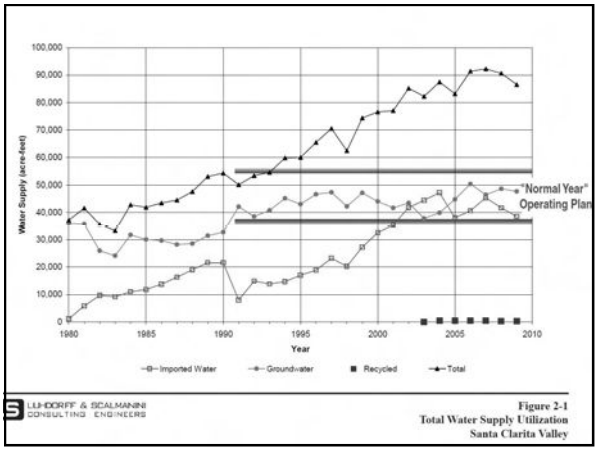


Figure 2-1
Total Water Supply Utilization
Santa Clarita Valley

Sustainability and Achievability

Sustainability

" 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" (86 years: 1922-2007)

"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"

Achievability

maintenance of groundwater levels above, or only temporarily slightly into, the intake (screened or perforated) sections of production wells

from 2009 Basin Yield Update (LSCE & GSI)

2008 Operating Plan Conclusions

Operating Plan is fully sustainable (no chronic groundwater level declines; no depleted stream flow), i.e. not overdraft, and mostly achievable (limited dry-period declines in eastern part of Valley)

Lack of any projected overdraft is consistent with actual historical basin response to the same range of groundwater pumping

Achievability issues in extended dry periods can be resolved by redistribution of some pumping to the west

- with redistribution, retain dry-period Alluvial pumping near 35,000 afy
- without redistribution, dry-period Alluvial pumping closer to 30,000 afy

Subsidence

In alluvial aquifers, results from "aquitard drainage" and resulting consolidation of the "aquitard"

- requires extensive, thick aquitard (fine-grained sediments, i.e. clay bed)
- requires chronically depressed groundwater levels (to allow clay to drain)

Santa Clarita Valley Alluvium

- up to 240 ft. thick, but lacking any extensive, thick aquitard => geology not conducive to subsidence, regardless of groundwater levels
- some near-constant and some fluctuating groundwater levels, but no chronically depressed groundwater levels anywhere => hydrology not conducive to subsidence.

No physical evidence of subsidence, e.g. lowering of land surface.

Small Private Pumping

Limited submittal of pumping-related data, approx. 5-6 years ago, for two tributary canyons; quantified less than 200 afy

No information submitted about well completions, e.g. whether in Alluvium or bedrock, pump capacities, water level records

No information about well failures, e.g. "going dry"

Extrapolated limited pumping data to conservatively estimate 500 afy of basin-wide small private pumping; included in Annual Water Report

Reported, and continue to expect, all private Alluvial wells to experience the same groundwater level fluctuations as monitored and reported in Annual Water Report

Monitoring

CA Health and Safety Code, Title 22

- Domestic Water Quality and Monitoring
- Waterworks Standards

CA Dept of Public Health

- Domestic Water Supply Permits
- Application of Health & Safety Code and DPH Policies

Santa Clarita Valley Purveyors

- Permitted and regulated as above
- In compliance with above for quantity and quality of water supplies

Perchlorate Treatment

- Groundwater Quality
  - Perchlorate treatment and restoration

Perchlorate

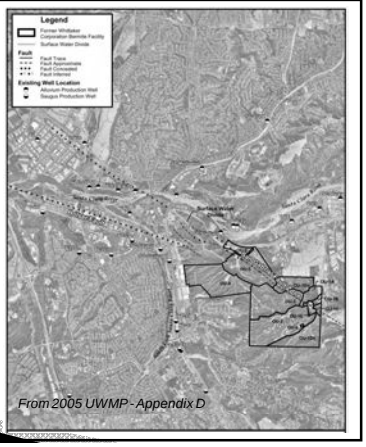
Year Perchlorate Detected	Purveyor Well	Groundwater Aquifer	Status
1997	SCWD Saugus 1	Saugus	DPH approved well return to service in January 2011; well in active service utilizing approved perchlorate treatment.
1997	SCWD Saugus 2	Saugus	DPH approved wells return to service in January 2011; well in active service utilizing approved perchlorate treatment.
1997	VWC Well 157	Saugus	Sealed and capacity replaced by new well.
1997	NCWD Well 11	Saugus	Out of service
2002	SCWD Stadium Well	Alluvium	Sealed and capacity replaced by new well.
2005	VWC Well Q2	Alluvium	DPH approved perchlorate treatment removal in 2007; treatment was installed in 2005 and relocated for potential future use; well remains in service.
2005	DTSC approved Interim Remedial Action Plan		
2006	NCWD Well NC-13	Saugus	DPH approved annual monitoring, results have always been below the detection limit for reporting; well remains in service.
2007	Settlement Agreement		
2010	VWC Well 201	Saugus	Out of service pending additional monitoring and evaluation of remediation alternatives.

Rapid Response Fund provides $10M in reimbursement funds to CLWA as fail-safe.

Perchlorate Impact

Valencia Water Company
Well 201

Site Location -- Former Whittaker Bermite Facility



From 2005 UWMP - Appendix D

Perchlorate Concentrations

Initial Detection (August, 2010) 5.0 ug/l
well removed from water supply service

Quarterly/Monthly Confirmation Sampling (November, 2010 – April, 2011) fluctuations between 5.7 and 12 ug/l

Logical Occurrence or Completely Unexpected?

Initial Perchlorate Contamination in Saugus Wells - 1997
Saugus 1 & 2; V 157; NCWD 11

Groundwater Flow
westerly gradient and flow direction – pre-1997 to 2010

Gradient Control = "Containment" via Restoration of Saugus 1 & 2
modeled – 2004
permitting, litigation, Settlement Agreement – 2007
design, construction – 2010
DPH water supply permit – 2010
start-up operations – 2010
full-time operation – January 2011

Valencia 201
first down-gradient Saugus well from original impacts
13-year elapsed time from initial impacts to V 201 impact
listed as "threatened" well in Settlement Agreement
while not a foregone conclusion, detection is a logical occurrence, and not completely unexpected

Water Supply Impact

Recent Operations

capture zone analysis – 2004
reduced pumping to avg. 180 afy – 2004-2010
replaced pumping with other Saugus well capacity

Saugus Formation

7,500 – 15,000 afy – normal year – water supply
15,000 – 35,000 afy – dry year – water supply

V 201

key well in dry years
3,777 afy of total – dry year – water supply
capacity needs to be restored before next potential dry year, i.e., within two years

V 201 Response

Removed from Water Supply Service at Initial Detection (August, 2010)

Quarterly-Monthly Confirmation Sampling

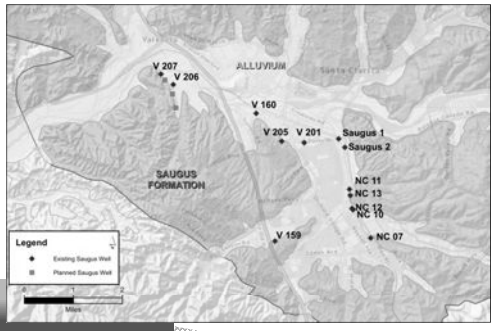
Alternatives
- restoration with – wellhead – treatment
- well replacement

Groundwater Modeling
- perchlorate migration
- need for secondary – containment –
- updated assessment of – threatened – wells

Dept. of Public Health Permitting

Design and Construction

Existing and Planned Saugus Well Locations



Organic Compounds

- Volatile and Synthetic Organic Compounds
  - Trichloroethylene (TCE) and Tetrachloroethylene (PCE)
    - Cleaning solvents, legacy contamination, urban stormwater runoff, septic systems
- CLWA annually monitors for these compounds;
  - TCE was found below the MCL in trace levels in groundwater in the Valley.
  - Not currently affecting production or needing treatment.

Water Banking Program Terms

Water Banking Programs

Banking Program	Extraction Capacity (AFY)	Contract Term
Rosedale Rio-Bravo	20,000	Through term of SWP contract
Semitropic interim programs	15,000	Through 2012/13 originally; through 2022/23 with Amendment
Semitropic - Newhall Land	4,950	Through 2035 with renewal by mutual agreement

State Water Project Reliability Comment Areas

- Supply Reliability
- Facility Reliability
- SWP and West Branch Conveyance
- Catastrophic Supply Interruption

SWP Supply Reliability

- Supply data from DWR's 2009 SWP Delivery Reliability Report.
- Based on model studies using 82 years of historical hydrology (1922 – 2003).
- Historical period includes several significant drought periods.
- Estimate for future (2029) includes adjustments to hydrology to reflect climate change.

SWP Facility Reliability

- Past SWP outages have been short-term (typically weeks in duration).
- Longest West Branch outage was planned three-month winter outage (Dec 1998 – Feb 1999).
- CLWA ideally located immediately downstream of two large SWP reservoirs – Pyramid and Castaic Lakes.
- Location allows deliveries to continue to CLWA and other West Branch Contractors even with outage in aqueduct upstream.
- No past SWP outages have impacted deliveries to CLWA.
- Potential supply impacts of future outage evaluated in UWMP Section 8.

SWP Conveyance

- SWP facilities are owned by State and operated by DWR.
- West Branch facilities, including aqueduct and Pyramid and Castaic Reservoirs, are part of SWP.
- CLWA and 28 other SWP Contractors each have a Water Supply Contract with DWR for water supply and delivery, with similar terms.
- Water Supply Contract:
  - Dictates terms for water delivery.
  - Provides for delivery of SWP water, supplies to and from out-of-service area banking programs, and non-SWP water.

SWP Conveyance (cont.)

- Each SWP Contractor has same priority for delivery within proportion of aqueduct capacity they pay for.
- Deliveries in excess of that capacity may be made through unused capacity of other Contractors.
- DWR requires separate delivery agreements for Contractor programs needing delivery through SWP facilities.
- CLWA has agreements with DWR for deliveries to and from its San Joaquin Valley banking programs and for delivery of its Buena Vista-Rosedale supply.

West Branch Conveyance

- DWR controls deliveries to each of three West Branch Contractors (CLWA, MWD, Ventura Co WPD).
- In dry years when SWP supplies are low, capacity normally used to convey SWP water is available to deliver other supplies.
- CLWA withdrawals from banking programs are planned only for dry years, when capacity would be available to convey it.

Catastrophic Supply Interruption

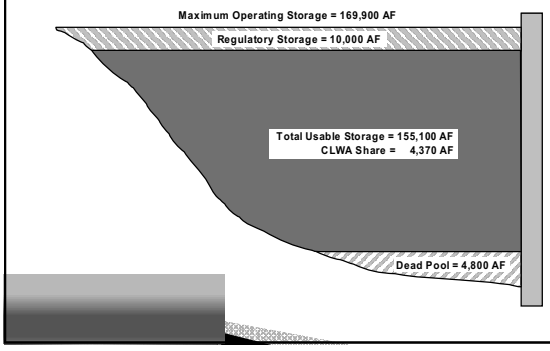
- Three SWP emergency outage scenarios considered:
  - Levee breach in Delta
  - California Aqueduct in San Joaquin Valley
  - West Branch Aqueduct
- Worst-case outage: West Branch Aqueduct
  - No SWP or other supplies through aqueduct
  - No supplies from groundwater banking in San Joaquin Valley

Catastrophic Supply Interruption

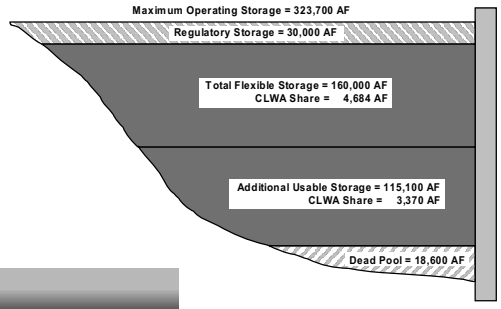
Outage assumptions:

- Six-month outage
- Occurs in normal/average year
- Supplies limited to:
  - Local Supplies
    - Groundwater
    - Recycled water
  - CLWA share of storage in West Branch reservoirs
    - Flexible storage
    - Emergency storage

Pyramid Lake Storage



Castaic Lake Storage



Six-Month West Branch Aqueduct Outage: Water Supplies and Demand (AF)

Water Supply Sources	2015	2020	2035	2050
Local Supplies				
Existing Supplies				
Groundwater	22,200	22,200	22,700	22,700
Recycled Water	120	120	120	120
Planned Supplies				
Future Groundwater	1,900	7,350	8,850	10,350
Recycled Water	370	1,020	3,850	7,870
Total Local Supplies	**24,590**	**30,690**	**35,520**	**41,040**
SWP West Branch Storage Available				
SWP Flexible Storage Accounts	6,060	4,680	4,680	4,680
Emergency Storage				
Pyramid Lake	4,370	4,370	4,370	4,370
Castaic Lake	3,370	3,370	3,370	3,370
Total West Branch Storage	**13,800**	**12,420**	**12,420**	**12,420**
Total Local Supplies and West Branch Storage	**38,390**	**43,110**	**47,940**	**53,460**
Demands				
Total Demand w/o Conservation	40,035	44,242	56,863	69,484
Total Demand w/ Conservation	**36,172**	**35,954**	**48,447**	**60,939**
Additional Supply and/or Conservation Required	**-**	**-**	**507**	**7,479**
As Percent of Demand	0%	0%	1%	11%

SBX7-7 Calculations and Water Conservation Accounting

SBX7-7 Calculations

- All values reported in UWMP by purveyors are required in statute passed in late 2009
- Methodologies developed through a DWR public committee process also required in statute; Kennedy/Jenks is a committee member
- Demand reduction targets calculated for each retail purveyor
- Purveyors may reach targets by combination of water conservation and recycled water programs

Water Conservation Accounting

- Estimates of future savings made by reviewing a wide variety of water conservation measures and programs, and then applying industry-accepted savings factors to them
- Saving factors are determined by in-depth technical studies, mainly done by the California Urban Water Conservation Council (CUWCC) and the American Waterworks Association
- CUWCC reports all savings calculations for its signatory agencies to SWRCB annually
- Detailed SCV Water Use Efficiency Strategic Plan is implementation plan for demand reductions

SBX7-7 Calculations and Water Conservation Accounting

- Document website links
  - SBX7-7 Methodologies: http://www.water.ca.gov/wateruseefficiency/sb7/committees/urban/u3/
  - CUWCC SWRCB Report: http://www.cuwcc.org/about/annual-reports
  - SCV Water Use Efficiency Strategic Plan: http://www.scvh2o.org/ http://www.clwa.org/about/publications.cfm

Chlorides/AWRM

- Imported Water Quality
  - Chloride TMDL
  - Alternative Water Resources Management Program (AWRM)
  - SWP Water Quality Modeling

Chlorides (continued)

- Imported Water Quality
  - Chloride TMDL (2005) – 100 mg/L from Saugus/Valencia WRPs
- Alternative Water Resources Management Program (AWRM) (2008)
  - Established conditional site specific objectives for chloride;
  - Provides water quality and water supply benefits, and protects biological resources;
  - SWP Water Quality Modeling

Santa Clarita Valley Urban Water Management Plan

Directors' Question and Answer Period

Santa Clarita Valley
Urban Water Management Plan

Next Steps

Consultant Team Resumes
Public Outreach Record

2010 Santa Clarita Valley
Urban Water Management Plan

Lynn M. Takaichi, P.E.

Chairman

Education

MS in Civil Engineering (Sanitary), University of California, Berkeley, 1972
BS in Civil Engineering, University of California, Berkeley, 1971
Special Study in Environmental Impact Assessment, University of California
Study in City and Regional Planning, University of California
Study in Water Resources Planning Civil Defense Preparedness Agency, Certificate of Achievement in Multi-Protection Design, University of Hawaii

Registration

Civil Engineer in California

Professional Summary

Mr. Takaichi is responsible for major planning and design projects, particularly assignments involving complex institutional and financial arrangements. He has directed a wide range of water projects including water resource studies, water system master plans, water treatment investigations, water facilities design and utility management plans. In addition, he has managed the preparation of numerous environmental impact assessments.

Mr. Takaichi has particular expertise in complex institutional arrangements and he works closely with specialized legal counsel, financial consultants, and water managers. His experience includes water agency formation, drafting of enabling legislation, negotiation of water supply and water service agreements, development of annexation policies and agreements, and management of a wide variety of water programs. He also has expertise in water system appraisals and has assisted numerous public agencies with the acquisition of investor-owned utilities.

Water Demand Models

- Comprehensive water system plan update for the Lakehaven Utility District.
- Modeling of water and reclaimed water systems for the Cambria Community Services District.
- Comprehensive water system master plan update for the City of Oxnard.
- Comprehensive water plan and capital improvement program ($380 million) for the Castaic Lake Water Agency.
- Water master plan for the City of Chino.
- Water Supply Reliability Plan Update and Optimization Model for the Castaic Lake Water Agency.
- Integrated Regional Water Management Plan for the Antelope Valley for the County of Los Angeles.
- Water Demand Model for the Mojave Water Agency.

Water Resource Studies

- Water Supply Reliability Evaluation for the San Gorgonio Pass Water Agency.
- Strategic planning consultant for local water resources development for the Los Angeles Department of Water & Power.

- Expert witness for water rights valuation for Squaw Creek Resort.
- Integrated Regional Water Management Plan for the Antelope Valley for the County of Los Angeles.
- Water Supply Reliability Plan Update and Optimization Model for the Castaic Lake Water Agency.
- Alternative Water Management Plan for the Santa Clara River for the Los Angeles County Sanitation Districts.
- Negotiation of numerous water transfer and exchange agreements for public and private clients.
- Evaluation of potential water marketing concepts at Lake Elizabeth for Ridgetop Ranch Properties.
- Peer review of SB 610/221 Water Supply Assessment for the Centennial Development (27,000 homes).
- Numerous groundwater evaluations and groundwater management plans.
- Preparation of numerous urban water management plans. Among these are plans for the Antelope Valley, Castaic Lake Water Agency, Hi-Desert Water District, City of Oxnard, City of Santa Paula, and Twentynine Palms Water District.
- Feasibility Evaluation of Alternative Spreading Facilities at the Cucamonga Spreading Grounds for the San Antonio Water Company.
- Evaluation of water banking requirements (Water Supply Reliability Plan) for the Castaic Lake Water Agency.
- Strategy Development for the Santa Ana River Recharge Facilities for the San Bernardino Valley Water Conservation District.
- Water resource evaluation of the Antelope Valley.
- West Ventura County water supply reliability study for the cities of Ventura and Oxnard.
- Water Resources Plan for the Cambria Community Services District.
- Concept Plan for the restoration of the Santa Rosa Basin for the Camrosa Water District.
- McGrath Lake preliminary watershed study for the McGrath State Beach Area Trustee Council.
- Water production alternatives study for the City of Camarillo.
- Evaluation of supplemental water supplies for the Nipomo Community Services District.
- Baseline water supply study for the Cambria Community Services District.
- Preliminary evaluation of the potential use of freeway dewatering water as a water supply for the City of Downey.
- Water resources study for the City of Santa Paula.
- Water Resources Element (LA County) of the Santa Clara River Enhancement and Management Plan for the Castaic Lake Water Agency.
- Optimization study of state water importation into Ventura County.
- Evaluation of potential water resources for the Hidden Valley Municipal Water District.
- Water resources evaluation and environmental assessment of 200,000 acres in Hawaii for the Soil Conservation Service.

Affiliations

American Society of Civil Engineers
American Water Works Association
National Society of Professional Engineers
Society of American Military Engineers
Water Environment Federation

National Association of Corrosion Engineers

Publications

Levi Brekke, Milton D. Larsen, Mary Ausburn, and Lynn Takaichi. 2002. *Suburban Water Demand Modeling Using Stepwise Regression.* Journal – American Water Work Association, October 2002.

Mary Lou Cotton, C.C.P.

Technical/Policy Advisor and QA/QC

Education

MS, Geological Sciences, University of Southern California
BS, Biological Sciences, University of Southern California

Registrations

Certified Water Conservation Practitioner, AWWA-CA/NV

Affiliations

California Urban Water Conservation Council
American Water Works Association, Water Conservation Certification Committee
Association of California Water Agencies, Water Use Efficiency and Communications Committees

Professional Summary

Mary Lou Cotton is a water resources planning and water conservation expert, with over 17 years of management experience with water agencies statewide, specifically in conducting water resource planning and management programs including surface water and groundwater investigations; water transfer, banking and exchange transactions and agreements; water conservation planning and management; master planning and design studies; water quality and hazardous waste investigations; and supporting the preparation of CEQA Compliance documents and obtaining project permits. Ms. Cotton is working in an advisory capacity for several clients on a wide variety of water banking (supply reliability) programs, as well as water transfers or exchanges for short-term and long-term water supplies. In addition, Ms. Cotton assists the State Water Contractors in an advisory capacity on Bay-Delta matters and is also serving as the General Manager of the State Water Project Contractors Authority.

Ms. Cotton has served on the California Urban Water Conservation Council for over a dozen years, as representative for Council members Kern County water Agency, Castaic Lake Water Agency and now Kennedy/Jenks Consultants. She has served on the Council Steering Committee for eight years, and is currently Secretary/Treasurer of the organization; this experience has made her extremely familiar with the requirements of the Memorandum of Understanding Regarding Urban Water Conservation in California (MOU). Ms. Cotton is also a member of the Association of California Water Agencies Water Use Efficiency and Communications Committees. She is an AWWA registered Level 1 Water Conservation Practitioner and currently serves on the AWWA Water Conservation Certification Committee.

This wide experience has made Ms. Cotton an expert on all aspects of California water management policy and practice. She has participated in numerous high-level efforts regarding water conservation in California, including the CALFED Bay-Delta Program Water Use Efficiency advisory committee and the Department of Water Resources Urban Water Management Plan guidebook advisory committee, and has worked on various pieces of conservation-related legislation. In addition, she has served on numerous CUWCC project advisory committees and participated in the 1997 and 2008 revisions of the MOU.

Project Experience

2010 Urban Water Management Plan Update, Castaic Lake Water Agency, Santa Clarita, CA. Project Manager for preparation of the 2010 regional Urban Water Management Plan (UWMP), which is being completed on behalf of CLWA and its four retail purveyors. The water supply analysis includes the SWP, local groundwater, reliability programs, other imported supplies and recycled water. The UWMP also includes an evaluation of the various alternative water management strategies and supplies available to the Valley and based on the evaluation, will recommend water supply strategies.

2010 Urban Water Management Plan Update, Mojave Water Agency, Apple Valley, CA. QA/QC. Kennedy/Jenks is currently providing planning services to product Mojave Water Agency's (MWA) 2010 UWMP with particular focus on Best Management Practices (BMPs) and new regulations. A State Water Project contractor, MWA's plan is to be completed in cooperation with numerous retailers from within their service area. This update will also include analysis of the various agencies' water conservation programs status for the purposes of evaluating compliance with AB 1420 and SBX7, in coordination with the local Alliance for Water Awareness and Conservation.

2010 Urban Water Management Plan Update, Western Municipal Water District, Riverside County, CA. QA/QC for preparation of the District's 2010 UWMP update, including water supplies, demands, and conservation measures.

2010 Urban Water Management Plan Update for Improvement District 4, Kern County Water Agency, Bakersfield, CA. Project Manager for preparation of the 2010 regional UWMP, for the Kern County Water Agency's (KCWA) Improvement District No. 4 (ID4), which represents the urban portion of KCWA's State Water Project wholesale service area. The water supply analysis includes the SWP, local groundwater, reliability programs, other imported supplies and recycled water. In addition to the water supply analyses required by the UWMP Act, this UWMP update will also include analysis of local water conservation program status for the purposes of evaluating compliance with AB 1420 and SBX7.

2010 Urban Water Management Plan Update, Port Hueneme Water Agency, Port Hueneme, CA. QA/QC for preparation of the Agency's 2010 UWMP update, which will include 25 years of water supply/demand analysis, new legislative requirements, water supply demand forecasting, Demand Management Measures review and analysis, and contingency planning.

2010 Urban Water Management Plan Update, City of Port Hueneme, CA. QA/QC for update of the City's 2010 UWMP. Project included review of the City's existing and future water supplies and demands, water supply reliability, summary of current conservation measures, an evaluation of recommended conservation measures, and an implementation plan.

2010 Urban Water Management Plan Update, San Bernardino Valley Municipal Water District, San Bernardino, CA. QA/QC for update of the District's 2010 UWMP with particular focus on Best Management Practices (BMP's) and new regulations. The work will also include coordination with California Department of Water Resources reviews and approvals.

2010 Urban Water Management Plan, Lake Arrowhead Community Services District, Lake Arrowhead, CA. Project Manager for production of this retail water purveyor's 2010 UWMP update.

2010 Urban Water Management Plan, North of the River Municipal Water District and Oildale Mutual Water Company, Kern County, CA. QA/QC for preparation of the 2010 UWMP update for Kern County Water Agency Improvement District No. 4's (ID4) participating retail purveyors, North of the River

Municipal Water District and Oildale Mutual Water Company. The UWMP update will provide information on ID4's wholesale service area and operations and will include data and information about the ID4 retail purveyor service areas and operations. The UWMP update will also include information on ID4 retail purveyor service areas that recover groundwater within ID4.

2010 Urban Water Management Plan, City of Ventura, CA. Project Manager for production of the City's 2010 UWMP update. The water supply analysis includes local groundwater, reliability programs, other imported supplies and recycled water. In addition to the water supply analyses required by the UWMP Act, this UWMP update will also include analysis of local water conservation program status for the purposes of evaluating compliance with AB 1420 and SBX7.

2010 Urban Water Management Plan, Central Coast Water Authority, Ventura County, CA. Currently providing QA/QC and third-party technical review for the CCWA's 2010 UWMP update.

2010 Urban Water Management Plan Update, Western Municipal Water District, Riverside County, CA. QA/QC for preparation of the District's 2010 UWMP update, including water supplies, demands, and conservation measures.

Water Use Efficiency Master Plan, Western Municipal Water District, Riverside County, CA: Project Manager. In concert with the growing emphasis on water use efficiency programs, WMWD commissioned the preparation of a Water Use Efficiency Master Plan to comprehensively address the long term use of water resources within their service area by adopting objectives, policies and programs designed to promote innovative emerging technologies and practices, as well as proven and cost-effective conservation measures. Ms. Cotton managed and authored several sections of the Plan, conducted an evaluation of water conservation measures through development of a weighted scoring matrix, and reviewed and assisted in the production of the Master Plan.

Water Conservation Master Plan, City of Riverside, Riverside County, CA: Technical Advisor & QA/QC. Recently selected for the preparation of a Water Conservation Master Plan to comprehensively address the long term use of water resources within the City's service area by adopting objectives, policies and programs designed to promote innovative emerging technologies and practices, as well as proven and cost-effective conservation measures.

Integrated Water Resources Management Plan (IWRMP), Western Municipal Water District, Riverside, CA: Project Team Member. Preparation of an integrated water resources plan for the Western Municipal Water District and retail agencies within the District (Riverside County). Project involved assistance to, and coordination of, a six member management group and approximately 20 stakeholders. Developed materials for stakeholder education, assisted with identification of water management objectives, and evaluation of projects put forth by stakeholders for consistency with objectives, financial feasibility, and compliance with State mandated requirements.

Upper Santa Clara Integrated Water Resources Management Plan, County of Los Angeles, CA: Project manager for the preparation of an integrated water resources plan for the Upper Santa Clara River Region (Los Angeles County). Project involves assistance to, and coordination of, an eight member management group and approximately 30 stakeholders. Develop materials for stakeholder education,

assist with identification of water management objectives, and evaluate projects put forth by stakeholders for consistency with objectives, financial feasibility, and compliance with State mandated requirements.

Hollister Area 2008 Urban Water Management Plan, Sunnyslope County Water District, City of Hollister, San Benito County Water District, CA. Provided QA/QC for a collaborative Urban Water Management Plan (UWMP) Update by the Sunnyslope County Water District (Sunnyslope), City of Hollister (City), and the San Benito County Water District (District). The latest amendment to the Plan incorporates a water shortage contingency plan, alternative water conservation measures and water reclamation programs.

Experience Prior to Kennedy/Jenks

Castaic Lake Water Agency, Water Resources Manager, Santa Clarita, CA. At the direction of the General Manager, work consisted of managing all aspects of the Agency's water resources projects, specifically dealing with water supply issues at the state and local levels. Prepared, facilitated, reviewed and submitted all water sale/transfer contracts, various agreements, and attendant resolutions to the Agency's Board of Directors and the Department of Water Resources. Prepared all documentation and conducted negotiations for three separate groundwater banking projects. Prepared in-house technical reports and other materials, including overseeing the production of the Agency's Urban Water Management Plan. Served in scientific advising capacity in reviewing all environmental regulatory documentation, particularly in regard to CEQA requirements, including consultant reports and other scientific documents. Served as the Agency's Water Conservation Coordinator; responsible for implementation of water conservation Best Management Practices as contained in the Memorandum of Understanding of the California Urban Water Conservation Council. Responsible for the Agency's public information program and oversee all its aspects. Represented the Agency on various committees, including several State Water Contractors standing committees, the California Urban Water Conservation Council Steering Committee, and the Association of California Water Agencies Communications and Program Committees.

Castaic Lake Water Agency, Assistant to the General Manager, Santa Clarita, CA. Worked at the direction of the General Manager, specifically dealing with water supply issues at the state and local levels. Prepared, facilitated, reviewed and submitted water sale/transfer contracts, various agreements, and attendant resolutions to the Agency's Board of Directors. Served in scientific advising capacity in reviewing environmental regulatory documentation, particularly in regard to the CALFED Bay-Delta Program; environmental impact reports; consultant reports and other scientific documents. Served as the Agency's Water Conservation Coordinator; responsible for implementation of water conservation Best Management Practices as contained in the Memorandum of Understanding of the California Urban Water Conservation Council. Responsible for the Agency's public information program. Prepared, compiled, wrote, and edited the Agency's quarterly newsletter and other Agency public information materials. Prepared in-house technical reports and other materials, including the Agency's Urban Water Management Plan. Represented the Agency on various committees, including several State Water

Contractors standing committees and the Association of California Water Agencies Communications and Program Committees.

Kern County Water Agency, Water Resources Planner, Bakersfield, CA. Attached to the Agency's Water Resources Department, specifically dealing with water supply issues, at both the state and local levels. Prepared, facilitated, reviewed and submitted water sale/transfer contracts, various agreements, and attendant resolutions to the Agency's Board of Directors. Served in scientific advising capacity in reviewing environmental regulatory documentation, particularly in regard to the CALFED Bay-Delta Program; environmental impact reports; consultant reports and other scientific documents. Served as the Agency's Water Conservation Coordinator; assist the Agency's Urban Bakersfield Advisory Committee. Responsible for implementation of water conservation Best Management Practices as contained in the Memorandum of Understanding of the California Urban Water Conservation Council. Also assisted with the Agency's participation in the AB3616 Agricultural Water Management Council. Responsible for majority of the Agency's public information program. Prepared, compiled, wrote, and edited the Agency's monthly newsletter. Prepared and wrote Agency public information materials. Prepared in-house technical reports and other materials including the Agency's Urban Water Management Plan. . Represented the Agency on various committees, including several State Water Contractors standing committees and budget review committee, the California Water Clearinghouse (for CALFED and Bay-Delta issues), the Association of California Water Agencies Communications (vice-chair) and Program Committees, and the Executive Committee of the Water Association of Kern County.

RESUME

Joseph C. Scalmanini

Specialization:

Forty-three years of practice in groundwater development and management, and oil and gas production. Assessments of groundwater resources and implementation of groundwater basin management in various areas throughout California; groundwater development and management encompassing well design, construction, operation, and maintenance; groundwater monitoring as part of basin management and as part of groundwater contamination investigations; artificial groundwater recharge facilities and practices; injection of industrial waste water; development of brackish and saline groundwater for municipal (desalination) and industrial water supply; water supply master planning.

Professional Registration:

Registered Civil Engineer, California, CE 28233

Academic Degrees:

M.E. Civil Engineering, University of California, Davis, CA	1984
B.S. Mechanical Engineering, University of Santa Clara, Santa Clara, CA	1967

Professional Experience:

Luhdorff and Scalmanini, Consulting Engineers, Woodland, CA	
President	2004 - Present
Principal Partner	1989 - 2004
Partner	1980 - 1989
University of California, Davis, Davis, CA	
Associate Development Engineer	1973 - 1979
Shell Oil Company	
Mechanical and Facilities Engineer	1967 - 1973

Representative Professional Assignments:

Consultant to water districts and utilities, municipalities, corporate and individual farming interests, corporate and private industry, and other engineering firms on groundwater development, utilization and management, including preparation and implementation of AB 3030 and other groundwater management plans, and plans for supplemental water supply and conjunctive use management. Consultation with public agencies, corporate and private concerns regarding groundwater contamination, its identification, monitoring, and management. Consultation with legal profession on technical aspects of groundwater development and utilization, including all aspects of groundwater basin yield and management, well design and construction, and application of pumping equipment.

Representative Professional Assignments continued:

Mr. Scalmanini directed and conducted a ground-water basin assessment in the Santa Maria Valley, including developing plans for conjunctive use of imported SWP water, recaptured return flows and increased artificial recharge of natural stream flow. After the adjudication of the Santa Maria Valley Groundwater Basin, he was appointed Basin Engineer, responsible for monitoring basin conditions and annually reporting to the court on the state of the basin.

Mr. Scalmanini directed the development of an alternative basin management plan for diversion of stream flow to replace coastal groundwater pumping and halt historical seawater intrusion in the Salinas Valley. He has developed several ground-water substitution programs for both public and private farming interests in Sacramento, Yolo and Sutter Counties, and authored Ground-Water Management Plans for these respective areas.

Mr. Scalmanini served as the court-appointed technical advisor to the Special Referee in the Chino Basin for development and implementation of an Optimum Basin Management Program to preserve and potentially increase the safe yield of the aquifer system, incorporate conjunctive use within storage limits in the aquifer, and make beneficial use of degraded water quality in the lower end of the basin by desalting ground water for future domestic water supply.

Mr. Scalmanini is directing ongoing engineering and hydrogeological analyses of local groundwater and imported State Water Project water supplies in the Upper Santa Clara River Area (Santa Clarita Valley) in Los Angeles County, including the preparation of annual Water Reports over the last eleven years. As part of that work, Mr. Scalmanini developed a cooperative technical program to integrate water resource analysis with the adjacent downstream basins, and has coordinated technical analysis of sustainable yield of the groundwater basin for ongoing agricultural, municipal, and other local water requirements since 2001. Mr. Scalmanini is the primary author of the AB3030 Groundwater Management Plan that has been adopted for the basin. He also prepared the Amendment to the 2000 Urban Water Management Plan for the State Water Contractor and all the water purveyors in the Valley to specifically address the adequacy of groundwater supplies in the wake of perchlorate contamination and the plan to contain contaminant migration while restoring contaminated wells to water supply service through the installation of wellhead treatment. He subsequently co-prepared an analysis of groundwater basin sustainable yield and a subsequent analysis of the adequacy of groundwater supply after another Alluvial well was impacted by perchlorate. He prepared the groundwater components of the 2005 Urban Water Management Plan, which was based on all the preceding analyses. Most recently, Mr. Scalmanini co-prepared an updated analysis of sustainable groundwater basin yield, including consideration of potential climate change impacts, for use in ongoing basin management and in the 2010 Urban Water Management Plan.

Mr. Scalmanini also currently serves as Chairman of the Ground-Water Committee that is developing and analyzing the potential for development of additional ground water throughout the Sacramento Valley as part of the Sacramento Valley Water Management Agreement reached in Phase 8 of the SWRCB Bay-Delta Water Rights Hearings.

Professional Affiliations:

National Ground Water Association
- Association of Ground Water Scientists and Engineers

American Water Works Association
California Groundwater Association
Groundwater Resources Association of California

Public Service:

- **Yolo County Aggregate Resources Committee (1975-79)**, Alternate delegate, hydrologist - analysis of impacts and development of management plans for extraction of aggregate from Cache Creek basin.
- **California Tenth Biennial Conference on Ground Water (1975)**, Member, Planning Committee
- **Chancellor's Campus (Univ. of Calif., Davis) Water Committee (1976-78)**, Staff Engineer - analysis of water supplies and uses, projection of requirements, development of conservation and management plans.
- **City of Davis Water Planning and Conservation Committee (1977-79)**, Chairman - analysis of water supplies and uses, projection of requirements, consideration of alternative supplies, development of conservation and management plans.
- **Yolo County Water Resources Task Force (1979)**, Member - development of county-wide master water plan.
- **Pacific Gas and Electric Co. ACT^2 Irrigation Pumping Demonstration Project (1992)**, Technical Advisor
- **Association of California Water Agencies (1994-1996)**, Member - Groundwater Committee
- **Cache Creek Conservancy**, **(2000-2002)**, Director

Teaching Activities:

Course Coordinator and Instructor University Extension Courses, University of California, Davis:

Concepts of Ground Water Management (1974, 1976, 1978, 1981)
Legal and Policy Considerations in Ground Water Management (1975, 1976, 1980)
Water Supply Wells and Pumps (1977, 1978,1981, 1983, 1985, 1986)
Groundwater Law, Hydrology and Management (2001-2010)

Instructor, University of California, Davis, Water Science 198, Introductory Hydraulics (1977, 1978, 1979)

Lecturer, University of California, Davis, Water Science 2, 140, 160; Ecology 230; Civil Engineering / Geology 175 (1975 - 1979)

Lecturer on Aquifer Characteristics, Well Hydraulics, and Groundwater Development, in Technical Training Classes at the U.S. Army Corps of Engineers' Hydraulic Engineering Center, Davis, CA.

Publications and Presentations:

Scott, V.H. and J.C. Scalmanini, **Water Wells and Pumps: Their Design, Construction, Operation, and Maintenance**, University of California Division of Agricultural Sciences Bulletin No. 1889, 1977.

Helweg, O.J., Scott, V.H., and J.C. Scalmanini, **Improving Well and Pump Efficiency**, American Water Works Association, 1983.

Publications and Presentations continued:

Scalmanini, J.C., and Scott V.H., **Design and Operational Criteria for Artificial Groundwater Recharge Facilities**, Water Science and Engineering Paper No. 2009, University of California, Davis, 1979.

Scalmanini, J.C., Scott, V.H., and O.J. Helweg, **Energy and Efficiency in Wells and Pumps**, presented at Twelfth Biennial Ground Water Conference, 1979.

Scalmanini, J.C., Johnson Jr., R.M., and E.E. Luhdorff Jr., **Development of a Groundwater Monitoring Program as a Basis for Coastal Groundwater Basin Management**, presented at the Fall Conference, American Water Works Association, CA-NV Section, 1983.
Scalmanini, J.C., **3030 Hindsight and 2020 Foresight, Actual Groundwater Management Experience Over the Last 15 Years, Soquel Creek Water District**, presented at the Association of California Water Agencies' Groundwater Management Conference, March 1994.

Scalmanini, J.C., **Legal and Technical Issues Related to Surface Water and Groundwater Interaction**, presented at the Groundwater Resources Association's California Ground Water & Efficient Usage for the Year 2000 and Beyond, October 1998.

Scalmanini, J.C., A. Schneider, and V. Cahill (panel presentation), **Groundwater Classification: Is the State Water Resources Control Board's Jurisdiction Over Ground Water Changing?**, presented at the Water Education Foundation's 2000 Update on Water Law and Policy, July 2000.

Scalmanini, J.C., **What the Heck's a Sub-Basin? Defining Basins and Sub-Basins**, presented at the Association of California Water Agencies' Groundwater Management: Will CalFed Help or Hinder Workshop, November 2000.

Scalmanini, J.C., **"Groundwater Law, Policy and Science: What can Be Done About The Disconnect",** presented at the Water Education Foundation's 2005 Water Law and Policy Briefing, San Diego, July 2005.

Nancy Clemm, P.E.

WORK SUMMARY

Nancy Clemm is a civil engineer with 30 years water resources planning experience, including 20 years working primarily on State Water Project (SWP) and Bay/Delta issues. Ms. Clemm is very familiar with SWP system operations, including reservoir, Delta, and conveyance facility operations, as well as with the Department of Water Resources (DWR) planning model used to estimate SWP delivery reliability. She has assisted in the preparation of numerous water supply planning documents, focused primarily on SWP supplies and facilities, including the 2005 and 2010 Urban Water Management Plans (UWMP) for Castaic Lake Water Agency (CLWA), the 1995 Regional Urban Water Management Plan and 1996 Integrated Water Resources Plan for the Metropolitan Water District of Southern California (MWD), and several environmental impact reports (EIR) dealing with SWP supplies and/or use of SWP conveyance facilities.

EXPERIENCE

WATER RESOURCES CONSULTANT, Los Angeles, California, 1999 - Present.
(Self-employed)

2005 and 2010 UWMPs: For CLWA, participated in preparation of 2005 and 2010 UWMPs, primarily focused on determining availability of SWP water supplies and assessing overall supply reliability.

Monterey Plus EIR: For MWD, provided technical support to SWP contractor representatives on advisory committee to DWR regarding water supply analyses and SWP contract issues, for preparation of new environmental document for Monterey Amendment to SWP water supply contract.

Water Program EIRs: For CLWA, assisted in preparation of EIRs for water programs involving use of SWP conveyance facilities, for CLWA's Rosedale Rio Bravo Water Storage District Water Banking Program, and its water acquisition from Buena Vista Water Storage District/Rosedale Rio Bravo Water Storage District.

SWP Table A Transfer EIR: For CLWA EIR for permanent transfer of SWP Table A amount, conducted SWP water supply reliability and water allocation analyses using data from DWR model studies, performed SWP aqueduct capacity rights and availability analysis, and prepared overall CLWA supply reliability assessment.

SWP Water Operations and Water Transfers: For State Water Contractors (SWC), participating in SWC Water Operations Committee, addressing SWP annual water supply and operational issues; and in SWC Water Transfers Committee, reviewing and providing recommendations regarding approval of proposed SWP contractor transfers and exchanges.

Reservoir Reoperation Report: For CALFED, drafted report on potential water supply and environmental benefits of reoperation of hydroelectric facilities in northern and central California.

Hydrologic Model: For Salt River Project, assisted with enhancements to runoff forecasting model, including making programming revisions, assisting with addition of user-interface, and writing user's manual and program documentation.

METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA, Los Angeles, California, 1991 - 98. (Senior Engineer, SWP Branch, 1993 - 98; Engineer, Bay Delta Branch, 1992; Engineer, SWP Branch, 1991)

SWP Water Supply Analyses: Assisted in preparation of several planning documents, including 1995 Regional Urban Water Management Plan and 1996 Integrated Water Resources Plan. Conducted numerous additional analyses to estimate future availability of SWP supplies, and to evaluate proposed SWP operational constraints, future water supply options, and SWP contract provisions.

SWP Supply Operations: Participated in SWC committee monitoring DWR's reservoir and Delta operations, addressing operational issues and various contractor issues such as equity and current supply versus risk of future shortage.

Water Contracts: Provided significant support in development of Monterey Amendment to SWP contract, including providing technical support for urban contractor negotiating team; assisting in amendment drafting and completion of environmental documentation; and resolution of implementation issues. Participated in drafting numerous agreements between MWD, DWR, and other agencies related to establishment of and water delivery to groundwater banking and exchange programs.

SWP Supply Planning: Participated in SWC committee monitoring DWR planning efforts to enhance SWP supplies, including review of proposed projects' feasibility, supply yield, water quality, environmental effects and mitigation, and costs.

SALT RIVER PROJECT, Phoenix, Arizona, 1981 - 90. (Senior Water Resources Analyst, 1985 - 90; Engineer III, 1983 - 84; Rotational Engineer, 1981 - 82)

Water Supply Analyses: Worked extensively with reservoir operations simulation model of Salt River Project system to conduct supply studies, to estimate future supplies and evaluate supply impacts given proposed physical and operational changes. Made major programming modifications and wrote program documentation.

Other Computer Modeling: Developed runoff forecasting model to estimate real-time runoff to reservoir system, including all model design, programming, and documentation. Assisted in development of water demand forecasting model based on land use, including model design, development, and implementation.

Water Contracts / Accounting: Developed detailed knowledge of existing water delivery and reservoir storage contracts. Participated in several negotiations for new water contracts, primarily concerning water delivery, accounting, and measurement.

EDUCATION

Bachelor of Science in Civil Engineering, Arizona State University, 1981.
Graduate courses in water resources modeling, Arizona State University.

REGISTRATION

Civil Engineer, California and Arizona

J. Lauren Everett

Water Resources Specialist

Education

B.S., Environmental Studies, University of California, Santa Barbara, 1999
M.S., Donald Bren School of Environmental Science and Management University of California, Santa Barbara, 2001

Professional Summary

Ms. Everett is a Water Resources Specialist, with over 8 years of experience in environmental and regulatory compliance providing technical planning support for a diverse range of water resource projects. Ms. Everett is currently involved with implementing DWR's Proposition 84 Integrated Regional Water Management Grant Program, urban water management planning, and supply and demand forecasting. Lauren has served as the liaison between planning, and engineering teams, and appreciates the teamwork and communication skills needed to successfully integrate planning and design concepts to meet regulatory requirements. She has also served as the project manager and project specialist for numerous water resource studies in Southern California.

Professional Experience

- *Castaic Lake Water Agency (CLWA), 2010 Urban Water Management Plan Update, Santa Clarita, CA:* Preparation of the 2010 regional Urban Water Management Plan (UWMP) is being completed on behalf of CLWA and its four retail purveyors. The water supply analysis includes the SWP, local groundwater, reliability programs, other imported supplies and recycled water. Ms. Everett is the technical lead on the UWMP development.

- *2010 Urban Water Management Plan Update for Improvement District 4, Kern County Water Agency, Bakersfield, CA.* Preparation of the 2010 regional UWMP, for the Kern County Water Agency's (KCWA) Improvement District No. 4 (ID4), which represents the urban portion of KCWA's State Water Project wholesale service area includes the SWP, local groundwater, reliability programs, other imported supplies and recycled water. Ms. Everett is the technical lead on the UWMP development.

- *Castaic Lake Water Agency (CLWA), Upper Santa Clara River IRWMP Proposition 84 Implementation Grant Application, Santa Clarita, CA:* The Project is the preparation of an Implementation Grant application requesting funds from the Proposition 84 Integrated Regional Water Management (IRWM) Implementation Grant Program for five Candidate Projects within the Upper Santa Clara River IRWM Plan. Ms. Everett managed the effort and was the technical lead on the application preparation.

- *Castaic Lake Water Agency (CLWA), Upper Santa Clara River IRWMP Proposition 84 Planning Grant Application, Santa Clarita, CA:* The Project is the preparation of a Planning Grant application requesting funds from the Proposition 84 IRWM Planning Grant Program for the 2010 Update of the Upper Santa Clara River IRWM Plan. Ms. Everett managed the effort and was the technical lead on the application preparation.

- *Los Angeles County Department of Public Works, Antelope Valley Integrated Regional Water Management Plan (Plan):* Ms. Everett managed the development of the Plan, which was

designed with a regional focus for the sustainable management of water resources in the Antelope Valley Region for the next twenty-five years. Over 40 agencies within the Antelope Valley participated in the planning process.

- *Los Angeles County Department of Public Works, Antelope Valley Integrated Regional Water Management Plan, Proposition 50 Round 2 Step 1 & Step 2 Grant Application, Antelope Valley, CA:* Kennedy/Jenks submitted a proposal for an implementation grant requesting $25 million for seven projects that targeted reducing the mismatch between supply and demand projected for the Region by 2035. Ms. Everett managed the preparation of the Step 1 and Step 2 grant applications.

- *Los Angeles County Department of Public Works, Antelope Valley Integrated Regional Water Management Plan, Region Acceptance Process (RAP) Application, Antelope Valley, CA:* Kennedy/Jenks submitted a proposal successfully defending the IRWMP Region's boundary to the Department of Water Resources allowing the IRWMP Region to remain in the Proposition 84 IRWMP Program. Ms. Everett managed the RAP effort.

- *Kern County Water Agency, Tulare Lake Basin Portion of Kern County Integrated Regional Water Management Plan (Plan), Kern County, CA:* Ms. Everett is currently assisting in the development of the integrated regional planning document, and providing assistant management responsibilities. Over 40 agencies within the Kern Region are participating in the Kern Region IRWM planning process.

- *Kern County Water Agency, Tulare Lake Basin Portion of Kern County Integrated Regional Water Management Plan, Region Acceptance Process Application, Kern County, CA:* Kennedy/Jenks submitted a proposal successfully defending the IRWMP Region's boundary to the Department of Water Resources allowing the IRWMP Region to remain in the Proposition 84 IRWMP Program. Ms. Everett managed the RAP effort.

- *Castaic Lake Water Agency (CLWA), Water Supply Reliability Plan Update, Santa Clarita, CA:* The plan and update are needed in order to evaluate the technical, environmental, and economic issues associated with potential water supply reliability projects. Ms. Everett's responsibilities include characterization of the water supply and demands for the region, and general report content.

- *Los Angeles County Department of Public Works, North Los Angeles/Kern County Regional Recycled Water Master Plan Environmental Impact Report, Antelope Valley, CA:* Kennedy/Jenks assisted Environmental Science Associates in preparing the hydrology, hazards and hazardous materials, and geology sections of the Environmental Impact Report. Ms. Everett managed the Kennedy/Jenks team on this effort.

- *Ventura County Waterworks District No. 8 Recycled Water Master Plan, Simi Valley, CA:* This project consists of the design of a recycled water distribution system to serve municipal and industrial customers within the City of Simi Valley. Ms. Everett's responsibilities included characterization of the environmental issues associated with implementing the system, identification of required permits and approvals, and general report coordination.

Dana Haasz

Project Manager

Education

M.S., Applied Geography, New Mexico State University, Las Cruces, NM
B.S., Geography and Environmental Science, McGill University, Montreal, Canada

Affiliations

California Urban Water Conservation Council
Western Water Alliance Steering Committee and Hiring Committee
Technical Advisor to CALFED Appropriate Water Measurement Panel/Agricultural and Urban
Environmental Justice Coalition for Water Steering Committee
Water Education Foundation, Water Leader (2003) and Water Leader Mentor (2009)

Professional Summary

Dana Haasz has 13 years experience in water conservation, demand modeling and resource planning. She currently manages the water use efficiency projects and programs for Kennedy/Jenks. Projects range from planning, program assessment, demand modeling and helping agencies to meet regulatory requirements, to the development of implementation programs, budgets, monitoring and quantification.

Dana spent the six years as the Water Conservation Administrator at San Francisco Public Utilities Commission. Ms. Haasz has extensive experience in regulatory compliance issues and long-term water supply planning for the retail and wholesale service areas, including planning, organizing, developing and administering retail water conservation programs including the identification, evaluation, and public promotion of conservation with industry, builders, developers, public agencies, customers, and community groups. Ms. Haasz's activities also extended to policy development, from legislative initiatives and statewide conservation issues to development of a revolving loan program and other efficiency-related activities at the local level.

In Ms. Haasz's six years at San Francisco Public Utilities Commission, she directly managed and implemented the growth of the Conservation department from a customer-service based residential rebate program to a multi-faceted approach that includes all customers, various types of incentives and services, outreach, education, policy and coordination with local, regional and state level activities. Her approach towards the expansion of the program was to merge public policy needs with solid business principles and quantified outcomes so as to make obvious and appropriate efficiency decisions for the customer as well as honoring the agency's responsibility to the ratepayer.

Prior to the SFPUC, Dana developed modeling and theoretical skills at the Pacific Institute for Water, Development and Environment where she co-authored an analysis quantifying water conservation potential for the state and policies and programs designed to achieve that goal.

Project Experience

2010 Urban Water Management Plans (18 water systems), Golden State Water Company, Rancho Cordova, CA. Currently providing water conservation services for GSWC's 2010 UWMP update for the 18 water systems that meet the criteria for the requirements of an UWMP. Updates will include analysis of water conservation programs status for the purposes of evaluating compliance with AB 1420 and SBX7, in coordination with the local Alliance for Water Awareness and Conservation.

2010 Urban Water Management Plan Update, Stockton East Water District, Stockton, CA. Currently providing water conservation services for preparation of the District's 2010 UWMP update, including water supplies, demands, and conservation measures, as well as addressing AB 1420 and SBX7-7 regulations.

The update will also include a water shortage contingency plan as it applies to Stockton East Water District being an urban water wholesaler.

Complete Water Conservation and Demand Reduction Program Evaluation, City of Roseville, Roseville, CA. Developed an implementation plan, including a review of past activities, identification of potential conservation measures, cost benefit analysis, program modeling and design to prepare conservation plan for City of Roseville, that meets the 20x2020 requirements.

Water Conservation Efficiency Master Plan, City of Riverside, Riverside, CA developed a conservation implementation program for the City of Riverside. Evaluated Riverside's past water use efficiency program, identified potential conservation measures, performed cost benefit analysis, modeled potential programs and developed a scored options matrix to assist Riverside with efforts to effectively comply the 20x2020 requirements and guide program design and implementation.

2010 Urban Water Management Plan Update, Castaic Lake Water Agency, Santa Clarita, CA. Currently providing water conservation services for preparation of the 2010 regional Urban Water Management Plan (UWMP), which is being completed on behalf of CLWA and its four retail purveyors. The water supply analysis includes the SWP, local groundwater, reliability programs, other imported supplies and recycled water. The UWMP also includes an evaluation of the various alternative water management strategies and supplies available to the Valley and based on the evaluation, will recommend water supply strategies.

2010 Urban Water Management Plan Update, Mojave Water Agency, Apple Valley, CA. Currently providing water conservation services to produce Mojave Water Agency's (MWA) 2010 UWMP with particular focus on Best Management Practices (BMPs) and new regulations. A State Water Project contractor, MWA's plan is to be completed in cooperation with numerous retailers from within their service area. This update will also include analysis of the various agencies' water conservation programs status for the purposes of evaluating compliance with AB 1420 and SBX7, in coordination with the local Alliance for Water Awareness and Conservation.

2010 Urban Water Management Plan Update, Western Municipal Water District, Riverside County, CA. Currently providing water conservation services for preparation of the District's 2010 UWMP update, including water supplies, demands, and conservation measures.

2010 Park Water Company Urban Water Management Plan and Water Use Efficiency Plan, CA. Currently providing water conservation services for preparation of the District's 2010 UWMP update, including water supplies, demands, and conservation measures.

2010 Suburban Water Systems Urban Water Management Plan, Oxnard, CA. Currently providing water conservation services for preparation of the District's 2010 UWMP update, including water supplies, demands, and conservation measures.

2010 Urban Water Management Plan Update for Improvement District 4, Kern County Water Agency, Bakersfield, CA. Currently providing water conservation services for preparation of the 2010 regional UWMP, for the Kern County Water Agency's (KCWA) Improvement District No. 4 (ID4), which represents the urban portion of KCWA's State Water Project wholesale service area. The water supply analysis includes the SWP, local groundwater, reliability programs, other imported supplies and recycled water. In addition to the water supply analyses required by the UWMP Act, this UWMP update will also include analysis of local water conservation program status for the purposes of evaluating compliance with AB 1420 and SBX7.

2010 Urban Water Management Plan Update, San Bernardino Valley Municipal Water District, San Bernardino, CA. Currently providing water conservation services for update of the District's 2010 UWMP with particular focus on Best Management Practices (BMP's) and new regulations. The work will also include coordination with California Department of Water Resources reviews and approvals.

2010 Urban Water Management Plan, Lake Arrowhead Community Services District, Lake Arrowhead, CA. Currently providing water conservation services for production of this retail water purveyor's 2010 UWMP update.

2010 Urban Water Management Plan, North of the River Municipal Water District and Oildale Mutual Water Company, Kern County, CA. Currently providing water conservation services for preparation of the 2010 UWMP update for Kern County Water Agency Improvement District No. 4's (ID4) participating retail purveyors, North of the River Municipal Water District and Oildale Mutual Water Company. The UWMP update will provide information on ID4's wholesale service area and operations and will include data and information about the ID4 retail purveyor service areas and operations. The UWMP update will also include information on ID4 retail purveyor service areas that recover groundwater within ID4.

2010 Urban Water Management Plan, City of Ventura, CA. Currently providing water conservation services for production of the City's 2010 UWMP update. The water supply analysis includes local groundwater, reliability programs, other imported supplies and recycled water. In addition to the water supply analyses required by the UWMP Act, this UWMP update will also include analysis of local water conservation program status for the purposes of evaluating compliance with AB 1420 and SBX7.

2010 Urban Water Management Plan, Central Coast Water Authority, Ventura County, CA. Currently providing QA/QC and third-party technical review regarding water conservation practices for the CCWA's 2010 UWMP update.

2010 Urban Water Management Plan Update, Western Municipal Water District, Riverside County, CA. Currently providing water conservation services for preparation of the District's 2010 UWMP update, including water supplies, demands, and conservation measures.

Project Experience Prior to Kennedy/Jenks

Water Conservation Administrator, San Francisco Public Utilities Commission

Water Saver Program: Developed market-based approach to conservation programs. The program aimed to secure permanent water savings for large commercial and industrial customers by providing technical support and financial incentive incentives based on the volume of saved water. The program allowed SFPUC to support larger process-oriented uses and other specific needs that are not part of the traditional fixture-based rebate programs. Participants included hotels, hospitals, colleges, and food growers.

Unaccounted for Water Analysis: Managed the first large urban agency implementation of the full AWWA M36 Water Loss process. The multi-phase analysis to discover, diagnose, and develop an implementation plan for capturing water system losses consisted of quantification and categorization of losses, identifying cost effective potential recovery and ,disaggregating city zones to prioritize and develop leak detection and repair implementation plan and providing leak detection training to City staff at the SFPUC.

Data Management: Managed design and development of database designed to improve the analytic capacity of conservation programs and link activities to water savings - actual and estimated – customer type, spatial information and more. The system also incorporated administrative tasks such as issuing rebates, mailings, inspection scheduling and follow up.

Low-income Direct Install Program: Developed high-efficiency toilet (HET) direct-installation and water audit program in coordination with community groups in order to save water in a hard to reach population and mitigate the impacts of rising water rates. The program provided free HETs to single family customers and a voucher program for multi-family residents in low-income communities. Local nonprofit groups were enlisted and community members trained in conservation principles in order to help market the program. program received two grants of $200,000 each, one from the California Department of Water Resources and one from the U.S. Bureau of Reclamation.

Education: Developed materials and an implementation plan for a water resources education program that would be compliant with both state and CUWCC requirements.

Municipal: Launched municipal audit program with detailed potential efficiency improvements, costs and implementation recommendations.

Conservation Legislation: Developed and worked to pass local conservation ordinances including a residential retrofit on resale for ordinance and a replacement ordinance for commercial accounts. Improvements include fixture replacement (toilets, showerheads aerators) and leak repair. Worked with the San Francisco Department of Building Inspection to train City inspectors, develop implementation materials and process.

Baseline Analysis: Participated in modeling of baseline use in San Francisco by customer type, potential demand reduction opportunities, costs and implementation options. Preferred alternative became the basis for SFPUC program activities.

California Urban Water Conservation Council: Represented Group 1 water agencies as convener of the CUWCC, 2005-2006 / Represented Group 2 Environmental Organizations as convener 2003-2004.

Appendix C

Purveyor Supply and Demand Tables

TABLE C-1
AVERAGE/NORMAL YEAR: EXISTING WATER SUPPLIES

EXISTING SUPPLIES[a]	2015	2020	2025	2030	2035	2040	2045	2050
Existing Groundwater[b]								
Alluvial Aquifer								
LACWWD 36[c]	0	0	0	0	0	0	0	0
NCWD	1,825	1,825	1,825	1,825	1,825	1,825	1,825	1,825
SCWD	10,500	10,500	10,500	11,500	11,500	11,500	11,500	11,500
VWC	11,675	11,675	11,675	11,675	11,675	11,675	11,675	11,675
Total	*24,000*	*24,000*	*24,000*	*25,000*	*25,000*	*25,000*	*25,000*	*25,000*
Saugus Formation								
LACWWD 36[c]	0	0	0	0	0	0	0	0
NCWD	3,525	3,525	3,525	3,525	3,525	3,525	3,525	3,525
SCWD[d]	2,850	3,350	3,350	3,350	3,350	3,350	3,350	3,350
VWC	2,850	3,350	3,350	3,350	3,350	3,350	3,350	3,350
Total	*9,225*	*10,225*	*10,225*	*10,225*	*10,225*	*10,225*	*10,225*	*10,225*
Recycled Water[e]								
LACWWD 36[c]	0	0	0	0	0	0	0	0
NCWD	0	0	0	0	0	0	0	0
SCWD	0	0	0	0	0	0	0	0
VWC	325	325	325	325	325	325	325	325
Total	*325*	*325*	*325*	*325*	*325*	*325*	*325*	*325*
Imported Water								
SWP Table A and Carryover[f]								
LACWWD 36[c]	1,656	1,943	2,217	2,489	2,688	2,901	3,091	3,269
NCWD	8,084	8,918	9,320	10,060	10,349	10,755	11,116	11,469
SCWD	23,918	24,263	24,268	23,963	24,541	24,979	25,369	25,787
VWC	24,442	22,776	21,795	20,888	19,822	18,765	17,825	16,875
Total	*58,100*	*57,900*	*57,600*	*57,400*	*57,400*	*57,400*	*57,400*	*57,400*
SWP Flexible Storage Accounts[g]								
LACWWD 36[c]	0	0	0	0	0	0	0	0
NCWD	0	0	0	0	0	0	0	0
SCWD	0	0	0	0	0	0	0	0
VWC	0	0	0	0	0	0	0	0
Total	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*

TABLE C-1 CON'T

		2015	2020	2025	2030	2035	2040	2045	2050
Buena Vista-Rosedale									
LACWWD 36[(c)]		325	375	450	500	525	575	625	650
NCWD		1,600	1,750	1,825	1,975	2,050	2,100	2,175	2,250
SCWD		4,675	4,775	4,775	4,725	4,825	4,900	4,975	5,050
VWC		4,400	4,100	3,950	3,800	3,600	3,425	3,225	3,050
	Total	*11,000*	*11,000*	*11,000*	*11,000*	*11,000*	*11,000*	*11,000*	*11,000*
Nickel Water - Newhall Land									
VWC	*Total*	1,607	1,607	1,607	1,607	1,607	1,607	1,607	1,607
Banking Programs[(g)]									
Rosedale Rio-Bravo									
LACWWD 36[(c)]		0	0	0	0	0	0	0	0
NCWD		0	0	0	0	0	0	0	0
SCWD		0	0	0	0	0	0	0	0
VWC		0	0	0	0	0	0	0	0
	Total	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Semitropic									
LACWWD 36[(c)]		0	0	0	0	0	0	0	0
NCWD		0	0	0	0	0	0	0	0
SCWD		0	0	0	0	0	0	0	0
VWC		0	0	0	0	0	0	0	0
	Total	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Semitropic – Newhall Land									
VWC	*Total*	0	0	0	0	0	0	0	0
TOTAL EXISTING SUPPLIES									
LACWWD 36[(c)]		1,981	2,318	2,667	2,989	3,213	3,476	3,716	3,919
NCWD		15,034	16,018	16,495	17,385	17,749	18,205	18,641	19,069
SCWD		41,943	42,888	42,893	43,538	44,216	44,729	45,194	45,687
VWC		45,299	43,833	42,702	41,645	40,379	39,147	38,007	36,882
	Total	**104,257**	**105,057**	**104,757**	**105,557**	**105,557**	**105,557**	**105,558**	**105,557**

Notes:

(a) The distribution of existing and planned supplies does not represent a formal allocation of water supplies among purveyors.

(b) Existing groundwater supplies represent the quantity of groundwater anticipated to be pumped with existing wells. As indicated in Tables 3-8 and 3-9 and Tables 3-4 and 3-5 of the 2009 Groundwater Basin Yield Analysis, individual purveyors may have well capacity in excess of quantities shown in this table. As indicated in Table 3-10, existing and planned groundwater pumping remain within the groundwater operating plan shown on Table 3-5.

(c) LACWWD 36 included for purposes of providing regional completeness; however, it is not required to prepare an UWMP.

(d) SCWD's existing Saugus 1 and Saugus 2 wells resumed production in 2011 with the completion of the perchlorate treatment facility.

(e) Per CLWA Draft Recycled Water Master Plan and Newhall Ranch Specific Plan.

(f) SWP supplies are based on the Department of Water Resources "*2009 State Water Project Delivery Reliability Report*."

(g) Not needed in average/normal years.

TABLE C-2
AVERAGE/NORMAL YEAR: PLANNED AND TOTAL WATER SUPPLIES

PLANNED SUPPLIES[a]	2015	2020	2025	2030	2035	2040	2045	2050
Future Groundwater[b]								
Alluvial Aquifer								
LACWWD 36[c]	0	0	0	0	0	0	0	0
NCWD	0	0	0	0	0	0	0	0
SCWD	0	0	0	0	0	0	0	0
VWC[d]	0	1,000	2,000	3,000	4,000	5,000	6,000	7,000
Total	-	*1,000*	*2,000*	*3,000*	*4,000*	*5,000*	*6,000*	*7,000*
Saugus Formation								
LACWWD 36[c][e]	500	500	500	500	500	500	500	500
NCWD	875	875	875	875	875	875	875	875
SCWD	0	0	0	0	0	0	0	0
VWC	0	0	0	0	0	0	0	0
Total	*1,375*	*1,375*	*1,375*	*1,375*	*1,375*	*1,375*	*1,375*	*1,375*
Recycled Water[f]								
LACWWD 36[c]	0	50	50	50	50	50	50	50
NCWD	200	500	1,000	1,275	1,775	2,275	2,775	3,275
SCWD	100	500	1,500	2,275	2,775	3,775	4,775	5,775
VWC	675	1,675	2,675	4,175	5,675	7,675	9,675	11,875
Total	*975*	*2,725*	*5,225*	*7,775*	*10,275*	*13,775*	*17,275*	*20,975*
Banking Programs[g]								
LACWWD 36[c]	0	0	0	0	0	0	0	0
NCWD	0	0	0	0	0	0	0	0
SCWD	0	0	0	0	0	0	0	0
VWC	0	0	0	0	0	0	0	0
Total	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
TOTAL PLANNED SUPPLIES								
LACWWD 36[c]	500	550	550	550	550	550	550	550
NCWD	1,075	1,375	1,875	2,150	2,650	3,150	3,650	4,150
SCWD	100	500	1,500	2,275	2,775	3,775	4,775	5,775
VWC	675	2,675	4,675	7,175	9,675	12,675	15,675	18,875
Total	**2,350**	**5,100**	**8,600**	**12,150**	**15,650**	**20,150**	**24,650**	**29,350**

TABLE C-2 CON'T

PURVEYOR EXISTING AND PLANNED SUPPLIES	2015	2020	2025	2030	2035	2040	2045	2050
LACWWD 36[(c)]	2,481	2,868	3,217	3,539	3,763	4,026	4,266	4,469
NCWD	16,109	17,393	18,370	19,535	20,399	21,355	22,291	23,219
SCWD	42,043	43,388	44,393	45,813	46,991	48,504	49,969	51,462
VWC	45,974	46,508	47,377	48,820	50,054	51,822	53,682	55,757
Total	**106,607**	**110,157**	**113,357**	**117,707**	**121,207**	**125,707**	**130,208**	**134,907**

Notes:

(a) The distribution of existing and planned supplies does not represent a formal allocation of water supplies among purveyors.

(b) Planned groundwater supplies represent new groundwater well capacity that may be required by an individual purveyor's production objectives in the Alluvial Aquifer and the Saugus Formation. When combined with existing purveyor and non-purveyor groundwater supplies, total groundwater production remains within the sustainable ranges identified in Table 3-7 of 2009 Groundwater Basin Yield Analysis. As indicated in Table 3-10, existing and planned groundwater pumping remain within the basin operating plan shown on Table 3- 5.

(c) LACWWD 36 included for purposes of providing regional completeness; however, it is not required to prepare an UWMP.

(d) Conversion of Newhall Land agricultural groundwater supplies to VWC M&I supplies.

(e) LACWWD 36 anticipates connecting a newly completed well in 2011.

(f) Per CLWA Draft Recycled Water Master Plan and Newhall Ranch Specific Plan.

(g) Not needed in average/normal years.

TABLE C-3
AVERAGE/NORMAL YEAR: DEMANDS WITH SBX7-7 REDUCTIONS AND COMPARISON TO TOTAL SUPPLIES

WATER DEMANDS W/ AND W/O CONSERVATION[a]	2015	2020	2025	2030	2035	2040	2045	2050
LACWWD 36[b]								
Demand w/o Conservation[c]	1,759	2,189	2,619	3,048	3,478	3,908	4,338	4,768
Anticipated Conservation Objective[d]	176	438	524	610	696	782	868	954
Reduction from Recycled Water[e]	0	50	50	50	50	50	50	50
Net Anticipated Water Conservation[f]	176	388	474	560	646	732	818	904
Demand w/ Conservation[g]	1,584	1,802	2,146	2,489	2,833	3,177	3,521	3,865
Existing and Planned Supplies	*2,481*	*2,868*	*3,217*	*3,539*	*3,763*	*4,026*	*4,266*	*4,469*
SBX7-7 Compliance Calculations								
NCWD								
Demand w/o Conservation[c]	12,571	14,246	15,922	17,598	19,273	20,949	22,624	24,300
20x2020 Reduction[h]	1,365	2,982	3,204	3,489	3,742	3,995	4,248	4,501
Reduction from Recycled Water[e]	200	500	1,000	1,275	1,775	2,275	2,775	3,275
Reduction from Water Conservation[i]	1,165	2,482	2,482	2,482	2,482	2,482	2,482	2,482
Demand w/ Conservation[j]	11,406	11,764	13,439	15,116	16,791	18,467	20,142	21,818
Existing and Planned Supplies	*16,109*	*17,393*	*18,370*	*19,535*	*20,399*	*21,355*	*22,291*	*23,219*
SCWD								
Demand w/o Conservation[c]	31,633	34,814	37,995	41,176	44,357	47,538	50,719	53,900
20x2020 Reduction[k]	3,524	7,557	8,067	8,576	9,085	9,595	10,104	10,614
Reduction from Recycled Water[e]	100	500	1,500	2,275	2,775	3,775	4,775	5,775
Reduction from Water Conservation[i]	3,424	7,057	7,057	7,057	7,057	7,057	7,057	7,057
Demand w/ Conservation[j]	28,209	27,757	30,938	34,119	37,300	40,481	43,662	46,843
Existing and Planned Supplies	*42,043*	*43,388*	*44,393*	*45,813*	*46,991*	*48,504*	*49,969*	*51,462*
VWC								
Demand w/o Conservation[c]	34,107	37,235	40,362	43,490	46,617	49,745	52,872	56,000
20x2020 Reduction[l]	3,962	8,648	9,372	10,095	10,819	11,542	12,266	12,990
Reduction from Recycled Water[e]	1,000	2,000	3,000	4,500	6,000	8,000	10,000	12,200
Reduction from Water Conservation[i]	2,962	6,648	6,648	6,648	6,648	6,648	6,648	6,648
Demand w/ Conservation[j]	31,144	30,587	33,714	36,842	39,968	43,097	46,223	49,352
Existing and Planned Supplies	*45,974*	*46,508*	*47,377*	*48,820*	*50,054*	*51,822*	*53,682*	*55,757*

TABLE C-3 CON'T

REGIONAL SUMMARY	2015	2020	2025	2030	2035	2040	2045	2050
Demand w/o Conservation[(c)]	80,070	88,484	96,898	105,312	113,726	122,140	130,554	138,968
Total 20x2020 Reduction	9,027	19,626	21,166	22,770	24,342	25,914	27,486	29,058
Total Reduction from Recycled Water[(m)]	1,300	3,050	5,550	8,100	10,600	14,100	17,600	21,300
Total Reduction from Water Conservation	7,727	16,576	16,662	16,748	16,833	16,919	17,005	17,091
Demand w/ Conservation	**72,343**	**71,908**	**80,236**	**88,564**	**96,892**	**105,220**	**113,549**	**121,877**
TOTAL EXISTING AND PLANNED SUPPLIES	**106,607**	**110,157**	**113,357**	**117,707**	**121,207**	**125,707**	**130,208**	**134,907**

Notes:

(a) Reflects existing and projected demands in CLWA service area only. CLWA's Annexation Policy requires annexing parties to provide additional fully reliable supplies. Known parties potentially seeking annexation include Legacy/Stevenson Ranch Phase 5, Tapia Canyon and Tesoro Del Valle.
(b) LACWWD 36 included for purposes of providing regional completeness; however, it is not required to prepare an UWMP.
(c) Demand w/o Conservation from Table 2-2.
(d) LACWWD 36 conservation objective estimated at 20% of projected demand commencing 2020; see Table 2-21.
(e) Recycled water projections from Table 4-3.
(f) Net Anticipated Conservation for LACWWD 36 is Anticipated Conservation Objective minus Reduction from Recycled Water.
(g) Demand w/ Conservation for LACWWD 36 is Demand w/o Conservation minus Net Anticipated Conservation.
(h) NCWD 20x2020 Reduction from Table 2-16. The 20% conservation requirement is assumed to continue through 2050 and continue to be met with a mixture of recycled water and conservation.
(i) Reduction from Water Conservation is 20x2020 Reduction minus Reduction from Recycled Water for 2015 and 2020; the quantity of water conservation remains at least at 2020 amounts through 2050.
(j) Demand w/ Conservation is Demand w/o Conservation minus Reduction from Water Conservation.
(k) SCWD 20x2020 Reduction from Table 2-18. The 20% conservation requirement is assumed to continue through 2050 and continue to be met with a mixture of recycled water and conservation.
(l) VWC 20x2020 Reduction from Table 2-20. The 20% conservation requirement is assumed to continue through 2050 and continue to be met with a mixture of recycled water and conservation.
(m) Recycled water reductions do not include demands from Honor Rancho.

TABLE C-4
SINGLE-DRY YEAR: EXISTING WATER SUPPLIES

EXISTING SUPPLIES[a]	2015	2020	2025	2030	2035	2040	2045	2050
Existing Groundwater[b]								
Alluvial Aquifer								
LACWWD 36[c]	0	0	0	0	0	0	0	0
NCWD	1,150	1,150	1,150	1,225	1,250	1,250	1,250	1,225
SCWD	8,150	8,150	8,150	8,150	8,150	8,150	8,150	8,150
VWC	11,000	10,950	10,900	11,675	11,650	11,625	11,600	11,275
Total	*20,300*	*20,250*	*20,200*	*21,050*	*21,050*	*21,025*	*21,000*	*20,650*
Saugus Formation								
LACWWD 36[c]	0	0	0	0	0	0	0	0
NCWD	4,975	4,975	4,975	4,975	4,975	4,975	4,975	4,975
SCWD[d]	3,500	3,500	3,500	3,500	3,500	3,500	3,500	3,500
VWC	11,925	11,925	11,925	11,925	11,925	11,925	11,925	11,925
Total	*20,400*	*20,400*	*20,400*	*20,400*	*20,400*	*20,400*	*20,400*	*20,400*
Recycled Water[e]								
LACWWD 36[c]	0	0	0	0	0	0	0	0
NCWD	0	0	0	0	0	0	0	0
SCWD	0	0	0	0	0	0	0	0
VWC	325	325	325	325	325	325	325	325
Total	*325*	*325*	*325*	*325*	*325*	*325*	*325*	*325*
Imported Water								
SWP Table A and Carryover[f]								
LACWWD 36[c]	405	436	440	444	468	499	522	543
NCWD	1,722	1,734	1,657	1,630	1,670	1,731	1,786	1,826
SCWD	6,171	5,892	5,208	4,736	4,720	4,710	4,701	4,696
VWC	3,602	2,938	2,694	2,290	2,242	2,161	2,091	2,036
Total	*11,900*	*11,000*	*9,999*	*9,100*	*9,100*	*9,101*	*9,100*	*9,101*
SWP Flexible Storage Accounts[g]								
LACWWD 36[c]	206	185	206	228	241	257	268	279
NCWD	877	738	776	838	859	890	918	939
SCWD	3,143	2,507	2,438	2,436	2,427	2,422	2,418	2,415
VWC	1,834	1,250	1,261	1,177	1,153	1,111	1,075	1,047
Total	*6,060*	*4,680*	*4,681*	*4,679*	*4,680*	*4,680*	*4,679*	*4,680*
Buena Vista-Rosedale								
LACWWD 36[c]	400	450	500	550	575	625	650	675
NCWD	1,650	1,800	1,900	2,025	2,075	2,150	2,225	2,250
SCWD	5,925	6,150	5,950	5,925	5,875	5,850	5,825	5,825

VWC		3,025	2,600	2,650	2,500	2,475	2,375	2,300	2,250
	Total	*11,000*	*11,000*	*11,000*	*11,000*	*11,000*	*11,000*	*11,000*	*11,000*
Nickel Water - Newhall Land									
VWC	*Total*	1,607	1,607	1,607	1,607	1,607	1,607	1,607	1,607
Banking Programs									
Rosedale Rio-Bravo[h]									
LACWWD 36[c]		775	900	1,000	1,075	1,125	1,200	1,250	1,275
NCWD		3,275	3,625	3,725	4,000	4,050	4,150	4,250	4,325
SCWD		11,750	12,275	11,725	11,575	11,400	11,300	11,200	11,125
VWC		4,200	3,200	3,550	3,350	3,425	3,350	3,300	3,275
	Total	*20,000*	*20,000*	*20,000*	*20,000*	*20,000*	*20,000*	*20,000*	*20,000*
Semitropic[i]									
LACWWD 36[c]		510	594	0	0	0	0	0	0
NCWD		2,170	2,364	0	0	0	0	0	0
SCWD		7,778	8,035	0	0	0	0	0	0
VWC		4,541	4,007	0	0	0	0	0	0
	Total	*15,000*	*15,000*	*0*	*0*	*0*	*0*	*0*	*0*
Semitropic - Newhall Land[j]									
VWC	*Total*	4,950	4,950	4,950	4,950	4,950	4,950	4,950	4,950
TOTAL EXISTING SUPPLIES									
LACWWD 36[c]		2,296	2,565	2,146	2,297	2,409	2,581	2,690	2,772
NCWD		15,819	16,386	14,183	14,693	14,879	15,146	15,404	15,540
SCWD		46,417	46,509	36,971	36,322	36,072	35,932	35,794	35,711
VWC		47,009	43,752	39,862	39,799	39,752	39,429	39,173	38,690
	Total	**111,542**	**109,212**	**93,162**	**93,111**	**93,112**	**93,088**	**93,061**	**92,713**

Notes:

(a) The distribution of existing and planned supplies does not represent a formal allocation of water supplies among purveyors.

(b) Existing groundwater supplies represent the quantity of groundwater anticipated to be pumped with existing wells. As indicated in Tables 3-8 and 3-9 and Tables 3-4 and 3-5 of the 2009 Groundwater Basin Yield Analysis, individual purveyors may have well capacity in excess of quantities shown above. Existing pumping is consistent with Table 3-8 of the 2009 Groundwater Basin Yield Analysis for 1977 single-dry year. As indicated in Table 3-11, existing and planned groundwater pumping remain within the groundwater operating plan shown on Table 3-5.

(c) LACWWD 36 included for purposes of providing regional completeness; however, it is not required to prepare an UWMP.

(d) SCWD's existing Saugus 1 and Saugus 2 wells resumed production in 2011 with the completion of the perchlorate treatment facility.

(e) Per CLWA Draft Recycled Water Master Plan and Newhall Ranch Specific Plan.

(f) SWP supplies are based on the Department of Water Resources "2009 State Water Project Delivery Reliability Report."

(g) Includes both CLWA and Ventura County entities flexible storage accounts. Initial term of agreement with Ventura County entities expires after 2015.

(h) CLWA has a maximum withdrawal capacity of 20,000 AFY and a storage capacity of 100,000 AF. As of 6/1/2011, there is 100,000 AF of recoverable water.

(i) CLWA has 45,920 AF of recoverable water as of 6/1/2011.

(j) Newhall Land has a maximum withdrawal capacity of 4,950 AFY and a storage capacity of 55,000 AF. As of 6/1/2011 there is 18,892 AF of recoverable water. Delivery of stored water from the Newhall Land's Semitropic Water Banking and Exchange Program is assumed available to VWC.

TABLE C-5
SINGLE-DRY YEAR: PLANNED AND TOTAL WATER SUPPLIES

PLANNED SUPPLIES[a]	2015	2020	2025	2030	2035	2040	2045	2050
Future Groundwater[b]								
Alluvial Aquifer								
LACWWD 36[c]	0	0	0	0	0	0	0	0
NCWD	0	0	0	0	0	0	0	0
SCWD	200	250	300	850	850	875	900	750
VWC[d]	0	1,000	2,000	3,000	4,000	5,000	6,000	7,000
Total	*200*	*1,250*	*2,300*	*3,850*	*4,850*	*5,875*	*6,900*	*7,750*
Saugus Formation								
LACWWD 36[c][e]	500	825	875	925	975	1,000	1,050	1,075
NCWD	1,400	2,950	3,025	3,150	3,200	3,275	3,325	3,400
SCWD	975	5,175	5,200	5,150	5,250	5,325	5,400	5,475
VWC (Restored Well)	825	3,777	3,777	3,777	3,777	3,777	3,777	3,750
VWC (New Wells)	-	973	823	698	498	323	148	-
Total	*3,700*	*13,700*	*13,700*	*13,700*	*13,700*	*13,700*	*13,700*	*13,700*
Recycled Water[f]								
LACWWD 36[c]	0	50	50	50	50	50	50	50
NCWD	200	500	1,000	1,275	1,775	2,275	2,775	3,275
SCWD	100	500	1,500	2,275	2,775	3,775	4,775	5,775
VWC	675	1,675	2,675	4,175	5,675	7,675	9,675	11,875
Total	*975*	*2,725*	*5,225*	*7,775*	*10,275*	*13,775*	*17,275*	*20,975*
Banking Programs[g]								
LACWWD 36[c]	0	0	440	488	1,028	1,097	1,147	1,193
NCWD	0	0	1,657	1,791	3,670	3,804	3,925	4,012
SCWD	0	0	5,208	5,205	10,374	10,351	10,332	10,321
VWC	0	0	2,694	2,516	4,928	4,749	4,596	4,474
Total	*0*	*0*	*10,000*	*10,000*	*20,000*	*20,000*	*20,000*	*20,000*
TOTAL PLANNED SUPPLIES								
LACWWD 36[c]	500	875	1,365	1,463	2,053	2,147	2,247	2,318
NCWD	1,600	3,450	5,682	6,216	8,645	9,354	10,025	10,687
SCWD	1,275	5,925	12,208	13,480	19,249	20,326	21,407	22,321
VWC	1,500	7,425	11,969	14,166	18,878	21,524	24,196	27,099
Total	**4,875**	**17,675**	**31,225**	**35,325**	**48,825**	**53,350**	**57,875**	**62,425**

TABLE C-5 CON'T

PURVEYOR EXISTING AND PLANNED SUPPLIES								
LACWWD 36[(c)]	2,796	3,440	3,511	3,760	4,462	4,728	4,937	5,090
NCWD	17,419	19,836	19,865	20,909	23,524	24,500	25,429	26,227
SCWD	47,692	52,434	49,179	49,802	55,321	56,258	57,201	58,032
VWC	48,509	51,177	51,831	53,965	58,630	60,953	63,369	65,789
Total	**116,417**	**126,887**	**124,387**	**128,436**	**141,937**	**146,438**	**150,936**	**155,138**

Notes:

(a) The distribution of existing and planned supplies does not represent a formal allocation of water supplies among purveyors.

(b) Planned groundwater supplies represent new groundwater well capacity that may be required by an individual purveyor's production objectives in the Alluvial Aquifer and the Saugus Formation, including 3,777 AFY of restored capacity from VWC Well 201 and approximately 10,000 AFY of new Saugus Formation well capacity. When combined with existing purveyor and non-purveyor groundwater supplies, total groundwater production is consistent with the 1977 single dry-year levels identified in Table 3-8 of the 2009 Groundwater Basin Yield Analysis. As indicated in Table 3-11, existing and planned groundwater pumping remain within the groundwater operating plan shown on Table 3- 5.

(c) LACWWD 36 included for purposes of providing regional completeness; however, it is not required to prepare an UWMP.

(d) Conversion of Newhall Land agricultural groundwater supplies to VWC M&I supplies.

(e) Includes 500 AFY from a newly completed well in 2011.

(f) Per CLWA Draft Recycled Water Master Plan and Newhall Ranch Specific Plan.

(g) Includes 10,000 AF of additional banking programs by 2025 and an additional 10,000 AF by 2035.

TABLE C-6
SINGLE-DRY YEAR: DEMANDS WITH SBX7-7 REDUCTIONS AND COMPARISON TO TOTAL SUPPLIES

WATER DEMANDS W/ AND W/O CONSERVATION[a]	2015	2020	2025	2030	2035	2040	2045	2050
LACWWD 36[b]								
Demand w/o Conservation[c]	1,935	2,408	2,881	3,353	3,826	4,299	4,772	5,245
Anticipated Conservation Objective[d]	176	438	524	610	696	782	868	954
Reduction from Recycled Water[e]	0	50	50	50	50	50	50	50
Net Anticipated Water Conservation[f]	176	388	474	560	646	732	818	904
Demand w/ Conservation[g]	1,759	2,020	2,407	2,794	3,181	3,568	3,955	4,342
Existing and Planned Supplies	*2,796*	*3,440*	*3,511*	*3,760*	*4,462*	*4,728*	*4,937*	*5,090*
SBX7-7 Compliance Calculations								
NCWD								
Demand w/o Conservation[c]	13,828	15,671	17,514	19,358	21,200	23,044	24,886	26,730
20x2020 Reduction[h]	1,365	2,982	3,204	3,489	3,742	3,995	4,248	4,501
Reduction from Recycled Water[e]	200	500	1,000	1,275	1,775	2,275	2,775	3,275
Reduction from Water Conservation[i]	1,165	2,482	2,482	2,482	2,482	2,482	2,482	2,482
Demand w/ Conservation[j]	12,663	13,188	15,031	16,876	18,718	20,562	22,404	24,248
Existing and Planned Supplies	*17,419*	*19,836*	*19,865*	*20,909*	*23,524*	*24,500*	*25,429*	*26,227*
SCWD								
Demand w/o Conservation[c]	34,796	38,295	41,795	45,294	48,793	52,292	55,791	59,290
20x2020 Reduction[k]	3,524	7,557	8,067	8,576	9,085	9,595	10,104	10,614
Reduction from Recycled Water[e]	100	500	1,500	2,275	2,775	3,775	4,775	5,775
Reduction from Water Conservation[i]	3,424	7,057	7,057	7,057	7,057	7,057	7,057	7,057
Demand w/ Conservation[j]	31,372	31,238	34,737	38,236	41,736	45,235	48,734	52,233
Existing and Planned Supplies	*47,692*	*52,434*	*49,179*	*49,802*	*55,321*	*56,258*	*57,201*	*58,032*
VWC								
Demand w/o Conservation[c]	37,517	40,959	44,398	47,839	51,278	54,720	58,159	61,600
20x2020 Reduction[l]	3,962	8,648	9,372	10,095	10,819	11,542	12,266	12,990
Reduction from Recycled Water[e]	1,000	2,000	3,000	4,500	6,000	8,000	10,000	12,200
Reduction from Water Conservation[i]	2,962	6,648	6,648	6,648	6,648	6,648	6,648	6,648
Demand w/ Conservation[j]	**34,555**	**34,310**	**37,750**	**41,191**	**44,630**	**48,072**	**51,511**	**54,951**
Existing and Planned Supplies	*48,509*	*51,177*	*51,831*	*53,965*	*58,630*	*60,953*	*63,369*	*65,789*

TABLE C-6 CON'T

REGIONAL SUMMARY	2015	2020	2025	2030	2035	2040	2045	2050
Demand w/o Conservation[(c)]	88,077	97,333	106,588	115,843	125,099	134,354	143,609	152,865
Total 20x2020 Reduction	9,027	19,626	21,166	22,770	24,342	25,914	27,486	29,058
Total Reduction from Recycled Water[(m)]	1,300	3,050	5,550	8,100	10,600	14,100	17,600	21,300
Total Reduction from Water Conservation	7,727	16,576	16,662	16,748	16,833	16,919	17,005	17,091
Demand w/ Conservation	**80,350**	**80,757**	**89,926**	**99,096**	**108,265**	**117,434**	**126,604**	**135,773**
TOTAL EXISTING AND PLANNED SUPPLIES	**116,417**	**126,887**	**124,387**	**128,436**	**141,937**	**146,438**	**150,936**	**155,138**

Notes:

(a) Reflects existing and projected demands in CLWA service area only. CLWA's Annexation Policy requires annexing parties to provide additional fully reliable supplies. Known parties potentially seeking annexation include Legacy/Stevenson Ranch Phase 5, Tapia Canyon and Tesoro Del Valle.
(b) LACWWD 36 included for purposes of providing regional completeness; however, it is not required to prepare an UWMP.
(c) Demand w/o Conservation from Table 2-2. Includes a 10% increase in demand during dry years.
(d) LACWWD 36 conservation objective estimated at 20% of projected demand commencing 2020; see Table 2-21.
(e) Recycled water projections from Table 4-3.
(f) Net Anticipated Conservation for LACWWD 36 is Anticipated Conservation Objective minus Reduction from Recycled Water.
(g) Demand w/ Conservation for LACWWD 36 is Demand w/o Conservation minus Net Anticipated Conservation.
(h) NCWD 20x2020 Reduction from Table 2-16. The 20% conservation requirement is assumed to continue through 2050 and continue to be met with a mixture of recycled water and conservation.
(i) Reduction from Water Conservation is 20x2020 Reduction minus Reduction from Recycled Water for 2015 and 2020; the quantity of water conservation remains at least at 2020 amounts through 2050.
(j) Demand w/ Conservation is Demand w/o Conservation minus Reduction from Water Conservation.
(k) SCWD 20x2020 Reduction from Table 2-18. The 20% conservation requirement is assumed to continue through 2050 and continue to be met with a mixture of recycled water and conservation.
(l) VWC 20x2020 Reduction from Table 2-20. The 20% conservation requirement is assumed to continue through 2050 and continue to be met with a mixture of recycled water and conservation.
(m) Recycled water reductions do not include demands from Honor Rancho.

TABLE C-7
EXISTING MULTIPLE-DRY YEAR: EXISTING WATER SUPPLIES

EXISTING SUPPLIES[a]	2015	2020	2025	2030	2035	2040	2045	2050
Existing Groundwater[b]								
Alluvial Aquifer								
LACWWD 36[c]	0	0	0	0	0	0	0	0
NCWD	1,125	1,125	1,125	1,200	1,200	1,200	1,200	1,175
SCWD	7,650	7,675	7,700	8,175	8,175	8,175	8,175	8,025
VWC	11,650	11,625	11,600	12,450	12,450	12,450	12,450	12,125
Total	*20,425*	*20,425*	*20,425*	*21,825*	*21,825*	*21,825*	*21,825*	*21,325*
Saugus Formation								
LACWWD 36[c]								
NCWD	4,975	4,975	4,975	4,975	4,975	4,975	4,975	4,975
SCWD[d]	3,550	3,550	3,550	3,550	3,550	3,550	3,550	3,550
VWC	11,175	11,175	11,175	11,175	11,175	11,175	11,175	11,175
Total	*19,700*	*19,700*	*19,700*	*19,700*	*19,700*	*19,700*	*19,700*	*19,700*
Recycled Water[e]								
LACWWD 36[c]	0	0	0	0	0	0	0	0
NCWD	0	0	0	0	0	0	0	0
SCWD	0	0	0	0	0	0	0	0
VWC	325	325	325	325	325	325	325	325
Total	*325*	*325*	*325*	*325*	*325*	*325*	*325*	*325*
Imported Water								
SWP Table A and Carryover[f]								
LACWWD 36[c]	1,117	1,278	1,423	1,592	1,691	1,801	1,895	1,968
NCWD	4,915	4,149	4,543	5,058	5,310	5,592	5,834	6,029
SCWD	18,006	16,666	16,406	16,492	16,519	16,542	16,574	16,601
VWC	8,862	10,807	10,628	9,858	9,479	9,065	8,697	8,401
Total	*32,900*	*32,900*	*33,000*	*33,000*	*33,000*	*33,000*	*33,000*	*33,000*
SWP Flexible Storage Accounts[g]								
LACWWD 36[c]	51	45	50	56	60	64	67	70
NCWD	226	148	161	179	188	198	207	214
SCWD	826	593	582	585	586	586	588	589
VWC	407	384	377	350	336	321	308	298
Total	*1,510*	*1,170*	*1,170*	*1,170*	*1,170*	*1,170*	*1,170*	*1,170*
Buena Vista-Rosedale								
LACWWD 36[c]	400	450	500	550	575	625	650	675
NCWD	1,700	1,450	1,575	1,750	1,825	1,925	2,000	2,050
SCWD	6,250	5,800	5,650	5,675	5,675	5,650	5,650	5,650
VWC	2,650	3,300	3,275	3,025	2,925	2,800	2,700	2,625

	Total	*11,000*	*11,000*	*11,000*	*11,000*	*11,000*	*11,000*	*11,000*	*11,000*
Nickel Water - Newhall Land									
VWC	*Total*	1,607	1,607	1,607	1,607	1,607	1,607	1,607	1,607
Banking Programs									
Rosedale Rio-Bravo[h]									
LACWWD 36[c]		577	662	723	801	842	890	931	961
NCWD		2,540	2,150	2,308	2,545	2,643	2,763	2,865	2,944
SCWD		9,306	8,636	8,336	8,297	8,222	8,174	8,139	8,107
VWC		2,577	3,552	3,633	3,357	3,292	3,173	3,065	2,988
	Total	*15,000*	*15,000*	*15,000*	*15,000*	*15,000*	*15,000*	*15,000*	*15,000*
Semitropic[i]									
LACWWD 36[c]		390	447	0	0	0	0	0	0
NCWD		1,718	1,450	0	0	0	0	0	0
SCWD		6,294	5,826	0	0	0	0	0	0
VWC		3,098	3,777	0	0	0	0	0	0
	Total	*11,500*	*11,500*	*0*	*0*	*0*	*0*	*0*	*0*
Semitropic – Newhall Land[j]									
VWC		4,950	4,950	4,950	4,950	4,950	4,950	4,950	4,950
TOTAL EXISTING SUPPLIES									
LACWWD 36[c]		2,536	2,882	2,696	3,000	3,168	3,380	3,543	3,674
NCWD		17,200	15,447	14,687	15,707	16,142	16,654	17,080	17,387
SCWD		51,882	48,745	42,224	42,774	42,727	42,678	42,676	42,522
VWC		47,300	51,502	47,570	47,096	46,540	45,866	45,278	44,494
	Total	**118,917**	**118,577**	**107,177**	**108,577**	**108,577**	**108,577**	**108,577**	**108,077**

Notes:

(a) The distribution of existing and planned supplies does not represent a formal allocation of water supplies among purveyors.

(b) Existing groundwater supplies represent the quantity of groundwater anticipated to be pumped with existing wells. As indicated in Tables 3-8 and 3-9 and Tables 3-4 and 3-5 of the 2009 Groundwater Basin Yield Analysis, individual purveyors may have well capacity in excess of quantities shown above. Existing pumping is consistent with Table 3-8 of the 2009 Groundwater Basin Yield Analysis for 1931-1934 multiple dry-year levels. As indicated in Table 3-12, existing and planned groundwater pumping remain within the groundwater operating plan shown on Table 3-5.

(c) LACWWD 36 included for purposes of providing regional completeness; however, it is not required to prepare an UWMP.

(d) SCWD's existing Saugus 1 and Saugus 2 wells resumed production in 2011 with the completion of the perchlorate treatment facility.

(e) Per CLWA Draft Recycled Water Master Plan and Newhall Ranch Specific Plan.

(f) SWP supplies are based on the Department of Water Resources "2009 State Water Project Delivery Reliability Report."

(g) Includes both CLWA and Ventura County entities flexible storage accounts. Initial term of agreement with Ventura County entities expires after 2015.

(h) CLWA has a maximum withdrawal capacity of 20,000 AFY and a storage capacity of 100,000 AF. As of 6/1/2011, there is 100,000 AF of recoverable water.

(i) CLWA has 45,920 AF of recoverable water as of 6/1/2011.

(j) Newhall Land has a maximum withdrawal capacity of 4,950 AFY and a storage capacity of 55,000 AF. As of 6/1/2011 there is 18,892 AF of recoverable water. Delivery of stored water from the Newhall Land's Semitropic Water Banking and Exchange Program is assumed available to VWC.

TABLE C-8
MULTIPLE-DRY YEAR: PLANNED AND TOTAL WATER SUPPLIES

PLANNED SUPPLIES[a]	2015	2020	2025	2030	2035	2040	2045	2050
Future Groundwater[b]								
Alluvial Aquifer								
LACWWD 36[c]	0	0	0	0	0	0	0	0
NCWD	0	0	0	0	0	0	0	0
SCWD	0	0	0	0	0	0	0	0
VWC[d]	0	1,000	2,000	3,000	4,000	5,000	6,000	7,000
Total	*0*	*1,000*	*2,000*	*3,000*	*4,000*	*5,000*	*6,000*	*7,000*
Saugus Formation								
LACWWD 36[c][e]	500	750	800	825	850	875	900	925
NCWD	1,250	3,875	3,950	4,050	4,075	4,125	4,175	4,225
SCWD	500	5,700	5,700	5,675	5,750	5,825	5,875	5,925
VWC (Restored Well)	2,375	1,625	1,500	1,400	1,275	1,125	1,000	875
VWC (New Wells)	0	0	0	0	0	0	0	0
Total	*4,625*	*11,950*	*11,950*	*11,950*	*11,950*	*11,950*	*11,950*	*11,950*
Recycled Water[f]								
LACWWD 36[c]	0	50	50	50	50	50	50	50
NCWD	200	500	1,000	1,275	1,775	2,275	2,775	3,275
SCWD	100	500	1,500	2,275	2,775	3,775	4,775	5,775
VWC	675	1,675	2,675	4,175	5,675	7,675	9,675	11,875
Total	*975*	*2,725*	*5,225*	*7,775*	*10,275*	*13,775*	*17,275*	*20,975*
Banking Programs[g]								
LACWWD 36[c]	0	0	323	362	769	819	861	895
NCWD	0	0	1,032	1,150	2,414	2,542	2,652	2,741
SCWD	0	0	3,729	3,748	7,509	7,519	7,534	7,546
VWC	0	0	2,416	2,240	4,309	4,120	3,953	3,819
Total	*0*	*0*	*7,500*	*7,500*	*15,000*	*15,000*	*15,000*	*15,000*
TOTAL PLANNED SUPPLIES								
LACWWD 36[c]	500	800	1,173	1,237	1,669	1,744	1,811	1,870
NCWD	1,450	4,375	5,982	6,475	8,264	8,942	9,602	10,241
SCWD	600	6,200	10,929	11,698	16,034	17,119	18,184	19,246
VWC	3,050	4,300	8,591	10,815	15,259	17,920	20,628	23,569
Total	**5,600**	**15,675**	**26,675**	**30,225**	**41,225**	**45,725**	**50,225**	**54,925**

TABLE C-8 CON'T

PURVEYOR EXISTING AND PLANNED SUPPLIES								
LACWWD 36[(c)]	3,036	3,682	3,869	4,237	4,837	5,124	5,354	5,544
NCWD	18,650	19,822	20,670	22,182	24,406	25,596	26,682	27,628
SCWD	52,482	54,945	53,152	54,472	58,761	59,797	60,860	61,768
VWC	50,350	55,802	56,161	57,912	61,799	63,786	65,906	68,063
Total	**124,517**	**134,252**	**133,852**	**138,802**	**149,802**	**154,302**	**158,802**	**163,002**

Notes:

(a) The distribution of existing and planned supplies does not represent a formal allocation of water supplies among purveyors.

(b) Planned groundwater supplies represent new groundwater well capacity that may be required by an individual purveyor's production objectives in the Alluvial Aquifer and the Saugus Formation, including 3,777 AFY of restored capacity from VWC Well 201 and approximately 10,000 AFY of new Saugus Formation well capacity. When combined with existing purveyor and non-purveyor groundwater supplies, total groundwater production is consistent with the 1931-1934 multiple dry-year levels identified in Table 3-8 of the 2009 Groundwater Basin Yield Analysis. As indicated in Table 3-12, existing and planned groundwater pumping remain within the groundwater operating plan shown on Table 3- 5.

(c) LACWWD 36 included for purposes of providing regional completeness; however, it is not required to prepare an UWMP.

(d) Conversion of Newhall Land agricultural groundwater supplies to VWC M&I supplies.

(e) Includes 500 AFY from a newly completed well in 2011.

(f) Per CLWA Draft Recycled Water Master Plan and Newhall Ranch Specific Plan.

(g) Includes 10,000 AF of additional banking programs by 2025 and an additional 10,000 AF by 2035.

TABLE C-9
MULTIPLE-DRY YEAR: DEMANDS WITH SBX7-7 REDUCTIONS AND COMPARISON TO TOTAL SUPPLIES

WATER DEMANDS W/ AND W/O CONSERVATION[a]	2015	2020	2025	2030	2035	2040	2045	2050
LACWWD 36[b]								
Demand w/o Conservation[c]	1,935	2,408	2,881	3,353	3,826	4,299	4,772	5,245
Anticipated Conservation Objective[d]	176	438	524	610	696	782	868	954
Reduction from Recycled Water[e]	0	50	50	50	50	50	50	50
Net Anticipated Water Conservation[f]	176	388	474	560	646	732	818	904
Demand w/ Conservation[g]	1,759	2,020	2,407	2,794	3,181	3,568	3,955	4,342
Existing and Planned Supplies	*3,036*	*3,682*	*3,869*	*4,237*	*4,837*	*5,124*	*5,354*	*5,544*
SBX7-7 Compliance Calculations								
NCWD								
Demand w/o Conservation[c]	13,828	15,671	17,514	19,358	21,200	23,044	24,886	26,730
20x2020 Reduction[h]	1,365	2,982	3,204	3,489	3,742	3,995	4,248	4,501
Reduction from Recycled Water[e]	200	500	1,000	1,275	1,775	2,275	2,775	3,275
Reduction from Water Conservation[i]	1,165	2,482	2,482	2,482	2,482	2,482	2,482	2,482
Demand w/ Conservation[j]	12,663	13,188	15,031	16,876	18,718	20,562	22,404	24,248
Existing and Planned Supplies	*18,650*	*19,822*	*20,670*	*22,182*	*24,406*	*25,596*	*26,682*	*27,628*
SCWD								
Demand w/o Conservation[c]	34,796	38,295	41,795	45,294	48,793	52,292	55,791	59,290
20x2020 Reduction[k]	3,524	7,557	8,067	8,576	9,085	9,595	10,104	10,614
Reduction from Recycled Water[e]	100	500	1,500	2,275	2,775	3,775	4,775	5,775
Reduction from Water Conservation[i]	3,424	7,057	7,057	7,057	7,057	7,057	7,057	7,057
Demand w/ Conservation[j]	31,372	31,238	34,737	38,236	41,736	45,235	48,734	52,233
Existing and Planned Supplies	*52,482*	*54,945*	*53,152*	*54,472*	*58,761*	*59,797*	*60,860*	*61,768*
VWC								
Demand w/o Conservation[c]	37,517	40,959	44,398	47,839	51,278	54,720	58,159	61,600
20x2020 Reduction[l]	3,962	8,648	9,372	10,095	10,819	11,542	12,266	12,990
Reduction from Recycled Water[e]	1,000	2,000	3,000	4,500	6,000	8,000	10,000	12,200
Reduction from Water Conservation[i]	2,962	6,648	6,648	6,648	6,648	6,648	6,648	6,648
Demand w/ Conservation[j]	**34,555**	**34,310**	**37,750**	**41,191**	**44,630**	**48,072**	**51,511**	**54,951**
Existing and Planned Supplies	*50,350*	*55,802*	*56,161*	*57,912*	*61,799*	*63,786*	*65,906*	*68,063*

TABLE C-9 CON'T

REGIONAL SUMMARY	2015	2020	2025	2030	2035	2040	2045	2050
Demand w/o Conservation[(c)]	88,077	97,333	106,588	115,843	125,099	134,354	143,609	152,865
Total 20x2020 Reduction	9,027	19,626	21,166	22,770	24,342	25,914	27,486	29,058
Total Reduction from Recycled Water[(m)]	1,300	3,050	5,550	8,100	10,600	14,100	17,600	21,300
Total Reduction from Water Conservation	7,727	16,576	16,662	16,748	16,833	16,919	17,005	17,091
Demand w/ Conservation	**80,350**	**80,757**	**89,926**	**99,096**	**108,265**	**117,434**	**126,604**	**135,773**
TOTAL EXISTING AND PLANNED SUPPLIES	**124,517**	**134,252**	**133,852**	**138,802**	**149,802**	**154,302**	**158,802**	**163,002**

Notes:

(a) Reflects existing and projected demands in CLWA service area only. CLWA's Annexation Policy requires annexing parties to provide additional fully reliable supplies. Known parties potentially seeking annexation include Legacy/Stevenson Ranch Phase 5, Tapia Canyon and Tesoro Del Valle.
(b) LACWWD 36 included for purposes of providing regional completeness; however, it is not required to prepare an UWMP.
(c) Demand w/o Conservation from Table 2-2. Includes a 10% increase in demand during dry years.
(d) LACWWD 36 conservation objective estimated at 20% of projected demand commencing 2020; see Table 2-21.
(e) Recycled water projections from Table 4-3.
(f) Net Anticipated Conservation for LACWWD 36 is Anticipated Conservation Objective minus Reduction from Recycled Water.
(g) Demand w/ Conservation for LACWWD 36 is Demand w/o Conservation minus Net Anticipated Conservation.
(h) NCWD 20x2020 Reduction from Table 2-16. The 20% conservation requirement is assumed to continue through 2050 and continue to be met with a mixture of recycled water and conservation.
(i) Reduction from Water Conservation is 20x2020 Reduction minus Reduction from Recycled Water for 2015 and 2020; the quantity of water conservation remains at least at 2020 amounts through 2050.
(j) Demand w/ Conservation is Demand w/o Conservation minus Reduction from Water Conservation.
(k) SCWD 20x2020 Reduction from Table 2-18. The 20% conservation requirement is assumed to continue through 2050 and continue to be met with a mixture of recycled water and conservation.
(l) VWC 20x2020 Reduction from Table 2-20. The 20% conservation requirement is assumed to continue through 2050 and continue to be met with a mixture of recycled water and conservation.
(m) Recycled water reductions do not include demands from Honor Rancho.

Appendix D

Recent Factors Affecting SWP Supplies

APPENDIX D
RECENT FACTORS AFFECTING SWP SUPPLIES

Since the last round of Urban Water Management Plans (UWMPs) were prepared in 2005, the California Department of Water Resources (DWR) has twice updated its State Water Project (SWP) Delivery Reliability Report. In each of its updates, DWR has projected further reductions in average SWP water deliveries than were projected in 2005. The 2009 Report is the most recent update, and identifies several emerging factors that have the potential to affect the availability and reliability of SWP supplies. Although the 2009 Report presents an extremely conservative projection of SWP delivery reliability, particularly in light of events occurring since its release, it remains the best available information concerning the SWP. Following is information and a brief summary of several factors identified in the 2009 Report having the potential to affect the availability and reliability of SWP supplies.

New U.S. Fish and Wildlife Service Biological Opinion for Delta Smelt and Related Litigation Matters

SWP operations have been challenged in connection with potential impacts to the Delta smelt, a small fish that resides only in the Delta and is protected under CESA and the ESA. In February 2005, the United States Fish and Wildlife Service (FWS) issued a "no jeopardy" determination and biological opinion (B.O.) analyzing potential impacts to the Delta smelt in connection with the long-term coordinated operations of the California State Water Project (SWP) and the federal Central Valley Project (CVP) through the year 2030. The project/action evaluated in the B.O., formally known as the "Operations Criteria and Plan" (or OCAP), includes existing pumping operations, proposals to increase SWP pumping over the next 30-year period, and other proposed long-term operational changes. In February 2005, several environmental groups filed suit in federal court against FWS and the Secretary of the Interior challenging the validity of the B.O. (*Natural Resources Defense Council v. Kempthorne*, USDC Case No. 05-CV-1207-OWW.)

In May 2007, the Federal District Court for the Eastern District of California determined that the B.O. violated the requirements of the ESA. In order that the SWP and CVP could continue to operate, the court established interim operating requirements for the Projects that would remain in place until a new B.O. was completed (the Interim Remedies)(December 14, 2007). The Interim Remedies were based on various factors occurring in the Delta, such as prevailing hydrologic and flow conditions, and the distribution and spawning status of Delta smelt. For the 2007-2008 water year, the Interim Remedies were reported to have reduced SWP supplies by approximately 500,000 acre-feet.

On December 15, 2008, FWS issued its new B.O. The B.O. concludes that the proposed long-term coordinated CVP and SWP operations will "jeopardize" the Delta smelt and "adversely modify" its critical habitat according to ESA standards. Pursuant to the ESA, because the B.O. is a "jeopardy" opinion, FWS was required to formulate and adopt as part of the B.O. a "Reasonable and Prudent Alternative" (RPA) to the proposed action that FWS believes will not cause jeopardy to the Delta smelt or adversely modify or destroy its critical habitat, and which can be implemented by Reclamation and DWR. (16 U.S.C. § 1536(b)(3)(A).) The RPA adopted as part of the B.O. imposed various new operating restrictions upon the CVP and SWP and has the potential to result in substantial water supply reductions from the Projects.

Soon after the B.O. was issued, DWR published information estimating that in comparison to the level of SWP exports from the Delta previously authorized under State Water

Resources Control Board (State Board) Decision 1641 (D-1641),[1] the FWS B.O. could reduce those deliveries by 18 to 29 percent during average and dry conditions, respectively. As with the Interim Remedies, potential water supply restrictions under the new B.O. are dependent on highly variable factors such as hydrologic conditions affecting Delta water supplies, flow conditions in the Delta, migratory and reproductive patterns of Delta smelt, and numerous other non-Project factors that impact the health and abundance of Delta smelt and its critical habitat.

Due to a number of alleged scientific and other deficiencies in the new FWS B.O., in early 2009 the State Water Contractors, the San Luis and Delta-Mendota Water Authority and several individual State and Federal contractor water agencies filed legal challenges against the B.O., which were consolidated in the Federal District Court for the Eastern District of California. (*The Consolidated Delta Smelt Cases*, Lead Case No. 1:09-CV-00407-OWW-GSA.) Early on in the proceedings, several of the plaintiff water agencies and the federal defendants filed cross-motions for summary judgment to determine whether a violation of the National Environmental Policy Act (NEPA) occurred in connection with federal defendants' adoption and implementation of the NMFS B.O. and its RPA. In a Memorandum Decision issued in November 2009, the court ruled that the moving plaintiffs were entitled to summary judgment on their claim that the federal defendants violated NEPA by failing to perform any NEPA analysis prior to adopting and implementing the new FWS B.O. and its RPA. (*The Consolidated Delta Smelt Cases*, Doc. No. 399 at 46-47.)

Separately, several of the plaintiffs filed a motion for preliminary injunction against the implementation of Component 2 (Action 3) of the RPA that proposed to restrict Delta exports during a particular timeframe in spring and summer months, depending on certain biological and environmental parameters. In May 2010, the court issued its Findings of Fact and Conclusions of Law Regarding Plaintiffs' Request for Preliminary Injunction Against Implementation of RPA Component 2 (a/k/a Action 3). In that decision, the court reconfirmed its earlier ruling that the federal defendants failed to examine the potential environmental and human consequences of the RPA actions adopted under the B.O. in violation of NEPA. (*Consolidated Delta Smelt Cases*, Doc. No. 704 at 120-122.) The court also ruled that the plaintiffs were likely to prevail on their claims that FWS violated the ESA and the federal Administrative Procedure Act (APA) in formulating and adopting RPA Component 2 without support of the best available science and without adequate explanation regarding its biological benefit to Delta smelt. (*Id.* at 123-125.)

In the meantime, the parties also filed cross motions for summary judgment to obtain a final ruling in the cases. Those motions were argued in early July 2010. In December 2010, the court issued a memorandum decision that invalidated the B.O. and RPA in several respects and remanded the matter to FWS. Further proceedings are expected to address interim operations of the SWP and CVP.

Because Delta smelt are also protected under the California ESA, the SWP and CVP are required to obtain take authorization from the California Department of Fish and Game (DFG). In July 2009, DFG issued a "consistency determination" pursuant to Fish and Game Code section 2080.1. That determination provides that operations of the SWP and CVP are in compliance with CESA so long as those operations occur in accordance with the FWS Delta smelt B.O. and RPA. Because the consistency determination posed a risk that the SWP could remain bound to the terms of the RPA even if the FWS B.O. was eventually overturned by a

[1] See additional discussion below regarding SWP exports as authorized under D-1641.

federal court, DFG's decision was challenged in state court by the State Water Contractors and the Kern County Water Agency. (*State Water Contractors v. California Department of Fish and Game, et al.*, Kern County Superior Court Case No. S-1500-CV-268074[2]; *Kern County Water Agency v. Department of Fish and Game, et al.*, Sacramento County Superior Court Case No. 34-2010-80000450.) The challenges assert, among other things, that DFG's consistency determination is invalid because it relies upon and seeks to enforce restrictions established under the new FWS B.O. that are alleged under *The Consolidated Delta Smelt Cases* to be invalid and unenforceable. The case is currently stayed by stipulation of the parties, pending the outcome of *The Consolidated Delta Smelt Cases*.

These litigation matters challenging the validity of the FWS B.O. and the DFG consistency determination give rise to the possibility that the restrictions on SWP exports could be relaxed and that SWP exports may return to the levels allowed by the Interim Remedies (above) or State Board Decision D-1641[3] pending issuance of a new B.O. and/or the implementation of the Bay-Delta Conservation Plan (BDCP). As an additional factor, by letter dated May 3, 2010, the federal Secretaries of the Department of Interior and the Department of Commerce have announced a joint initiative to develop a single integrated B.O. for the Delta and related water operations of the CVP and SWP.[4] The timing, nature and extent of the regulatory measures to be contained in any such B.O., and whether those measures would be legally challenged or upheld, cannot be predicted with any degree of certainty at this time.

New National Marine Fisheries Service Biological Opinion Salmon/Anadromous Species and Related Litigation Matters

SWP operations have also been challenged in connection with potential impacts to anadromous species in the San Francisco Bay-Delta estuary. In October 2004, the National Marine Fisheries Service (NMFS) issued a "no jeopardy" determination and B.O. analyzing potential impacts to federally listed winter-run and spring-run salmon and steelhead trout related to the long-term coordinated operations of the CVP and SWP through the year 2030. As with the 2005 FWS B.O. and *Kempthorne* case discussed above, OCAP was the project/action evaluated in the 2004 NMFS B.O., which included the Projects' existing Delta pumping operations, proposals to increase SWP pumping by 20 percent over the long term, and other operational changes. In August 2005, several environmental groups filed suit in federal court against NMFS and the Secretary of Commerce challenging the validity of the B.O. (*Pacific Coast Federation of Fishermen's Associations, et al. v. Gutierrez, et al*., Case No. 1:06-CV-00245-OWW-GSA.)

In April 2008, the United States District Court for the Eastern District of California issued

[2] In June 2010, the case was transferred to Sacramento, California, where it is now referenced as *State Water Contractors v. California Department of Fish and Game, et al.,* Sacramento County Superior Court Case No. 34-2010-80000552.

[3] D-1641 implements the objectives of the 1995 Bay-Delta Plan and imposes flow and water quality objectives to assure protection of beneficial uses in the Delta. The requirements of D-1641 address, among other things, standards for fish and wildlife protection, municipal and industrial water quality, agricultural water quality, and salinity. D-1641 imposed a new operating regime for the Delta, including measures such as X2, an export/inflow ratio, and the Vernalis Adaptive Management Program (VAMP). The standards under D-1641 are accomplished through requirements and conditions imposed on the water right permits for the SWP, the CVP and others. (*See*, California Water Plan Update 2009, Regional Reports Volume 3, Sacramento-San Joaquin River Delta at DB-6.)

[4] http://www.doi.gov/news/pressreleases/upload/Roy.pdf

its decision invalidating the NMFS B.O. for failing to comply with the requirements of the federal ESA. As with the *Kempthorne* case (above), the court did not vacate the B.O., meaning that SWP and CVP operations were authorized to continue pending the preparation of a new B.O. and any interim remedies imposed by the court. Remedy proceedings were held similar to those conduced in the *Kempthorne* case discussed above and, in separate Findings of Fact and Conclusions of Law issued in July and October 2008, Judge Wanger determined that additional water supply restrictions beyond those required in *Kempthorne* (i.e., the Interim Remedies for Delta smelt) were not required at that time for the anadromous species.

On June 4, 2009, NMFS issued a new B.O. regarding the effects of SWP and CVP operations on listed winter and spring-run salmon, steelhead trout, green sturgeon, and southern resident killer whales. Like the new FWS B.O. discussed above, the NMFS B.O. concludes that the proposed long-term coordinated operations of the CVP and SWP will jeopardize the species and adversely modify the critical habitats of most of those species. Pursuant to the ESA, because the B.O. is a "jeopardy" opinion, NMFS was required to formulate and adopt a Reasonable and Prudent Alternative (RPA) to the proposed action that NMFS believed would not cause jeopardy to the species or adversely modify or destroy their critical habitats, and which can be implemented by Reclamation and DWR. (16 U.S.C. § 1536(b)(3)(A).) The RPA adopted by NMFS imposed various new operating restrictions upon the CVP and SWP which have the potential to result in substantial reductions in water supply from the Projects.

NMFS calculated that its new B.O. has the potential to reduce SWP deliveries from the Delta by 7 percent in addition to the potential reductions under the new FWS B.O. for Delta smelt (above). DWR has estimated that average annual reductions to SWP deliveries could be closer to 10 percent beyond the restrictions imposed under the FWS B.O. (thus, a total of 28 to 39 percent during average and dry conditions, respectively, in comparison to SWP exports authorized under D-1641). As with the FWS B.O., potential water supply restrictions under the NMFS B.O. are dependent on several variable factors, such as hydrologic conditions in the Delta region, migratory and reproductive patterns of protected salmonid species, and other non-Project factors that impact the health and abundance of the species and their habitats.

In June 2009, numerous legal challenges were filed against the new NMFS B.O. and consolidated in the United States District Court for the Eastern District of California alleging, among other things, that the operating restrictions set forth in the B.O. are in violation of the federal ESA, the federal APA, and other laws. (*The Consolidated Salmonid Cases*, Lead Case No. 1:09-CV-1053-OWW-DLB.) Early in the proceedings, several of the plaintiff water agencies and the federal defendants filed cross-motions for summary judgment to determine whether a NEPA violation occurred in connection with federal defendants' adoption and implementation of the NMFS B.O. and its RPA. The court heard oral argument on the motions in February 2010, and took the matter under submission.

Separately, in January 2010, several of the plaintiff water agencies filed applications for a temporary restraining order and motions for preliminary injunction regarding the implementation of RPA Actions IV.2.1 and IV.2.3, which are designed to restrict Delta exports during a particular timeframe in spring and summer months, depending on certain biological and environmental parameters. In February 2010, the court issued its Memorandum Decision and Order Re Plaintiffs' Motion for Temporary Restraining Order. The decision found that federal defendants violated NEPA by failing to consider the potential human and environmental impacts

caused by implementation of the RPA Actions, and that a temporary injunction against RPA Action IV.2.3 would not cause jeopardy to the species, whereas a failure to enjoin the Action would cause irreparable water supply impacts to the plaintiffs. (*The Consolidated Salmonid Cases*, Doc. No. 202 at 20-22.) In subsequent rulings issued in March 2010, the court ordered that plaintiffs were entitled to summary judgment on their claims that federal defendants violated NEPA by failing to prepare any NEPA documentation in the adoption and implementation of the NMFS B.O. and its RPA. (*The Consolidated Salmonid Cases*, Doc. Nos. 266 and 288 at 3.)

Plaintiffs' motions for a preliminary injunction were heard in April and May 2010, and in May 2010 the court issued Findings of Fact and Conclusions of Law Re Plaintiffs' Request for Preliminary Injunction. In that decision, the court reconfirmed its previous ruling that federal defendants violated NEPA by failing to undertake an analysis of whether the RPA Actions adopted by NMFS under its new B.O. would adversely impact humans and the human environment. (*The Consolidated Salmonid Cases*, Doc. No. 347 at 129-130, 138.) Further, the court ruled that the plaintiff water agencies had a substantial likelihood of being able to show that the federal defendants violated the ESA and the APA by failing to adequately justify, through generally recognized scientific principles, the precise flow prescriptions imposed by RPA Actions IV.2.1 and IV.2.3. (*Id.* at 130, 133-134.)[5]

Following its May 18th ruling, the court conducted further proceedings and accepted additional evidence to address the proposed injunction and whether the relief requested by the plaintiffs would adversely affect the species (namely, Central Valley spring-run Chinook salmon and Central Valley steelhead). Based on those proceedings, in June 2010, the court issued Supplemental Findings of Fact and Conclusions of Law Re Plaintiffs' Request for Preliminary Injunction. (*The Consolidated Salmonid Cases*, Doc. No. 380.) The Supplemental Findings noted that if RPA Actions IV.2.1 and IV.2.3 were enjoined through June 15, 2010, the FWS B.O. for Delta smelt (above) would control Project operations between May 26th and June 15th, unless those restrictions were also enjoined, in which case Project operations would be controlled by D-1641.[6] (Doc. No. 380 at 12.) Accordingly, the court granted an injunction against RPA Actions IV.2.1 and IV.2.3 and authorized Project operations in accordance with D-1641, provided that export pumping could be reduced on shortened notice upon a showing of jeopardy to the species or adverse modification of its critical habitat. (*Id.* at 17-18.)

In August and November 2010, the parties also filed motions for summary judgment to obtain a final ruling in the cases. Those motions were argued on December 16 and 17, 2010, and the court is expected to issue a memorandum decision on the motions.

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[5] RPA Action IV.2.1 limits combined water exports by the CVP and SWP based on San Joaquin River flows as measured at Vernalis. (NMFS B.O. at 642.) When flows at Vernalis range from 0 to 6,000 cfs, Action IV.2.1 limits combined CVP and SWP exports to 1,500 cfs. (NMFS B.O. at 642.) When flows at Vernalis range from 6,000 to 21,750 cfs, Action IV.2.1 imposes an inflow to combined CVP and SWP exports ratio of 4:1. (NMFS B.O. at 642.) The pumping restrictions associated with Action IV.2.1 terminate May 31st. (NMFS B.O. at 641-642.) RPA Action IV.2.3 limits Old and Middle River (OMR) flows to no more negative than -2,500 cfs between January 1 and June 15, or until the average daily water temperature at Mossdale is greater than 72 degrees Fahrenheit for seven consecutive days, whichever occurs first. (NMFS B.O. at 648-650.)

[6] Among other things, D-1641 limits Project exports to a combined total of not more than 35 percent of total Delta inflow and further limits Project operations to ensure that certain water quality standards are met as measured by the location of the isohaline condition referred to as spring X2. (See *The Consolidated Salmonid Cases*, Doc. No. 380 at 12-14.)

Because the salmon species covered by the new NMFS B.O. are also protected under CESA, the SWP and CVP are required to obtain take authorization from DFG. In September 2009, DFG issued a "consistency determination" pursuant to Fish and Game Code section 2080.1. That determination provides that operations of the SWP and CVP are in compliance with CESA so long as those operations occur in accordance with the RPA set forth in the NMFS B.O. Because the consistency determination posed a risk that the SWP could remain bound to the terms of the RPA even if the NMFS B.O. was eventually overturned by a federal court, DFG's decision was challenged in state court by the State Water Contractors and the Kern County Water Agency. (*State Water Contractors v. California Department of Fish and Game, et al.*, Kern County Superior Court Case No. S-1500-CV-268497.)[7] The challenge asserts, among other things, that DFG's consistency determination is invalid because it relies upon and seeks to enforce restrictions established under the NMFS B.O. that are alleged under *The Consolidated Salmon Cases* to be invalid and unenforceable. As described above, the Federal District Court for the Eastern District of California has ruled that plaintiffs have a strong likelihood of being able to show that portions of the NMFS B.O. fail to comply with the ESA and the APA, and has enjoined implementation of several RPA Actions. Because the court's ruling effectively modified aspects of the NMFS B.O. for 2010, DWR requested that DFG make a determination that the NMFS B.O., as modified by the court, remained consistent with the provisions of CESA. In May 2010, DFG issued a new consistency determination, finding the court-modified NMFS B.O. consistent with CESA. In June 2010, an amended complaint was filed against the May 24th consistency determination. By stipulation of the parties, the case is currently stayed pending the outcome of *The Consolidated Salmonid Cases*.

The current legal challenges regarding the validity of the new NMFS B.O. and the DFG consistency determination give rise to the possibility that the restrictions on SWP exports could be relaxed and that SWP exports may return to the higher levels allowed by the Interim Remedies decision in *Kempthorne* (above) or D-1641 pending the issuance of a new B.O. and/or implementation of the BDCP. Furthermore, as noted above, in May 2010 the Department of Interior and the Department of Commerce announced a joint initiative to develop a single, integrated B.O. for the coordinated operations of the CVP and SWP in the Delta.[8] The timing, nature, and extent of the regulatory measures to be contained that B.O., and whether those measures would be legally challenged or upheld, cannot be predicted with any degree of certainty at this time.

Watershed Enforcers v. California Department of Water Resources

Another litigation matter concerning SWP operations is *Watershed Enforcers v. Cal. Dept. of Water Resources* (2010) 185 Cal. App. 4th 969 (Alameda County Superior Court Case No. RG06292124). In that case, a plaintiffs group filed suit against DWR alleging the SWP was being operated without "take authorization" under CESA. The case was heard by the Alameda County Superior Court in November 2006 and, in April 2007, the court ordered DWR to cease and desist further operations of the Harvey O. Banks pumping plant facilities of the SWP unless DWR obtained proper authorization from DFG for the take of Delta smelt and salmon species listed under CESA. The trial court decision was appealed by DWR and several water agency

[7] In June 2010, the case was transferred to Sacramento, California, where it is now referenced as *State Water Contractors v. California Department of Fish and Game, et al.,* Sacramento County Superior Court Case No. 34-2010-80000560.
[8] http://www.doi.gov/news/pressreleases/upload/Roy.pdf

parties and the court's order was stayed pending the appeal, meaning that DWR was not required to cease its operations of the Banks facilities.

As discussed above, the new FWS and NMFS B.O.s were issued while the *Watershed Enforcers* case was pending on appeal. Based on those new B.O.s, DFG issued consistency determinations and take authorization for the SWP under CESA with respect to Delta smelt and the listed anadromous species. (Also discussed above, those consistency determinations have been challenged in state court.) Thereafter, in September 2009, DWR and one of the water agency parties dismissed their appeals in the *Watershed Enforcers* case. The case remained active in 2009-2010, however, for purposes of resolving the discrete legal issue raised by the remaining water agency parties as to whether DWR is the type of entity that is subject to the take prohibitions under CESA. In a June 2010 decision, the First District Court of Appeal affirmed the trial court decision in all respects, including the determination that DWR qualifies as a "person" within the meaning of CESA, which means that DWR is subject to CESA's permitting requirements. (*Watershed Enforcers v. Department of Water Resources* (2010) 185 Cal. App. 4th 969, 973.)

California Department of Fish and Game Incidental Take Permit for Longfin Smelt and Related Litigation Matters

Regulatory actions related to longfin smelt also have the potential to affect the availability and reliability of SWP supplies. In February 2008, the California Fish and Game Commission (Commission) approved a petition to list the longfin smelt as a "candidate" species under CESA. Under CESA, once a species is granted candidate status, it is entitled to protections until the Commission determines whether to list the species as threatened or endangered. To afford such interim protection, in February 2008, the Commission adopted the first in a series of emergency take regulations that authorized the CVP and SWP to take longfin smelt, yet established certain operating restrictions on Project exports from the Delta in an effort to protect the species. The emergency regulations were proposed to remain in effect until February 2009, at which time the Commission was required to decide whether to list the longfin as a threatened or endangered species. Initially, the Commission's take regulation imposed the same Delta export restrictions that were established in the *Kempthorne* case (i.e., the Interim Remedies discussed above). In November 2008, however, the Commission revised its emergency regulations in a manner that threatened to impose export restrictions beyond those established for Delta smelt. According to information published by DWR, the Commission's 2008-2009 revised emergency take regulations had the potential to reduce SWP supplies in the January to February 2009 period by up to approximately 300,000 acre-feet under a worst-case scenario. Under other scenarios, however, the SWP delivery reductions were expected to be no greater than those imposed under the new FWS B.O. for Delta smelt. In December 2008, several water agency interests filed suit against the Commission's revised take regulation, alleging it violated CESA.

In March 2009, the Commission determined that the listing of longfin smelt as a "threatened" species was warranted under CESA. CESA sets forth a general prohibition against the take of a threatened species except as otherwise authorized by statute. One such authorization is provided by California Fish and Game Code section 2081, wherein DFG may authorize the incidental taking of a threatened species in connection with an otherwise lawful activity through the issuance of a permit. In February 2009, in advance of an official listing of the species as threatened, DFG issued Incidental Take Permit No. 2081-2009-001-03 (Permit)

to DWR which imposes terms and conditions on the ongoing and long-term operation of SWP facilities in the Delta for the protection of longfin smelt. The operating restrictions under the Permit are based in large part on the restrictions imposed on the SWP by the new FWS B.O. for Delta smelt (see above).

In June 2009, the Commission officially listed longfin smelt as a threatened species under CESA. As with the FWS B.O., potential water supply restrictions under the Permit are dependent on several variable factors, such as hydrologic conditions in the Delta region, migratory and reproductive patterns of longfin smelt, and other non-Project factors affecting longfin smelt abundance in the Delta. DWR has not indicated whether any particular reductions in SWP exports are likely to result from the Permit. As previously noted, however, DWR has estimated that the restrictions imposed by the FWS B.O. and RPA for Delta smelt could reduce SWP deliveries between 18 and 29 percent in comparison to Project deliveries authorized under D-1641. In March 2009, due to a number of alleged scientific and other deficiencies in the Permit, the State Water Contractors challenged the Permit in Sacramento County Superior Court. (*State Water Contractors v. California Dept. of Fish and Game, et al.*, Sac. Sup. Ct. Case No. 34-2009-80000203.) That case puts DFG's ability to enforce the Permit into question.

California Drought Conditions

On June 4, 2008, the Governor of California proclaimed a statewide drought due to record-low rainfall in Spring 2008 and court-ordered restrictions on Delta exports as discussed above. (Executive Order S-06-08.) Soon thereafter, the Governor proclaimed a state of drought emergency to exist within the Counties of Sacramento, San Joaquin, Stanislaus, Merced, Madera, Fresno, Kings, Tulare and Kern. (Proclamation dated June 12, 2008.) On February 27, 2009, the Governor declared a statewide water supply emergency to combat California's third consecutive year of drought conditions, evidenced by low reservoir storage and estimated snowpack water content at that time. (Proclamation dated February 27, 2009.)

Since then, statewide hydrologic conditions have improved, although the State's water supply emergency declaration has not been lifted. In March 2010, DWR announced that both manual and electronic readings indicate that the water content in California's mountain snowpack was 107 percent of normal and stated that the "readings boost our hope that we will be able to increase the State Water Project allocation by this spring to deliver more water to our cities and farms." Among these readings, DWR reported that electronic sensor readings showed northern Sierra snow water equivalents at 126 percent of normal for that date, central Sierra at 93 percent, and southern Sierra at 109 percent.[9] As of January 2011, DWR reported snow water equivalents for the northern Sierra at 164 percent of normal, 186 percent of normal for the central Sierra, and 260 percent for the southern Sierra.[10] According to DWR's California Data Exchange Center, hydrologic conditions in California as of December 1, 2010 were as follows: statewide precipitation was 155 percent of average; statewide runoff was 115 percent of average; and key historical average statewide reservoir storage was at 105 percent, with two of the state's largest reservoirs, Lake Shasta (CVP) and Lake Oroville (SWP), respectively storing 116 percent and 75 percent of their historical averages.[11]

[9] http://www.water.ca.gov/news/newsreleases/2010/030310snow.pdf
[10] http://cdec.water.ca.gov/cgi-progs/snow/DLYSWEQ
[11] http://cdec.water.ca.gov/cgi-progs/reports/EXECSUM

APPENDIX D
RECENT FACTORS AFFECTING SWP SUPPLIES

Development of Delta Plan and Delta Flow Criteria Pursuant to New State Laws

In November 2009, the California Legislature enacted SBX7-1 as one of several bills passed as part of a comprehensive water package related to water supply reliability, ecosystem health, and the Delta. SBX7-1 became effective on February 3, 2010 and adds Division 35 to the California Water Code (commencing with Section 85300), referred to as the Sacramento-San Joaquin Delta Reform Act of 2009 (Act). Among other things, the Act creates the Delta Stewardship Council (Council) as an independent agency of the state. (Wat. Code § 85200.) SBX7-1 also amends the California Public Resources Code to specify changes to the Delta Protection Commission and to create the Delta Conservancy. (Pub. Res. Code §§ 29702-29780.) The Act directs the Council to develop a comprehensive management plan for the Delta by January 1, 2012 (Delta Plan) and to first develop an Interim Plan that includes recommendations for early actions, projects, and programs for the Delta. (*See generally*, Second Draft Interim Plan, Prepared for Consideration by the Delta Stewardship Council at 1.)

In addition to these and other requirements, SBX7-1 requires the State Board to use the best available scientific information to develop flow criteria for the Delta ecosystem necessary to protect public trust resources, including fish, wildlife, recreation and scenic enjoyment. Similarly, DFG is required to identify quantifiable biological objectives and flow criteria for species of concern in the Delta. In August 2010, the State Board adopted Resolution No. 2010-0039 approving its report entitled "Development of Flow Criteria for the Sacramento-San Joaquin Delta Ecosystem" (Flow Criteria). The State Board report concludes that substantially higher flows are needed through the Delta than in have occurred in previous decades in order to benefit zooplankton and various fish species. (Flow Criteria at 5-8.) Separately, in September 2010, DFG issued a draft report entitled "Quantifiable Biological Objectives and Flow Criteria for Aquatic and Terrestrial Species of Concern Dependent on the Delta" (DFG Report). The DFG Report is based on similar biological objectives and recommends Delta flows similar to those set forth in the State Board's Flow Criteria. (DFG Report at 13.) Notably, both the State Board and DFG recognize that their recommended flow criteria for the Delta do *not* balance the public interest or the need to provide an adequate and reliable water supply. (Flow Criteria at 4; DFG Report at 16.) Also of importance, both the State Board and DFG acknowledge that their recommended flow criteria do not have any regulatory or adjudicatory effect; however, they may be used to inform the Council as it prepares the Delta Plan, and may be considered as the Bay Delta Conservation Plan (BDCP) process moves forward. (Flow Criteria at 3, 10; DFG Report at ES-4.)

DWR's Final 2009 SWP Delivery Reliability Report

DWR continues to evaluate the issues affecting SWP exports from the Delta and how those issues may affect the long-term availability and reliability of SWP deliveries to the SWP Contractors. In September 2010, DWR released its Final 2009 SWP Delivery Reliability Report (DWR Report), which forecasts additional reductions to SWP supplies in comparison to the 2007 Report. According to DWR, the long-term average delivery of contractual SWP Table A supply is projected to be 60 percent under current and future conditions over the 20-year projection. (DWR Report at 43, 48, Tables 6.3 and 6.12.) Within that long-term average, SWP Table A deliveries can range from 7 percent (single dry year) to 68 percent (single wet year) of contractual amounts under current conditions, and from 11 percent (single dry year) to 97 percent (single wet year) under future conditions. (Id. at 43-44, 49, Tables 6.4, 6.5, 6.13 and 6.14.) Contractual amounts are projected to range from 32 to 38 percent during multiple-dry

year periods, and from 79 to 93 percent during multiple wet periods. (Id. at 49, Tables 6.13 and 6.14.)

To ensure a conservative analysis, the DWR Report expressly assumes and accounts for the institutional, environmental, regulatory, and legal factors affecting SWP supplies, including, but not limited to, water quality constraints, fishery protections, other D-1641 requirements and the operational limitations imposed by the FWS and NMFS B.O.s that are discussed above. The DWR Report also considers the potential effects of Delta levee failures and other seismic or flood events. (*See*, *e.g.*, DWR Report at 19-24, 25-28, 29-35, Appendices A, A-1, A-2, B.) Notably, the DWR Report assumes that all of these restrictions and limitations will remain in place over the next 20-year period and that no actions to improve the Delta will occur, even though numerous legal challenges, various Delta restoration processes, and new legal requirements for Delta improvements are currently underway (i.e., BDCP, Delta Vision, Delta Plan, etc.). Finally, DWR's long-term SWP delivery reliability analyses incorporate assumptions that are intended to account for potential supply shortfalls related to global climate change. (*See*, *e.g.*, DWR Report at 19, 29-30, Appendices A-B.) Based on these and other factors, the DWR Report presents a conservative projection of SWP delivery reliability.

Conclusion

DWR's most recently published SWP Delivery Reliability Report (September 2010) demonstrates that the projected long-term average delivery amounts of contractual SWP Table A supplies have decreased in comparison to previous estimates. However, as noted, the projections developed by DWR are predicated on conservative assumptions, which make the projections useful from a long-range urban water supply planning perspective.[12] Indeed, recent rulings in various legal actions and other factors described above, among others, support higher estimates of average annual SWP deliveries than projected in DWR's 2009 Report. While this may lead DWR to increase its projections in its next scheduled Report, the 2009 Report remains the best available information concerning the long-term delivery reliability of SWP supplies.

[12] *See*, *e.g.*, *Sonoma County Water Coalition v. Sonoma County Water Agency* (2010) 189 Cal.App.4th 33; *Watsonville Pilots Association v. City of Watsonville* (2010) 183 Cal.App.4th 1059; *Vineyard Area Citizens for Responsible Growth v. City of Rancho Cordova* (2007) 40 Cal.4th 412.

Appendix E

Demand Management Measures

STATE OF CALIFORNIA – CALIFORNIA NATURAL RESOURCES AGENCY

DEPARTMENT OF WATER RESOURCES
1416 NINTH STREET, P.O. BOX 942836
SACRAMENTO, CA 94236-0001
(916) 653-5791

ARNOLD SCHWARZENEGGER, *Governor*

RECEIVED
NOV 22 2010
By

November 9, 2010

Mr. Dirk Marks, Water Resources Manager
Castaic Lake Water Agency
27234 Bouquet Canyon Road
Santa Clarita, California 91350-2173

Dear Mr. Marks:

The Department of Water Resources (DWR) has reviewed the Castaic Lake Water Agency's (CLWA) Self-Certification Statement – Table 1 dated October 26, 2010, regarding implementation of the Urban Best Management Practices (BMPs).

The purpose of DWR's review is to determine eligibility of CLWA to receive water management grant or loan funds. DWR has followed the *Draft AB 1420 Compliance Requirements* dated June 1, 2009. For detailed information, please visit http://www.water.ca.gov/wateruseefficiency/finance/.

Based on DWR's review of the information in Table 1, CLWA has and is currently implementing the BMPs consistent with AB 1420 and, therefore, is eligible to receive water management grant or loan funds.

DWR reserves the right to request additional information and documentation, including reports from CLWA to substantiate the accuracy of the information provided in Table 1. DWR may reverse or modify its eligibility determination and notify you and the funding agency if inaccuracies are found in the supporting documentation or in Table 1.

If you have any questions, please contact me at (916) 651-7025 or Jodi Evans at (916) 651-7026.

Sincerely,

Fethi BenJemaa
Ag Water Use Efficiency Section Chief

AB 1420 Self- Certification Statement Table 1

Note: Table 1 documents Status of Past and Current BMP implementation.

Self-Certification Statement: The Urban Water Supplier and its authorized representative certifies, under penalty of perjury, that all information and claims, stated in this table, regarding compliance and implementation of the BMPs, including alternative conservation approaches, are true and accurate. This signed AB 1420 Self-Certification Statement Table 1, and Table 2 are the basis for granting funds by the Funding Agency. Falsification and/or inaccuracies in AB 1420 Self Certification Statement Table 1, and Table 2 and in any supporting documents substantiating such claims may, at the discretion of the funding agency, result in loss of all State funds to the applicant. Additionally, the Funding Agency, in its sole discretion, may halt disbursement of grant or loan funds, not pay pending invoices, and/or pursue any other applicable legal remedy and refer the matter to the Attorney General's Office.

Name of Signatory Dirk Marks Title of Signatory Water Resources Manager Signature of signatory Dat 26-Oct-10

Application Date:

Proposal Identification Number: CUWCC Member? Yes/No Yes

Has Urban Water Supplier submitted a 2005 Urban Water Management Plan? Yes/No Yes Is the UWMP Plan Deemed Complete by DWR? Yes/No Yes

Applicant Name: Castaic Lake Water Agency

Project Title:

Applicant's Contact Information: Name: Dirk Marks Phone: 661-513-1297 E-mail: dmarks @clwa.org

Participants:

Retailer (List Below)	*Wholesaler (List Below)*

C1	C2	C3	C4	C5	*C6	C7	**C8	**C9	**C10	C11	C12	C13	C14	C15	C16	C17	C18
				BMP Implemented by Retailers and/or Wholesalers / *BMP*			**Compliance Options/Alternative Conservation Approaches (1)**			**BMP Is Exempt (2)**			**BMP Implementation Requirements Met**				
BMPs required for Wholesale Supplier	BMPs required for Retail Supplier	BMPs	Retailer *Yes/No*	Wholesaler *Yes/No*	Regional *Yes/No*	BMP Checklist	Flex Track	Gallons Per Capita Per Day GPCD	Not Cost Effective	Lack of Funding	Lack of Legal Authority	CUWCC MOU Requirement Met: Retailer *Yes/No*	CUWCC MOU Requirement Met: Wholesaler *Yes/No*	Date of BMP Report Submitted to CUWCC for (2007-2008) (MOU Signatories)	Date BMP Implementation Data Submitted to DWR in CUWCC Format (Non MOU Signatories) (3)	All Supporting Documents have been Submitted Yes/No	
	✓	BMP 1 Water Survey for Single/Multi-Family Residential Customers															
	✓	BMP 2 Residential Plumbing Retrofit															
✓	✓	BMP 3 System Water Audits, Leak Detection		Yes		✓							Yes			Yes	
✓	✓	BMP 3 Leak Repairs		Yes		✓							Yes			Yes	
	✓	BMP 4 Metering with Commodity Rates for All New connections															
	✓	BMP 4 Retrofit of Existing Connections															

C1	C2	C3	C4	C5	*C6	C7	**C8	**C9	**C10	C11	C12	C13	C14	C15	C16	C17	C18
				BMP Implemented by Retailers and/or Wholesalers / *BMP*			**Compliance Options/Alternative Conservation Approaches (1)**			**BMP Is Exempt (2)**			**BMP Implementation Requirements Met**				
BMPs required for Wholesale Supplier	BMPs required for Retail Supplier	BMPs	Retailer *Yes/No*	Wholesaler *Yes/No*	Regional *Yes/No*	BMP Checklist	Flex Track	Gallons Per Capita Per Day GPCD	Not Cost Effective	Lack of Funding	Lack of Legal Authority	CUWCC MOU Requirement Met: Retailer *Yes/No*	CUWCC MOU Requirement Met: Wholesaler *Yes/No*	Date of BMP Report Submitted to CUWCC for (2007-2008) (MOU Signatories)	Date BMP Implementation Data Submitted to DWR in CUWCC Format (Non MOU Signatories) (3)	All Supporting Documents have been Submitted Yes/No	
	✓	BMP 5 Large Landscape Conservation Programs and Incentives															
	✓	BMP 6 High-Efficiency Washing Machine Rebate Programs															
✓	✓	BMP 7 Public Information		Yes		✓							Yes			Yes	
✓	✓	BMP 8 School Education		Yes		✓							Yes			Yes	
	✓	BMP 9 Conservation programs for Commercial, Industrial, and Institutional (CII) Accounts															
✓		BMP 10 Wholesale Agency Assistance Programs		Yes		✓							Yes			Yes	
	✓	BMP 11 Conservation Pricing															
✓	✓	BMP 12 Conservation Coordinator		Yes		✓							Yes			Yes	
	✓	BMP 13 Water Waste Prohibitions															
	✓	BMP 14 Residential ULFT Replacement Programs															

***C6:** Wholesaler may also be a retailer (supplying water to end water users)

****C8, **C9, **, and C10:** Agencies choosing an alternative conservation approach are responsible for achieving water savings equal or greater than that which they would have achieved using only BMP list.

(1) For details, please see: http://www.cuwcc.org/mou/exhibit-1-bmp-definitions-schedules-requirements.aspx.

(2) BMP is exempt based on cost-effectiveness, lack of funding, and lack of legal authority criteria as detailed in the CUWCC MOU

(3) Non MOU signatories must submit to DWR reports and supporting documents in the same format as CUWCC.

STATE OF CALIFORNIA – CALIFORNIA NATURAL RESOURCES AGENCY
EDMUND G. BROWN JR., *Governor*

DEPARTMENT OF WATER RESOURCES
1416 NINTH STREET, P.O. BOX 942836
SACRAMENTO, CA 94236-0001
(916) 653-5791

RECEIVED
JAN 31 2011
NCWD

January 26, 2011

Mr. Stephen L. Cole
General Manager
Newhall County Water Agency
Post Office Box 220970
Santa Clarita, California 91322-0970

Dear Mr. Cole:

The Department of Water Resources (DWR) has reviewed the Newhall County Water Agency's (NCWA) Self-Certification Statement – Tables 1 and 2 submitted on January 18, 2011, regarding implementation of the Urban Best Management Practices (BMPs).

The purpose of DWR's review is to determine eligibility of the NCWA to receive water management grant or loan funds. DWR has followed the *Draft AB 1420 Compliance Requirements* dated June 1, 2009. For detailed information, please visit http://www.water.ca.gov/wateruseefficiency/finance/.

Based on DWR's review of the information in Tables 1 and 2, the NCWA has and is currently implementing the BMPs consistent with AB 1420 and, therefore, is eligible to receive water management grant or loan funds.

DWR reserves the right to request additional information and documentation, including reports from the NCWA to substantiate the accuracy of the information provided in Tables 1 and 2. DWR may reverse or modify its eligibility determination and notify you and the funding agency if inaccuracies are found in the supporting documentation or in Tables 1 and 2.

If you have any questions, please contact me at (916) 651-7025 or Jodi Evans at (916) 651-7026.

Sincerely,

Fethi BenJemaa
Ag Water Use Efficiency Section Chief

AB 1420 Self- Certification Statement Table 1

Note: Table 1 documents Status of Past and Current BMP implementation.

Self-Certification Statement: The Urban Water Supplier and its authorized representative certifies, under penalty of perjury, that all information and claims, stated in this table, regarding compliance and implementation of the BMPs, including alternative conservation approaches, are true and accurate. This signed AB 1420 Self-Certification Statement Table 1, and Table 2 are the basis for granting funds by the Funding Agency. Falsification and/or inaccuracies in AB 1420 Self Certification Statement Table 1, and Table 2 and in any supporting documents substantiating such claims may, at the discretion of the funding agency, result in loss of all State funds to the applicant. Additionally, the Funding Agency, in its sole discretion, may halt disbursement of grant or loan funds, not pay pending invoices, and/or pursue any other applicable legal remedy and refer the matter to the Attorney General's Office.

Name of Signatory Stephen L Cole Title of Signatory General Manager Signature of signatory Date 11/23/10

Application Date: 11/23/2010

Proposal Identification Number: CUWCC Member? Yes/No Yes

Has Urban Water Supplier submitted a 2005 Urban Water Management Plan? Yes/No Yes Is the UWM Plan Deemed Complete by DWR? Yes/No Submitting 2010

Applicant Name: Newhall County Water District

Project Title: Santa Clara River Sewer Trunk Line Relocation "Phase 1"

Applicant's Contact Information: Name: Michael Alvord Phone: 661-259-3610 E-mail: malvord@ncwd.org

Participants:

Retailer (List Below)	*Wholesaler (List Below)*
Newhall County Water District	*Castaic Lake Water Agency*

C1	C2	C3	C4	C5	*C6	C7	**C8	**C9	**C10	C11	C12	C13	C14	C15	C16	C17	C18
				BMP Implemented by Retailers and/or Wholesalers / *BMP*			Compliance Options/Alternative Conservation Approaches (1)			BMP Is Exempt (2)			BMP Implementation Requirements Met				
BMPs required for Wholesale Supplier	BMPs required for Retail Supplier	BMPs	Retailer *Yes/No*	Wholesaler *Yes/No*	Regional *Yes/No*	BMP Checklist	Flex Track	Gallons Per Capita Per Day GPCD	Not Cost Effective	Lack of Funding	Lack of Legal Authority	CUWCC MOU Requirement Met: Retailer *Yes/No*	CUWCC MOU Requirement Met: Wholesaler *Yes/No*	Date of BMP Report Submitted to CUWCC for (2007-2008) (MOU Signatories)	Date BMP Implementation Data Submitted to DWR in CUWCC Format (Non MOU Signatories) (3)	All Supporting Documents have been Submitted Yes/No
	✓	BMP 1 Water Survey for Single/Multi-Family Residential Customers	✓				✓					No		12/30/2008		Yes
	✓	BMP 2 Residential Plumbing Retrofit	✓				✓					No		12/30/2008		Yes
✓	✓	BMP 3 System Water Audits, Leak Detection	✓	✓		✓						Yes	Yes	12/30/2008		Yes
✓	✓	BMP 3 Leak Repairs	✓	✓		✓						Yes	Yes	12/30/2008		Yes
	✓	BMP 4 Metering with Commodity Rates for All New connections	✓			✓						Yes		12/30/2008		Yes
	✓	BMP 4 Retrofit of Existing Connections	✓			✓						Yes		12/30/2008		Yes

C1	C2	C3	C4	C5	*C6	C7	**C8	**C9	**C10	C11	C12	C13	C14	C15	C16	C17	C18
				BMP Implemented by Retailers and/or Wholesalers / *BMP*			**Compliance Options/Alternative Conservation Approaches (1)**			**BMP Is Exempt (2)**			**BMP Implementation Requirements Met**				
BMPs required for Wholesale Supplier	BMPs required for Retail Supplier	BMPs	Retailer *Yes/No*	Wholesaler *Yes/No*	Regional *Yes/No*	BMP Checklist	Flex Track	Gallons Per Capita Per Day GPCD	Not Cost Effective	Lack of Funding	Lack of Legal Authority	CUWCC MOU Requirement Met: Retailer *Yes/No*	CUWCC MOU Requirement Met: Wholesaler *Yes/No*	Date of BMP Report Submitted to CUWCC for (2007-2008) (MOU Signatories)	Date BMP Implementation Data Submitted to DWR in CUWCC Format (Non MOU Signatories) (3)	All Supporting Documents have been Submitted Yes/No
	✓	BMP 5 Large Landscape Conservation Programs and Incentives	✓	✓		✓						Yes		12/30/2008		Yes
	✓	BMP 6 High-Efficiency Washing Machine Rebate Programs	✓				✓					No		12/30/2008		Yes
✓	✓	BMP 7 Public Information	✓	✓		✓						Yes	Yes	12/30/2008		Yes
✓	✓	BMP 8 School Education	✓	✓		✓						Yes	Yes	12/30/2008		Yes
	✓	BMP 9 Conservation programs for Commercial, Industrial, and Institutional (CII) Accounts	✓	✓		✓						Yes		12/30/2008		Yes
✓		BMP 10 Wholesale Agency Assistance Programs		✓		✓							Yes	12/30/2008		Yes
	✓	BMP 11 Conservation Pricing	✓									Yes		12/30/2008		Yes
✓	✓	BMP 12 Conservation Coordinator	✓	✓		✓						Yes	Yes	12/30/2008		Yes
	✓	BMP 13 Water Waste Prohibitions	✓			✓						Yes		12/30/2008		Yes
	✓	BMP 14 Residential ULFT Replacement Programs	✓	✓		✓						Yes		12/30/2008		Yes

***C6:** Wholesaler may also be a retailer (supplying water to end water users)
****C8, **C9, **, and C10:** Agencies choosing an alternative conservation approach are responsible for achieving water savings equal or greater than that which they would have achieved using only BMP list.

(1) For details, please see: http://www.cuwcc.org/mou/exhibit-1-bmp-definitions-schedules-requirements.aspx.
(2) BMP is exempt based on cost-effectiveness, lack of funding, and lack of legal authority criteria as detailed in the CUWCC MOU
(3) Non MOU signatories must submit to DWR reports and supporting documents in the same format as CUWCC.

AB 1420 Self- Certification Statement Table 2

Provide Schedule, Budget, and Finance Plan to Demonstrate Commitment to Implement All BMP's to Become in Compliance with BMP Implementation - Commencing Within 1st Year of Agreement for Which Applicant Receives Funds.

Self-Certification Statement: The Urban Water Supplier and its authorized representative certifies, under penalty of perjury, that all information and claims, stated in this table, regarding compliance and implementation of the BMPs, including alternative conservation approaches, are true and accurate. This signed AB 1420 Self-Certification Statement Table 1 and Table 2 are the basis for granting funds by the Funding Agency. Falsification and/or inaccuracies in AB 1420 Self Certification Statement Table 1 and Table 2, and in any supporting documents substantiating such claims may, at the discretion of the funding agency, result in loss of all State funds to the applicant. Additionally, the Funding Agency, in its sole discretion, may halt disbursement of grant or loan funds, not pay pending invoices, and/or pursue any other applicable legal remedy and refer the matter to the Attorney General's Office.

Name of Signatory Stephen L Cole Title of Signatory General Manager Signature of signatory _____ Date 11/23/10

Application Date: 11/23/2010

Proposal Identification Number: | CUWCC Member? Yes/No: Yes

Applicant Name: Newhall County Water District | Is the UWM Plan Deemed Complete by DWR? Yes/No: Submitting 2010

Project Title: Santa Clara River Sewer Trunk Line Relocation "Phase 1"

Applicant's Contact Information: Name: Michael Alvord

	Retailer (List Below)		
Participants:	Newhall County Water District		

C1	C2	C3	C4	C5	*C6	C7	C8	**C9	**C10	**C11	C12			C13	C14	C15	C16	C17	C18	C19
				BMP Implemented by Retailers and/or Wholesalers				Compliance Options / Alternative Conservation Approaches (1)			BMP is Exempt (2)			Implementation Scheduled to Commence within 1st Year of Agreement						
CUWCC 2010 Flex Track BMPs	BMPs required for Wholesale Supplier	BMPs required for Retail Supplier	BMPs	Retailer *Yes/No*	Wholesaler *Yes/No*	Regional *Yes/No*	Alternative Conservation Approaches Yes/No	BMP Checklist	Flex Track	Gallons Per Capita Per Day GPCD	Not Cost Effective	Lack of Funding	Lack of Legal Authority	Start Date (MM/YR)	Completion Level (%)	BMP Completion Date (MM/YR)	Budget (Dollars)	Funding Source & Finance Plan to Implement BMPs	Meets CUWCC Coverage Yes/No	Funds Requested, if Available. (See AB 1420 Compliance Table 3) Yes/No
	1. Utility Operations Programs																			
1.11			BMP 12 Conservation Coordinator																	
1.12			BMP 13 Water Waste Prohibitions																	
1.13			BMP 10 Wholesale Agency Assistance Programs																	
1.20			BMP 3 System Water Audits, Leak Detection/Repair																	
1.30			BMP 4 Metering with Commodity Rates for All New/**Retrofit of Existing** connections																	
1.40			BMP 11 Conservation Pricing																	
	2. Educational Programs																			
2.10			BMP 7 Public Information																	
2.20			BMP 8 School Education																	
	3. Residential																			
3.11		✓	BMP 1 **Indoor** Water Survey for Single/Multi-Family Residential Customers	Yes	No		Yes		✓					Jul-11	90%	Jun-13	$2,500.00	Water Rates	Yes	
3.12		✓	BMP 1 **Outdoor** Water Survey for Single/Multi-Family Residential Customers	Yes	No		Yes		✓					Jul-11	90%	Jun-13	$2,500.00	Water Rates	Yes	
3.20		✓	BMP 2 Residential Plumbing Retrofit	Yes	No		Yes		✓					Jul-11	50%	Jun-15	$6,000.00	Water Rates	Yes	

CUWCC 2010 Flex Track BMPs	BMPs required for Wholesale Supplier	BMPs required for Retail Supplier	BMPs	BMP Implemented by Retailers and/or Wholesalers				Compliance Options / Alternative Conservation Approaches (1)			BMP is Exempt (2)			Implementation Scheduled to Commence within 1st Year of Agreement						
				Retailer *Yes/No*	Wholesaler *Yes/No*	Regional *Yes/No*	Alternative Conservation Approaches Yes/No	BMP Checklist	Flex Track	Gallons Per Capita Per Day GPCD	Not Cost Effective	Lack of Funding	Lack of Legal Authority	Start Date (MM/YR)	Completion Level (%)	BMP Completion Date (MM/YR)	Budget (Dollars)	Funding Source & Finance Plan to Implement BMPs	Meets CUWCC Coverage Yes/No	Funds Requested, if Available. (See AB 1420 Compliance Table 3) Yes/No
3.30		✓	BMP 6 High-Efficiency Washing Machine Rebate Programs	Yes	No		Yes		✓					Jul-11	0%	Jun-17	$18,000.00	Water Rates	Yes	
3.40			BMP 14 Residential ULFT Replacement Programs																	
4. Commercial, Industrial, Institutional																				
4.00			BMP 9 Conservation programs for Commercial, Industrial, and Institutional (CII) Accounts																	
5. Landscape																				
5.00			BMP 5 Large Landscape Conservation Programs and Incentives																	

*C6: Wholesaler may also be a retailer (supplying water to end water users)
**C9, ** C10, and **C11: Agencies choosing an alternative conservation approach are responsible for achieving water savings equal or greater than that which they would have achieved using only BMP list.
(1) For details, please see http://www.cuwcc.org/mou/exhibit-1-bmp-definitions-schedules-requirements.aspx.
(2) BMP is exempt based on cost-effectiveness, lack of funding, or lack of legal authority, as detailed in the CUWCC MOU.

STATE OF CALIFORNIA – CALIFORNIA NATURAL RESOURCES AGENCY EDMUND G. BROWN JR., *Governor*

DEPARTMENT OF WATER RESOURCES
1416 NINTH STREET, P.O. BOX 942836
SACRAMENTO, CA 94236-0001
(916) 653-5791

January 26, 2011

Mr. Matthew Dickens
Resource Conservation Manager
Valencia Water Company
Post Office Box 5904
24631 Avenue Rockefeller
Valencia, California 91380

Dear Mr. Dickens:

The Department of Water Resources (DWR) has reviewed the Valencia Water Company's (VWC) Self-Certification Statement – Table 1 submitted on January 13, 2011, regarding implementation of the Urban Best Management Practices (BMPs).

The purpose of DWR's review is to determine eligibility of the VWC to receive water management grant or loan funds. DWR has followed the *Draft AB 1420 Compliance Requirements* dated June 1, 2009. For detailed information, please visit http://www.water.ca.gov/wateruseefficiency/finance/.

Based on DWR's review of the information in Table 1, the VWC has and is currently implementing the BMPs consistent with AB 1420 and, therefore, is eligible to receive water management grant or loan funds.

DWR reserves the right to request additional information and documentation, including reports from the VWC to substantiate the accuracy of the information provided in Table 1. DWR may reverse or modify its eligibility determination and notify you and the funding agency if inaccuracies are found in the supporting documentation or in Table 1.

If you have any questions, please contact me at (916) 651-7025 or Jodi Evans at (916) 651-7026.

Sincerely,

Fethi BenJemaa
Ag Water Use Efficiency Section Chief

AB 1420 Self- Certification Statement Table 1

Note: Table 1 documents Status of Past and Current BMP implementation.

Self-Certification Statement: The Urban Water Supplier and its authorized representative certifies, under penalty of perjury, that all information and claims, stated in this table, regarding compliance and implementation of the BMPs, including alternative conservation approaches, are true and accurate. This signed AB 1420 Self-Certification Statement Table 1, and Table 2 are the basis for granting funds by the Funding Agency. Falsification and/or inaccuracies in AB 1420 Self Certification Statement Table 1, and Table 2 and in any supporting documents substantiating such claims may, at the discretion of the funding agency, result in loss of all State funds to the applicant. Additionally, the Funding Agency, in its sole discretion, may halt disbursement of grant or loan funds, not pay pending invoices, and/or pursue any other applicable legal remedy and refer the matter to the Attorney General's Office.

Name of Signatory Matthew S. Dickens **Title of Signatory** Resource Conservation Manager **Signature of signatory** _____ **Date** 12/21/2010

Application Date:

Proposal Identification Number: _____ **CUWCC Member? Yes/No** Yes

Has Urban Water Supplier submitted a 2005 Urban Water Management Plan? Yes/No Yes **Is the UWM Plan Deemed Complete by DWR? Yes/No** Yes

Applicant Name: Castaic Lake Water Agency

Project Title:

Applicant's Contact Information: **Name:** Matthew S. Dickens **Phone:** 661-295-6543 **E-mail:** mdickens@valenciawater.com

Participants:

Retailer (List Below)	*Wholesaler (List Below)*
Valencia Water Company	*Castaic Lake Water Agency*

C1	C2	C3	C4	C5	*C6	C7	**C8	**C9	**C10	C11	C12	C13	C14	C15	C16	C17	C18
				BMP Implemented by Retailers and/or Wholesalers / *BMP*			**Compliance Options/Alternative Conservation Approaches (1)**			**BMP Is Exempt (2)**			**BMP Implementation Requirements Met**				
BMPs required for Wholesale Supplier	BMPs required for Retail Supplier	BMPs	Retailer *Yes/No*	Wholesaler *Yes/No*	Regional *Yes/No*	BMP Checklist	Flex Track	Gallons Per Capita Per Day GPCD	Not Cost Effective	Lack of Funding	Lack of Legal Authority	CUWCC MOU Requirement Met: Retailer *Yes/No*	CUWCC MOU Requirement Met: Wholesaler *Yes/No*	Date of BMP Report Submitted to CUWCC for (2007-2008) (MOU Signatories)	Date BMP Implementation Data Submitted to DWR in CUWCC Format (Non MOU Signatories) (3)	All Supporting Documents have been Submitted Yes/No	
	✓	BMP 1 Water Survey for Single/Multi-Family Residential Customers	Yes			X						Yes		3/30/2009		Yes	
	✓	BMP 2 Residential Plumbing Retrofit	Yes			X						Yes		3/30/2009		Yes	
✓	✓	BMP 3 System Water Audits, Leak Detection	Yes			X						Yes		3/30/2009		Yes	
✓	✓	BMP 3 Leak Repairs	Yes			X						Yes		3/30/2009		Yes	
	✓	BMP 4 Metering with Commodity Rates for All New connections	Yes			X						Yes		3/30/2009		Yes	
	✓	BMP 4 Retrofit of Existing Connections	Yes			X						Yes		3/30/2009		Yes	

C1	C2	C3	C4	C5	*C6	C7	**C8	**C9	**C10	C11	C12	C13	C14	C15	C16	C17	C18
				BMP Implemented by Retailers and/or Wholesalers / *BMP*			**Compliance Options/Alternative Conservation Approaches (1)**			**BMP Is Exempt (2)**			**BMP Implementation Requirements Met**				
BMPs required for Wholesale Supplier	BMPs required for Retail Supplier	BMPs	Retailer *Yes/No*	Wholesaler *Yes/No*	Regional *Yes/No*	BMP Checklist	Flex Track	Gallons Per Capita Per Day GPCD	Not Cost Effective	Lack of Funding	Lack of Legal Authority	CUWCC MOU Requirement Met: Retailer *Yes/No*	CUWCC MOU Requirement Met: Wholesaler *Yes/No*	Date of BMP Report Submitted to CUWCC for (2007-2008) (MOU Signatories)	Date BMP Implementation Data Submitted to DWR in CUWCC Format (Non MOU Signatories) (3)	All Supporting Documents have been Submitted Yes/No
	✓	BMP 5 Large Landscape Conservation Programs and Incentives	Yes			X						Yes		3/30/2009		Yes
	✓	BMP 6 High-Efficiency Washing Machine Rebate Programs	Yes			X						No		3/30/2009		Yes
✓	✓	BMP 7 Public Information	Yes			X						Yes		3/30/2009		Yes
✓	✓	BMP 8 School Education	Yes			X						Yes		3/30/2009		Yes
	✓	BMP 9 Conservation programs for Commercial, Industrial, and Institutional (CII) Accounts	Yes			X						Yes		3/30/2009		Yes
✓		BMP 10 Wholesale Agency Assistance Programs	NA			NA						NA		NA		NA
	✓	BMP 11 Conservation Pricing	Yes			X						Yes		3/30/2009		Yes
✓	✓	BMP 12 Conservation Coordinator	Yes			X						Yes		3/30/2009		Yes
	✓	BMP 13 Water Waste Prohibitions	Yes			X						Yes		3/30/2009		Yes
	✓	BMP 14 Residential ULFT Replacement Programs	Yes			X						Yes		3/30/2009		Yes

***C6:** Wholesaler may also be a retailer (supplying water to end water users)

****C8, **C9, **, and C10:** Agencies choosing an alternative conservation approach are responsible for achieving water savings equal or greater than that which they would have achieved using only BMP list.

(1) For details, please see: http://www.cuwcc.org/mou/exhibit-1-bmp-definitions-schedules-requirements.aspx.
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AB 1420 Self- Certification Statement Table 2

Provide Schedule, Budget, and Finance Plan to Demonstrate Commitment to Implement All BMP's to Become in Compliance with BMP Implementation - Commencing Within 1st Year of Agreement for Which Applicant Receives Funds.

Self-Certification Statement: The Urban Water Supplier and its authorized representative certifies, under penalty of perjury, that all information and claims, stated in this table, regarding compliance and implementation of the BMPs, including alternative conservation approaches, are true and accurate. This signed AB 1420 Self-Certification Statement Table 1 and Table 2 are the basis for granting funds by the Funding Agency. Falsification and/or inaccuracies in AB 1420 Self Certification Statement Table 1 and Table 2, and in any supporting documents substantiating such claims may, at the discretion of the funding agency, result in loss of all State funds to the applicant. Additionally, the Funding Agency, in its sole discretion, may halt disbursement of grant or loan funds, not pay pending invoices, and/or pursue any other applicable legal remedy and refer the matter to the Attorney General's Office.

Name of Signatory Matthew S. Dickens Title of Signatory Resource Conservation Manager Signature of signatory _____ Date 12/22/2010

Application Date:

Proposal Identification Number:

CUWCC Member? Yes/No: Yes

Applicant Name: Castaic Water Agency

Is the UWM Plan Deemed Complete by DWR? Yes/No: Yes

Project Title:

Applicant's Contact Information: Name: Matthew S. Dickens

	Retailer (List Below)		
Participants:	Valencia Water Company		

C1	C2	C3	C4	C5	*C6	C7	C8	**C9	**C10	**C11	C12			C13	C14	C15	C16	C17	C18	C19
				BMP Implemented by Retailers and/or Wholesalers				Compliance Options / Alternative Conservation Approaches (1)			BMP is Exempt (2)			Implementation Scheduled to Commence within 1st Year of Agreement						
CUWCC 2010 Flex Track BMPs	BMPs required for Wholesale Supplier	BMPs required for Retail Supplier	BMPs	Retailer *Yes/No*	Wholesaler *Yes/No*	Regional *Yes/No*	Alternative Conservation Approaches Yes/No	BMP Checklist	Flex Track	Gallons Per Capita Per Day GPCD	Not Cost Effective	Lack of Funding	Lack of Legal Authority	Start Date (MM/YR)	Completion Level (%)	BMP Completion Date (MM/YR)	Budget (Dollars)	Funding Source & Finance Plan to Implement BMPs	Meets CUWCC Coverage Yes/No	Funds Requested, if Available. (See AB 1420 Compliance Table 3) Yes/No
1. Utility Operations Programs																				
1.11	✓	✓	BMP 12 Conservation Coordinator	Yes				X												
1.12		✓	BMP 13 Water Waste Prohibitions	Yes				X												
1.13	✓		BMP 10 Wholesale Agency Assistance Programs																	
1.20	✓	✓	BMP 3 System Water Audits, Leak Detection/**Repair**	Yes				X												
1.30		✓	BMP 4 Metering with Commodity Rates for All New/**Retrofit of Existing** connections	Yes				X												
1.40		✓	BMP 11 Conservation Pricing	Yes				X												
2. Educational Programs																				
2.10	✓	✓	BMP 7 Public Information	Yes				X												
2.20	✓	✓	BMP 8 School Education	Yes				X												
3. Residential																				
3.11		✓	BMP 1 **Indoor** Water Survey for Single/Multi-Family Residential Customers	Yes				X												
3.12		✓	BMP 1 **Outdoor** Water Survey for Single/Multi-Family Residential Customers	Yes				X												
3.20		✓	BMP 2 Residential Plumbing Retrofit	Yes				X												

CUWCC 2010 Flex Track BMPs	BMPs required for Wholesale Supplier	BMPs required for Retail Supplier	BMPs	BMP Implemented by Retailers and/or Wholesalers			Compliance Options / Alternative Conservation Approaches (1)				BMP is Exempt (2)			Implementation Scheduled to Commence within 1st Year of Agreement						
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3.30		✓	BMP 6 High-Efficiency Washing Machine Rebate Programs	Yes				X			X									
3.40		✓	BMP 14 Residential ULFT Replacement Programs	Yes				X												
4. Commercial, Industrial, Institutional																				
4.00		✓	BMP 9 Conservation programs for Commercial, Industrial, and Institutional (CII) Accounts	Yes				X												
5. Landscape																				
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STATE OF CALIFORNIA – CALIFORNIA NATURAL R. URCES AGENCY
EDMUND G. BROWN JR., *Governor*

DEPARTMENT OF WATER RESOURCES
1416 NINTH STREET, P.O. BOX 942836
SACRAMENTO, CA 94236-0001
(916) 653-5791

March 16, 2011

Ms. Cathy Z. Hollomon
Associate Water Resources Planner
Santa Clarita Water District
Post Office Box 903
Santa Clarita, California 91380-9003

Dear Ms. Hollomon:

The Department of Water Resources (DWR) has reviewed the Santa Clarita Water District's (SCWD) Self-Certification Statement – Tables 1 and 2 submitted on February 15, 2011, regarding implementation of the Urban Best Management Practices (BMPs).

The purpose of DWR's review is to determine eligibility of SCWD to receive water management grant or loan funds. DWR has followed the *Draft AB 1420 Compliance Requirements* dated June 1, 2009. For detailed information, please visit http://www.water.ca.gov/wateruseefficiency/finance/.

Based on DWR's review of the information in Tables 1 and 2, SCWD has and is currently implementing the BMPs consistent with AB 1420 and, therefore, is eligible to receive water management grant or loan funds.

DWR reserves the right to request additional information and documentation, including reports from SCWD to substantiate the accuracy of the information provided in Tables 1 and 2. DWR may reverse or modify its eligibility determination and notify you and the funding agency if inaccuracies are found in the supporting documentation or in Tables 1 and 2.

If you have any questions, please contact me at (916) 651-7025 or Jodi Evans at (916) 651-7026.

Sincerely,

Fethi BenJemaa
Ag Water Use Efficiency Section Chief

AB 1420 Self- Certification Statement Table 1

Note: Table 1 documents Status of Past and Current BMP implementation.

Self-Certification Statement: The Urban Water Supplier and its authorized representative certifies, under penalty of perjury, that all information and claims, stated in this table, regarding compliance and implementation of the BMPs, including alternative conservation approaches, are true and accurate. This signed AB 1420 Self-Certification StatementTable 1, and Table 2 are the basis for granting funds by the Funding Agency. Falsification and□or inaccuracies in AB 1420 Self Certification Statement Table 1,and Table 2 and in any supporting documents substantiating such claims may, at the discretion of the funding agency, result in loss of all State funds to the applicant. Additionally, theFunding Agency, in its sole discretion, may halt disbursement of grant or loan funds, not pay pending invoices, and□or pursue any other applicable legal remedy and refer the matter to the Attorney General's Office.

Name of Signatory Cathy Z. Hollomon **Title of Signatory** Associate Water resources Planner **Signature of signatory** □□□□□□□□□□□□□□□□□□□□□□□□□□□□□ **Date** □□□□□□□□□□□□□□□□□

Application Date:

Proposal Identification Number: **CUWCC Member? Yes No** No (see letter)

Has Urban Water Supplier submitted a 2005 Urban Water Management Plan? Yes□No Yes **Is the UWM Plan Deemed Complete by DWR? Yes□No** Yes

Applicant Name: Santa Clarita Water Division

Project Title:

Applicant's Contact Information: **Name:** Cathy Z. Hollomon **Phone:** 661-964-3997 **E-mail:** chollomon□scwater.org

Participants:

Retailer (List Below)	*Wholesaler (List Below)*
Santa Clarita water Division	

C1 C2 C3 C4 C5 □C6 C7 □C8 □C9 □C10 C11 C12 C13 C14 C15 C16 C17 C18

BMPs required for Wholesale Supplier	BMPs required for Retail Supplier	BMPs	BMP Implemented by Retailers and□or Wholesalers / *BMP*			Compliance Options□Alternative Conservation Approaches (1)			BMP Is Exempt (2)			BMP Implementation Requirements Met				
			Retailer *Yes/No*	Wholesaler *Yes/No*	Regional *Yes/No*	BMP Checklist	Flex Track	Gallons Per Capita Per Day GPCD	Not Cost Effective	Lack of Funding	Lack of Legal Authority	CUWCC MOU Requirement Met: Retailer *Yes/No*	CUWCC MOU Requirement Met: Wholesaler *Yes/No*	Date of BMP Report Submitted to CUWCC for (2007-2008) (MOU Signatories)	Date BMP Implementation Data Submitted to DWR in CUWCC Format (Non MOU Signatories) (3)	All Supporting Documents have been Submitted Yes/No
	✓	BMP 1 Water Survey for Single/Multi-Family Residential Customers	✓				✓					No		3/2/2008		Yes
	✓	BMP 2 Residential Plumbing Retrofit	✓			✓						No		3/2/2008		Yes
✓	✓	BMP 3 System Water Audits, Leak Detection	✓			✓						Yes		3/2/2008		Yes
✓	✓	BMP 3 Leak Repairs	✓			✓						Yes		3/2/2008		Yes
	✓	BMP 4 Metering with Commodity Rates for All New connections	✓			✓						Yes		3/2/2008		Yes
	✓	BMP 4 Retrofit of Existing Connections	✓			✓						Yes		3/2/2008		Yes

C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14	C15	C16	C17	C18
				BMP Implemented by Retailers and/or Wholesalers / *BMP*			**Compliance Options/Alternative Conservation Approaches (1)**			**BMP Is Exempt (2)**			**BMP Implementation Requirements Met**				
BMPs required for Wholesale Supplier	BMPs required for Retail Supplier	BMPs	Retailer *Yes/No*	Wholesaler *Yes/No*	Regional *Yes/No*	BMP Checklist	Flex Track	Gallons Per Capita Per Day GPCD	Not Cost Effective	Lack of Funding	Lack of Legal Authority	CUWCC MOU Requirement Met: Retailer *Yes/No*	CUWCC MOU Requirement Met: Wholesaler *Yes/No*	Date of BMP Report Submitted to CUWCC for (2007-2008) (MOU Signatories)	Date BMP Implementation Data Submitted to DWR in CUWCC Format (Non MOU Signatories) (3)	All Supporting Documents have been Submitted Yes/No
	✓	BMP 5 Large Landscape Conservation Programs and Incentives	✓		✓	✓						No		3/2/2008		Yes
	✓	BMP 6 High-Efficiency Washing Machine Rebate Programs	✓			✓						No		3/2/2008		Yes
✓	✓	BMP 7 Public Information	✓		✓	✓						Yes		3/2/2008		Yes
✓	✓	BMP 8 School Education	✓		✓	✓						Yes		3/2/2008		Yes
	✓	BMP 9 Conservation programs for Commercial, Industrial, and Institutional (CII) Accounts	✓			✓						No		3/2/2008		Yes
✓		BMP 10 Wholesale Agency Assistance Programs										NA				Yes
	✓	BMP 11 Conservation Pricing	✓			✓						Yes		3/2/2008		Yes
✓	✓	BMP 12 Conservation Coordinator	✓			✓						Yes		3/2/2008		Yes
	✓	BMP 13 Water Waste Prohibitions	✓			✓						Yes		3/2/2008		Yes
	✓	BMP 14 Residential ULFT Replacement Programs	✓		✓	✓						No		3/2/2008		Yes

C6: Wholesaler may also be a retailer (supplying water to end water users)
C8, C9, and C10: Agencies choosing an alternative conservation approach are responsible for achieving water savings equal or greater than that which they would have achieved using only BMP list.

(1) For details, please see: http://www.cuwcc.org/mou/exhibit-1-bmp-definitions-schedules-requirements.aspx.
(2) BMP is exempt based on cost-effectiveness, lack of funding, and lack of legal authority criteria as detailed in the CUWCC MOU
(3) Non MOU signatories must submit to DWR reports and supporting documents in the same format as CUWCC.

AB 1420 Self- Certification Statement Table 2

Provide Schedule, Budget, and Finance Plan to Demonstrate Commitment to Implement All BMP's to Become in Compliance with BMP Implementation - Commencing Within 1st Year of Agreement for Which Applicant Receives Funds.

Self-Certification Statement: The Urban Water Supplier and its authorized representative certifies, under penalty of perjury, that all information and claims, stated in this table, regarding compliance and implementation of the BMPs, including alternative conservation approaches, are true and accurate. This signed AB 1420 Self-Certification Statement Table 1 and Table 2 are the basis for granting funds by the Funding Agency. Falsification and□or inaccuracies in AB 1420 Self Certification Statement Table 1 and Table 2, and in any supporting documents substantiating such claims may, at the discretion of the funding agency, result in loss of all State funds to the applicant. Additionally, the Funding Agency, in its sole discretion, may halt disbursement of grant or loan funds, not pay pending invoices, and□or pursue any other applicable legal remedy and refer the matter to the Attorney General's Office.

Name of Signatory□Cathy Z. Hollomon□□□Title of Signatory □Associate Water Resources PLanner□ Signature of signatory□□□□□□□□□□□□□□□□□□□□□□□□ Date □□□□□□□□□□□□□□□□□□□□

Application Date:

Proposal Identification Number:

CUWCC Member? Yes□No: No (see letter)

Applicant Name: Cathy Z. Hollomon

Is the UWM Plan Deemed Complete by DWR? Yes□No: Yes

Project Title:

Applicant's Contact Information: **Name** Santa Clarita Water Division

	Retailer (List Below)		
Participants:			

C1	C2	C3	C4	C5	□C6	C7	C8	□C9	□C10	□C11	C12			C13	C14	C15	C16	C17	C18	C19
				BMP Implemented by Retailers and□or Wholesalers				**Compliance Options □ Alternative Conservation Approaches (1)**			**BMP is Exempt (2)**			**Implementation Scheduled to Commence within 1st Year of Agreement**						
CUWCC 2010 Flex Track BMPs	BMPs required for Wholesale Supplier	BMPs required for Retail Supplier	BMPs	Retailer *Yes/No*	Wholesaler *Yes/No*	Regional *Yes/No*	Alternative Conservation Approaches Yes/No	BMP Checklist	Flex Track	Gallons Per Capita Per Day GPCD	Not Cost Effective	Lack of Funding	Lack of Legal Authority	Start Date (MM/YR)	Completion Level (□)	BMP Completion Date (MM/YR)	Budget (Dollars)	Funding Source & Finance Plan to Implement BMPs	Meets CUWCC Coverage Yes/No	Funds Requested, if Available. (See AB 1420 Compliance Table 3) Yes/No
	1. Utility Operations Programs																			
1.11	✓	✓	BMP 12 Conservation Coordinator																	
1.12		✓	BMP 13 Water Waste Prohibitions																	
1.13	✓	✓	BMP 10 Wholesale Agency Assistance Programs																	
1.20	✓	✓	BMP 3 System Water Audits, Leak Detection/**Repair**																	
1.30		✓	BMP 4 Metering with Commodity Rates for All New/**Retrofit of Existing** connections																	
1.40		✓	BMP 11 Conservation Pricing																	
	2. Educational Programs																			
2.10	✓	✓	BMP 7 Public Information																	
2.20	✓	✓	BMP 8 School Education																	
	3. Residential																			
3.11		✓	BMP 1 **Indoor** Water Survey for Single/Multi-Family Residential Customers						✓					Jul-08	30	Jun-15	program to be combined with BMP 5 - large landscape Conservation, which focuses on HOA properties	water rates	Yes	

CUWCC 2010 Flex Track BMPs	BMPs required for Wholesale Supplier	BMPs required for Retail Supplier	BMPs	BMP Implemented by Retailers and/or Wholesalers				Compliance Options / Alternative Conservation Approaches (1)			BMP is Exempt (2)			Implementation Scheduled to Commence within 1st Year of Agreement						
				Retailer *Yes/No*	Wholesaler *Yes/No*	Regional *Yes/No*	Alternative Conservation Approaches Yes/No	BMP Checklist	Flex Track	Gallons Per Capita Per Day GPCD	Not Cost Effective	Lack of Funding	Lack of Legal Authority	Start Date (MM/YR)	Completion Level (%)	BMP Completion Date (MM/YR)	Budget (Dollars)	Funding Source & Finance Plan to Implement BMPs	Meets CUWCC Coverage Yes/No	Funds Requested, if Available. (See AB 1420 Compliance Table 3) Yes/No
3.12			BMP 1 **Outdoor** Water Survey for Single/Multi-Family Residential Customers						✓					Jul-09	30	Jun-15	program to be combined with BMP 5 - large landscape Conservation, which focuses on HOA properties	water rates	Yes	
3.20		✓	BMP 2 Residential Plumbing Retrofit					✓						Jun-08	80	Jun-13	$4,000	water rates	Yes	
3.30		✓	BMP 6 High-Efficiency Washing Machine Rebate Programs					✓						Jul-11	0	Jun-20	$37,500	water rates	Yes	
3.40		✓	BMP 14 Residential ULFT Replacement Programs					✓						Jun-07	40	Jun-15	$20,000	water rates	Yes	
	4. Commercial, Industrial, Institutional																			
4.00		✓	BMP 9 Conservation programs for Commercial, Industrial, and Institutional (CII) Accounts					✓						Jun-09	20	Jun-15	$30,000	water rates	Yes	
	5. Landscape																			
5.00		✓	BMP 5 Large Landscape Conservation Programs and Incentives					✓						Jun-09	20	Jun-15	$100,000	water rates	Yes	

C6: Wholesaler may also be a retailer (supplying water to end water users)
C9, C10, and C11: Agencies choosing an alternative conservation approach are responsible for achieving water savings equal or greater than that which they would have achieved using only BMP list.
(1) For details, please see http://www.cuwcc.org/mou/exhibit-1-bmp-definitions-schedules-requirements.aspx.
(2) BMP is exempt based on cost-effectiveness, lack of funding, or lack of legal authority, as detailed in the CUWCC MOU.

CLWA DMM Materials

CUWCC BMP COVERAGE REPORT FOR WHOLESALE AGENCIES

Foundation Best Management Practices for Urban Water Efficiency

Agency: Castaic Lake Water Agency **District Name:** Castaic Lake Water Agency **CUWCC Unit #:** 6278

Primary Contact Stephanie Anagnoson **Email:** sanagnoson@clwa.org

Base Year: Calendar or FiscalYear Reporting **Report Date:** 27-May-11

Foundational BMPs

BMP 1.1.3 Wholesale Agency Assistance Programs

Date of 2009 Data Download

Date of 2010 Data Download

a) Financial investments and building partnerships Value of resources provided to retailers for: 2009	2009 Monetary Amount for Financial Incentives	2009 Monetary Amount for Equivalent Resources
BMP 2.1 Public Outreach	$ 81,000	$ 200,700
BMP 2.2 Education	$ 100,000	$ 266,373
BMPs 3, 4, 5 (not designated by BMP)	$ 43,975	$ 133,773
Total Value of Resources	$ 224,975	$ 600,846
	On Track	On Track

"On Track" if Retailer accepted offer and Wholesaler provided resources. "Not on Track" if Retailer accepted offer and Wholesaler did not provde resources.

a) Financial investments and building partnerships Value of resources provided to retailers for: 2010	2010 Monetary Amount for Financial Incentives	2010 Monetary Amount for Equivalent Resources
BMP 2.1 Public Outreach	$ 89,000	$ 264,200
BMP 2.2 Education	$ 108,000	$ 244,195
BMPs 3, 4, 5 (not designated by BMP)	$ 127,645	$ 671,593
Total Value of Resources	$ 324,645	$ 1,179,988
	On Track	On Track

Agency: **Castaic Lake Water Agency** District Name: **Castaic Lake Water Agency** CUWCC Unit #: **6278**

	2009 Technical Support Description	2010 Technical Support Description	
b) Technical Support	Provide conservation coordinator servies; fund and prepare Urban Water Management Plan and other planning documents; conduct Valley-wide public outreach for conservation.	Provide conservation coordinator services; fund and prepare Urban Water Management Plan and other planning documents; conduct Valley-wide public outreach for conservation; manage residential high-efficiency toilet rebate program, residential landscape program (with weather-based irrigation incentive), commercial, industrial and institutional program and large landscape audit program.	" On Track" if Retailer accepted and Wholesaler provided and described Technical Support
	On Track	On Track	

	2009		2010	
	c) Retail Angency	Programs Managed for Retailers	c) Retail Angency	Programs Managed for Retailers
				" On Track" if Retailer accepted and Wholesaler provided and lists programs managed for retailers

	2009		2010	
d) Water Shortage Allocation				
Has Water shortage plan or policy been adopted?	November 9, 2005	Adoption Date	November 9, 2005	"OnTrack" if plan /policy adopted and document provided. "Not on Track" if no water shortage plan or policy adopted or document not provided.
	2005UWMPCh8WaterShortage	File Name	2005UWMPCh8WaterShortage	
	On Track		On Track	
e) Non signatory Reporting of BMP implementation by non-signatory agencies	n/a		n/a	Report if possible

	List Efforts to recruit retailers	List Efforts to recruit retailers	
f) Encourage CUWCC Membership List Efforts to recruit retailers	Santa Clarita Water Division has been encouraged to join during conservation coordinator meetings.	Santa Clarita Water Division has been encouraged to join during conservation coordinator meetings.	"On Track" if efforts listed or dues paid.
	On Track	On Track	

Agency: **Castaic Lake Water Agency** District Name: **Castaic Lake Water Agency** CUWCC Unit #: **6278**

BMP 1.2 Water Loss Control

Date of 2009 Data Submittal: N/A
Date of 2010 Data Submittal: June 1, 2011

	2009	
Complete a prescreening Audit	Yes	On Track if Yes
Metered Sales AF	37,820	Metered sales to retail agencies
Verifiable Other Uses AF	37,820	
Total Supply AF	39,051	Into wholesale system
(Metered Sales + System uses)/ Total Supply >0.89	1.94	On Track if >0.89, Not on Track if No
If ratio is less than 0.9, complete a full scale Audit in 2009?	Yes	On Track if Yes
Verify Data with Records on File?	Yes	On Track if Yes
Operate a system Leak Detection Program?	Yes	On Track if Yes
Comments	On Track	

For wholesalers AWWA methodology applies to supplies to wholesalers, sales to retail agencies or sub wholesalers, and pipelines operated by wholesalers. End use retail customers are not considered in this

	2010	
Compile Standard Water Audit using AWWA Software?	Yes	On Track if Yes, Not on Track if No
AWWA file provided to CUWCC?	Yes	On Track if Yes, Not on Track if No
AWWA Water Audit Validity Score?	77	Info only until 2012
Completed Training in AWWA Audit Method?	no	Info only until 2012
Completed Training in Component Analysis Process?	No	Info only until 2012
Complete Component Analysis?	no	Info only until 2012
Repaired all leaks and breaks to the extent cost effective?	Yes	On Track if Yes, Not on Track if No
Locate and repair unreported leaks to the extent cost effective.	Yes	On Track if Yes, Not on Track if No
Maintain a record-keeping system for the repair of reported leaks, including time of report, leak location, type of leaking pipe segment or fitting, and leak running time from report to repair.		Info only until 2012
Provided 7 types of Water Loss Control Info		info only until 2012

Leaks Repaire	Value Real Losses	Value Apparent Losses	Miles Surveyed	Press Reduction	Cost Interventions	Water Lost from Leaks AF
0	$ 560,689	$ 152,318	0	No	$ -	no data

On Track

Agency: **Castaic Lake Water Agency** District Name: **Castaic Lake Water Agency** CUWCC Unit #: **6278**

1.3 METERING WITH COMMODITY RATES FOR ALL NEW CONNECTIONS AND RETROFIT OF EXISTING CONNECTIONS

Date of 2009 Data Submittal: June 1, 2011
Date of 2010 Data Submittal: June 1, 2011

	2009	2010	
Exemption requested?	No	No	
At least as Effective As Requested?	No	No	
Does Agency have Unmetered Deliveries to Retail Agencies or Other Wholesalers?	No	No	
Metered Accounts billed by volume of use	Yes	Yes	Volumetric billing required for all connections on same schedule as metering
Completed a written plan, policy or program to test, repair and replace meters	No	No	info only until 2012
	On Track	On Track	

Agency: Castaic Lake Water Agency
WHOLESALE Water Supplier

District Name: Castaic Lake Water Agency

CUWCC Unit #: 6278

Coverage Report Date: May 19, 2011

Primary Contact Stephanie Anagnoson

Email: sanagnoson@clwa.org

BMP 2. EDUCATION PROGRAMS

date 2009 datafile downloaded: June 1, 2011

date 2010 datafile downloaded:

BMP 2.1 Public Outreach Actions Implemented and Reported to CUWCC

	2009	2010
1) Contacts with the public (minimum 4 times per year)	134	129
2) Water supplier contacts with media (minimum 4 times per year, i.e., at least quarterly).	219	50
3) An actively maintained website that is updated regularly (minimum 4 times per year, i.e., at least quarterly).	Yes	Yes
4) Description of materials used to meet minimum requirement.	Website General water conservation information Email Messages Newsletter articles on conservation Articles or stories resulting from outreach Editorial board visits News releases Radio contacts	Newsletter articles on conservation Website General water conservation information Email Messages Landscape water conservation media campaig Articles or stories resulting from outreach Editorial board visits Radio and TV contacts
5) Annual budget for public outreach program.	$ 378,747	$ 1,063,235
6) Description of all other outreach programs	n/a	watering index (updated weekly) 3 Easy Tips (water conservation social marketing campaign) (updated throughout the summer) Water Conservation Tips (updated weekly) Cll Water Conservation (updated throughout year)
	On Track for 5 Actions	On Track for 5 Actions

All 6 action types implemented and reported to CUWCC to be 'On Track')

Agency: **Castaic Lake Water Agency** District Name: **Castaic Lake Water Agency** CUWCC Unit □: **6278**

WHOLESALE Water Supplier Coverage Report Date: May 19, 2011

2.2 School Education Programs Implemented and Reported to CUWCC

date 2009 datafile downloaded: June 1, 2011

date 2010 datafile downloaded: June 1, 2011

	2009	2010	
Does this wholesale agency implement School Education Programs for Sub Wholesalers or Retail unility's benefit?	Yes	Yes	
Names of Sub Wholesale and Retail Agencies benefiting from Program?	Newhall County Water District, Santa Clarita Water Division, Valencia Water Company	Newhall County Water District, Santa Clarita Water Division, Valencia Water Company	
1) Curriculum materials developed and/or provided by wholesale agency	Curricula that covers science, social studies, and math standards mandated by State of California	Curricula that covers science, social studies, and math standards mandated by State of California	All 5 actions types implemented and reported to CUWCC to be 'On Track'
2) Materials meet state education framework requirements and are grade-level appropriate?	Yes	Yes	
3) Materials Distributed to K-6?	Yes	Yes	
Describe K-6 Materials	Materials cover science, social studies, and math standards mandated by State of California as they relate to water, water quality, water conservation and water supply issues.	Materials cover science, social studies, and math standards mandated by State of California as they relate to water, water quality, water conservation and water supply issues.	Describe materials to meet minimum requirements
Materials distributed to 7-12 students?	Yes	Yes	Info Only
4) Annual budget for school education program.	$ 337,164	$ 352,195	
5) Description of all other water supplier education programs	n/a	n/a	
	On Track	On Track	

AWWA WLCC Free Water Audit Software: Reporting Worksheet

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WAS v4.2

Back to Instructions

? Click to access definition

Water Audit Report for: Castaic Lake Water Agency
Reporting Year: 40796 7/2009 - 6/2010

Please enter data in the white cells below. Where available, metered values should be used; if metered values are unavailable please estimate a value. Indicate your confidence in the accuracy of the input data by grading each component (1-10) using the drop-down list to the left of the input cell. Hover the mouse over the cell to obtain a description of the grades

All volumes to be entered as: ACRE-FEET PER YEAR

WATER SUPPLIED << Enter grading in column 'E'

Volume from own sources:	8	36,675.000	acre-ft/yr	
Master meter error adjustment (enter positive value):	8	3.600	over-registered	acre-ft/yr
Water imported:	8	34,885.000	acre-ft/yr	
Water exported:	10	34,610.000	acre-ft/yr	
WATER SUPPLIED:		36,946.400	acre-ft/yr	

AUTHORIZED CONSUMPTION

Click here: ? for help using option buttons below

				Pcnt:	Value:
Billed metered:	10	35,353.000	acre-ft/yr		
Billed unmetered:	10	0.000	acre-ft/yr		
Unbilled metered:	10	0.000	acre-ft/yr		
Unbilled unmetered:		461.830	acre-ft/yr	1.25%	

Default option selected for Unbilled unmetered - a grading of 5 is applied but not displayed

Use buttons to select percentage of water supplied **OR** value

AUTHORIZED CONSUMPTION: 35,814.830 acre-ft/yr

WATER LOSSES (Water Supplied - Authorized Consumption) 1,131.570 acre-ft/yr

Apparent Losses

				Pcnt:	Value:
Unauthorized consumption:		92.366	acre-ft/yr	0.25%	

Default option selected for unauthorized consumption - a grading of 5 is applied but not displayed

Customer metering inaccuracies:	5	357.101	acre-ft/yr	1.00%	
Systematic data handling errors:	5		acre-ft/yr		

Systematic data handling errors are likely, please enter a non-zero value; otherwise grade = 5

Choose this option to enter a percentage of billed metered consumption. This is NOT a default value

Apparent Losses: 449.467

Real Losses (Current Annual Real Losses or CARL)

Real Losses = Water Losses - Apparent Losses: 682.103 acre-ft/yr

WATER LOSSES: 1,131.570 acre-ft/yr

NON-REVENUE WATER

NON-REVENUE WATER: 1,593.400 acre-ft/yr

= Total Water Loss + Unbilled Metered + Unbilled Unmetered

SYSTEM DATA

Length of mains:	10	43.0	miles	
Number of active AND inactive service connections:	10	25		
Connection density:		1	conn./mile main	
Average length of customer service line:	10		ft	(pipe length between curbstop and customer meter or property boundary)
Average operating pressure:	10	110.0	psi	

COST DATA

Total annual cost of operating water system:	10	$107,299,883	$/Year	
Customer retail unit cost (applied to Apparent Losses):	5	$1.04	$/1000 gallons (US)	
Variable production cost (applied to Real Losses):	5	$822.00	$/acre-ft	

Retail costs are less than (or equal to) production costs; please review and correct if necessary

PERFORMANCE INDICATORS

Financial Indicators

Non-revenue water as percent by volume of Water Supplied:	4.3%
Non-revenue water as percent by cost of operating system:	1.0%
Annual cost of Apparent Losses:	$152,318
Annual cost of Real Losses:	$560,689

Operational Efficiency Indicators

Apparent Losses per service connection per day:	16050.33	gallons/connection/day
Real Losses per service connection per day*:	N/A	gallons/connection/day
Real Losses per length of main per day*:	14,161.45	gallons/mile/day
Real Losses per service connection per day per psi pressure:		gallons/connection/day/psi
? Unavoidable Annual Real Losses (UARL):	Not Valid	

*** UARL cannot be calculated as either average pressure, number of connecions or length of mains is too small: SEE UARL DEFINITION ***

From Above, Real Losses = Current Annual Real Losses (CARL):	682.10
? Infrastructure Leakage Index (ILI) [CARL/UARL]:	

* only the most applicable of these two indicators will be calculated

WATER AUDIT DATA VALIDITY SCORE:

***** YOUR SCORE IS: 77 out of 100 *****

A weighted scale for the components of consumption and water loss is included in the calculation of the Water Audit Data Validity Score

PRIORITY AREAS FOR ATTENTION:

Based on the information provided, audit accuracy can be improved by addressing the following components:

1: Volume from own sources
2: Customer metering inaccuracies
3: Customer retail unit cost (applied to Apparent Losses)

For more information, click here to see the Grading Matrix worksheet

The fields in red are required.

Agency name: Castaic Lake Water Agency

Reporting unit name (District name): Castaic Lake Water Agency

Reporting unit number: 6278

Primary contact:

First name: Stephanie

Last name: Anagnoson

Email: sanagnoson@clwa.org

You must enter the reporting unit number that we have on record for your agency. Click here to open a table to obtain this number.

Link to FAQs

2009

BMP 1.1 Operations Practices

Comments:

See the complete MOU: View MOU

See the coverage requirements for this BMP:

Conservation Coordinator

Conservation Coordinator ◯ Yes ◯ No

Contact Information

First Name: Thomas

Last Name: Hawes

Title: water conservation program coordinat

Phone: 661.513.1231

Email: thawes@clwa.org

Note that the contact information may be the same as the primary contact information at the top of the page. If this is your case, excuse the inconvenience but please enter the information again.

Water Waste Prevention

Water Agency shall do one or more of the following:

a. Enact and enforce an ordinance or establish terms of service that prohibit water waste
b. Enact and enforce an ordinance or establish terms of service for water efficient design in new development
c. Support legislation or regulations that prohibit water waste
d. Enact an ordinance or establish terms of service to facilitate implementation of water shortage response measures
e. Support local ordinances that prohibit water waste
f. Support local ordinances that establish permits requirements for water efficient design in new

To document this BMP, provide the following:

a. A description of, or electronic link to, any ordinances or terms of service
b. A description of, or electronic link to, any ordinances or requirements adopted by local jurisdictions or regulatory agencies with the water agency's service area.
c. A description of any water agency efforts to cooperate with other entities in the adoption or enforcement of local requirement
d. description of agency support positions with respect to adoption of legislation or regulations

You can show your documentation by providing files, links (web addresses), and/or entering a description.

File name(s): Email files to natalie@cuwcc.org

Web address(s) URL: comma-separated list: http://dpw.lacounty.gov/wwd/web/docs/Water%20Wasting%20Ordinance%20final.pdf

Enter a description:

We can provide documentation on the following aspects of water waste prevention:
c. Supported local ordinance that prohibits water waste in unincorporated LA County (http://dpw.lacounty.gov/wwd/web/docs/Water%20Wasting%20Ordinance%20final.pdf)
d. Supported City of Santa Clarita's Municipal Code 9.38.015 Water Conservation Action Plan.

The fields in red are required.

Agency name: Castaic Lake Water Agency

Reporting unit name (District name): Castaic Lake Water Agency

Reporting unit number: 6278

Primary contact:

First name: Stephanie

Last name: Anagnoson

Email: sanagnoson@clwa.org

You must enter the reporting unit number that we have on record for your agency. Click here to open a table to obtain this number.

Link to FAQs

2010

BMP 1.1 Operations Practices

Comments:

See the complete MOU: View MOU

See the coverage requirements for this BMP:

Conservation Coordinator

Conservation Coordinator ◯ Yes ◯ No

Contact Information

First Name: Thomas

Last Name: Hawes

Title: water conservation program coordinat

Phone: 661.513.1231

Email: thawes@clwa.org

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b. A description of, or electronic link to, any ordinances or requirements adopted by local jurisdictions or regulatory agencies with the water agency's service area.
c. A description of any water agency efforts to cooperate with other entities in the adoption or enforcement of local requirement
d. description of agency support positions with respect to adoption of legislation or regulations

You can show your documentation by providing files, links (web addresses), and/or entering a description.

File name(s): Email files to natalie@cuwcc.org

Web address(s) URL: comma-separated list: http://dpw.lacounty.gov/wwd/web/docs/Water%20Wasting%20Ordinance%20final.pdf

Enter a description:

We can provide documentation on the following aspects of water waste prevention:
c. Supported local ordinance that prohibits water waste in unincorporated LA County (http://dpw.lacounty.gov/wwd/web/docs/Water%20Wasting%20Ordinance%20final.pdf)
d. Supported City of Santa Clarita's Municipal Code 9.38.015 Water Conservation Action Plan.

The fields in red are required.

Agency name: Castaic Lake Water Agency

Reporting unit name (District name): Castaic Lake Water Agency

Reporting unit number: 6278

Primary contact:

First name: Stephanie

Last name: Anagnoson

Email: sanagnoson@clwa.org

You must enter the reporting unit number that we have on record for your agency. Click here to open a table to obtain this number.

Link to FAQs

View MOU

2009 BMP 1.2 Water Loss Control

Did your agency complete a pre-screening system audit in 2009? Yes ○ No ●

If yes, answer the following:

Determine metered sales in AF: 37,820.00

Definition: other accountable uses not included in metered sales, such as unbilled water use, fire suppression, etc.

Determine system verifiable uses AF: [illegible]0.00

Determine total supply into the system in AF: 39,051.00

Does your agency keep necessary data on file to verify the answers above? Yes No

Did your agency complete a full-scale system water audit during 2009? Yes No ●

Does your agency maintain in-house records of audit results or the completed AWWA worksheet for the completed audit which could be forwarded to CUWCC? Yes No ○

Did your agency operate a system leak detection program? Yes No

Comments:

version 1.0 2009

The fields in red are required.

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Reporting unit name (District name): Castaic Lake Water Agency

Reporting unit number: 6278

Primary contact:

First name: Stephanie

Last name: Anagnoson

Email: sanagnoson@clwa.org

You must enter the reporting unit number that we have on record for your agency. Click here to open a table to obtain this number.

Link to FAQs

2010 BMP 1.2 Water Loss Control

View MOU

AWWA Water Audit

Agency to complete a Water Audit & Balance Using The AWWA Software ◉ Yes ○ No

Email to natalie@cuwcc.org - Worksheets (AWWA Water Audit). Enter the name of the file below:

CLWA Water Audit 2010

Water Audit Validity Score from AWWA spreadsheet: 77

Agency Completed Training In The AWWA Water Audit Method ○ Yes ◉ No

Agency Completed Training In The Component Analysis Process ○ Yes ◉ No

Completed/Updated the Component Analysis (at least every 4 years)? ○ Yes ◉ No

Component Analysis Completed/Updated Date:

Water Loss Performance

Agency Repaired All Reported Leaks & Breaks To The Extent Cost Effective ◉ Yes ○ No

Recording Keeping Requirements:

Date/Time Leak Reported	Leak Location
Type of Leaking Pipe Segment or Fitting	Leak Running Time From Report to Repair
Leak Volume Estimate	Cost of Repair

Agency Located and Repaired Unreported Leaks to the Extent Cost Effective ◉ Yes ○ No

Type of Program Activities Used to Detect Unreported Leaks

monthly reconciling of water purchased to water sold

Annual Summary Information

Complete the following table with annual summary information (required for reporting years 2-5 only)

Total Leaks Repaired	Economic Value Of Real Loss	Economic Value Of Apparent Loss	Miles Of System Surveyed For Leaks	Pressure Reduction Undertaken for loss reduction	Cost Of Interventions	Water Saved (AF/Year)
0	$560,689.00	$152,318.00				

Comments: Please note that the AWWA M36 spreadsheet presents a number of unanswerable questions for wholesalers, including line 65 (average length of customer line --- we have only retailers as customers). We also have trouble with line 78 (our retail costs are less than production costs) and line 101 (UARL).

version 1.0

2009

The fields in red are required.

Agency name: Castaic Lake Water Agency

Reporting unit name (District name): Castaic Lake Water Agency

Reporting unit number: 6278

Primary contact:

First name: Stephanie

Last name: Anagnoson

Email: sanagnoson@clwa.org

You must enter the reporting unit number that we have on record for your agency. Click here to open a table to obtain this number.

BMP 1.3 Metering with Commodity

Link to FAQs

See the complete MOU: View MOU

See the coverage requirements for this BMP:

Implementation

Does your agency have any unmetered service connections? ○ Yes ○ No

If YES, has your agency completed a meter retrofit plan? ○ Yes ○ No

Enter the number of previously unmetered accounts fitted with meters during reporting year:

Are all new service connections being metered? ○ Yes ○ No

Are all new service connections being billed volumetrically? ○ Yes ○ No

Has your agency completed and submitted electronically to the Council a written plan, policy or program to test, repair and replace meters? ○ Yes ○ No

Please Fill Out The Following Matrix

Account Type	# Metered Accounts	# Metered Accounts Read	# Metered Accounts Billed by Volume	Billing Frequency Per Year	# of estimated bills/yr
Other	26	26	26	Monthly	12
Other				Monthly	
Other				Other	
Other				Other	
Other				Other	
Other				Other	
Other				Other	
Other				Other	
Other				Other	
Other				Other	

Number of CII Accounts with Mixed-use Meters: 0

Number of CII Accounts with Mixed-use Meters Retrofitted with Dedicated Irrigation Meters during Reporting Period:

Feasibility Study

Has your agency conducted a feasibility study to assess the merits of a program to provide incentives to switch mixed-use accounts to dedicated landscape meters? ○ Yes ○ No

If YES, please fill in the following information:

A. When was the Feasiblity Study conducted

B. Email or provide a link to the feasibility study (or description of):

File name(s): Email files to natalie@cuwcc.org Enter the file name here e.g. WaterWastePreventionOrdinance

Web address(s) URL: comma-separated list Enter the URL to your documentation.

General Comments about BMP 1.3:

The fields in red are required.

Agency name: Castaic Lake Water Agency

Reporting unit name (District name): Castaic Lake Water Agency

Reporting unit number: 6278

Primary contact:

First name: Stephanie

Last name: Anagnoson

Email: sanagnoson@clwa.org

You must enter the reporting unit number that we have on record for your agency. Click here to open a table to obtain this number.

BMP 1.3 Metering with Commodity 2010

Link to FAQs

See the complete MOU: View MOU

See the coverage requirements for this BMP:

Implementation

Does your agency have any unmetered service connections? ○ Yes ○ No

If YES, has your agency completed a meter retrofit plan? ○ Yes ○ No

Enter the number of previously unmetered accounts fitted with meters during reporting year:

Are all new service connections being metered? ○ Yes ○ No

Are all new service connections being billed volumetrically? ○ Yes ○ No

Has your agency completed and submitted electronically to the Council a written plan, policy or program to test, repair and replace meters? ○ Yes ○ No

Please Fill Out The Following Matrix

Account Type	# Metered Accounts	# Metered Accounts Read	# Metered Accounts Billed by Volume	Billing Frequency Per Year	# of estimated bills/yr
Other	26	26	26	Monthly	12
Other				Monthly	
Other				Other	
Other				Other	
Other				Other	
Other				Other	
Other				Other	
Other				Other	
Other				Other	
Other				Other	

Number of CII Accounts with Mixed-use Meters: 0

Number of CII Accounts with Mixed-use Meters Retrofitted with Dedicated Irrigation Meters during Reporting Period:

Feasibility Study

Has your agency conducted a feasibility study to assess the merits of a program to provide incentives to switch mixed-use accounts to dedicated landscape meters? ○ Yes ○ No

If YES, please fill in the following information:

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File name(s): Email files to natalie@cuwcc.org Enter the file name here e.g. WaterWastePreventionOrdinance

Web address(s) URL: comma-separated list Enter the URL to your documentation.

Comments:

The fields in red are required.

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Reporting unit name (District name): Castaic Lake Water Agency

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First name: Stephanie

Last name: Anagnoson

Email: sanagnoson@clwa.org

Click here to open a table that displays your agency name reporting unit name and reporting unit number. Please ensure that you enter the correct information.

Link to FAQs

2009

BMP 2.1 Public Outreach

View MOU

Is your agency performing Public Outreach for your Retailers?

Are there one or more retail agencies that count on your agency to help them comply with this BMP? ○ Yes ○ No

Enter the name(s) of the retail agency (comma delimited): Newhall County Water District, Santa Clarita Water Division, Valencia Water Company, LA County Waterworks #36

Is your agency performing public outreach?

Report a minimum of 4 water conservation related contacts your agency had with the public during the year.

Public Information Programs List

Did at least one contact take place during each quarter of the reporting year? ✓

Number of Public Contacts	Public Information Programs
4	Newsletter articles on conservation
52	Website
37	General water conservation information
4	Email Messages
37	Landscape water conservation media campaigns

Contact with the Media

Are there one or more retail agencies that count on your agency to help them comply with this BMP? ○ Yes ○ No

Enter the name(s) of the retail agency (comma delimited): Newhall County Water District, Santa Clarita Water Division, Valencia Water Company, LA County Waterworks #36

OR Wholesale Agency (Contacts with the Media)

Media Contacts List

Did at least one contact take place during each quarter of the reporting year? ✓

Number of Media Contacts	Did at least one contact take place during each quarter of the reporting year?	Media Contact Types
45		Articles or stories resulting from outreach
0		Editorial board visits
5		News releases
163		Radio contacts
1,040		Television contacts
5		Written editorials

Is a Wholesale Agency Performing Website Updates?

Did one or more retail agencies rely on your agency's responsibility for meeting the requirements of and for CUWCC reporting of this BMP? ○Yes ○No

Enter the name(s) of the retail agency (comma delimited)

Santa Clarita Water Division

Is Your Agency Performing Website Updates?

Enter your agency's URL (website address): http://www.clwa.org

Describe a minimum of four water conservation related updates to your agency's website that took place during the year:

watering index (updated weekly)
Plants of the Conservatory Garden
Water Conservation Tips
Fire-Retardant, Water-wise Plants
Water Conservation Tips (updated weekly)

Did at least one Website Update take place during each quarter of the reporting year? ○Yes ○No

Public Outreach Annual Budget

Enter budget for public outreach programs. You may enter total budget in a single line or brake the budget into discrete categories by entering many rows. Please indicate if personnel costs are included in the entry.

Category	Amount		Personnel Costs Included? If yes, check the box.	Comments	
PR Consulting	$150,512		✓	Social marketing campaign	
Public Outreach	$33,512		✓	Public events	
Publications	$51,512		✓	Quarterly newsletter, yearly water quality repor	
BMP Implementat	$143,211		✓	Conservation Programs, including outreach	

Comments:

The fields in red are required.

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Link to FAQs

2010

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Link to FAQs

2009

BMP 2.2 School Education Programs

View MOU

School Programs

Is your agency implementing school programs which can be counted to help another agency comply with this BMP? ○ Yes ○ No

Enter retailer names, separated by commas: Newhall County Water District, Santa Clarita Water Division, Valencia Water Company

☑ Materials meet state education framework requirements?

Description of Materials: Curricula that covers science, social studies, and math standards mandated by State of California

☑ Materials distributed to K-6 Students?

Description of materials distributed to K-6 Students: Materials cover science, social studies, and math standards mandated by State of California as they relate to water, water quality, water conservation and water supply issues.

Number of students reached: 11,135

☑ Materials distributed to 7-12 Students?

Description of materials distributed to 7-12 Students: Soil Permeability,Water Born Diseases, and Water Quality materials for 7-8 grades that correlate to the State of California Standards.

Number of Distribution: 812

Annual budget for school education program: $337,164.00

Description of all other water supplier education programs:

School Program Activities

Classroom presentations:

Number of presentations: 445 Number of attendees: 11135

Large group assemblies:

Number of presentations: 0 Number of attendees: 0

Children's water festivals or other events:

Number of presentations: 1 Number of attendees: 5000

Cooperative efforts with existing science/water education programs (various workshops, science fair awards or judging) and follow-up:

Number of presentations: 0 Number of attendees: 0

Other methods of disseminating information (i.e. themed age-appropriate classroom loaner kits):

Description

Number distributed

Staffing children's booths at events & festivals:

Number of booths: 4 | Number of attendees: 6700

Water conservation contests such as poster and photo:

Description

Number distributed

Offer monetary awards/funding or scholarships to students:

Number Offered: 5 | Total Funding: 16500

Teacher training workshops:

Number of presentations: 0 | Number of attendees: 0

Fund and/or staff student field trips to treatment facilities, recycling facilities, water conservation gardens, etc.:

Number of tours or field trips: 159 | Number of participants: 5565

College internships in water conservation offered:

Number of internships: 0 | Total funding: 0

Career fairs/workshops:

Number of presentations: 1 | Number of attendees: 5,000

Additional program(s) supported by agency but not mentioned above:

Description

Number of events (if applicable): 37 | Number of participants: 10000

Total reporting period budget expenditures for school education programs (include all agency costs): $337164

Comments

The fields in red are required.

Agency name: Castaic Lake Water Agency

Reporting unit name (District name): Castaic Lake Water Agency

Reporting unit number: 6278

Primary contact:

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View MOU

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Description

Number of events (if applicable): 37 | Number of participants: 10000

Total reporting period budget expenditures for school education programs (include all agency costs): $337164

Comments

AWWA WLCC Free Water Audit Software: Reporting Worksheet

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Back to Instructions

? Click to access definition

Water Audit Report for: Santa Clarita Water Division
Reporting Year: 2009 1/2009 - 12/2009

Please enter data in the white cells below. Where available, metered values should be used; if metered values are unavailable please estimate a value. Indicate your confidence in the accuracy of the input data by grading each component (1-10) using the drop-down list to the left of the input cell. Hover the mouse over the cell to obtain a description of the grades

All volumes to be entered as: ACRE-FEET PER YEAR

WATER SUPPLIED		<< Enter grading in column 'E'			
Volume from own sources:	?	7	10,077.000	acre-ft/yr	
Master meter error adjustment (enter positive value):	?	2	1,334.000	under-registered	acre-ft/yr
Water imported:	?	7	17,739.000	acre-ft/yr	
Water exported:	?	n/a	0.000	acre-ft/yr	
WATER SUPPLIED:			29,150.000	acre-ft/yr	

AUTHORIZED CONSUMPTION					Click here: ? for help using option buttons below
Billed metered:	?	7	26,132.000	acre-ft/yr	
Billed unmetered:	?	10	59.000	acre-ft/yr	
Unbilled metered:	?	n/a	0.000	acre-ft/yr	Pcnt: Value:
Unbilled unmetered:	?	7	39.000	acre-ft/yr	○ ◉ 39.000
AUTHORIZED CONSUMPTION:	?		26,230.000	acre-ft/yr	Use buttons to select percentage of water supplied OR value

WATER LOSSES (Water Supplied - Authorized Consumption)					
			2,920.000	acre-ft/yr	
Apparent Losses					Pcnt: Value:
Unauthorized consumption:	?	3	5.000	acre-ft/yr	○ ◉ 5.000
Customer metering inaccuracies:	?	5	263.960	acre-ft/yr	1.00% ◉ ○
Systematic data handling errors:	?	5		acre-ft/yr	
Systematic data handling errors are likely, please enter a non-zero value; otherwise grade = 5					Choose this option to enter a percentage of billed metered consumption. This is NOT a default value
Apparent Losses:	?		268.960		?
Real Losses (Current Annual Real Losses or CARL)					
Real Losses = Water Losses - Apparent Losses:	?		2,651.040	acre-ft/yr	
WATER LOSSES:			2,920.000	acre-ft/yr	

NON-REVENUE WATER				
NON-REVENUE WATER:	?		2,959.000	acre-ft/yr
= Total Water Loss + Unbilled Metered + Unbilled Unmetered				

SYSTEM DATA					
Length of mains:	?	5	308.0	miles	
Number of active AND inactive service connections:	?	7	28,687		
Connection density:			93	conn./mile main	
Average length of customer service line:	?	10	15.0	ft	(pipe length between curbstop and customer meter or property boundary)
Average operating pressure:	?	7	95.0	psi	

COST DATA				
Total annual cost of operating water system:	?	8	$15,613,461	$/Year
Customer retail unit cost (applied to Apparent Losses):	?	7	$1.26	$/100 cubic feet (ccf)
Variable production cost (applied to Real Losses):	?	7	$263.54	$/acre-ft

PERFORMANCE INDICATORS

Financial Indicators

Non-revenue water as percent by volume of Water Supplied:	10.2%
Non-revenue water as percent by cost of operating system:	5.5%
Annual cost of Apparent Losses:	$147,620
Annual cost of Real Losses:	$698,655

Operational Efficiency Indicators

Apparent Losses per service connection per day:	8.37	gallons/connection/day
Real Losses per service connection per day*:	82.50	gallons/connection/day
Real Losses per length of main per day*:	N/A	
Real Losses per service connection per day per psi pressure:	0.87	gallons/connection/day/psi
? Unavoidable Annual Real Losses (UARL):	700.26	acre-feet/year
From Above, Real Losses = Current Annual Real Losses (CARL):	2,651.04	acre-feet/year
? Infrastructure Leakage Index (ILI) [CARL/UARL]:	3.79	

* only the most applicable of these two indicators will be calculated

WATER AUDIT DATA VALIDITY SCORE:

***** YOUR SCORE IS: 64 out of 100 *****

A weighted scale for the components of consumption and water loss is included in the calculation of the Water Audit Data Validity Score

PRIORITY AREAS FOR ATTENTION:

Based on the information provided, audit accuracy can be improved by addressing the following components:

1: Master meter error adjustment
2: Water imported
3: Customer metering inaccuracies

For more information, click here to see the Grading Matrix worksheet

VWC DMM Materials

AWWA WLCC Free Water Audit Software: Reporting Worksheet

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WAS v4.0

Back to Instructions

? Click to access definition

Water Audit Report for: VALENCIA WATER COMPANY
Reporting Year: 2009 | 1/2009 - 12/2009

Please enter data in the white cells below. Where available, metered values should be used; if metered values are unavailable please estimate a value. Indicate your confidence in the accuracy of the input data by grading each component (1-10) using the drop-down list to the left of the input cell. Hover the mouse over the cell to obtain a description of the grades

All volumes to be entered as: ACRE-FEET PER YEAR

WATER SUPPLIED

<< Enter grading in column 'E'

Volume from own sources:	?	10	15,320.591	acre-ft/yr	
Master meter error adjustment (enter positive value):	?	4	110.308	over-registered	acre-ft/yr
Water imported:	?	10	14,730.873	acre-ft/yr	
Water exported:	?	10	0.000	acre-ft/yr	
WATER SUPPLIED:			29,941.156	acre-ft/yr	

AUTHORIZED CONSUMPTION

Click here: ? for help using option buttons below

					Pcnt:	Value:
Billed metered:	?	10	28,964.492	acre-ft/yr		
Billed unmetered:	?	7	0.000	acre-ft/yr		
Unbilled metered:	?	10	0.737	acre-ft/yr		
Unbilled unmetered:	?		374.264	acre-ft/yr	1.25%	

Default option selected for Unbilled unmetered - a grading of 5 is applied but not displayed

Use buttons to select percentage of water supplied **OR** value

AUTHORIZED CONSUMPTION:	?		29,339.493	acre-ft/yr

WATER LOSSES (Water Supplied - Authorized Consumption)

601.663 acre-ft/yr

Apparent Losses

					Pcnt:	Value:
Unauthorized consumption:	?		74.853	acre-ft/yr	0.25%	

Default option selected for unauthorized consumption - a grading of 5 is applied but not displayed

Customer metering inaccuracies:	?	10	145.554	acre-ft/yr	0.50%	
Systematic data handling errors:	?		0.000	acre-ft/yr		

Systematic data handling errors are likely, please enter a non-zero value; otherwise grade = 5

Choose this option to enter a percentage of billed metered consumption. This is NOT a default value

Apparent Losses:	?	220.407	

Real Losses

Real Losses = Water Losses - Apparent Losses:	?	381.256	acre-ft/yr
WATER LOSSES:		601.663	acre-ft/yr

NON-REVENUE WATER

NON-REVENUE WATER:	?	976.664	acre-ft/yr

= Total Water Loss + Unbilled Metered + Unbilled Unmetered

SYSTEM DATA

Length of mains:	?	10	352.3	miles	
Number of active AND inactive service connections:	?	10	29,948		
Connection density:			85	conn./mile main	
Average length of customer service line:	?	10	0.0	ft	(pipe length between curbstop and customer meter or property boundary)
Average operating pressure:	?	8	86.0	psi	

COST DATA

Total annual cost of operating water system:	?	10	$19,374,217	$/Year
Customer retail unit cost (applied to Apparent Losses):	?	10	$1.10	$/100 cubic feet (ccf)
Variable production cost (applied to Real Losses):	?	10	$208.49	$/acre-ft/yr

PERFORMANCE INDICATORS

Financial Indicators

Non-revenue water as percent by volume of Water Supplied:	3.3%
Non-revenue water as percent by cost of operating system:	1.4%
Annual cost of Apparent Losses:	$105,802
Annual cost of Real Losses:	$79,486

Operational Efficiency Indicators

Apparent Losses per service connection per day:	6.57	gallons/connection/day
Real Losses per service connection per day*:	11.37	gallons/connection/day
Real Losses per length of main per day*:	N/A	
Real Losses per service connection per day per psi pressure:	0.13	gallons/connection/day/psi
? Unavoidable Annual Real Losses (UARL):	200.84	million gallons/year
? Infrastructure Leakage Index (ILI) [Real Losses/UARL]:	0.62	

* only the most applicable of these two indicators will be calculated

WATER AUDIT DATA VALIDITY SCORE:

***** YOUR SCORE IS: 89 out of 100 *****

A weighted scale for the components of consumption and water loss is included in the calculation of the Water Audit Data Validity Score

PRIORITY AREAS FOR ATTENTION:

Based on the information provided, audit accuracy can be improved by addressing the following components:

1: Master meter error adjustment
2: Unauthorized consumption
3: Systematic data handling errors

For more information, click here to see the Grading Matrix worksheet

AWWA WLCC Free Water Audit Software: Reporting Worksheet

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WAS v4.0

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Water Audit Report for: VALENCIA WATER COMPANY
Reporting Year: 2010 1/2010 - 12/2010

Please enter data in the white cells below. Where available, metered values should be used; if metered values are unavailable please estimate a value. Indicate your confidence in the accuracy of the input data by grading each component (1-10) using the drop-down list to the left of the input cell. Hover the mouse over the cell to obtain a description of the grades

All volumes to be entered as: ACRE-FEET PER YEAR

WATER SUPPLIED

<< Enter grading in column 'E'

Volume from own sources:	?	10	16,080.171	acre-ft/yr	
Master meter error adjustment (enter positive value):	?	4	115.777	over-registered	acre-ft/yr
Water imported:	?	10	11,212.962	acre-ft/yr	
Water exported:	?	10	0.000	acre-ft/yr	
WATER SUPPLIED:			27,177.356	acre-ft/yr	

AUTHORIZED CONSUMPTION

Click here: ? for help using option buttons below

					Pcnt:	Value:
Billed metered:	?	10	26,512.654	acre-ft/yr		
Billed unmetered:	?	7	0.000	acre-ft/yr		
Unbilled metered:	?	10	0.779	acre-ft/yr		
Unbilled unmetered:	?		339.717	acre-ft/yr	1.25%	

Default option selected for Unbilled unmetered - a grading of 5 is applied but not displayed

Use buttons to select percentage of water supplied **OR** value

AUTHORIZED CONSUMPTION:	?		26,853.150	acre-ft/yr

WATER LOSSES (Water Supplied - Authorized Consumption)

324.206 acre-ft/yr

Apparent Losses

					Pcnt:	Value:
Unauthorized consumption:	?		67.943	acre-ft/yr	0.25%	

Default option selected for unauthorized consumption - a grading of 5 is applied but not displayed

Customer metering inaccuracies:	?	10	133.233	acre-ft/yr	0.50%	
Systematic data handling errors:	?		0.000	acre-ft/yr		

Systematic data handling errors are likely, please enter a non-zero value; otherwise grade = 5

Choose this option to enter a percentage of billed metered consumption. This is NOT a default value

Apparent Losses:	?	201.177	

Real Losses

Real Losses = Water Losses - Apparent Losses:	?	123.029	acre-ft/yr
WATER LOSSES:		324.206	acre-ft/yr

NON-REVENUE WATER

NON-REVENUE WATER:	?	664.702	acre-ft/yr

= Total Water Loss + Unbilled Metered + Unbilled Unmetered

SYSTEM DATA

Length of mains:	?	10	357.4	miles	
Number of active AND inactive service connections:	?	10	30,080		
Connection density:			84	conn./mile main	
Average length of customer service line:	?	10	0.0	ft	(pipe length between curbstop and customer meter or property boundary)
Average operating pressure:	?	10	86.0	psi	

COST DATA

Total annual cost of operating water system:	?	10	$19,083,083	$/Year
Customer retail unit cost (applied to Apparent Losses):	?	10	$1.10	$/100 cubic feet (ccf)
Variable production cost (applied to Real Losses):	?	10	$245.96	$/acre-ft/yr

PERFORMANCE INDICATORS

Financial Indicators

Non-revenue water as percent by volume of Water Supplied:	2.4%
Non-revenue water as percent by cost of operating system:	1.1%
Annual cost of Apparent Losses:	$96,571
Annual cost of Real Losses:	$30,260

Operational Efficiency Indicators

Apparent Losses per service connection per day:	5.97	gallons/connection/day
Real Losses per service connection per day*:	3.65	gallons/connection/day
Real Losses per length of main per day*:	N/A	
Real Losses per service connection per day per psi pressure:	0.04	gallons/connection/day/psi
? Unavoidable Annual Real Losses (UARL):	202.33	million gallons/year
? Infrastructure Leakage Index (ILI) [Real Losses/UARL]:	0.20	

* only the most applicable of these two indicators will be calculated

WATER AUDIT DATA VALIDITY SCORE:

***** YOUR SCORE IS: 89 out of 100 *****

A weighted scale for the components of consumption and water loss is included in the calculation of the Water Audit Data Validity Score

PRIORITY AREAS FOR ATTENTION:

Based on the information provided, audit accuracy can be improved by addressing the following components:

1: Master meter error adjustment
2: Unauthorized consumption
3: Systematic data handling errors

For more information, click here to see the Grading Matrix worksheet

NCWD DMM Materials

AWWA WLCC Free Water Audit Software: Reporting Worksheet

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WAS v4.2

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Water Audit Report for: Newhall County Water District
Reporting Year: 2010 | 7/2009 - 6/2010

Please enter data in the white cells below. Where available, metered values should be used; if metered values are unavailable please estimate a value. Indicate your confidence in the accuracy of the input data by grading each component (1-10) using the drop-down list to the left of the input cell. Hover the mouse over the cell to obtain a description of the grades

All volumes to be entered as: ACRE-FEET PER YEAR

WATER SUPPLIED

<< Enter grading in column 'E'

Volume from own sources:	?	10	5,828.810	acre-ft/yr
Master meter error adjustment (enter positive value):	?			acre-ft/yr
Water imported:	?	10	4,108.730	acre-ft/yr
Water exported:	?			acre-ft/yr
WATER SUPPLIED:			9,937.540	acre-ft/yr

AUTHORIZED CONSUMPTION

Click here: ? for help using option buttons below

					Pcnt:	Value:
Billed metered:	?	10	9,281.320	acre-ft/yr		
Billed unmetered:	?	n/a		acre-ft/yr		
Unbilled metered:	?	10	22.290	acre-ft/yr		
Unbilled unmetered:	?		124.219	acre-ft/yr	1.25%	

Default option selected for Unbilled unmetered - a grading of 5 is applied but not displayed

Use buttons to select percentage of water supplied **OR** value

AUTHORIZED CONSUMPTION:	?		9,427.829	acre-ft/yr

WATER LOSSES (Water Supplied - Authorized Consumption)

509.711 acre-ft/yr

Apparent Losses

					Pcnt:	Value:
Unauthorized consumption:	?		0.000	acre-ft/yr		

Enter a positive value, otherwise a default percentage of 0.25% and a grading of 5 is applied

Customer metering inaccuracies:	?	10	0.000	acre-ft/yr		
Systematic data handling errors:	?	10	5.000	acre-ft/yr		

Choose this option to enter a percentage of billed metered consumption. This is NOT a default value

Apparent Losses:	?	5.000	

Real Losses (Current Annual Real Losses or CARL)

Real Losses = Water Losses - Apparent Losses:	?	504.711	acre-ft/yr
WATER LOSSES:		509.711	acre-ft/yr

NON-REVENUE WATER

NON-REVENUE WATER:	?	656.220	acre-ft/yr

= Total Water Loss + Unbilled Metered + Unbilled Unmetered

SYSTEM DATA

Length of mains:	?	10	158.5	miles	
Number of active AND inactive service connections:	?	10	9,604		
Connection density:			61	conn./mile main	
Average length of customer service line:	?	6	15.0	ft	(pipe length between curbstop and customer meter or property boundary)
Average operating pressure:	?	6	100.0	psi	

COST DATA

Total annual cost of operating water system:	?	10	$3,530,399	$/Year
Customer retail unit cost (applied to Apparent Losses):	?	10	$0.97	$/100 cubic feet (ccf)
Variable production cost (applied to Real Losses):	?	10	$355.25	$/acre-ft

PERFORMANCE INDICATORS

Financial Indicators

Non-revenue water as percent by volume of Water Supplied:	6.6%
Non-revenue water as percent by cost of operating system:	6.6%
Annual cost of Apparent Losses:	$2,108
Annual cost of Real Losses:	$179,298

Operational Efficiency Indicators

Apparent Losses per service connection per day:	0.46	gallons/connection/day
Real Losses per service connection per day*:	46.92	gallons/connection/day
Real Losses per length of main per day*:	N/A	
Real Losses per service connection per day per psi pressure:	0.47	gallons/connection/day/psi
? Unavoidable Annual Real Losses (UARL):	280.34	acre-feet/year
From Above, Real Losses = Current Annual Real Losses (CARL):	504.71	acre-feet/year
? Infrastructure Leakage Index (ILI) [CARL/UARL]:	1.80	

* only the most applicable of these two indicators will be calculated

WATER AUDIT DATA VALIDITY SCORE:

***** YOUR SCORE IS: 96 out of 100 *****

A weighted scale for the components of consumption and water loss is included in the calculation of the Water Audit Data Validity Score

PRIORITY AREAS FOR ATTENTION:

Based on the information provided, audit accuracy can be improved by addressing the following components:

1: Unauthorized consumption
2: Unbilled unmetered
3: Average length of customer service line

For more information, click here to see the Grading Matrix worksheet

Appendix F

Draft Water Shortage Contingency Plans/Ordinances

This appendix contains examples that were adopted in 1991 to address water shortage conditions and will be used as models for future water shortage contingency ordinances.

Appendix I

DROUGHT EMERGENCY WATER SHARING AGREEMENT

1. Parties. The parties to this agreement are: Valencia Water Company, Santa Clarita Water Company, Los Angeles County Waterworks District No. 36-Val Verde, Newhall County Water District, and the Castaic Lake Water Agency.

2. Critical Water Shortage Conditions. The State of California is experiencing a fifth year of drought, which has caused critical water shortages in many areas of the state, including the service area of the Castaic Lake Water Agency. The Agency has recently been informed that the State Water Project will have insufficient water to meet its demands for the coming year.

3. Water Sharing Agreement. In order to alleviate the emergency water shortage caused by the Drought and by insufficient agency water to meet demands, the undersigned parties agree to cooperate in sharing available water from all sources among themselves without regard to water, contractual or other rights for the duration of the emergency, and to facilitate among themselves water transfers, exchanges, and wheeling arrangements.

4. Preservation of Rights. By entering into this emergency water pooling and transfer, the parties do not waive their individual claims to water rights, or to contractual or other claims to water or the use of water. Each party agrees that no party hereto will lose any water right, contract right, or other entitlement to water by entering into this agreement,

nor shall any party attempt to use this agreement or the emergency exchange of water as a basis for a claim against any other party of a continued right to the use of that water. This agreement shall not be construed as constituting any alteration in the respective priorities or terms of any of the rights held by any party, nor as an admission with respect to any rights or claims. Each party further agrees that no party hereto will lose any water or other right by a claim of non-use by another party, prescription, or dedication to public use by entering into this agreement.

5. Termination. This agreement shall terminate upon the cessation of drought conditions affecting the service area of the Castaic Lake Water Agency, or January 1, 1992, whichever is sooner, but may be extended by mutual consent of all the parties.

6. Counterparts. This agreement shall be executed in counterparts, each of which shall be deemed an original.

7. Effective Date. The effective date of this agreement shall be that date upon which all the parties hereto have executed the agreement.

Valencia Water Company

Date: FEBRUARY 13, 1991

Attest:

by

Santa Clarita Water Company

Date: February 26, 1991

by W. J. Manthey

Attest:

Benjamin L. Borelli

Los Angeles County Waterworks
District No. 36

Date: 8/27/91

by ORIGINAL SIGNED BY

Attest:

~~Pg~~ 21

Newhall County Water District

Date: 2/19/91

by ORIGINAL SIGNED BY

Attest:

~~Pg~~ 22

Castaic Lake Water Agency

Date: 2/28/91

by ORIGINAL SIGNED BY

Attest:

~~Pg~~ 23

s/Los Angeles County Waterworks District No. 36

Date: AUG 27 1991

by Michael D. Antonovich

Attest:
ATTEST: LARRY J. MONTEILH
EXECUTIVE OFFICER —
CLERK OF THE BOARD OF SUPERVISORS
By Lynne C. Valle, Deputy

s/Newhall County Water District

Date:

Attest:

by

s/Castaic Lake Water Agency

Date: 2/28/91

Attest:

by

APPROVED AS TO FORM
DE WITT W. CLINTON, County Counsel

BY
DEPUTY

ADOPTED
BOARD OF SUPERVISORS
COUNTY OF LOS ANGELES

S 9 1 AUG 27 1991

LARRY J. MONTEILH
EXECUTIVE OFFICER

s/ Newhall County Water District Date: 2/19/71

Attest:

by [signature] President [signature] Secy

s/ Castaic Lake Water Agency Date: _____

Attest:

by _____ _____

s/Los Angeles County Waterworks
District No. 36

Date:

Attest:

by

s/Newhall County Water District

Date:

Attest:

by

s/Castaic Lake Water Agency

Date: 2/28/91

Attest:

by

Appendix II

RESOLUTION NO.804

RESOLUTION OF THE BOARD OF DIRECTORS OF CASTAIC LAKE WATER AGENCY RECOGNIZING REDUCTIONS IN REQUESTED DELIVERY OF STATE WATER PROJECT SUPPLY FOR YEAR 1991 AND MANDATING A PROGRAM OF WATER CONSERVATION IN THE SANTA CLARITA VALLEY

WHEREAS, the Castaic Lake Water Agency is a public entity organized and operating pursuant to the California Water Code, Appendix, Chapter 103, and is primarily empowered to supply water at wholesale to retail water distributors within the Santa Clarita Valley; and

WHEREAS, the Agency's source of water is by contract with the State Water Project of the California Department of Water Resources; and

WHEREAS, the State Water Project, and the entire State of California is experiencing protracted drought conditions of unprecedented recent duration; and

WHEREAS, the California Department of Water Resources in a letter dated February 2, 1991 advised the Agency to plan for "severe reductions" in its State Water Project supply; and

WHEREAS, the letter further reported, "there is a 50% probability that the Department will only be able to deliver about half of the water requested for municipal and industrial use in 1991"; and

WHEREAS, half of the requested State Water Project supply of the Castaic Lake Water Agency would be 13,050 acre feet: and

WHEREAS, the retail water distributors within the Santa Clarita Valley operate ground water production facilities that have been planned to make up some portion of the delivery reductions in State Project Water; and

WHEREAS, the retail water distributors and the Agency, have pursuant to Water Code, Sections 10610 through 10656, adopted a URBAN WATER MANAGEMENT PROGRAM for retail sales which contains water conservation measures including, metering, leak detection, public education, public information, home retrofit devices, drip and sprinkler irrigation restrictions, and a landscape suggestion for use of drought tolerant plantings; and

WHEREAS, heretofore, the Castaic Lake Water Agency adopted Resolution No. 667 relating to a voluntary water conservation program to reduce water consumption by 10 percent; and

WHEREAS, it is now essential to enact a mandatory program;

NOW, THEREFORE, BE IT RESOLVED that this Agency's Board of Directors does hereby find and determine the following:

1. That the General Manager of the Agency be authorized to execute a "Drought Emergency Water Sharing Agreement" with the local water purveyors to make it clear that emergency drought sharing of Agency water supplies during year 1991 not result in any waiver of contractual or other right to use of Agency water.

2. That the General Manager confer with the retail water purveyors to coordinate the distribution and use of the limited State Project Water supply to maximize the distribution of the ground water production capacity of the combined facilities operated by the retail water purveyors.

3. That the Agency request both the City of Santa Clarita and the County of Los Angeles to adopt mandatory water use ordinances with terms generally as follows:

I. A WATER CONSERVATION ORDINANCE WHICH SHALL TERMINATE ON JANUARY 1, 1992 UNLESS RENEWED OR TERMINATED EARLIER

A. Hose Watering-Prohibition.

No person shall hose-water or wash down any sidewalks, walkways, driveways, parking areas, or other paved surfaces. Willful violation hereof shall be an infraction punishable by a fine of $100.00 for the first infraction and $500.00 each for subsequent infraction.

B. Watering of Lawns and Landscaping

1. No person shall water or cause to be watered any lawn or landscaping between the hours of 10:00 a.m. and 5:00 p.m.

2. No person shall water or cause to be watered any lawn or landscaping more than once a day.

3. No person shall water or cause to be watered any lawn or landscaping to such an extent that runoff into adjoining streets, parking lots or alleys occurs due to incorrectly directed or maintained sprinklers or excessive watering.

4. It shall be the duty of all persons to inspect all hoses, faucets and sprinkling systems for leaks and to cause all leaks to be repaired as soon as is reasonably practicable.

5. Willful violation hereof shall be an infraction punishable by a fine of $100.00 for the first infraction and $500.00 each for subsequent infractions.

C. Indoor Plumbing and Fixtures.

1. It shall be the duty of all persons to inspect all accessible indoor plumbing and faucets for leaks and to cause all leaks to be repaired as soon as is reasonably practicable.

2. Any new or replacement toilets installed in any residence or business shall be of a low-flow variety.

3. Willful violation hereof shall be an infraction punishable by a fine of $500.00.

D. Washing Vehicles

No vehicle of any type may be washed, except at a commercial car wash, unless such vehicle is washed by using a hand-held bucket or a water-hose equipped with an automatic shutoff nozzle. No person shall leave a water hose running while washing a vehicle or at any other time. Willful violation hereof shall be an infraction punishable by a fine of $100.00 for the first infraction and $500.00 each for subsequent infraction.

E. Public Eating Places

No restaurant, cafeteria, coffee shop, or other public place where food is sold or served shall serve drinking water to any customer unless specifically requested to do so by such customer. Willful violation hereof shall be an infraction punishable by a fine of $100.00 for the first infraction and $500.00 each for subsequent infractions.

F. Decorative Fountains

No person shall use water to clean, fill, or maintain levels in decorative fountains unless such water flows through a recycling system. Willful violation hereof shall be an infraction punishable by a fine of $100.00 for the first infraction and $500.00 each for subsequent infractions.

4. That the above cited three paragraphs are deemed appropriate as PHASE ONE of the Agency's mandatory conservation program with recognition of the possibility that the California Department of Water Resources may declare deeper finite reductions for the municipal and industrial water supplies of the State Water Project. Residents of the Agency are put on notice that further and additional phases of the mandatory conservation program may be enacted by the Agency and could include the following:

A. Odd/Even landscape irrigation restriction, based upon address

B. A financial penalty of say triple the water rate for metered water service that exceeds historic use

C. Complete prohibition of landscape irrigation

I, the undersigned, hereby certify: That I am the duly appointed and acting Secretary of the Castaic Lake Water Agency, and that at a special meeting of the Board of Directors of said Agency held on Monday, February 11, 1991, the foregoing Resolution No. 804 was duly and regularly adopted by said Board, and that said resolution has not been rescinded or amended since the date of its adoption, and that it is now in full force and effect.

Betty L. Castleberry
Secretary

DATED: 2/12/91

Appendix III

ORDINANCE NO. 101

WATER CONSERVATION ORDINANCE OF
NEWHALL COUNTY WATER DISTRICT

* * * * * * * * * * * * * * *

BE IT ORDAINED BY THE BOARD OF DIRECTORS OF NEWHALL COUNTY WATER DISTRICT, LOS ANGELES COUNTY, CALIFORNIA AS FOLLOWS:

Section 1: Because of the water supply conditions prevailing within the District's service area, the general welfare requires that water resources available to the District be put to the maximum beneficial use to the extent to which they are capable, and that the waste or unreasonable use, or unreasonable method of use of water be prevented, and that the conservation of such water be practiced with the view to the reasonable and beneficial use thereof in the interest of the people of the District, and for the public welfare. The purpose of this Ordinance is to provide a water conservation plan to minimize the effect of a shortage of water supplies on the customers of the District.

Section 2: No customer of the District shall make, cause, use or permit the use of water from the District in a manner contrary to any provision of this Ordinance.

Section 3: Watering of Lawns or Landscaping.

(a) No person shall water or cause to be watered any lawn or landscaping between the hours of 10:00 a.m. and 5:00 p.m.

(b) No person shall water or cause to be watered any lawn or landscaping more than once a day.

(c) No person shall water or cause to be watered any lawn or landscaping to such an extent that runoff into adjoining streets, parking lots or alleys occurs due to incorrectly directed or maintained sprinklers or excessive watering.

(d) It shall be the duty of all persons to inspect all hoses, faucets and sprinkling systems for leaks and to cause all leaks to be repaired as soon as is reasonably practicable.

Section 4: Indoor Plumbing and Fixtures.

(a) It shall be the duty of all persons to inspect all accessible indoor plumbing and faucets for leaks and to cause all leaks to be repaired as soon as is reasonably practicable.

(b) For new or replacement toilets installed in any residence or business, local low-flow types are recommended.

Section 5: Washing Vehicles. No vehicle of any type may be washed, except at a commercial car wash, unless such vehicle is washed by using a hand-held bucket or a water-hose equipped with an automatic shutoff nozzle. No person shall leave a water hose running while washing a vehicle or at any other time.

Section 6: Public Eating Places. No restaurant, cafeteria, coffee shop or other public place where food is sold or served shall serve drinking water to any customer unless specifically requested to do so by such customer.

Section 7: No person shall use water to clean, fill or maintain levels in decorative fountains unless such water flows through a recycling system.

Section 8: Water Conservation Kits. Water conservation kits are available without charge to the District's customers at the District's office. In most cases, the kits include a plastic displacement bag, two sets of shower flow restrictors, two dye tablets to check for toilet leaks and a brochure which explains the use of the kit. The kits are to be installed by the District's customers.

Section 9: Effective Date. The water use restrictions of this Ordinance are effective immediately. Other provisions of this Ordinance are effective on March 21, 1991.

ADOPTED, SIGNED AND APPROVED by the Board of Directors of NEWHALL COUNTY WATER DISTRICT this 19th day of February, 1991.

MARY JUNE HERRINGTON, President
of the Board of Directors of the
NEWHALL COUNTY WATER DISTRICT

A T T E S T:

JAMES E. JINKS, Secretary of
the Board of Directors of the
NEWHALL COUNTY WATER DISTRICT

STATE OF CALIFORNIA)
) ss.
COUNTY OF LOS ANGELES)

I hereby certify that the foregoing Ordinance No. 101 was duly and regularly adopted and passed by the Board of Directors of the NEWHALL COUNTY WATER DISTRICT at a regular meeting thereof on the 19th day of February, 1991 by the following vote of the members thereof:

AYES:	DIRECTORS:	Herrington, Hayes, Wade, Agajanian and Whiteside
NOES:	DIRECTORS:	None
ABSENT:	DIRECTORS:	None
ABSTAINED:	DIRECTORS:	None

JAMES E. JINKS, Secretary of
the Board of Directors of the
NEWHALL COUNTY WATER DISTRICT

ORDINANCE NO. 102

ORDINANCE AMENDING SECTION 3 OF ORDINANCE NO. 101 OF NEWHALL COUNTY WATER DISTRICT RE WATER CONSERVATION

* * * * * * * * * * * * * * *

BE IT ORDAINED BY THE BOARD OF DIRECTORS OF NEWHALL COUNTY WATER DISTRICT, LOS ANGELES COUNTY, CALIFORNIA AS FOLLOWS:

Section 1: Section 3 of Ordinance No. 101 is amended to provide as follows:

"Section 3: Watering of Lawns or Landscaping.

(a) No person shall water or cause to be watered any lawn or landscaping between the hours of 8:00 a.m. and 6:00 p.m.

(b) No person shall water or cause to be watered any lawn or landscaping more than once a day, or for a period of time not to exceed ten minutes per watering station or cycle.

(c) No person shall water or cause to be watered any lawn or landscaping to such an extent that runoff into adjoining streets, parking lots or alleys occurs due to incorrectly directed or maintained sprinklers or excessive watering.

(d) It shall be the duty of all persons to inspect all hoses, faucets and sprinkling systems for leaks and to cause all leaks to be repaired as soon as is reasonably practicable."

Section 2: The provisions of this Ordinance shall be effective on November 19, 1991.

ADOPTED, SIGNED AND APPROVED by the Board of Directors of NEWHALL COUNTY WATER DISTRICT this 15th day of October, 1991.

MARY JUNE HERRINGTON, President of the Board of Directors of the NEWHALL COUNTY WATER DISTRICT

A T T E S T:

JAMES E. JINKS, Secretary of the Board of Directors of the NEWHALL COUNTY WATER DISTRICT

STATE OF CALIFORNIA)
) ss.
COUNTY OF LOS ANGELES)

I hereby certify that the foregoing Ordinance No. 102 was duly and regularly adopted and passed by the Board of Directors of the NEWHALL COUNTY WATER DISTRICT at a regular meeting thereof on the 15th day of October, 1991 by the following vote of the members thereof:

AYES:	DIRECTORS:	Herrington, Hayes, Wade, Agajanian and Whiteside
NOES:	DIRECTORS:	None
ABSENT:	DIRECTORS:	None
ABSTAINED:	DIRECTORS:	None

JAMES E. JINKS, Secretary of the Board of Directors of the NEWHALL COUNTY WATER DISTRICT

Appendix IV

ORDINANCE NO. 91-16

AN ORDINANCE OF THE CITY OF SANTA CLARITA
ADDING CHAPTER 9.38 TO TITLE 9
OF THE SANTA CLARITA MUNICIPAL CODE

WHEREAS, the State of California is experiencing a prolonged drought; and

WHEREAS, the delivery of State Project Water to the Castaic Lake Water Agency has been reduced by 90% of the requested delivery levels.

THE CITY COUNCIL OF THE CITY OF SANTA CLARITA DOES HEREBY ORDAIN AS FOLLOWS:

Section 1. The Santa Clarita Municipal Code is amended adding Chapter 9.38 to Title 9 relating to water conservation to read as follows:

CHAPTER 9.38

WATER CONSERVATION

Sections:

9.38.010 Drought Committee
9.38.015 Water Conservation Regulations
9.38.020 Penalties
9.38.025 Termination of Ordinance
9.38.030 Ordinance 91-16 Amended

9.38.010 Drought Committee

A. A drought committee shall be established, whose function shall be:

1. to review all available data on water consumption, water supply and ground water conditions;

2. to evaluate the level of compliance with the terms of this Ordinance;

3. to evaluate the level of achievement of the stated water consumption reductions;

4. to make recommendations to the City Council concerning the timing of and need for implementation of future additional water restrictions as may be developed; and

5. to make recommendations to the water purveyors in the City of Santa Clarita concerning additional measures to encourage water conservation, including but not limited to; conservation goals for individual water accounts, surcharges for excessive water use and the installation of flow restriction devices in water services.

B. The members of the Drought Committee shall include representatives from the staff of the City of Santa Clarita, the Upper Santa Clara Water Committee, other appointees as the City Council deems appropriate, and the staff of the Castaic Lake Water Agency.

9.38.015 Water Conservation Regulations

A. Water conservation shall be achieved through the restriction and/or prohibition of various types of water use. The restrictions and prohibitions shall be implemented immediately.

B. The following conditions and restrictions shall apply to the use of water within the City of Santa Clarita:

1. Hose Water Prohibition.

a. No person shall hose-water or wash down any sidewalks, walkways, driveways, parking areas, or other paved surface.

2. Watering of Lawns and Landscaping.

a. No person shall water or cause to be watered any lawn or landscaping between the hours of 8:00 a.m. and 6:00 p.m. except as provided in Section 9.38.015.B.2.e.

b. Lawns and landscaping shall be watered no more frequently than every other day.

c. No person shall water or cause to be watered any lawn or landscaping to such an extent that runoff into adjoining streets, parking lots or alleys occurs due to incorrectly directed or maintained sprinklers or to excessive watering.

d. It shall be the duty of all persons to inspect all hoses, faucets and sprinkling systems for leaks and to cause all leaks to be repaired as soon as is reasonably practicable.

e. Commercial gardeners and landscapers, municipal water uses, commercial nurseries, golf courses and other water-dependent industries shall not water or cause to be watered any lawn of landscaping between the hours of 10:00 a.m. and 3:00 p.m., and no more frequently than every other day, unless reclaimed water is used.

f. The maintenance and testing of irrigation systems may be performed without the restrictions specified in Section 9.38.015.B.2.a and 9.38.015.B.2.e.

3. Indoor Plumbing.

   a. Accessible indoor plumbing and fixtures must be inspected for leaks and repaired as soon as reasonably practicable.

   b. New and replacement toilets, showers and faucets shall be of a low-flow type. New or replacement faucets shall be equipped with aerators.

4. Washing Vehicles.

   a. Vehicles must be washed by hand-held bucket or with a hose equipped with automatic shutoff nozzle. Hoses may not be left running.

   b. These restrictions shall not be applied to commercial vehicle washing facilities and operations.

5. Public Eating Places.

   a. Water may be served only upon request by the customer.

6. Decorative Fountains.

   a. Water may not be used to clean, fill or maintain levels in decorative fountains unless the fountain has a water recycling system.

7. Landscaping and Irrigation Plans.

   a. All new landscaping and irrigation improvements shall be approved by the City of Santa Clarita Director of Parks and Recreation prior to construction.

   b. No person or entity shall be required to implement any landscaping requirements of any association, developer or governing agency until the termination of this ordinance.

C. Conservation Goal

1. The goal of this Water Conservation Ordinance is to achieve at least 25% reduction of overall water consumption within the City of Santa Clarita.

9.38.020 Penalties.

A. Willful violations of the terms of this Ordinance shall be subject to written warnings and/or citations. A written warning shall be issued upon the first violation of any part of this Ordinance. The second violation shall result in a fine of $50.00. The third violation shall result in a fine of $100.00, and all subsequent violations shall result in a fine of $300.00 for each violation.

9.38.025 Termination of Ordinance.

A. This Ordinance shall terminate on January 1, 1992, unless renewed or termination earlier by ordinance.

Section 2. The City Council hereby declares that the provisions of this Ordinance are severable and if for any reason a court or competent jurisdiction shall hold any sentence, paragraph or section of this Ordinance to be invalid, such decision shall not affect the validity of the remaining parts of this Ordinance.

Section 3. This Ordinance is adopted as an urgency measure. The facts of the urgency are these: The State of California is currently suffering from the effects of a five-year drought, and the deliveries of State Project water to local water agencies are being reduced. This Ordinance restricts or prohibits certain types of water usage. The immediate enactment of this Ordinance is therefore necessary to ensure the adequacy of the water supply for the City of Santa Clarita and is thereby directly related to public health, safety and welfare. Therefore, this Ordinance shall be effective immediately upon adoption.

Section 4. The City Clerk shall certify to the passage of this Ordinance and shall cause it to be published in the manner prescribed by law.

9.38.030 Ordinance 91-12 Amended

A. Ordinance 91-12 is hereby amended, deleting Section 9.38.015.b.8 in its entirety.

PASSED, APPROVED AND ADOPTED this 13th day of March, 1991.

Carl Boyer
CARL BOYER, MAYOR

ATTEST:

Donna M. Grindey
DONNA GRINDEY, CITY CLERK

STATE OF CALIFORNIA)
COUNTY OF LOS ANGELES) ss.
CITY OF SANTA CLARITA)

I, Donna M. Grindey, City Clerk of the City of Santa Clarita, do hereby certify that the foregoing Ordinance No. 91-16 was duly adopted as an urgency ordinance at a regular meeting of the City Council on the 13th day of March, 1991, by the following four-fifths vote, to wit:

AYES: COUNCILMEMBERS Darcy, Heidt, McKeon, Boyer

NOES: COUNCILMEMBERS Klajic

ABSENT: COUNCILMEMBERS None

Donna M. Grindey
CITY CLERK

AGN:gmm-394

ORDINANCE NO. 91-48

AN ORDINANCE OF THE CITY COUNCIL OF THE CITY OF SANTA CLARITA, CALIFORNIA, AMENDING CHAPTER 9.38 OF THE SANTA CLARITA MUNICIPAL CODE RELATING TO WATER CONSERVATION

THE CITY COUNCIL OF THE CITY OF SANTA CLARITA, CALIFORNIA, DOES ORDAIN AS FOLLOWS:

SECTION 1. The Santa Clarita Municipal Code is hereby amended at Subsection 9.38.015.B.2.b to read as follows:

b. Lawns and landscaping shall be watered no more than 10 minutes per watering station or cycle per day.

SECTION 2. The Santa Clarita Municipal Code at Subsection 9.38.015.B.2.e is hereby amended to read as follows:

e. Commercial gardeners and landscapers, municipal water uses, commercial nurseries, golf courses and other water-dependent industries shall not water or cause to be watered any lawn or landscaping between the hours of 10:00 a.m. and 3:00 p.m., and no more than 10 minutes per watering station or cycle per day unless reclaimed water is used. This subsection does not apply to residential lawns which are subject to the time limitations indicated in the other subsections of this Ordinance.

SECTION 3. Section 9.38.015.C.1 is hereby amended to read as follows:

1. The goal of this Water Conservation Ordinance is to achieve a significant reduction of overall water consumption within the City of Santa Clarita.

SECTION 4. This Ordinance is adopted as an urgency measure. The facts of the urgency are these: The State of California is currently suffering from the effects of a five-year drought, and the deliveries of State Project water to local water agencies are being reduced. This Ordinance restricts or prohibits certain types of water usage. The immediate enactment of this Ordinance is therefore necessary to ensure the adequacy of the water supply for the City of Santa Clarita and is thereby directly related to public health, safety and welfare. Therefore, this Ordinance shall be effective immediately upon adoption.

SECTION 5. The City Clerk shall certify to the passage of this Ordinance and shall cause it to be published in the manner prescribed by law.

PASSED, APPROVED AND ADOPTED this 8th day of October, 1991.

Carl Boyer

Carl Boyer, Mayor

ATTEST:

Donna M. Grindey

Donna M. Grindey, City Clerk

STATE OF CALIFORNIA)
COUNTY OF LOS ANGELES) ss
CITY OF SANTA CLARITA)

I, Donna M. Grindey, City Clerk of the City of Santa Clarita, do hereby certify that the foregoing Ordinance No. 91-48 was duly adopted as an urgency ordinance at a regular meeting of the City Council on the 8th day of October, 19 91 by the following four-fifths vote, to wit:

AYES: COUNCILMEMBERS: Darcy, Heidt, McKeon, Boyer

NOES: COUNCILMEMBERS: Klajic

ABSENT: COUNCILMEMBERS: None

Donna M. Grindey

Donna M. Grindey, City Clerk

Appendix V

ORDINANCE NO. 91-0046U

An urgency ordinance amending Title 11, Chapter 11.38 of the Los Angeles County Code relating to Water and Sewers to add Part 4, Water Conservation.

The Board of Supervisors of the County of Los Angeles ordains as follows:

Section 1. Title 11, Chapter 11.38 of the County Code is amended by adding Part 4, to read:

Part 4. Water Conservation Requirements For The Unincorporated Los Angeles County Area.

Section 11.38.620 Hose Watering Prohibition. No person shall hose water or wash down any sidewalks, walkways, driveways, parking areas or other paved surfaces, except as is required for the benefit of public health and safety. Willful violation hereof shall be an infraction punishable by a fine of $100.00 for the first infraction and $500.00 each for subsequent infractions.

Section 11.38.630 Watering of Lawns and Landscaping.

a). No person shall water or cause to be watered any lawn or landscaping between the hours of 10:00 a.m. and 5:00 p.m.

b). No person shall water or cause to be watered any lawn or landscaping more than once a day.

c). No person shall water or cause to be watered any lawn or landscaping to such an extent that runoff into adjoining streets, parking lots or alleys occurs due to incorrectly directed or maintained sprinklers or excessive watering.

d). It shall be the duty of all persons to inspect all hoses, faucets and sprinkling systems for leaks and to cause all leaks to be repaired as soon as is reasonably practicable.

e). Willful violation hereof shall be an infraction punishable by a fine of $100.00 for the first infraction and $500.00 each for subsequent infractions.

Section 11.38.640 Indoor Plumbing and Fixtures.

a). It shall be the duty of all persons to inspect all accessible indoor plumbing and faucets for leaks and to cause all leaks to be repaired as soon as is reasonably practicable.

b). Willful violation hereof shall be an infraction punishable by a fine of $500.00.

Section 11.38.650 Washing Vehicles.
No motor vehicle, boat, trailer or other type of mobile equipment may be washed, except at a commercial car wash or with reclaimed water, unless such vehicle is washed by using a hand-held bucket or a water-hose equipped with an automatic shutoff nozzle. No person shall leave a water hose running while washing a vehicle or at any other time. Willful violation hereof shall be an infraction punishable by a fine of $100.00 for the first infraction and $500.00 each for subsequent infractions.

Section 11.38.660 Public Eating Places.
No restaurant, hotel, cafeteria, cafe or other public place where food is sold or served shall serve drinking water to any customer unless specifically requested to

do so by such customer. Willful violation hereof shall be an infraction punishable by a fine of $100.00 for the first infraction and $500.00 each for subsequent infractions.

Section 11.38.670 Decorative Fountains.
No person shall use water to clean, fill or maintain levels in decorative fountains, ponds, lakes, or other similar aesthetic structures unless such water flows through a recycling system. Willful violation hereof shall be an infraction punishable by a fine of $100.00 for the first infraction and $500.00 each for subsequent infractions.

Section 2. This ordinance shall terminate on January 1, 1993, unless renewed or terminated earlier by ordinance.

Section 3. Due to the severity of the drought in the State of California, there is an immediate need to prohibit the wasting of water in the Los Angeles County unincorporated area to better utilize the available water supplies. This ordinance is urgently needed for the preservation of the public health, safety and general welfare and shall take effect immediately.

Section 4. This ordinance shall be published in

Metropolitan News Enterprise

a newspaper printed and published in the County of Los Angeles.

Michael D. Antonovich
Chairman

ATTEST:

Executive Officer
Board of Supervisors
of the County of Los Angeles

I hereby certify that at its meeting of March 21, 1991, the foregoing ordinance was adopted by the Board of Supervisors of said County of Los Angeles by the following vote, to wit:

Ayes:	Noes:
Supervisors Gloria Molina	Supervisors None
Edmund D. Edelman	
Deane Dana	
Michael D. Antonovich	

Executive Officer
Board of Supervisors
of the County of Los Angeles

Effective Date: March 21, 1991

Operative Date: _____

I hereby certify that pursuant to Section 25103 of the Government Code, delivery of this document has been made.
LARRY J. MONTEILH
Executive Officer
Clerk of the Board of Supervisors
By _____ DEPUTY

APPROVED AS TO FORM:
DE WITT W. CLINTON
County Counsel
By _____
GERALD F. CRUMP
Chief Assistant County Counsel

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. . . S A M P L E N O T I C E . . .

LOS ANGELES COUNTY WATER WASTING ORDINANCE
NOTICE OF WARNING

Date _____

Address: _____
_____
_____
_____

Dear Customer:

Due to the severity of the current drought, the County Board of Supervisors, on March 21, 1991, adopted an Ordinance that specifies a number of water saving measures. The Ordinance applies to the unincorporated areas of the County and includes the following provisions:

__ Washing down of paved surfaces is prohibited, except as required for public health and safety.

__ Lawn and landscape watering is prohibited between the hours of 10:00 a.m. and 5:00 p.m.

__ Landscape watering that results in runoff into adjoining streets, parking lots or alleys due to misdirected sprinklers or excessive watering is prohibited.

__ Leaking hoses, faucets and sprinkling systems must be repaired as soon as is reasonably practicable.

__ Leaks to indoor plumbing systems must be repaired as soon as is reasonably practicable.

__ Washing of a motor vehicle, boat or trailer is prohibited except at a commercial car wash or with a hand-held bucket or water hose equipped with an automatic shutoff nozzle.

__ Serving drinking water to customers at public eating places is prohibited unless specifically requested by such customers.

__ Water cannot be used in decorative fountains, ponds, lakes and other similar aesthetic structures unless the water flows through a recycling system.

We observed the violation(s) of the above noted provisions on your property. We request your support in complying with the provisions of this ordinance so that we can avoid unnecessary waste and stretch our limited water supplies for the duration of the drought. Violation of this Ordinance is punishable by a fine of up to $500. If you have any questions regarding this ordinance or its enforcement please contact (your office and phone number).

(WW3901)

Appendix VI

RESOLUTION

ADOPTING A WATER SHORTAGE CONTINGENCY PLAN
FOR THE SANTA CLARITA WATER COMPANY

WHEREAS, the California Legislature enacted Assembly Bill 11X during the 1991 Extraordinary Session of the California Legislature (an act to amend the California Water Code Sections 10620, 10621, 10631, and 10652, and to add Section 10656 to the California Water Code, relating to water); and

WHEREAS, AB 11X mandates that every urban water supplier providing municipal water directly or indirectly to more than 3,000 customers or supplying more than 3,000 acre feet of water annually to develop a Water Shortage Contingency Plan; and

WHEREAS, AB 11X mandates that said Plan be filed with the California Department of Water Resources by January 31, 1992; and

WHEREAS, the Santa Clarita Water Company is an urban supplier of water providing water to more than 3,000 customers, and has therefore prepared and circulated for public review a Draft Water Shortage Contingency Plan, in compliance with the requirements of AB 11X, has held a properly noticed public hearing on January 29, 1992, regarding said Draft Plan, and has thereafter prepared a Final Water Shortage Contingency Plan;

NOW, THEREFORE, BE IT RESOLVED by the Santa Clarita Water Company's Board as follows:

1. A Final Water Shortage Contingency Plan is hereby adopted and is attached hereto as Exhibit "A" hereof, which exhibit is hereby incorporated herein;

2. The President is hereby authorized and directed to file the Plan with the California Department of Water Resources;

3. The President is hereby also authorized to follow lawful procedures to declare a Water Shortage Emergency and to implement this Water Shortage Contingency Plan; and

4. The President shall recommend to the Santa Clarita Water Company's Board additional procedures, rules, and regulations to carry out effective and equitable allocation of water resources during a water shortage.

Appendix VI

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WHEREAS, AB 11X mandates that said Plan be filed with the California Department of Water Resources by January 31, 1992; and

WHEREAS, the Santa Clarita Water Company is an urban supplier of water providing water to more than 3,000 customers, and has therefore prepared and circulated for public review a Draft Water Shortage Contingency Plan, in compliance with the requirements of AB 11X, has held a properly noticed public hearing on January 29, 1992, regarding said Draft Plan, and has thereafter prepared a Final Water Shortage Contingency Plan;

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2. The President is hereby authorized and directed to file the Plan with the California Department of Water Resources;

3. The President is hereby also authorized to follow lawful procedures to declare a Water Shortage Emergency and to implement this Water Shortage Contingency Plan; and

4. The President shall recommend to the Santa Clarita Water Company's Board additional procedures, rules, and regulations to carry out effective and equitable allocation of water resources during a water shortage.

Newhall County Water District's Ordinance No. 112

ORDINANCE NO.112
WATER CONSERVATION, SHORTAGE, DROUGHT AND EMERGENCY RESPONSE ORDINANCE

* *

Section 1: ***PURPOSE*****:** Article 10, Section 2 of the California Constitution declares that waters of the State are to be put to beneficial use, that waste, unreasonable use, or unreasonable method of use be prevented, and that water be conserved for the public welfare. The specific provisions of this Ordinance are necessary and proper to conserve water resources and minimize cost to the customer. This ordinance requires that available water resources be put to the maximum beneficial use, and that water efficient practices be used to reach this objective. This further finds that water supplies may be reduced because of drought, failure of facilities, or catastrophic events such as earthquakes and regional power failures. Anti-waste and water conservation requirements are necessary to achieve demand reduction without unneeded hardship.

Section 2: ***DEFINITIONS AND TERMS:***

A. ***Water efficient practices****:* Cost-effective practices that require the least amount of water to generate the greatest benefit (water and cost savings) to the customer.

B. ***Water Waste:*** To use or expend water carelessly or needlessly.

C. ***Water User:*** Business or residential customer.

D. ***Water Conservation Stages:*** The General Manager shall determine the conservation stage, except that the Board shall determine any conservation stage more restrictive than Stage 1. A water deficiency occurs when the current or near-term water demand exceeds the current or near-term water supply.

Stage 1 Water Alert: Water deficiencies range between 1 and 15 percent.

Stage 2 Water Warning: Water deficiencies range from more than 15 and up to 25 percent.

Stage 3 Water Emergency: Water deficiencies range from more than 25 and up to 35 percent.

Stage 4 Water Crisis: Water deficiencies are more than 35 percent.

E. ***Water Deficiency:*** A water deficiency occurs when the current or near-term water demand exceeds the current or near-term water supply, based on a yearly assessment. (Percent or deficiency = (1 – water supply/water demand) x 100

F. ***Water Conservation Goals:***

Stage 1 Water Alert: ***Achieve a Conservation level of up to 10 percent.***

Stage 2 Water Warning: ***Achieve a Conservation level of up to 20 percent.***

Stage 3 Water Emergency: ***Achieve a Conservation level of up to 30 percent.***

Stage 4 Water Crisis: ***Achieve a Conservation level of over 30 percent.***

Section 3: ***WATER CONSERVATION ACTION PLAN:*** This plan establishes water conservation measures to be taken in response to current and anticipated levels of deficiency in State and/or local water supplies. No Water User shall waste water or make, cause, or permit the use of water for any purpose contrary to any provision of this Ordinance, or in quantities in excess of the use permitted by the conservation stage in effect pursuant to this Ordinance.

3.1 Efficient Water Use. *Because more severe effects of a water shortage are often brought about due to wasteful water use habits carried over from times of sufficient supply, certain voluntary water-use practices are encouraged at all times.*

3.1.1 Outdoor Water Use Efficiency Guidelines and Recommendations:

a) Sprinklers should be maintained and adjusted so that overspray, runoff, and water waste is avoided. The most effective and water-efficient irrigation should be used, and drip irrigation should be considered where appropriate.

b) All leaks in plumbing and irrigation systems should be repaired promptly

c) Vehicles should be washed using a hose equipped with automatic shutoff nozzle.

d) Sidewalks, walkways, driveways, parking lots or any other hard-surfaced areas should not be washed down, except for health and safety purposes.

e) Low-water-use native or drought-tolerant vegetation should be used to minimize the need for irrigation. Plants and trees with similar water needs should be grouped together for most efficient irrigation. (Please see our website (agency site) for more information and links to other websites listing drought tolerant plants.)

f) Landscape should be installed in a manner that will reduce the amount of water needed for irrigation. For example, the use of mulches and watering basins is encouraged where appropriate.

g) Irrigation should occur during optimal watering hours, avoiding wind and heat. The following hours are considered the most efficient hours for (Agency)customers to effectively irrigate lawns and landscaped areas:

Winter/Fall (November through April) – 6 PM to 10 AM

Spring/Summer (May through October) –8 PM to 9 AM

h) Water usage on any decorative fountains, ponds or other types of water streams should be minimized by incorporating a water recycling system so the water is continually recovered and reused.

i) Pool and spa safety covers or evaporation-reducing water treatments should be considered if safe and appropriate for the situation. These will help minimize water loss due to evaporation. Pool and spa chemistry should be balanced and maintained to help reduce the frequency of pool/spa draining and refilling.

3.1.2 Indoor Water Use Efficiency Guidelines and Recommendations:

a) All leaks and/or damage to faucets, toilets, and indoor pipes should be repaired immediately.

b) Low flow devices for indoor plumbing fixtures including faucets, kitchen spray nozzles, toilets, and showers should be used where possible.

c) Install 1.3 or less gallon per flush (gpf) high efficiency toilets or .08/1.6 gallon per flush (gpf) dual-flush toilets.

d) Water-efficient Energy Star® approved appliances including, but not limited to, clothes washers and dishwashers should be used.

e) Clothes washers and dishwashers should be run using full loads to maximize water efficiency.

f) A source specific hot water dispenser or a whole house hot water recirculation system should be considered. These devices generate hot water within seconds, minimizing running the water until it is hot.

g) All commercial establishments where food or beverages are provided should encourage the serving of water to their customers only when specifically requested by the customer.

3.1.3 New Construction Water Efficiency Guidelines: As new technology advances, builders of new structures or persons retrofitting existing facilities should consider options such as evapotranspiration-controlled sprinkler systems, grey water or non-potable water systems (where legally acceptable), storm water cisterns, and landscape designs minimizing the use of turf and water-intensive plants. Businesses should review industry-specific guidance for ways to reduce water usage and should consider programs such as multi-pass cooling towers and process water recycling. Conveyor car wash and commercial laundry systems must utilize a recirculating system. Decorative water fountains, ponds or other types of water streams must incorporate a water recycling system.

3.2 Water Conservation Stage 1 Water Alert –: *At this stage of water deficiency, the Water Users are strongly encouraged to adhere to all the guidelines in section 3.1, Water Use Efficiency Guidelines. The following practices are also strongly suggested during Stage 1 water deficiencies:*

a) Outdoor irrigation of all vegetation including lawns and landscaping is limited to three times per week and no more than 10 minutes per watering station. Irrigation should occur during the following hours:

Winter/Fall (November through April) – 6 PM to 10 AM

Spring/Summer (May through October) – 8 PM to 9 AM

b) Repair all water leaks within five (5) days of notification by Water Purveyor.

3.3 <u>Water Conservation Stage 2 Water Warning:</u> *At this stage of water deficiency, Efficient Water Use Guidelines (3.1.1-3.1.2 above) and Stage 1 practices (3.2 above) become mandatory requirements. Further mandatory practices during Stage 2 are as follows:*

- ***a)*** All new landscaping shall be limited to widely accepted drought-tolerant plants requiring less than typical water requirements.
- ***b)*** No new lawns, whether by seed or sod, shall be installed.
- ***c)*** No filling of pools or spas. Water levels may be maintained.
- ***d)*** No filling of or re-filling of decorative fountains, ponds or other types of water streams, except to the extent needed to sustain aquatic life, provided that such animals are of significant value and have been actively managed within the water feature prior to the enactment of a stage 2 water warning.
- ***e)*** Repair all water leaks within seventy-two (72) hours of notification by Water Purveyor.

3.4 <u>Water Conservation Stage 3 Water Emergency:</u> *At this stage of water deficiency, Efficient Water Use Guidelines (3.1.1-3.1.2 above), Stage 1 practices (3.2 above), and Stage 2 practices (3.3 above) become mandatory requirements. Further mandatory practices during Stage 3 are as follows:*

- ***a)*** No new applications for service will be accepted.
- ***b)*** No water for grading will be allowed.
- ***c)*** Washing vehicles is prohibited, except at commercial facilities that recycle water.
- ***d)*** Street cleaning with potable water is prohibited.
- ***e)*** Repair all water leaks within forty-eight (48) hours of notification by Water Purveyor.

3.5 <u>Water Conservation Stage 4 Water Crisis:</u> *At this stage of water deficiency, Efficient Water Use Guidelines (3.1.1- 3.1.2 above), Stage 1 practices (3.2 above), Stage 2 practices (3.3 above), and Stage 3 practices (3.4 above) become mandatory requirements. Further mandatory practices during Stage 4 are as follows:*

- ***a)*** Outdoor irrigation of all vegetation including lawns and landscaping is prohibited. Existing trees and larger shrubs will be exempt.
- ***b)*** No new landscaping shall be permitted.

Repair all water leaks within twenty-four (24) hours of notification by Water Purveyor.

Section 4: ***ENFORCEMENT:***

4.1 ***Efficient Water Use and Stage 1 Enforcement:***

a) Any notification of signs or indications of water leaks or water waste will be documented. The Purveyor will confirm the water waste prior to any further action.

b) The Purveyor shall determine the action to be taken to inform the Water User of the guidelines in this Ordinance and to encourage more efficient and cost-effective water use.

4.2 ***Stage 2, 3 and 4 Enforcement.*** *The Purveyor has the duty and is authorized to enforce provisions of Stage 2, 3, and 4 of this Ordinance. If a violation is ongoing, the Purveyor may disconnect service until the violation is corrected.*

4.2.1 ***First Violation.*** For a first violation, an elevated usage letter shall be issued to the Water User.

4.2.2 ***Second Violation.*** For a second violation, a corrective action letter shall be issued to the Water User, and a fine of $40 shall be added to the Water User's bill at the property where the violation occurred if the corrective action is not taken within 10 days after receiving the written warning.

4.2.3 ***Third Violation.*** For a third violation, a fine of $100 shall be added to the Water User's bill at the property where the violation occurred if the corrective action is not taken within 10 days after receiving the written warning. In addition to the fine, the Purveyor may require installation of a flow restricting device on the Water User's service connection.

4.2.4 ***Fourth Violation.*** For the fourth and any additional violations, a fine of $250 shall be added to the Water User's bill at the property where the violation occurred. The Purveyor may also discontinue the Water User's water service at the property where the violation occurred. Re-connection shall be permitted only when there is reasonable protection against future violations, such as a flow-restricting device on the customer's service connection, as determined at the Purveyor's discretion.

4.3 ***District Enforcement Costs.*** The Purveyor shall be reimbursed for its costs and expenses in enforcing the provisions of this Ordinance, including such costs as incurred for Purveyor staff to investigate and monitor the Water User's compliance with the terms of this Ordinance. The charges for the installation of flow restricting devices or for discontinuing or restoring water service, as the Purveyor incurs those charges, shall be added to the Water User's bill at the property where the enforcement costs were incurred.

Section 5: ***ADMINISTRATION:***

5.1 ***General.*** The provisions of this Ordinance shall be administered and enforced by the Purveyor , who may delegate such enforcement to one or more employees or contractors of the Purveyor. The Purveyor may implement additional demand reduction practices, including surcharges, rationing, and specific water allocations, in times of severe shortage or emergency situations.

5.1.1 ***Water Utility Accounts.*** Accounts shall not be established for new customers, including the transfer of accounts upon change of ownership, until the customer agrees to comply with the provisions of this Ordinance.

5.1.2 ***Discretionary Exemptions.*** The Purveyor may, in its discretion, exempt Water Users and individual facilities of Water Users from the provisions of this Ordinance, or impose reasonable conditions in lieu of compliance with this Ordinance, if it is found that any of the following conditions exist:

a) Hardship. The requirements of this Ordinance would cause an unnecessary and undue hardship upon the Water User, the Water User facility or the public.

b) Health and Safety. Strict compliance with the requirements of this Ordinance would create an emergency condition, as determined by the Purveyor or other governmental entity with appropriate jurisdiction, affecting the health, protection or safety of the Water User or the public.

c) No Impact on Water Use. The granting of the exemption or imposition of reasonable conditions in lieu of compliance with this Ordinance would not increase the quantity of water consumed by the Water User or otherwise adversely affect service to other Water Users. In other words, the Water User will create an offset. In granting any such relief, the departure from the requirements of this Ordinance shall be limited to the minimum necessary to address the circumstances upon which such departure is required by a Water User.

5.1.3 ***Appeals.*** Any customer or applicant for a water service may appeal any decision under this Ordinance to the Purveyor whose decision shall be final.

RULE N0. 14.1

WATER CONSERVATION AND RATIONING PLAN

GENERAL INFORMATION (C)

1. If water supplies are projected to be insufficient to meet normal customer demand, and are beyond the control of the utility, the utility may elect to implement voluntary conservation using the portion of this plan set forth in Section A of this Rule, after notifying the Director of the Commission's Division of Water and Audits of its intent, via a letter in both hard-copy and e-mailed formats.

2. Prior to declaration of mandatory rationing, a utility may request authorization of a Schedule 14.1 – Staged Mandatory Water Conservation and Rationing tariff, via a Tier 2 advice letter.

3. If, in the opinion of the utility, more stringent water measures are required, the utility shall request Commission authorization to implement the staged mandatory conservation and rationing measures set forth in Sections B through E.

4. The utility shall file a Tier 1 advice letter to request activation of a particular stage of Schedule 14.1 – Staged Mandatory Water Conservation and Rationing tariff.

   a. If a Declaration of Mandatory Rationing is made by utility or governing agency, or

   b. If the utility is unable to address voluntary conservation levels set by itself, supplier, or governing agency, or

   c. If the utility chooses to subsequently activate a different stage

5. When Schedule 14.1 is in effect and the utility determines that water supplies are again sufficient to meet normal demands, and mandatory conservation and rationing measures are no longer necessary, the utility shall seek Commission approval via a Tier 1 advice letter to de-activate the particular stage of mandatory rationing that had been authorized.

6. In the event of a water supply shortage requiring a voluntary or mandatory program, the utility shall make available to its customers water conservation kits as required by its version of Rule 20. The utility shall notify all customers of the availability of conservation kits via a bill insert or direct mailers.

(continued) (C)

RULE N0. 14.1
(continued)

WATER CONSERVATION AND RATIONING PLAN

A. CONSERVATION - NON-ESSENTIAL OR UNAUTHORIZED WATER USE (C)

No customer shall use utility-supplied water for non-essential or unauthorized uses, including but not limited to:

1. Use of potable water for more than minimal landscaping, as defined in the landscaping regulated of the jurisdiction or as described in Article 10.8 of the California Government Code in connection with new construction;
2. Use through any meter when the company has notified the customer in writing to repair a broken or defective plumbing, sprinkler, watering or irrigation system and the customer has failed to effect such repairs within five business days;
3. Use of potable water which results in flooding or runoff in gutters or streets;
4. Individual private washing of cars with a hose except with the use of a positive action shut-off nozzle. Use of potable water for washing commercial aircraft, cars, buses, boats, trailers, or other commercial vehicles at any time, except at commercial or fleet vehicle or boat washing facilities operated at a fixed location where equipment using water is properly maintained to avoid wasteful use;
5. Use of potable water washing buildings, structures, , driveways, patios, parking lots, tennis courts, or other hard-surfaced areas, except in the cases where health and safety are at risk;
6. Use of potable water to irrigate turf, lawns, gardens, or ornamental landscaping by means other than drip irrigation, or hand watering without quick acting positive action shut-off nozzles, on a specific schedule, for example: 1) before 9:00 a.m. and after 5:00 p.m.; 2) every other day; or 3) selected days of the week;
7. Use of potable water for watering streets with trucks, except for initial wash-down for construction purposes (if street sweeping is not feasible), or to protect the health and safety of the public;

(continued) (C)

RULE N0. 14.1
(continued)

WATER CONSERVATION AND RATIONING PLAN

A. CONSERVATION – NON-ESSENTIAL OR UNAUTHORIZED WATER USE (CONT.) (C)

8. Use of potable water for construction purposes, such as consolidation of backfill, dust control, or other uses unless no other source of water or other method can be used.
9. Use of potable water for construction purposes unless no other source of water or other method can be used;
10. Use of potable water for street cleaning;
11. Operation of commercial car washes without recycling at least 50% of the potable water used per cycle;
12. Use of potable water for watering outside plants, lawn, landscape and turf areas during certain hours if and when specified in Schedule No. 14.1 when the schedule is in effect;
13. Use of potable water for decorative fountains or the filling or topping off of decorative lakes or ponds. Exceptions are made for those decorative fountains, lakes, or ponds which utilize recycled water;
14. Use of potable water for the filling or refilling of swimming pools.
15. Service of water by any restaurant except upon the request of a patron; and
16. Use of potable water to flush hydrants, except where required for public health or safety.

B. STAGED MANDATORY RATIONING OF WATER USAGE

1. Prior to declaration of mandatory rationing, a utility may request authorization of a Schedule 14.1 – Staged Mandatory Water Conservation and Rationing tariff, via a Tier 2 advice letter, with full justification. The utility may not institute Schedule 14.1 until it has been authorized to do so by the Commission.

(continued) (C)

RULE N0. 14.1
(continued)

WATER CONSERVATION AND RATIONING PLAN

B. STAGED MANDATORY RATIONING OF WATER USAGE (Cont) (C)

a. A staged Schedule 14.1 that has been authorized by the Commission shall remain dormant until triggered by specific conditions detailed in the Schedule 14.1 tariff and utility has requested and received authorization for activating a stage by Commission.

b. Notice of the Tier 2 advice letter and associated public participation hearing shall be provided to customers under General Order (GO) 96-B rules.

c. Utility shall comply with all requirements of Sections 350-358 of the California Water Code.

d. The Tier 2 advice letter requesting institution of a Schedule 14.1 shall include but not be limited to:

   i. Proposed Schedule 14.1 tariff, which shall include but not be limited to:

      1. Applicability,
      2. Territory applicable to,
      3. A detailed description of each Stage of Rationing,
      4. A detailed description of the Trigger that Activates each Stage of Rationing,
      5. A detailed description of each water use restriction for each stage of rationing.
      6. Water use violation levels, written warning levels, associated fines, and exception procedures,
      7. Conditions for installation of a flow restrictor,
      8. Charges for removal of flow restrictors, and
      9. Special Conditions (C)

(continued)

RULE N0. 14.1
(continued)

WATER CONSERVATION AND RATIONING PLAN

B. STAGED MANDATORY RATIONING OF WATER USAGE (Cont) (C)

ii. Justification for, and documentation and calculations in support of plan, including but not limited to each item in B.1.d.i above.

2. Number of Stages requested by each utility/district may vary, depending on specifics of water shortage event.

3. The utility shall file a Tier 1 advice letter to request activation of a particular stage of Schedule 14.1 – Staged Mandatory Water Conservation and Rationing tariff.

a. If a Declaration of Mandatory Rationing is made by utility or governing agency,

b. If the utility is unable to address voluntary conservation levels set by itself or governing agency, or

c. If the utility chooses to subsequently activate a different stage.

d. The Tier 1 advice letter requesting activation of a Schedule 14.1 shall include but not be limited to:

i. Justification for activating this particular stage of mandatory rationing, as well as period during which this particular stage of mandatory conservation and rationing measures will be in effect.

ii. When the utility requests activation of a particular Stage, it shall notify its customers as detailed in Section E, below.

4. All monies collected by the utility through water use violation fines shall not be accounted for as income.

5. All expenses incurred by utility to implement Rule 14.1 and Schedule 14.1 that have not been considered in a General Rate Case or other proceeding, shall be recoverable by utility if determined to be reasonable by Commission.

a. These monies shall be accumulated by the utility in a separate memorandum account for disposition as directed or authorized from time to time by the Commission. (C)

(continued)

Valencia Water Company
24631 Avenue Rockefeller
Valencia, CA 91355
Los Angeles County

Original Cal. P.U.C. Sheet No. 617-W
Canceling _____ Cal. P.U.C. Sheet No. _____

RULE NO. 14.1

WATER CONSERVATION AND RATIONING PLAN

C. ENFORCEMENT OF STAGED MANDATORY CONSERVATION AND RATIONING (N)

1. The water use restrictions of the conservation program, in Section A of this rule, become mandatory when the authorized Schedule 14.1-Staged Mandatory Rationing Program is triggered, the utility files a Tier 1 advice letter requesting activation of a particular stage, and authorization is received from the Commission.

a. In the event a customer is observed to be using water for any nonessential or unauthorized use as defined in Section A of this rule, the utility may charge a water use violation fine in accordance with Schedule No. 14.1.

2. The utility may, after one verbal and one written warning, install a flow-restricting device on the service line of any customer observed by utility personnel to be using water for any non-essential or unauthorized use as defined in Section A above.

3. A flow restrictor shall not restrict water delivery by greater than 50% of normal flow and shall provide the premise with a minimum of 3 Ccf/person/month. The restricting device may be removed only by the utility, only after a three-day period has elapsed, and only upon payment of the appropriate removal charge as set forth in Schedule No. 14.1.

4. After the removal of the restricting device, if any non-essential or unauthorized use of water shall continue, the utility may install another flow-restricting device. This device shall remain in place until water supply conditions warrant its removal and until the appropriate charge for removal has been paid to the utility.

5. Any tampering with flow restricting device by customer can result in fines or discontinuation of water use at the utility's discretion.

6. If, despite installation of such flow-restricting device pursuant to the provisions of the previous enforcement conditions, any such non-essential or unauthorized use of water shall continue, then the utility may discontinue water service to such customer. In such latter event, a charge as provided in Rule No. 11 shall be paid to the utility as a condition to restoration of service. (N)

(continued)

(To be inserted by utility)
Advice Letter No. 134
Decision No. _____

Issued by
Keith Abercrombie
NAME
General Manager
TITLE

(To be inserted by Cal. P.U.C.)
Date Filed MAR - 3 2011
Effective MAR - 3 2011
Resolution No. _____

RULE N0. 14.1

WATER CONSERVATION AND RATIONING PLAN

C. ENFORCEMENT OF STAGED MANDATORY CONSERVATION AND RATIONING (Cont) (N)

7. All monies collected by the utility through water use violation fines shall not be accounted for as income. All expenses incurred by utility to implement Rule 14.1 and Schedule 14.1 that have not been considered in a General Rate Case or other proceeding, shall be recoverable by utility if determined to be reasonable by Commission. These additional monies shall be accumulated by the utility in a separate memorandum account for disposition as directed or authorized from time to time by the Commission.

8. The charge for removal of a flow-restricting device shall be in accordance with Schedule No. 14.1.

D. APPEAL PROCEDURE

1. Any customer who seeks a variance from any of the provisions of this water conservation and rationing plan shall notify the utility in writing, explaining in detail the reason for such a variation. The utility shall respond to each such request in writing.

2. Any customer not satisfied with the utility's response may file an appeal with the staff of the Commission. The customer and the utility will be notified of the disposition of such appeal by letter from the Executive Director of the Commission. (N)

(continued)

RULE N0. 14.1
(continued)

WATER CONSERVATION AND RATIONING PLAN

D. APPEAL PROCEDURE

3. If the customer disagrees with such disposition, the customer shall have the right to file a formal complaint with the Commission. Except as set forth in this Section, no person shall have any right or claim in law or in equity, against the utility because of, or as a result of, any matter or thing done or threatened to be done pursuant to the provisions of this water conservation and rationing plan. (N)

E. PUBLICITY

1. As stated under Section B.1.b and c, when a utility requests authorization of a Schedule 14.1 – Staged Mandatory Water Conservation and Rationing tariff, via a Tier 2 advice letter, it shall provide notice of the Tier 2 advice letter and associated public meeting provided to customers, under General Order (GO) 96-B rules, and shall comply with all requirements of Sections 350-358 of the California Water Code (CWC), including but not limited to the following:

   a. In order to be in compliance with both the GO and CWC, the utility shall provide notice via both newspaper and bill insert/direct mailing.

   b. Utility shall file one notice for each advice letter filed, that includes both notice of the filing of the Tier 2 advice letter as well as the details of the public meeting (date, time, place, etc).

   c. The public meeting shall be held after the utility files the Tier 2 advice letter, and before the Commission authorizes implementation of the tariff.

   d. Utility shall consult with Division of Water and Audits staff prior to filing advice letter, in order to determine details of public meeting. (N)

(continued)

RULE N0. 14.1
(continued)

WATER CONSERVATION AND RATIONING PLAN

E. PUBLICITY (Cont)

2. In the event that a Schedule 14.1-Staged Mandatory Rationing Plan is triggered, and a utility requests activation through the filing of a Tier 1 advice letter, the utility shall notify its customers and provide each customer with a copy of Schedule 14.1 by means of bill insert or direct mailing. Notification shall take place prior to imposing any fines associated with this plan. (N)

3. During the period that a stage of Schedule 14.1 is activated, the utility shall provide customers with updates in at least every other bill, regarding its water supply status and the results of customers' conservation efforts. (N)

CALIFORNIA PUBLIC UTILITIES COMMISSION

Water Division

INSTRUCTIONS FOR WATER CONSERVATION, RATIONING AND SERVICE CONNECTION MORATORIA

Standard Practice U-40-W

SAN FRANCISCO, CALIFORNIA

July 2007

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INSTRUCTIONS FOR WATER CONSERVATION,
RATIONING AND SERVICE CONNECTION MORATORIA

A—PURPOSE AND SCOPE

1. The purpose of this standard practice is to provide guidance to Water Division staff, to the public and to utilities as to steps to be taken when the utility suffers from a water shortage. The three levels of action are voluntary rationing, mandatory rationing and a service connection moratorium.

B—BACKGROUND

2. General Order 103, Chart 1, and Standard Practice U-22-W, Determination of Water Supply Requirements of Water Systems, address water supply requirements, but supply can be affected temporarily due to drought or decreased production of a utility's wells. When this happens, utilities may have to resort to mandatory conservation or may have to institute a service connection moratorium.

3. Parties may also protest service area extensions (see Standard Practice U-14-W) over concern that the available supplies may be inadequate to serve the new customers, which would be the equivalent of a service connection moratorium (see Section F)[1].

4. The position of the Commission in overall water supply planning was set forth in Decision 99-04-061, April 22, 1999 (see Appendix A to this Standard Practice).

C—DEVELOPMENT OF CONSERVATION AND RATIONING

5. In mid-1976, due to a drought, the Commission opened an Order Instituting Investigation (OII, Case No. 10114, June 8, 1976) to determine what actions to take. In early 1977, the Commission issued an emergency decision that allowed water utilities to distribute water conservation kits and to implement cost effective water conservation programs.

6. The Commission was once again faced with drought conditions in mid-1988. The Commission opened OII 89-03-005 that allowed all classes of water utilities to file a water conservation and rationing plan consisting of two distinct parts: Rule 14.1 (a "voluntary conservation" program) and Schedule 14.1 (the mandatory rationing and penalty part). This plan was based primarily upon the Department of Water Resources and Metropolitan Water District's model plans, but also

[1] In Resolution No. 4154, August 5, 1999, the Sierra Club protested Valencia Water Company's Advice Letters 84 and 85 for service area extension. The Commission found in the favor of Valencia, that it had adequate supplies, but ordered the utility to file its Water Management Program by application so the long-term water availability issues could be heard.

incorporated aspects of the North Marin Water District, East Bay Municipal Utility District, and California Water Service Company's existing conservation and rationing plans. The main objective of Rule 14.1 and Schedule 14.1 was to have a plan readily available for any utility that needed conservation and/or rationing methods. This plan allowed regulated utilities to achieve conservation of 17.5% to 26%.

7. The drought was officially declared over in February 1993 and the OII was closed. Because history shows that drought occurs in California about once every ten years, Rule 14.1 has remained in place. When conditions become severe, the utility may file an advice letter to institute Schedule 14.1. The Commission must approve implementation of this schedule by resolution.

D—VOLUNTARY RATIONING

8. Voluntary rationing consists of the steps described in Rule 14.1 (Appendix B). This Tariff Rule should be in the tariff book of every utility that might suffer from a water shortage.

E—MANDATORY RATIONING

9. Mandatory rationing consists of the steps described in Schedule 14.1. The utility adds schedule 14.1 to its tariff book by filing an advice letter with full justification. Staff will prepare a resolution for consideration by the Commission. The Commission must approve the imposition of mandatory conservation.

10. Schedule 14.1 may be modified to fit the needs of the utility and its particular water shortage situation. The following provisions are examples of what might be included in a typical Schedule 14.1:

A. Prohibit nonessential and unauthorized water use, including:
   i. use for more than minimal landscaping in connection with new construction;
   ii. use through any meter when the company has notified the customer in writing to repair a broken or defective plumbing, sprinkler, watering or irrigation system and the customer has failed to effect such repairs within five days;
   iii. use of water which results in flooding or runoff in gutters or streets;
   iv. use of water through a hose for washing cars, buses, boats, trailers or other vehicles without a positive automatic shut-off valve on the outlet end of the hose;
   v. use of water through a hose for washing buildings, structures, sidewalks, walkways, driveways, patios, parking lots, tennis courts, or other hard-surfaced areas;
   vi. use of water to clean, fill or maintain levels in decorative fountains;

vii. use of water for construction purposes unless no other source of water or other method can be used;
viii. service of water by any restaurant except upon the request of a patron; and
ix. use of water to flush hydrants, except where required for public health or safety.

B. Establish customer water allocations at a percentage of historical usage with the corresponding billing periods of a non-drought year being the base.

C. Establish an allocation of a percentage of historical usage with the corresponding billing periods of a non-drought year being the base for consumption for users of process water (water used to manufacture, alter, convert, clean, grow, heat or cool a product, including water used in laundries and car wash facilities that recycle the water used).

D. Establish a minimum allocation of a number of Ccf per month (one Ccf is one hundred cubic feet) for any customer regardless of historical usage.

E. Establish an exceptions procedure for customers with no prior billing period record or where unusual circumstances dictate a change in allocation.

F. Establish a penalty ("conservation fee") of $2.00 per Ccf for usage over allocated amounts, provided, however, that banking of underusage from month to month is allowed.

G. Provide that penalty funds are not to be accounted for as income, but are to be kept in a separate reserve account for disposition as directed by the Commission.

H. Provide that, after written warning for nonessential or unauthorized water use, for subsequent violations the utility may install a flow restrictor to be left in a minimum of three days. The second time a flow restrictor is installed it may be left in until rationing ends.

I. Establish charges of $25, $50, or actual cost depending on meter size for removing restrictors, and provide that continuing nonessential or unauthorized use may result in disconnection.

J. Establish an appeal procedure first through the utility, then to the Commission staff through the Executive Director, then to the Commission via a formal complaint.

F—SERVICE CONNECTION MORATORIUM

11. A service connection moratorium is sometimes imposed by the California Department of Health Services. The California Water Code, Section 350 et seq.,

provides that any public water supplier may, after public notice and hearing, declare a water shortage emergency within its service area whenever it determines that the ordinary demands and requirements of its consumers cannot be satisfied without depleting the water supply to the extent that there would be insufficient water for human consumption, sanitation, and fire protection. After it has declared a water shortage emergency, it must adopt such regulations and restrictions on water delivery and consumption as it finds will conserve its water supply for the greatest public benefit. Section 357 requires that suppliers which are subject to regulation by the CPUC shall secure its approval before making such regulations and restrictions effective.

12. Section 2708 of the Public Utilities Code states:

> **2708.** Whenever the commission, after a hearing had upon its own motion or upon complaint, finds that any water company which is a public utility operating within this State has reached the limit of its capacity to supply water and that no further consumers of water can be supplied from the system of such utility without injuriously withdrawing the supply wholly or in part from those who have theretofore been supplied by the corporation, the commission may order and require that no such corporation shall furnish water to any new or additional consumers until the order is vacated or modified by the commission. The commission, after hearing upon its own motion or upon complaint, may also require any such water company to allow additional consumers to be served when it appears that service to additional consumers will not injuriously withdraw the supply wholly or in part from those who theretofore had been supplied by such public utility.

13. To establish a service connection moratorium the utility must:
    a. Hold a public meeting under Section 350 and 351 of the Water Code
    b. Add the following language to each service schedule:

> "MORATORIUM
> No service shall be provided to any premises not previously served within the _____ Service Area as defined on the Service Area Map filed as a part of these tariffs."

G—EXEMPTIONS

14. Some decisions to impose a moratorium contain exceptions. For example in Citizen's Utilities (CUCC) Montara District:

> "The moratorium shall not apply to owners of real property who are customers of CUCC on or before the date of this order, or their successors in interest, if any change in the use of their property

will not increase their demand upon the system." (D.86-05-078, Ordering Paragraph 3.)

15. D.86-05-078 also provided that prospective customers could seek an exemption from the moratorium by filing an application with the Commission showing that extraordinary circumstances required an exemption.

16. In D.00-06-020, June 8, 2000 the Commission granted an application and authorized Citizens Utilities to install a water service connection to applicant's property at APN 037-278-090 following cessation of service at applicant's property at 888 Ocean Boulevard in Montara. Costs were to be borne by applicant. The order made it clear that water service could not be reinstated at 888 Ocean Boulevard absent a lifting or easing of the moratorium. Such determinations were also delegated to staff[2].

[2] D.86-05-078, May 28, 1986, Ordering Paragraph 4.

The Commission's Role in Water Planning

The two state agencies primarily responsible for overseeing water planning are the California Department of Water Resources, which is manages the State Water Project and produces the California Water Plan, and the State Water Quality Control Board and Regional Water Quality Control Boards which have authority over water allocation and water quality protection.

In addition to the state agencies which have broad planning and management powers, local government also has a part in water use decisions. For example, county boards of supervisors, county water agencies, land use planning agencies, city governments, municipal water districts and many special districts all have a role in the use of water in California.

In this context, the Commission has recognized the futility of one party taking unilateral action to protect a groundwater basin:

> Rehabilitation of the Santa Maria Groundwater Basin is not the responsibility of, and is beyond the physical and financial resources of any single individual, company, or agency. Even if [Southern California Water Company] were to stop drawing from the basin entirely and injected into the basin the entire 7,900 AFY it desires to obtain from the [Central Coast Water Authority], the basin's fundamental problems of declining quantity and water quality would not be solved. Most simply put, the basin's salvation as a water resource requires the immediate, undivided, sincere and selfless attention of all its users.

(Re Southern California Water Company, 48 CPUC2d 511, 519 (D.93-03-066)(emphasis in original).)

The Commission's role is limited to ensuring that each jurisdictional water utility provides its customers with "just and reasonable service, . . . and facilities as are necessary to promote the safety, health, comfort and convenience of its patrons, employees, and the public." (§ 451.) The Commission has further delineated the service standard in its General Order 103 where it proscribes Standards of Service

including water quality, water supply, and water pressure, as well as many other details of service.

The Commission has not, however, dictated to investor-owned utilities what method of obtaining water must be used to meet its present and future responsibility of providing safe and adequate supply of water at reasonable rates. (Southern California Water, 48 CPUC2d at 517.)

Which is not to suggest that the Commission ignores issues of water availability in its regulation of water utilities. The Commission requires that all water utilities prepare, file, and update a water management plan which includes identification of water sources as well as consumption projections over 15 years. These plans are updated by the utility as part of its general rate case.

RULE N0. 14.1
WATER CONSERVATION AND RATIONING PLAN

GENERAL INFORMATION

If water supplies are projected to be insufficient to meet normal customer demand, and are beyond the control of the utility, the utility may elect to implement voluntary conservation using the portion of this plan set forth in Section A of this Rule after notifying the Commission's Water Division of its intent. If, in the opinion of the utility, more stringent water measures are required, the utility shall request Commission authorization to implement the mandatory conservation and rationing measures set forth in Section B.

The Commission shall authorize mandatory conservation and rationing by approving Schedule No. 14.1, Mandatory Water Conservation and Rationing. When Schedule No. 14.1 has expired, or is not in effect, mandatory conservation and rationing measures will not be in force. Schedule No. 14.1 will set forth water use violation fines, charges for removal of flow restrictors, and the period during which mandatory conservation and rationing measures will be in effect.

When Schedule No. 14.1 is in effect and the utility determines that water supplies are again sufficient to meet normal demands, and mandatory conservation and rationing measures are no longer necessary, the utility shall seek Commission approval to rescind Schedule No. 14.1 to discontinue rationing.

In the event of a water supply shortage requiring a voluntary or mandatory program, the utility shall make available to its customers water conservation kits as required by Rule 20. The utility shall notify all customers of the availability of conservation kits.

(continued)

RULE N0. 14.1
(continued)

WATER CONSERVATION AND RATIONING PLAN

A. CONSERVATION - NON-ESSENTIAL OR UNAUTHORIZED WATER USE

No customer shall use utility-supplied water for non-essential or unauthorized uses as defined below:

1. Use of water through any connection when the utility has notified the customer in writing to repair a broken or defective plumbing, sprinkler, watering or irrigation system and the customer has failed to make such repairs within 5 days after receipt of such notice.

2. Use of water which results in flooding or run-off in gutters, waterways, patios, driveway, or streets.

3. Use of water for washing aircraft, cars, buses, boats, trailers or other vehicles without a positive shut-off nozzle on the outlet end of the hose. Exceptions include washing vehicles at commercial or fleet vehicle washing facilities operated at fixed locations where equipment using water is properly maintained to avoid wasteful use.

4. Use of water through a hose for washing buildings, structures, sidewalks, walkways, driveways, patios, parking lots, tennis courts, or other hard-surfaced areas in a manner which results in excessive run-off or waste.

5. Use of water for watering streets with trucks, except for initial wash-down for construction purposes (if street sweeping is not feasible), or to protect the health and safety of the public.

6. Use of water for construction purposes, such as consolidation of backfill, dust control, or other uses unless no other source of water or other method can be used.

7. Use of water for more than minimal landscaping in connection with any new construction.

(continued)

RULE N0. 14.1
(continued)

WATER CONSERVATION AND RATIONING PLAN

A. CONSERVATION – NON-ESSENTIAL OR UNAUTHORIZED WATER USE (CONT.)

8. Use of water for outside plants, lawn, landscape, and turf areas more often than every other day, with even numbered addresses watering on even numbered days of the month and odd numbered addresses watering on the odd numbered days of the month, except that this provision shall not apply to commercial nurseries, golf courses and other water-dependent industries.

9. Use of water for watering outside plants, lawn, landscape and turf areas during certain hours if and when specified in Schedule No. 14.1 when the schedule is in effect.

10. Use of water for watering outside plants and turf areas using a hand-held hose without a positive shut-off valve.

11. Use of water for decorative fountains or the filling or topping off of decorative lakes or ponds. Exceptions are made for those decorative fountains, lakes, or ponds which utilize recycled water.

12. Use of water for the filling or refilling of swimming pools.

13. Service of water by any restaurant except upon the request of the patron.

B. RATIONING OF WATER USAGE

In the event the conservation measures required by Section A are insufficient to control the water shortage, the utility shall, upon Commission approval, imposed mandatory conservation and rationing. Rationing shall be in accordance with the conditions set forth in Schedule No. 14.1 as filed at the time such rationing is approved by the Commission.

Before mandatory conservation and rationing is authorized by the Commission, the utility shall hold public meetings and takes all other applicable steps required by Sections 350 through 358 of the California Water Code.

(continued)

RULE N0. 14.1
(continued)

WATER CONSERVATION AND RATIONING PLAN

C. ENFORCEMENT OF MANDATORY CONSERVATION AND RATIONING

1. The water use restrictions of the conservation program, in Section A of this rule, become mandatory when the rationing program goes into effect. In the event a customer is observed to be using water for any nonessential or unauthorized use as defined in Section A of this rule, the utility may charge a water use violation fine in accordance with Schedule No. 14.1.

2. The utility may, after one verbal and one written warning, install a flow-restricting device on the service line of any customer observed by utility personnel to be using water for any non-essential or unauthorized use as defined in Section A above.

3. A flow restrictor shall not restrict water delivery by greater than 50% of normal flow and shall provide the premise with a minimum of 6 Ccf/month. The restricting device may be removed only by the utility, only after a three-day period has elapsed, and only upon payment of the appropriate removal charge as set forth in Schedule No. 14.1.

4. After the removal of the restricting device, if any non-essential or unauthorized use of water shall continue, the utility may install another flow-restricting device. This device shall remain in place until water supply conditions warrant its removal and until the appropriate charge for removal has been paid to the utility.

5. If, despite installation of such flow-restricting device pursuant to the provisions of the previous enforcement conditions, any such non-essential or unauthorized use of water shall continue, then the utility may discontinue water service to such customer. In such latter event, a charge as provided in Rule No. 11 shall be paid to the utility as a condition to restoration of service.

6. Any monies collected by the utility through water use violation fines shall not be accounted for as income, but shall be accumulated by the utility in a separate account for disposition as directed or authorized from time to time by the Commission.

7. The charge for removal of a flow-restricting device shall be in accordance with Schedule No. 14.1.

(continued)

RULE N0. 14.1
(continued)

WATER CONSERVATION AND RATIONING PLAN

D. APPEAL PROCEDURE

Any customer who seeks a variance from any of the provisions of this water conservation and rationing plan shall notify the utility in writing, explaining in detail the reason for such a variation. The utility shall respond to each such request.

Any customer not satisfied with the utility's response may file an appeal with the staff of the Commission. The customer and the utility will be notified of the disposition of such appeal by letter from the Executive Director of the Commission.

If the customer disagrees with such disposition, the customer shall have the right to file a formal complaint with the Commission. Except as set forth in this Section, no person shall have any right or claim in law or in equity, against the utility because of, or as a result of, any matter or thing done or threatened to be done pursuant to the provisions of this water conservation and rationing plan.

E. PUBLICITY

In the event the utility finds it necessary to implement this plan, it shall notify customers and hold public hearings concerning the water supply situation, in accordance with Chapter 3, Water Shortage Emergencies, Sections 350 to 358, of the California Water Code. The utility shall also provide each customer with a copy of this plan by means of billing inserts or special mailings; notification shall take place prior to imposing any fines associated with this plan. In addition, the utility shall provide customers with periodic updates regarding its water supply status and the results of customers' conservation efforts. Updates may be by bill insert, special mailing, poster, flyer, newspaper, television or radio spot/advertisement, community bulletin board, or other appropriate methods.

SCHEDULE NO. 14.1
MANDATORY WATER CONSERVATION AND RATIONING

APPLICABILITY

This schedule applies to all water customers served under all tariff rates schedules authorized by the Commission. It is only effective in times of rationing, as required by Rule No. 14.1, and only for the period noted in the Special Conditions section below.

TERRITORY

This schedule is applicable within the entire territory served by the utility.

WATER USE VIOLATION FINE

When this schedule is in effect, the water use restrictions of the conservation program, in Section A of Rule 14.1, become mandatory. If a customer is seen violating the water usage restrictions, as outlined in Rule No. 14.1 and the Special Conditions below, the customer will be subject to the following fine structure:

First offense - written warning	
Second offense - (of the same restriction)	$25
Third offense - (of the same restriction)	$50
Each additional offense - (of the same restriction)	$25 more than the previous fine imposed.

Offenses for separate water use restrictions will each start at the warning stage.

The water use violation fine is in addition to the regular rate schedule charges.

(continued)

SCHEDULE NO. 14.1
MANDATORY WATER CONSERVATION AND RATIONING (CONT.)

FLOW RESTRICTOR REMOVAL CHARGE

The charge for removal of a flow-restricting device shall be:

Connection Size	Removal Charges
5/8" to 1"	$25.00
1-1/2" to 2"	$50.00
3" and larger	Actual cost

SPECIAL CONDITIONS

1. This tariff schedule shall remain in effect for period of six (6) months from the effective date set forth below.

2. There shall be no use of utility-supplied water for outside plants, lawn, landscape, and turf areas between the hours of 3:00 a.m. to 8:00 p.m., regardless of address or day of the month.

3. Water use violation fines may be applied to violations of Section A of Rule No. 14.1, which prohibits non-essential and unauthorized uses of water.

4. Water use violation fines must be separately identified on each bill.

5. All bills are subject to the reimbursement fee set forth on Schedule No. UF.

LACWWD No. 36 Water Shortage Conservation Ordinance

MINUTES OF THE BOARD OF SUPERVISORS
COUNTY OF LOS ANGELES, STATE OF CALIFORNIA

Sachi A. Hamai, Executive Officer-
Clerk of the Board of Supervisors
383 Kenneth Hahn Hall of Administration
Los Angeles, California 90012

At its meeting held October 7, 2008, the Board took the following action:

72

The following item was called up for consideration:

Urgency Ordinance for introduction amending the County Code, Title 11 - Health and Safety, to readopt Part 4 of Chapter 11.38 - Water Conservation Requirements for the Unincorporated County area, which establishes water conservation and waste prevention requirements with a written warning for the first violation and a fine of $100 for each subsequent violation; and find that adoption of ordinance is exempt from the California Environmental Quality Act.

On motion of Supervisor Molina, seconded by Supervisor Antonovich, duly carried by the following vote: Ayes: Supervisors Molina, Yaroslavsky, Knabe, Antonovich and Burke; Noes: None, the Board introduced, waived reading and adopted the attached Ordinance No. 2008-0052U entitled, "An urgency ordinance amending Title 11 - Health and Safety of the Los Angeles County Code, relating to water conservation requirements for the Unincorporated Los Angeles County Area." This ordinance shall take effect October 7, 2008.

02100708_72

Attachment

Copies distributed:
Each Supervisor
Chief Executive Officer
County Counsel
Acting Director of Public Works
Acting Director of Beaches and Harbors
Director of Internal Services
Director of Parks and Recreation
Director of Planning
Director of Public Health

(ALSO SEE BOARD ORDER NO. 40 THIS DATE)

ANALYSIS

This ordinance amends Title 11 – Health and Safety of the Los Angeles County Code, relating to Water and Sewers, to readopt Part 4 of Chapter 11.38 – Water Conservation Requirements for the Unincorporated Los Angeles County Area.

Pursuant to Section 2 of Ordinance No. 91-0046U, Part 4 of Chapter 11.38 – Water Conservation Requirements for the Unincorporated Los Angeles County Area, terminated on January 1, 1993. This ordinance readopts the same provisions, which were previously set forth in Part 4, except that this ordinance does not have a sunset date, revises the fine amounts, and sets forth a review mechanism.

This ordinance is an urgency measure and requires a four-fifths vote by the Board of Supervisors for adoption.

RAYMOND G. FORTNER, JR.
County Counsel

By
TRUC L. MOORE
Deputy County Counsel
Public Works Division

TLM:ia

08/13/08 (Requested)

09/17/08 (Revised)

553230_1

ORDINANCE NO. 2008-00052U

An urgency ordinance amending Title 11 – Health and Safety of the Los Angeles County Code, relating to water conservation requirements for the Unincorporated Los Angeles County Area.

The Board of Supervisors of the County of Los Angeles ordains as follows:

SECTION 1. Chapter 11.38, Part 4, is hereby readopted as amended to read as follows:

Part 4. Water Conservation Requirements for the Unincorporated Los Angeles County Area

11.38.620 Hose watering prohibition.

No person shall hose water or wash down any sidewalks, walkways, driveways, parking areas or other paved surfaces, except as is required for the benefit of public health and safety. Willful violation hereof shall be subject to a written warning for the first violation, and shall be an infraction punishable by a fine of $100.00 ~~for the first infraction and $500.00 each~~ for each subsequent ~~infractions~~violation.

11.38.630 Watering of lawns and landscaping.

A. No person shall water or cause to be watered any lawn or landscaping between the hours of 10:00 a.m. and 5:00 p.m.

B. No person shall water or cause to be watered any lawn or landscaping more than once a day.

C. No person shall water or cause to be watered any lawn or landscaping to such an extent that runoff into adjoining streets, parking lots or alleys occurs due to incorrectly directed or maintained sprinklers or excessive watering.

D. It shall be the duty of all persons to inspect all hoses, faucets and sprinkling systems for leaks, and to cause all leaks to be repaired as soon as is reasonably practicable.

E. Willful violation hereof shall be subject to a written warning for the first violation, and shall be an infraction punishable by a fine of $100.00 ~~for the first infraction and $500.00 each~~ for each subsequent ~~infractions~~violation.

11.38.640 Indoor plumbing and fixtures.

A. It shall be the duty of all persons to inspect all accessible indoor plumbing and faucets for leaks, and to cause all leaks to be repaired as soon as is reasonably practicable.

B. Willful violation hereof shall be subject to a written warning for the first violation, and shall be an infraction punishable by a fine of ~~$500~~100.00 for each subsequent violation.

11.38.650 Washing vehicles.

No motor vehicle, boat, trailer, or other type of mobile equipment may be washed, except at a commercial carwash or with reclaimed water, unless such vehicle is washed by using a hand-held bucket or a water-hose equipped with an automatic shutoff nozzle. No person shall leave a water hose running while washing a vehicle or at any other time. Willful violation hereof shall be subject to a written warning for the

first violation, and shall be an infraction punishable by a fine of $100.00 ~~for the first infraction and $500.00 each~~ for each subsequent ~~infractions~~violation.

11.38.660 Public eating places.

No restaurant, hotel, cafeteria, café, or other public place where food is sold or served shall serve drinking water to any customer unless specifically requested to do so by such customer. Willful violation hereof shall be subject to a written warning for the first violation, and shall be an infraction punishable by a fine of $100.00 ~~for the first infraction and $500.00 each~~ for each subsequent ~~infractions~~violation.

11.38.670 Decorative fountains.

No person shall use water to clean, fill, or maintain levels in decorative fountains, ponds, lakes, or other similar aesthetic structures unless such water flows through a recycling system. Willful violation hereof shall be subject to a written warning for the first violation, and shall be an infraction punishable by a fine of $100.00 ~~for the first infraction and $500.00 each~~ for each subsequent ~~infractions~~violation.

11.38.680 Procedural requirements.

The Director of Public Works, with input and concurrence from the Director of Public Health, shall periodically review the provisions of this Part and recommend necessary updates to the Board of Supervisors. The review of these provisions and preparation of resulting recommendations, if any, shall be performed, at a minimum, every two years following the first review, which shall to be completed by December 31, 2010.

SECTION 2. Due to the severity of the drought in the State of California, there is an immediate need to prohibit the wasting of water in the Los Angeles County unincorporated area to better utilize the available water supplies. This ordinance is urgently needed for the preservation of the public health, safety, and general welfare, and shall take effect immediately.

[1138WATERTMCC]

SECTION 3. This ordinance shall be published in The Metropolitan News a newspaper printed and published in the County of Los Angeles.

Yvonne B. Burke
Chair

ATTEST:

Sachi A. Hamai
Executive Officer -
Clerk of the Board of Supervisors
County of Los Angeles

I hereby certify that at its meeting of October 7, 2008 the foregoing ordinance was adopted by the Board of Supervisors of said County of Los Angeles by the following vote, to wit:

	Ayes		Noes
Supervisors	Gloria Molina	Supervisors	None
	Zev Yaroslavsky		
	Don Knabe		
	Michael D. Antonovich		
	Yvonne B. Burke		

Effective Date: October 7, 2008

~~Operative Date:~~ _____

Sachi A. Hamai
Executive Officer -
Clerk of the Board of Supervisors
County of Los Angeles

APPROVED AS TO FORM:
RAYMOND G. FORTNER, JR.
County Counsel

By Leela Kapur
Leela Kapur
Chief Deputy County Counsel

S:\Ordinances\County Counsel\2008\2008-0052U

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

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I. Introduction

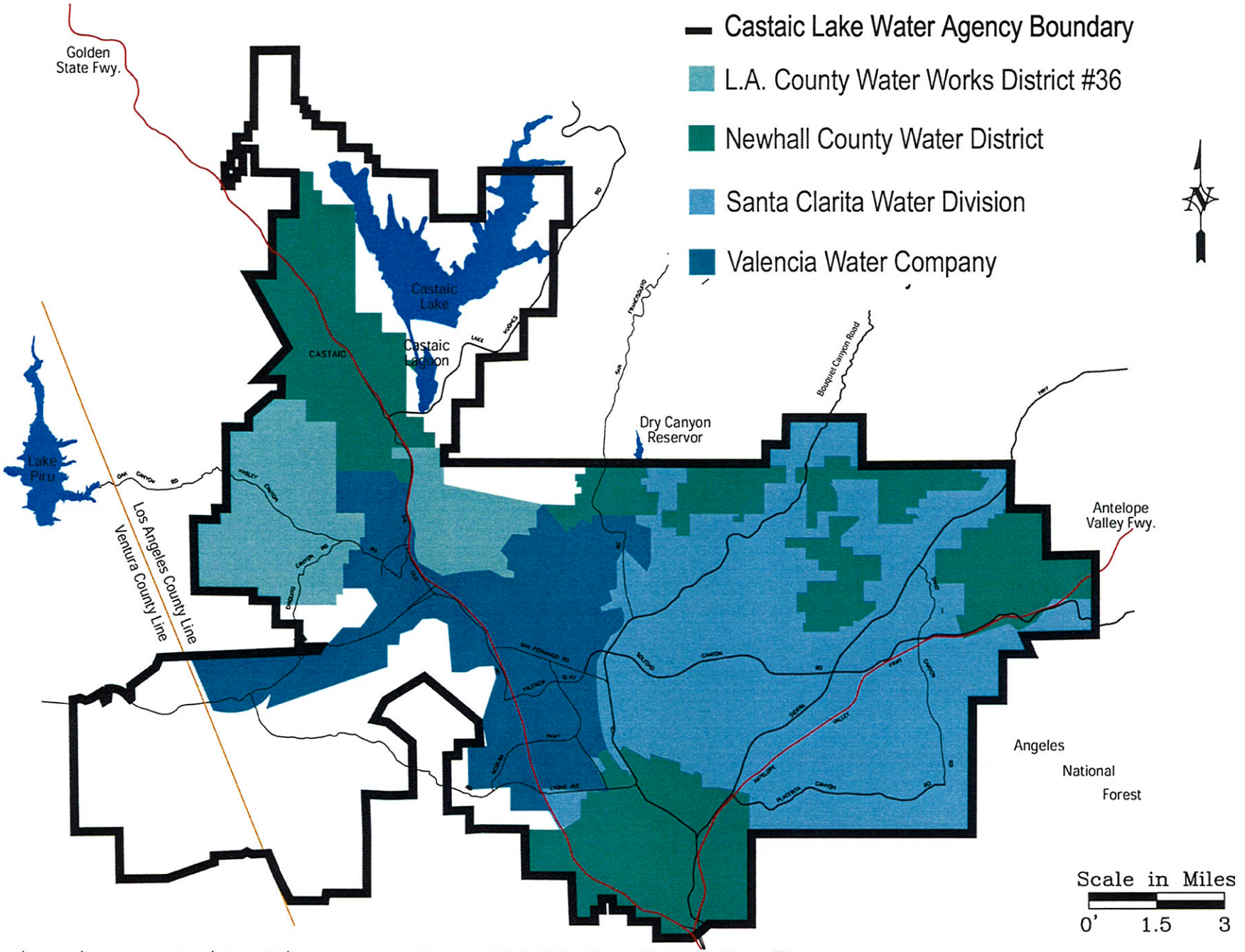
Castaic Lake Water Agency

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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LUHDORFF & SCALMANINI
CONSULTING ENGINEERS

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

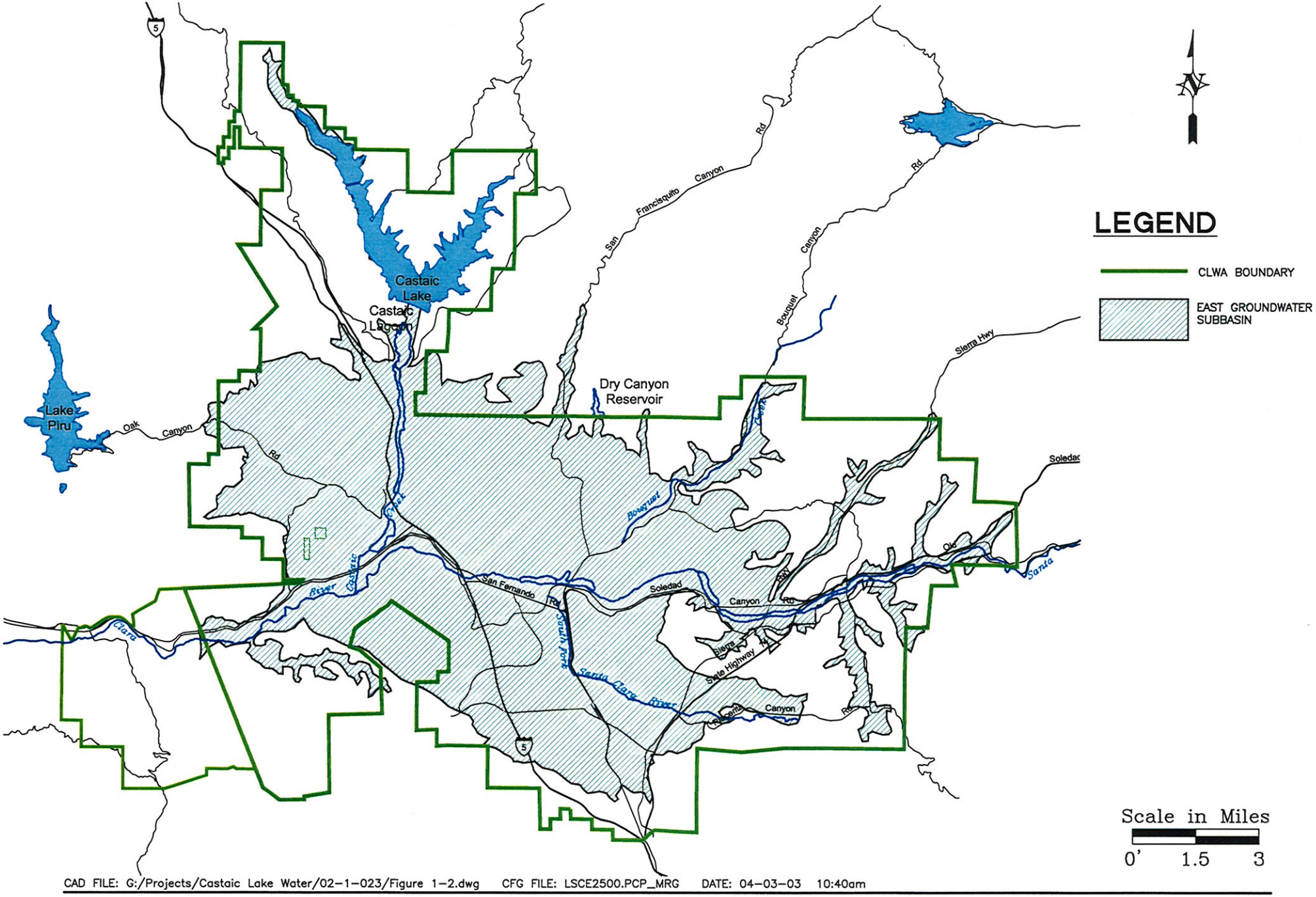

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Figure 1-2
Santa Clara River Valley
East Groundwater Subbasin

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;

III. Groundwater Basin Conditions

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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.

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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.

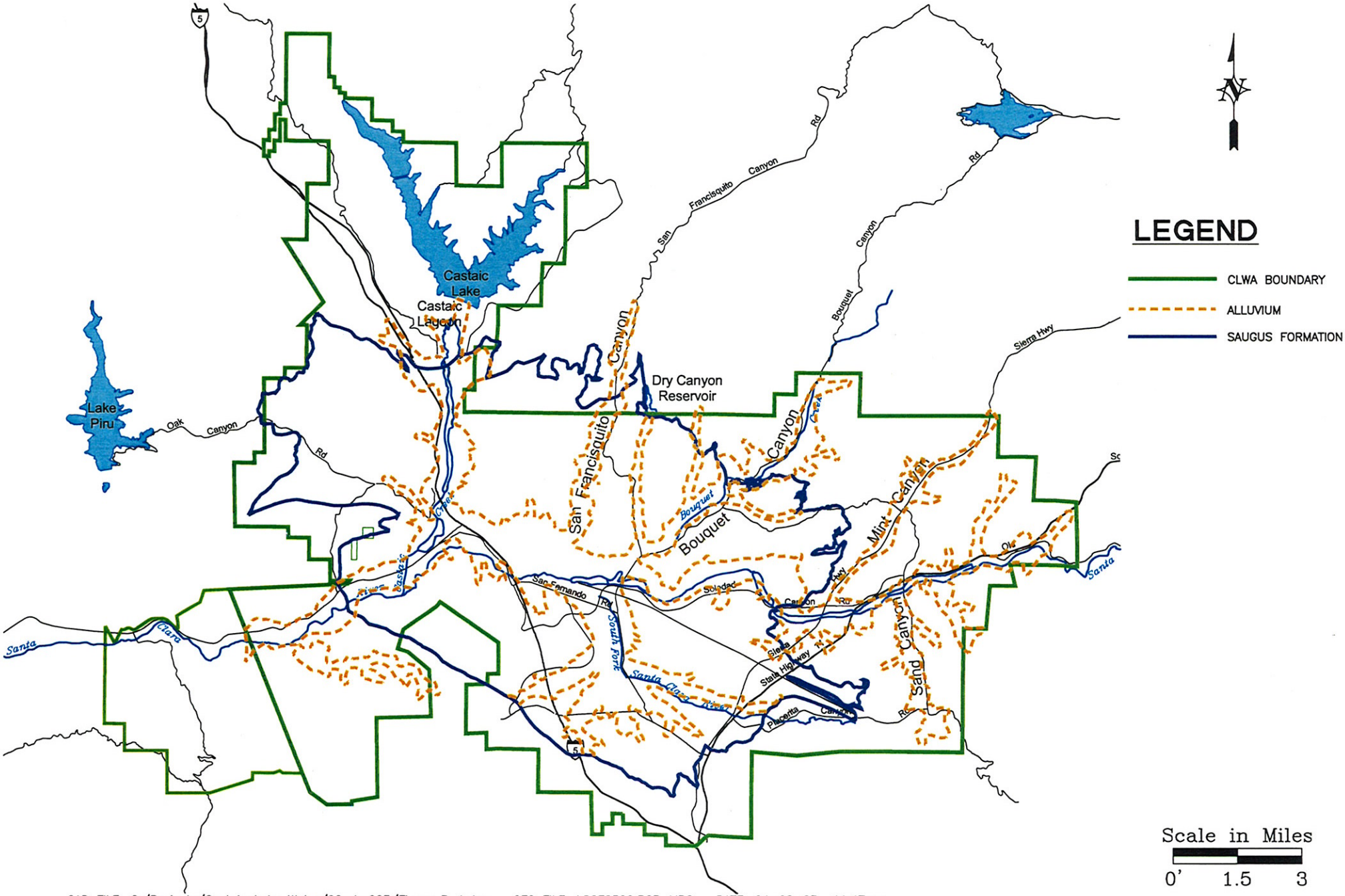

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Figure 3-1
Alluvial and Saugus Formations
Santa Clara River Valley East Groundwater Subbasin

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

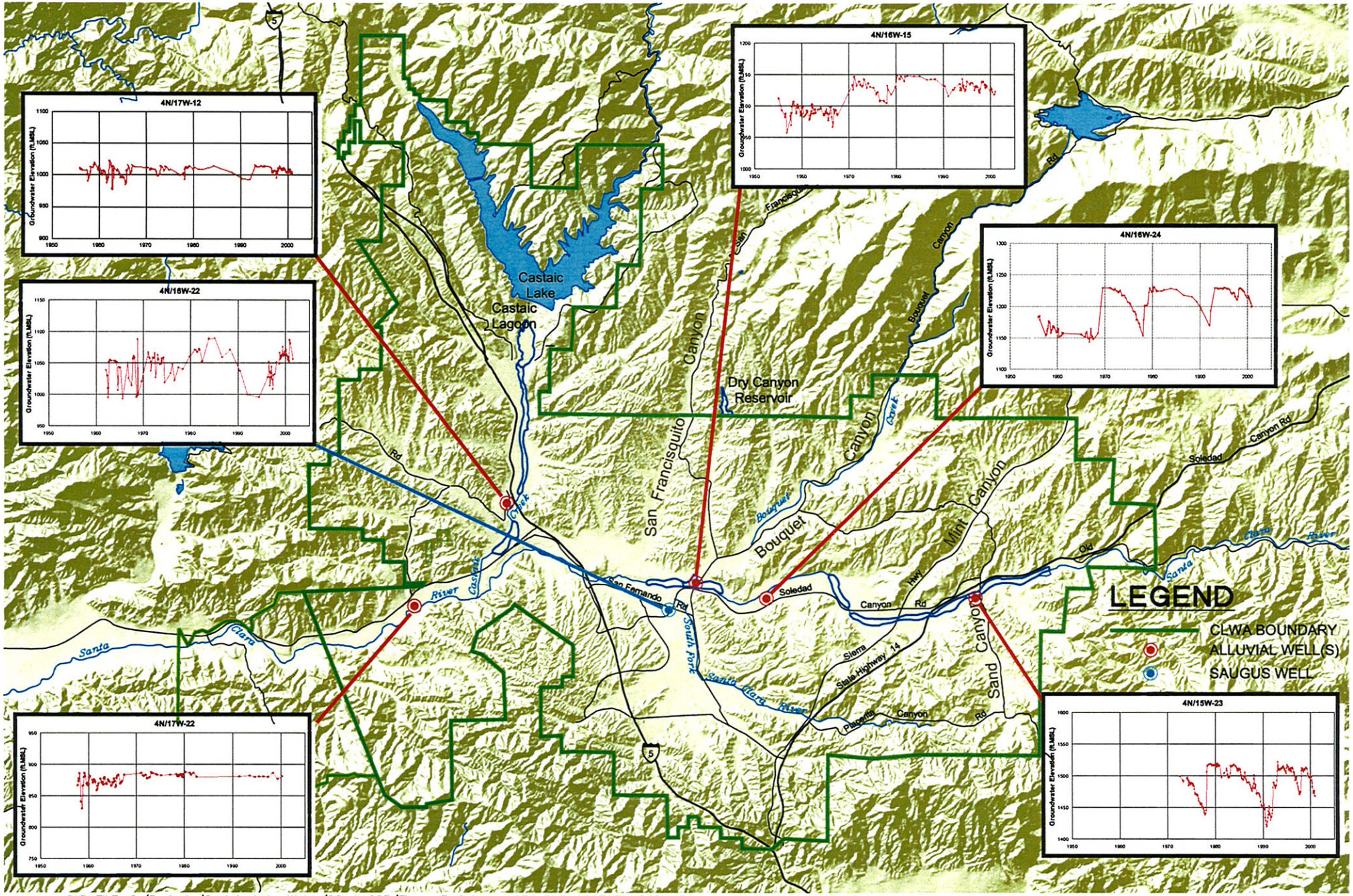

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Figure 3-2
Historical Groundwater Elevations
Santa Clara River Valley East Groundwater Subbasin

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

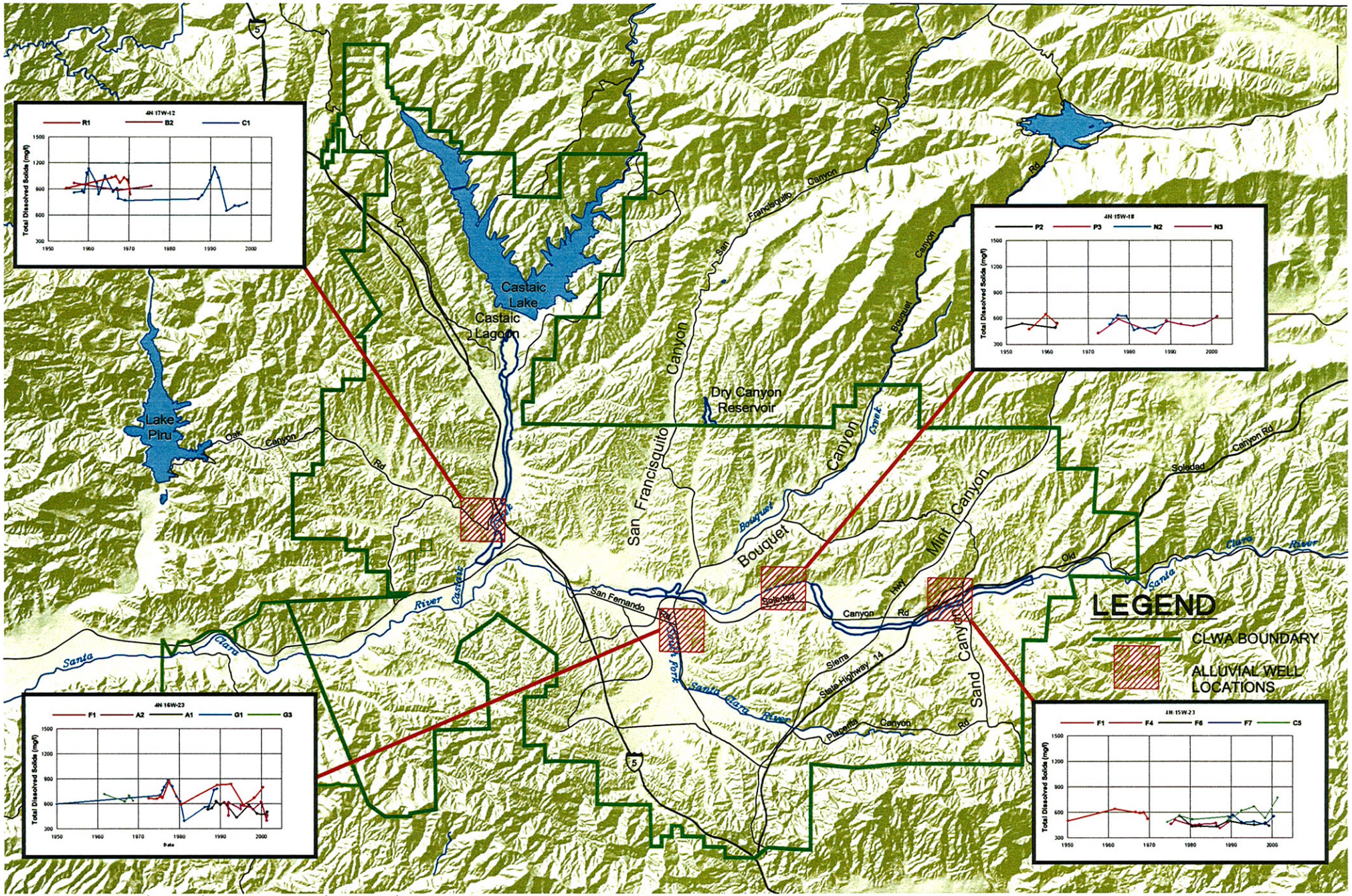

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Figure 3-3
Historical Groundwater Quality by Section
Santa Clara River Valley East Groundwater Subbasin

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

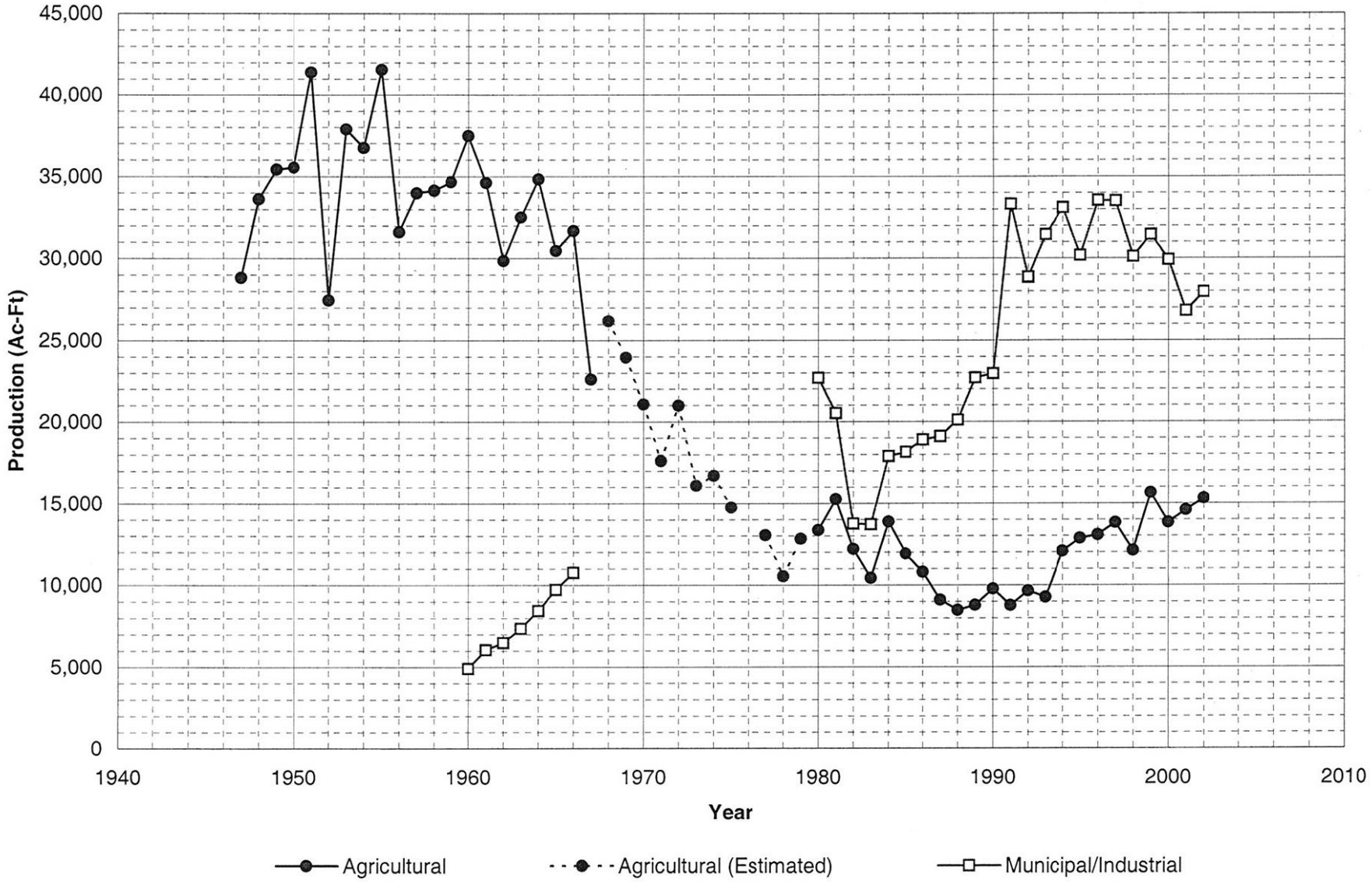


Figure 4-1

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	66,600	77,700	90,900	106,000
Agriculture	15,100	12,400	9,800	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

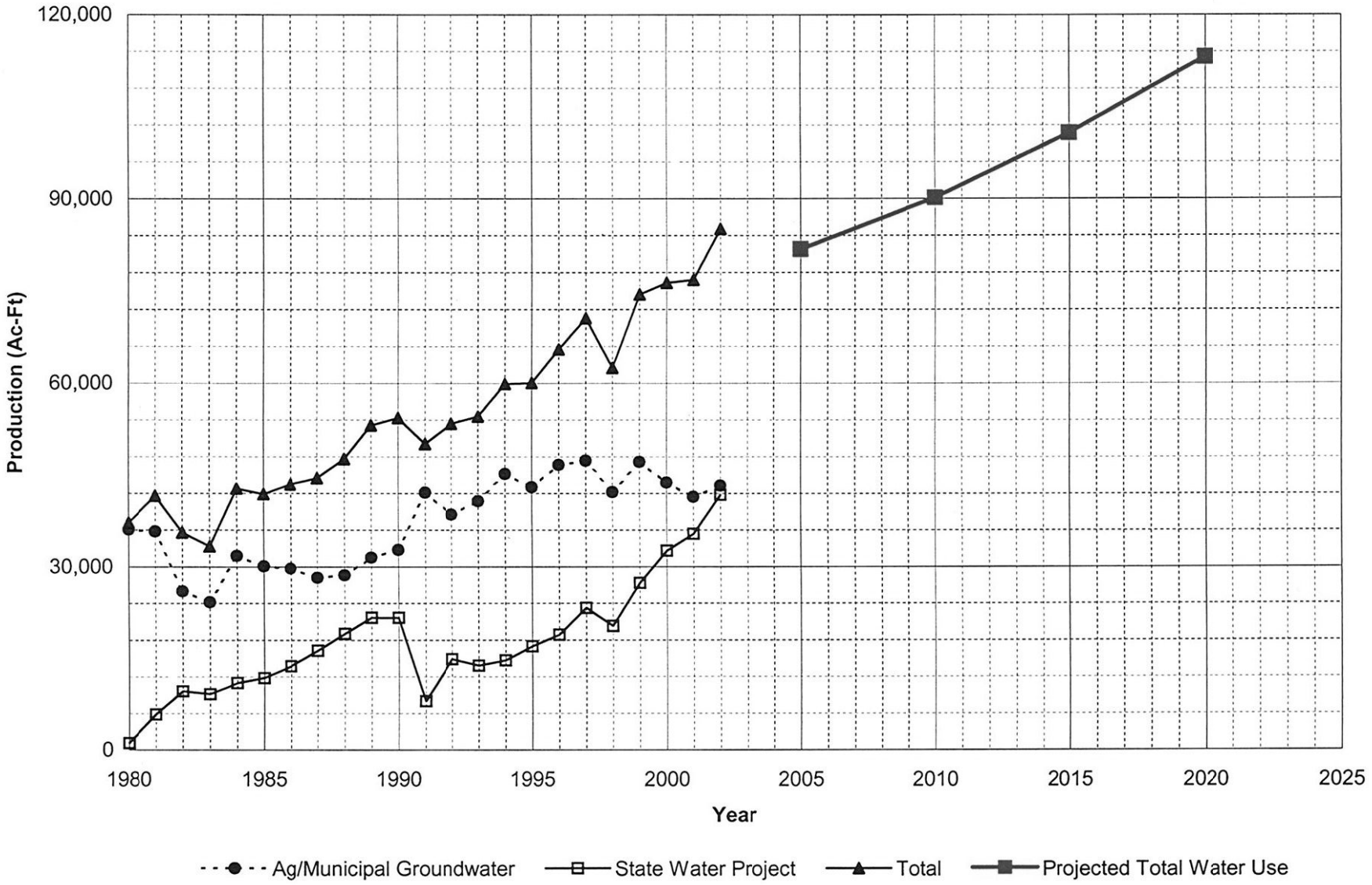


Figure 4-2

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

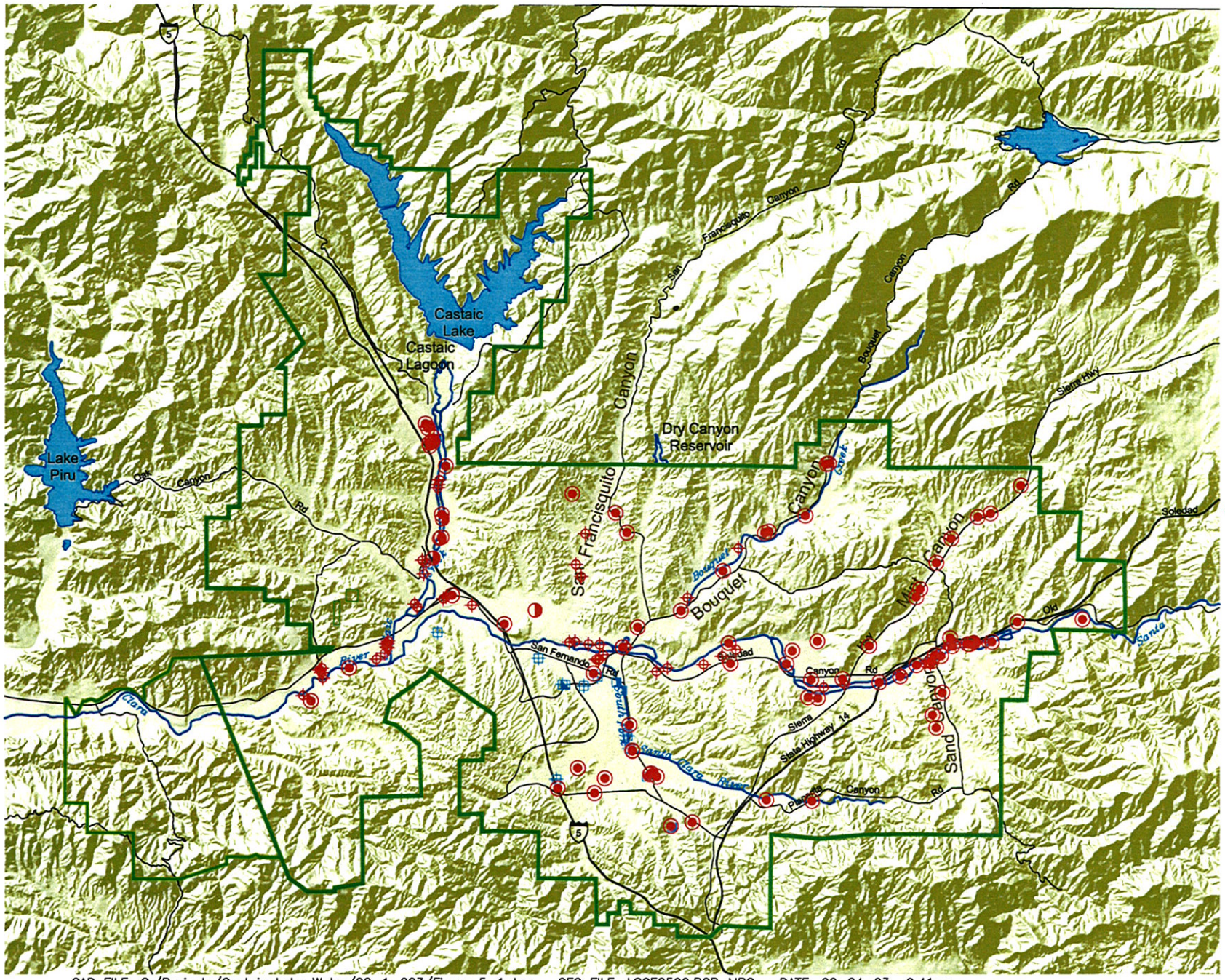
Prior to 1980, all water supply in the Upper Santa Clara River Area was developed from local groundwater; since 1980, imported surface water has become an increasing component of overall water supply in the area, but groundwater continues to meet all agricultural water demand and a significant part of 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



LEGEND

- ACTIVE ALLUVIAL WELL
- INACTIVE ALLUVIAL WELL
- ACTIVE SAUGUS WELL
- INACTIVE SAUGUS WELL
- SAUGUS MONITORING WEL
- UNKNOWN ALLUVIAL WELL
- CLWA BOUNDARY

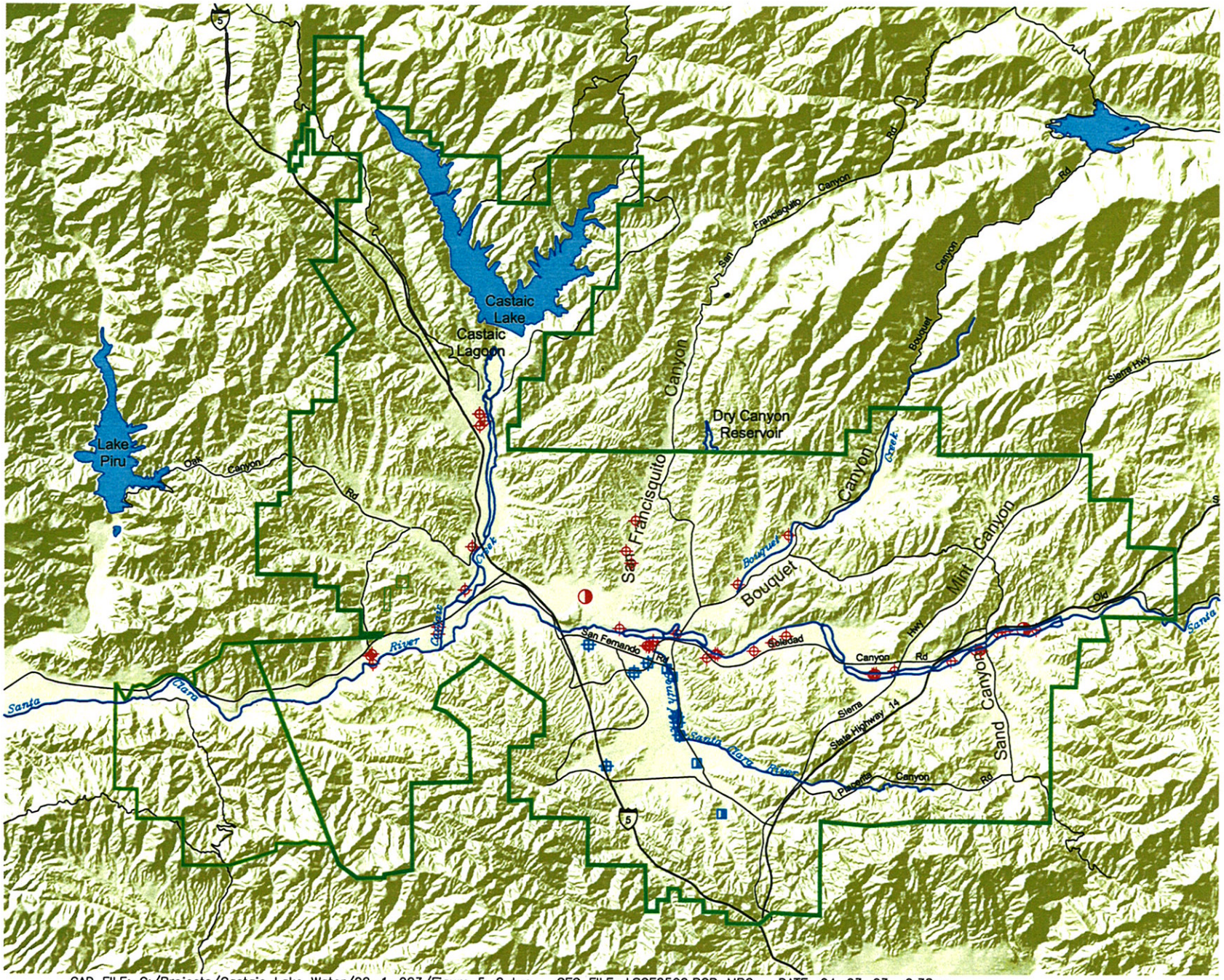
Scale in Miles

0' 1.5 3

CAD FILE: G:/Projects/Castaic Lake Water/02-1-023/Figure 5-1.dwg CFG FILE: LSCE2500.PCP_MRG DATE: 02-24-03 9:41am

LUHDORFF & SCALMANINI
CONSULTING ENGINEERS

Figure 5-1
Water Level Monitoring Well Network
Santa Clara River Valley East Groundwater Subbasin



LEGEND

- ACTIVE ALLUVIAL WELL
- INACTIVE ALLUVIAL WELL
- ACTIVE SAUGUS WELL
- INACTIVE SAUGUS WELL
- CLWA BOUNDARY

Scale in Miles

0' 1.5 3

CAD FILE: G:/Projects/Castaic Lake Water/02-1-023/Figure 5-2.dwg CFG FILE: LSCE2500.PCP_MRG DATE: 04-03-03 9:38am

LUHDORFF & SCALMANINI
CONSULTING ENGINEERS

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.

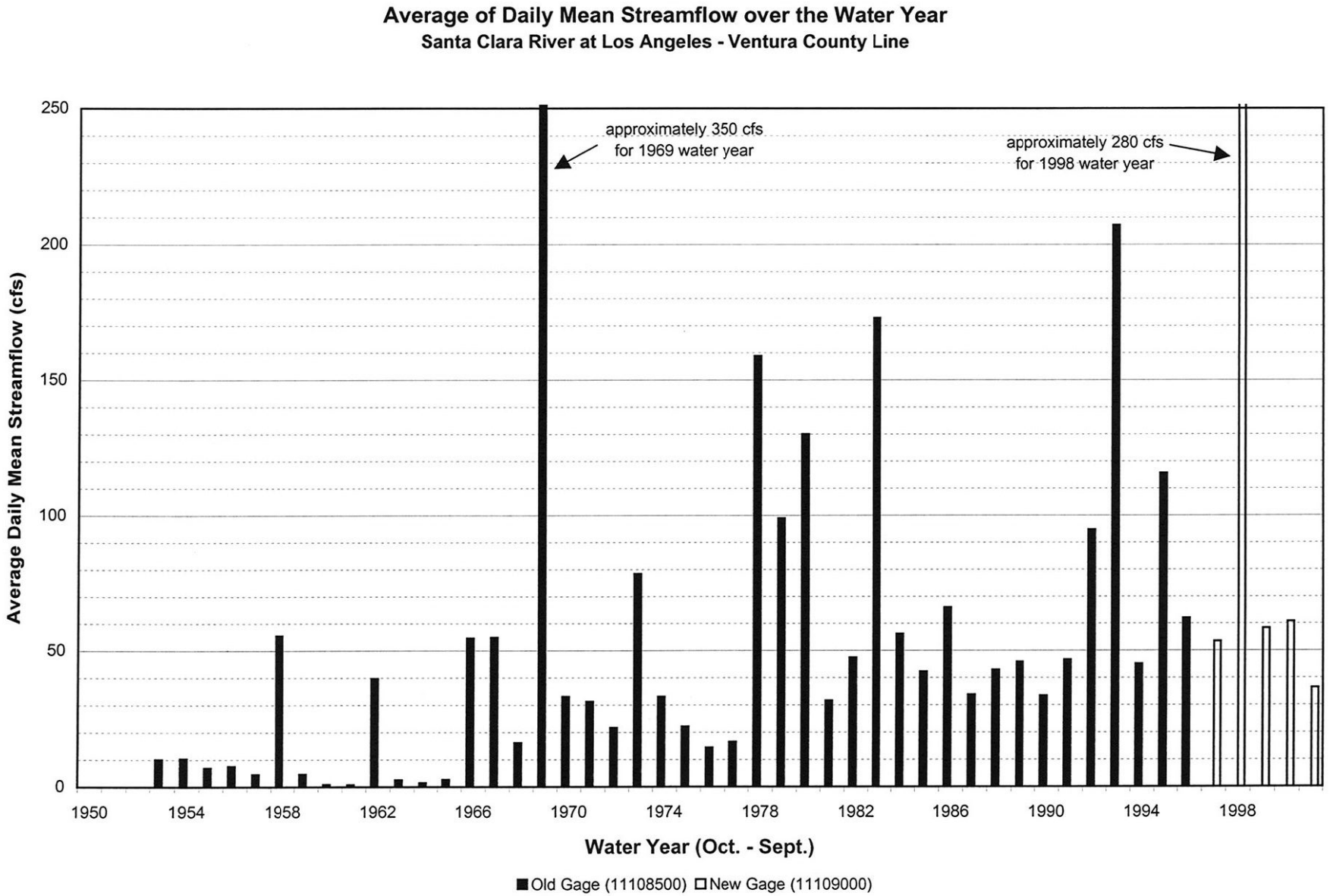

Average of Daily Mean Streamflow over the Water Year
Santa Clara River at Los Angeles - Ventura County Line
Average Daily Mean Streamflow (cfs)
250
200
150
100
50
0
approximately 350 cfs
for 1969 water year
approximately 280 cfs
for 1998 water year
1950
1954
1958
1962
1966
1970
1974
1978
1982
1986
1990
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
Upper Santa Clara Valley Groundwater Basin
East Subbasin

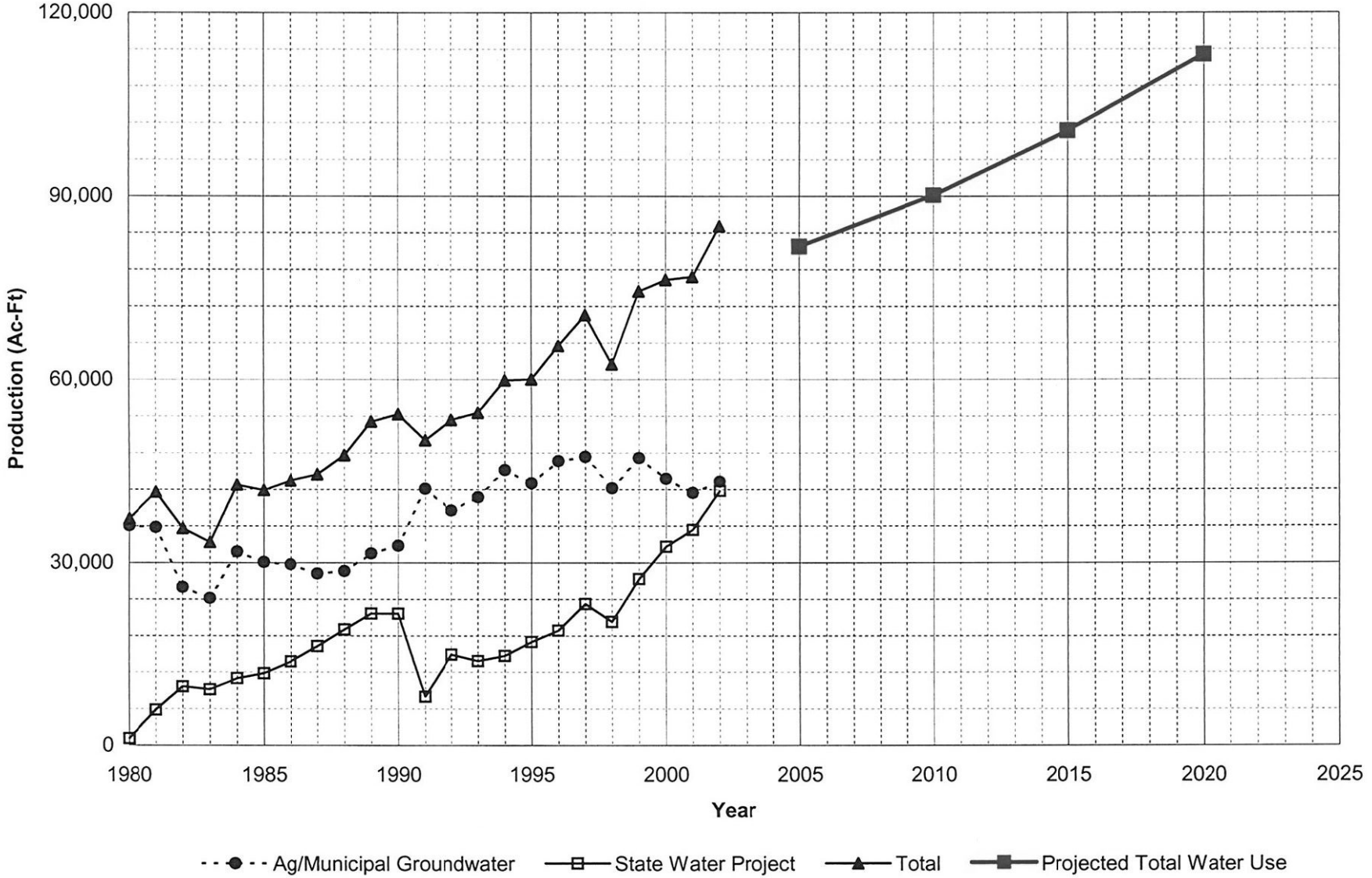


Figure 5-4

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 Subbbasin

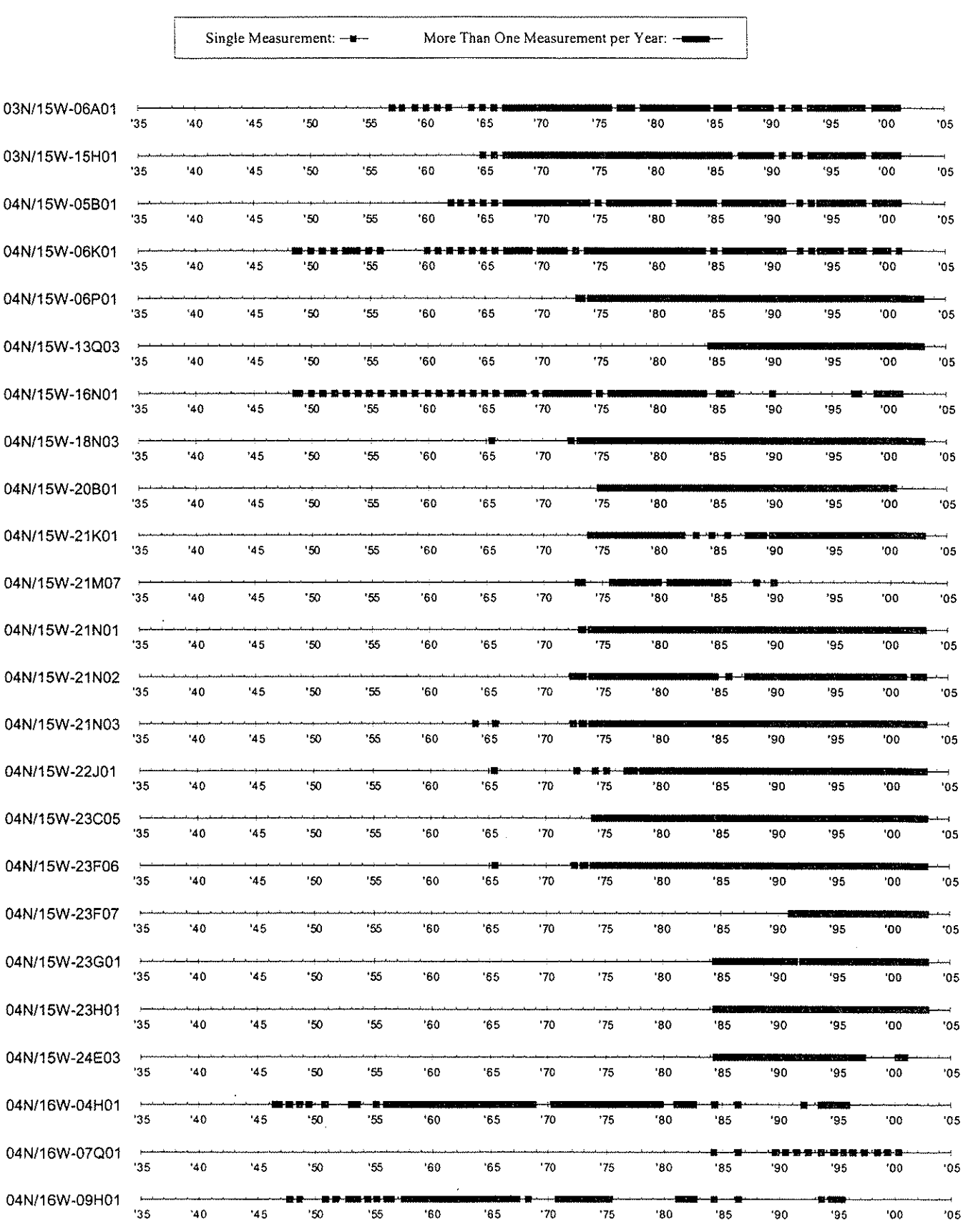


Table A1 - Continued
Dates of Historic Water Level Measurements in Alluvial Wells
Santa Clara River Valley Groundwater Basin, East Subbbasin

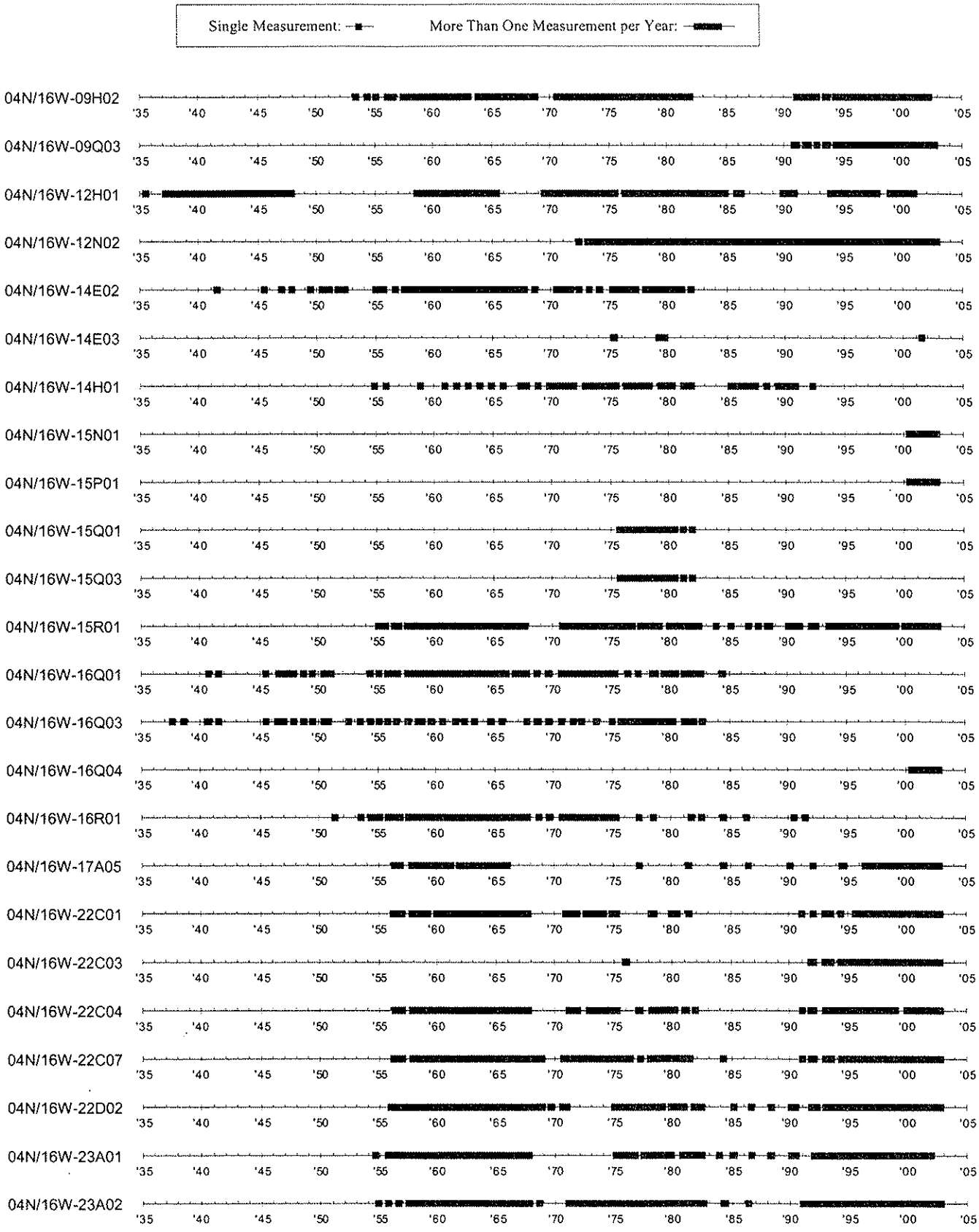


Table A1 - Continued
Dates of Historic Water Level Measurements in Alluvial Wells
Santa Clara River Valley Groundwater Basin, East Subbbasin

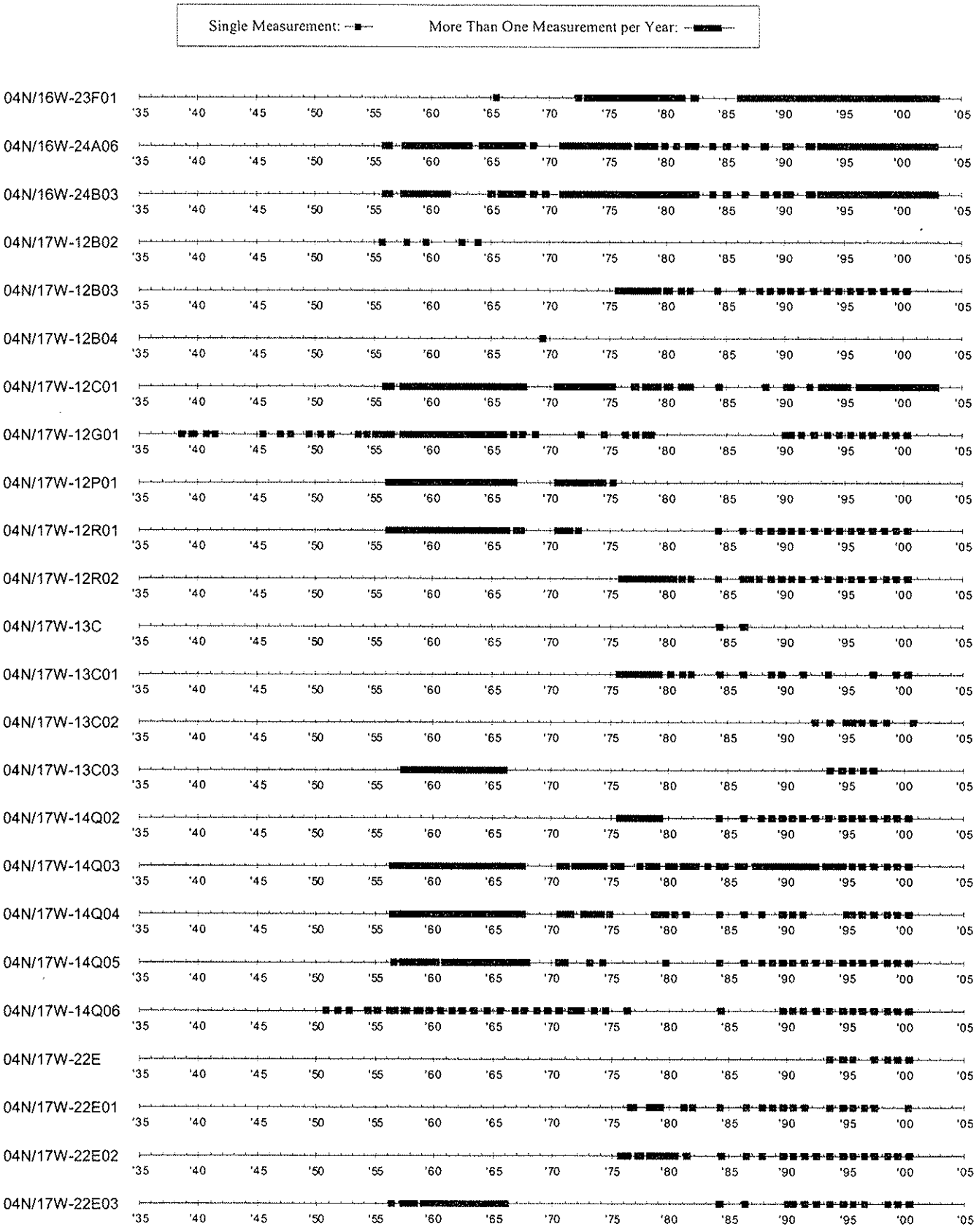


Table A1 - Continued
Dates of Historic Water Level Measurements in Alluvial Wells
Santa Clara River Valley Groundwater Basin, East Subbbasin

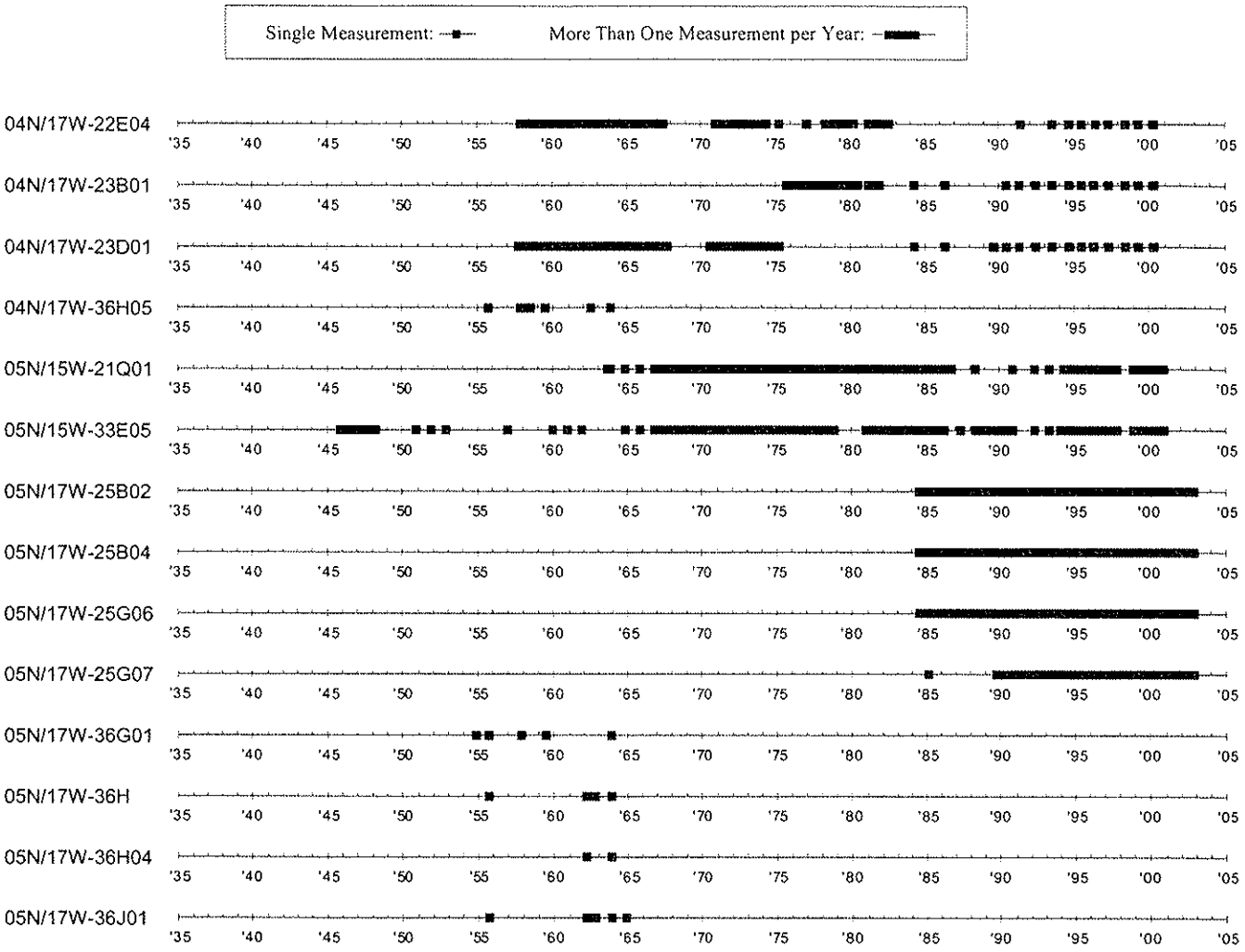


Table A1a
Dates of Historic Water Level Measurements in LACFCD Alluvial Wells
Santa Clara River Valley Groundwater Basin, East Subbbasin

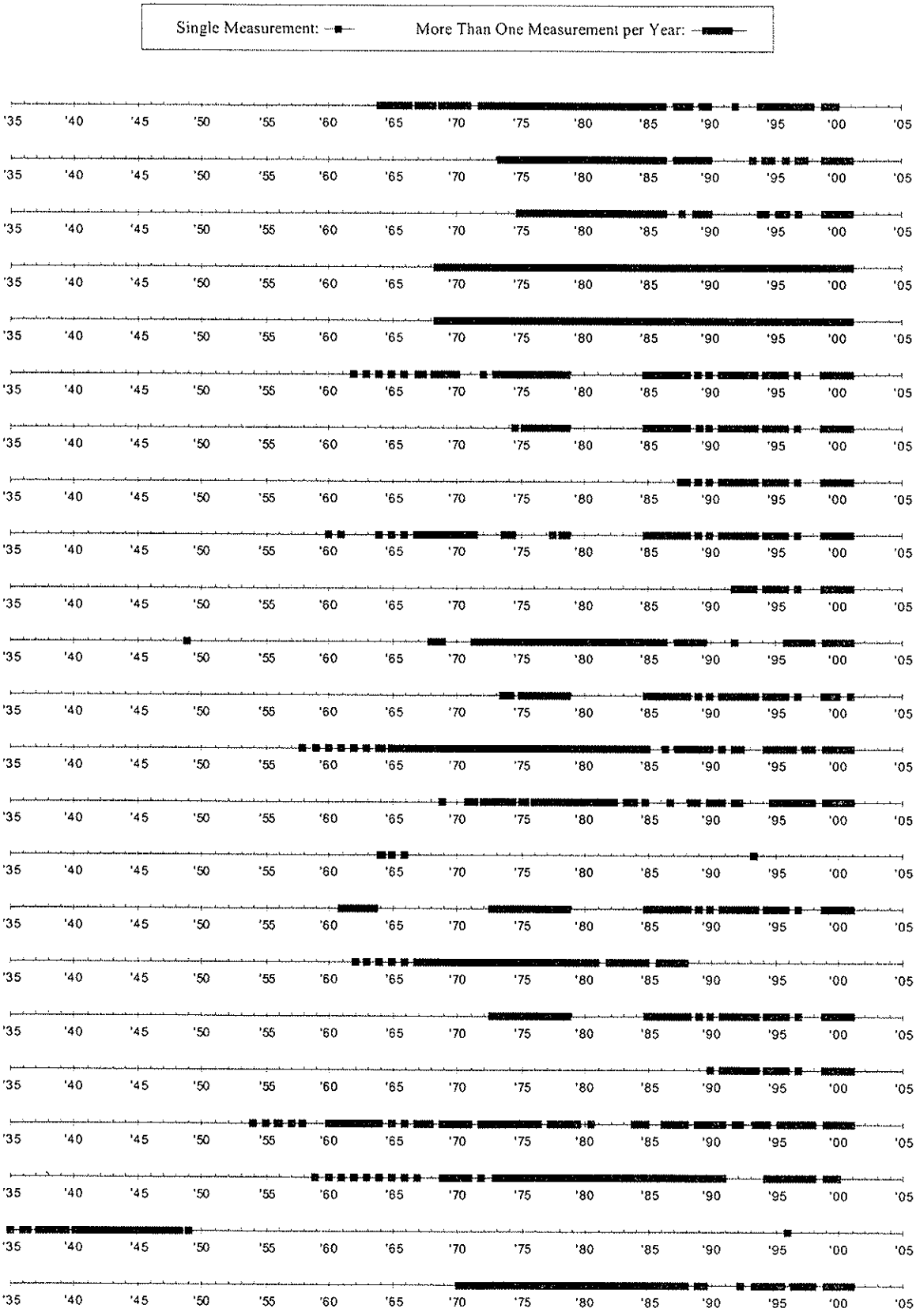


Table A1a - Continued
Dates of Historic Water Level Measurements in LACFCD Alluvial Wells
Santa Clara River Valley Groundwater Basin, East Subbbasin

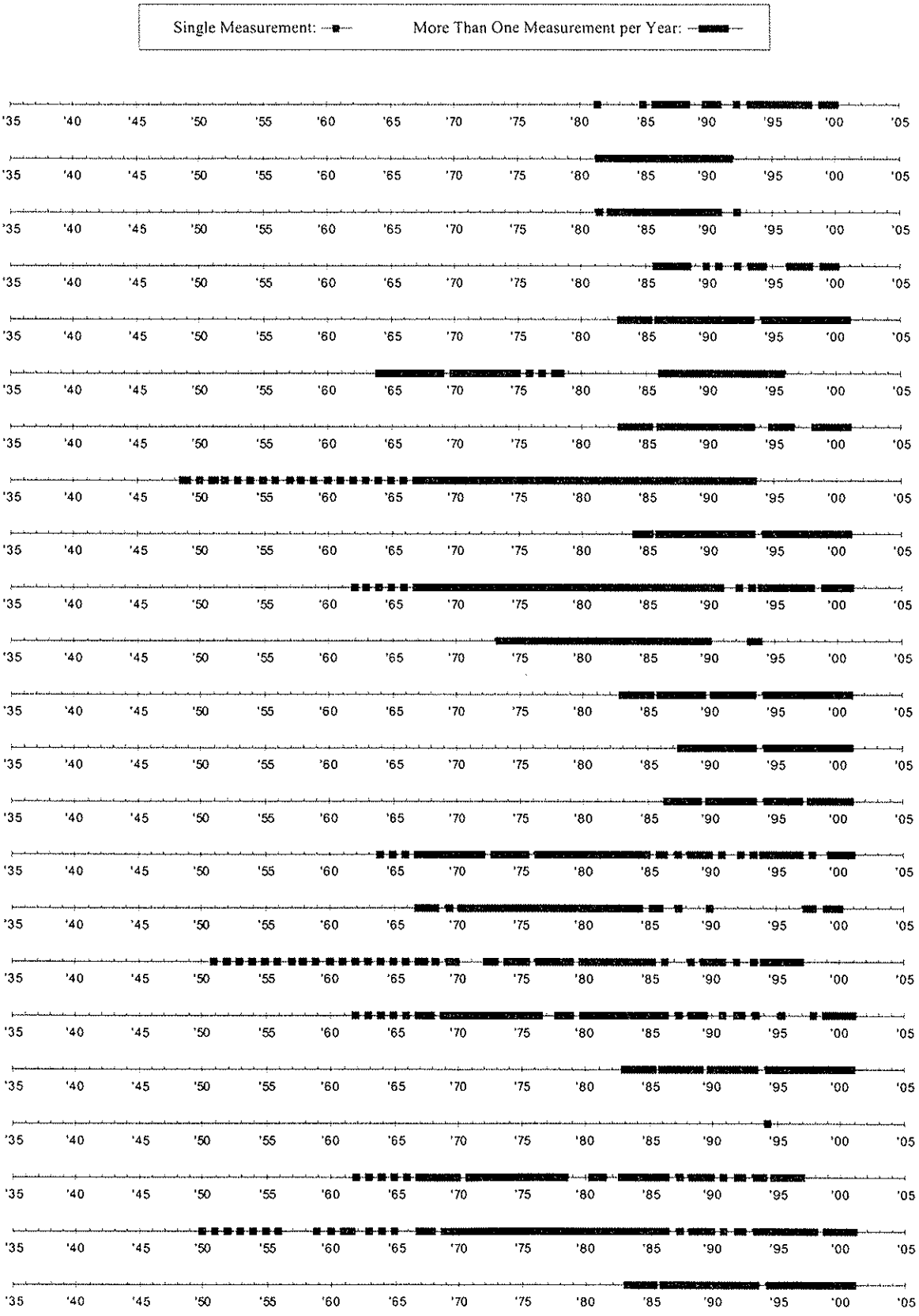


Table A1a - Continued
Dates of Historic Water Level Measurements in LACFCD Alluvial Wells
Santa Clara River Valley Groundwater Basin, East Subbbasin

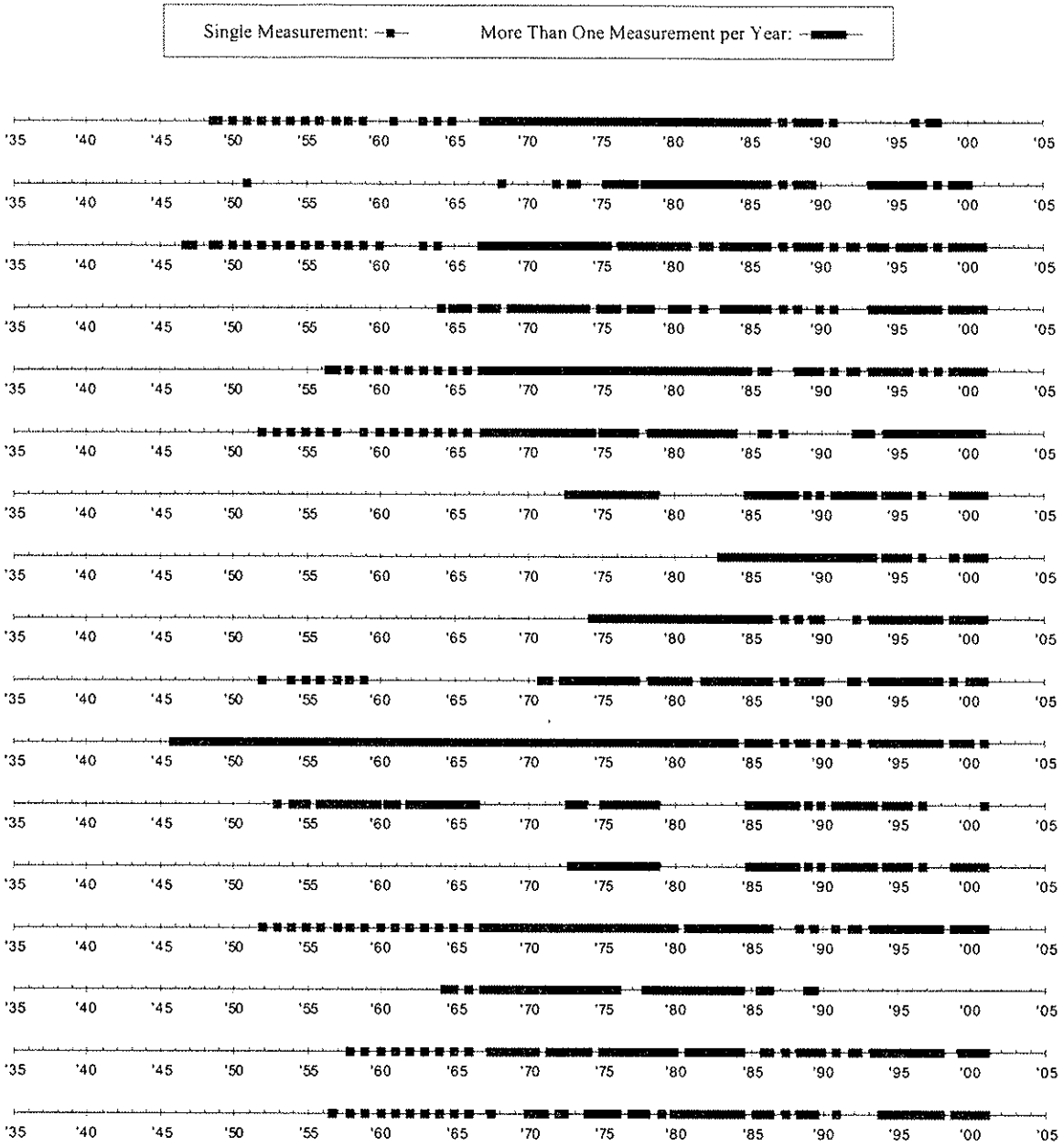


Table A2
Dates of Historic Water Level Measurements in Saugus Wells
Santa Clara River Valley Groundwater Basin, East Subbbasin

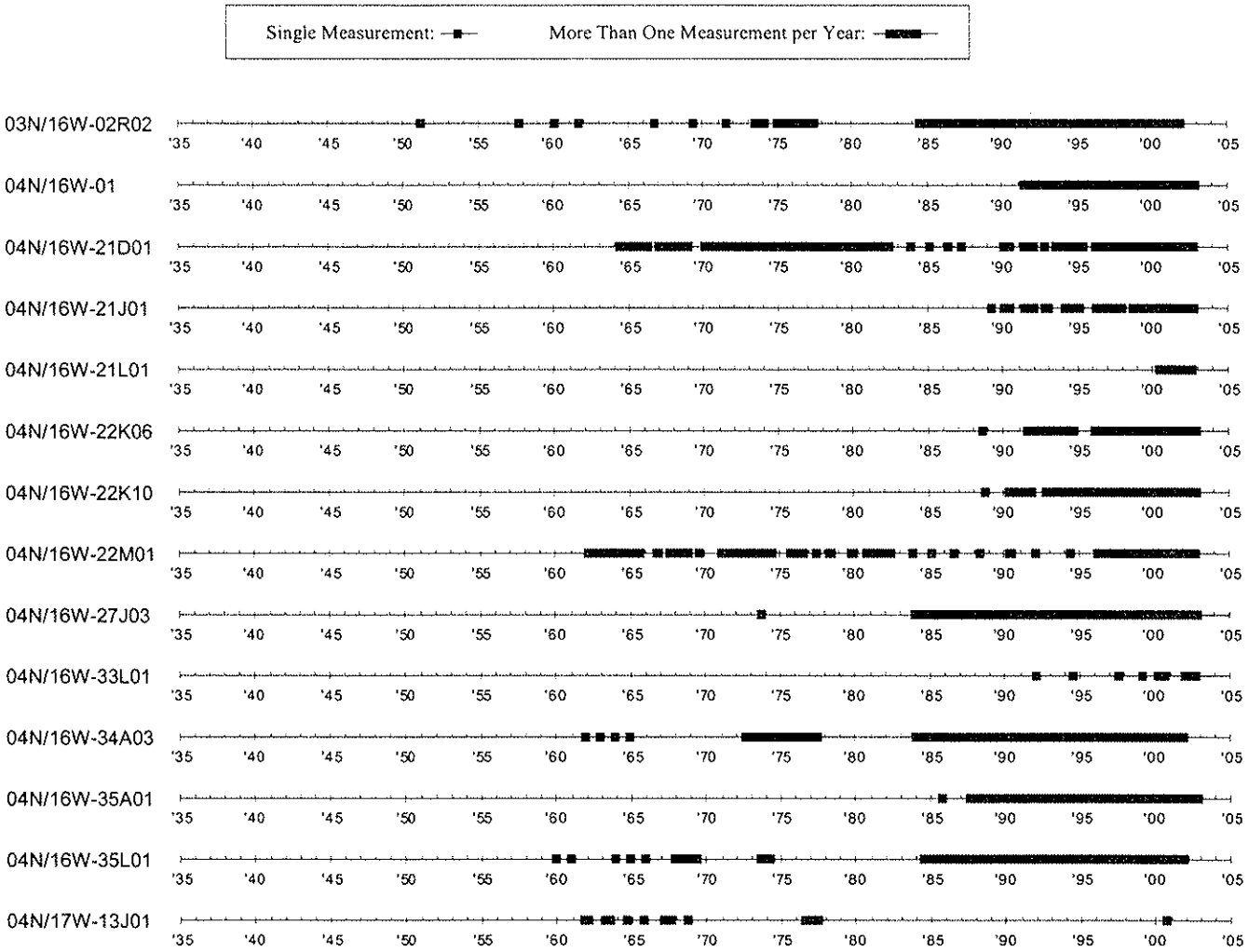


Table A3
Dates of Historic Water Quality Measurements (TDS) in Alluvial Wells
Santa Clara River Valley Groundwater Basin, East Subbbasin

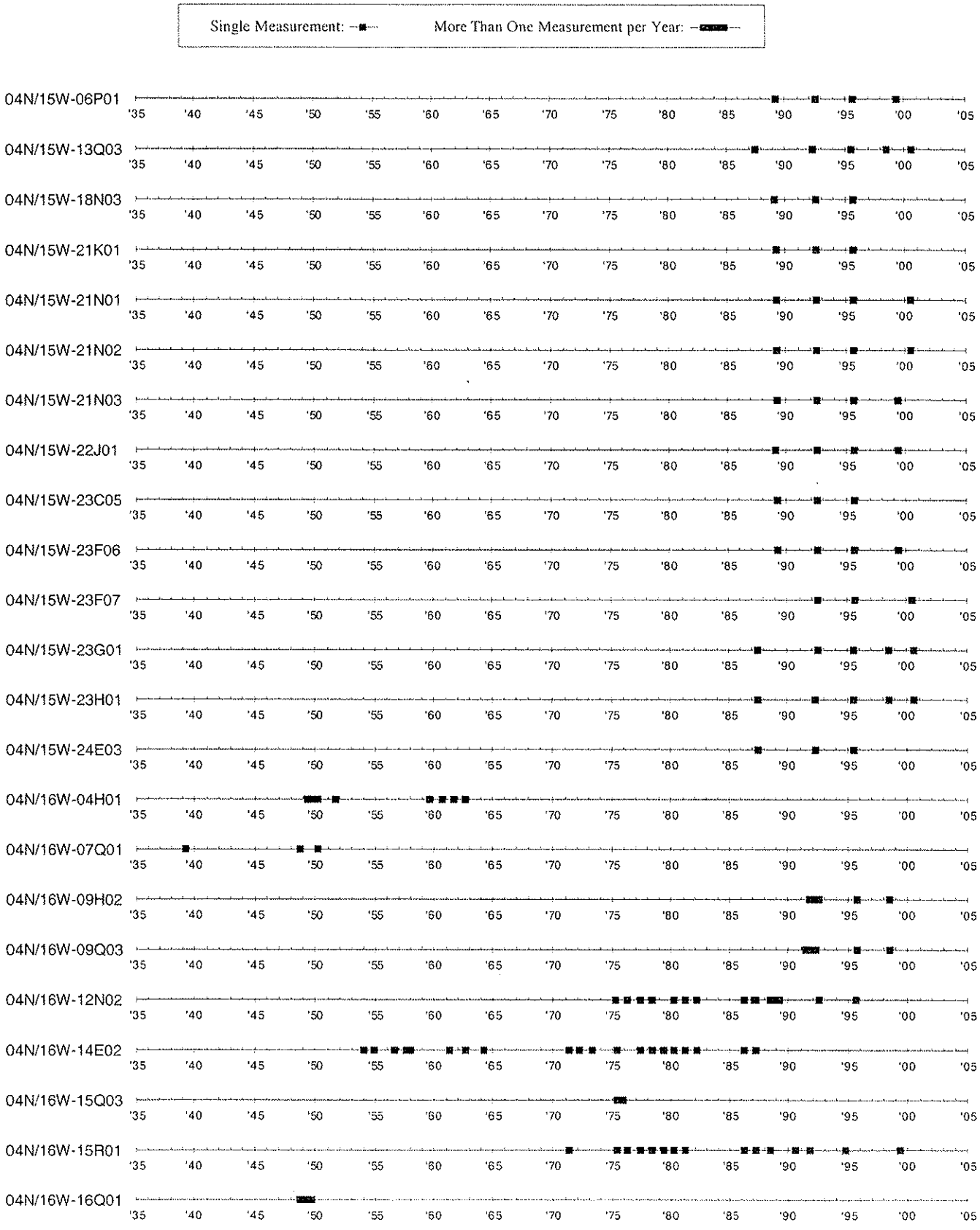


Table A3 - Continued
Dates of Historic Water Quality Measurements (TDS) in Alluvial Wells
Santa Clara River Valley Groundwater Basin, East Subbbasin

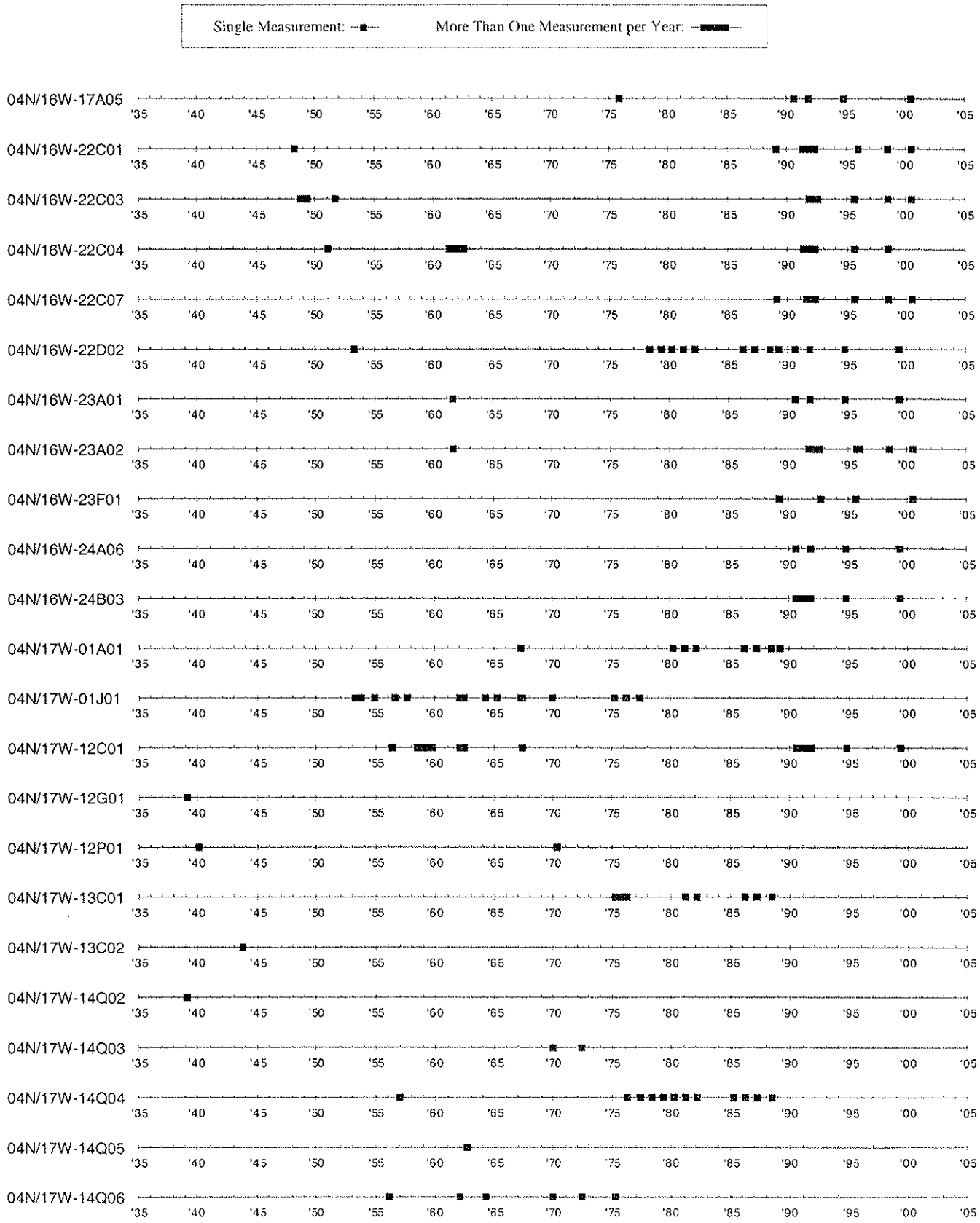


Table A3 - Continued
Dates of Historic Water Quality Measurements (TDS) in Alluvial Wells
Santa Clara River Valley Groundwater Basin, East Subbbasin

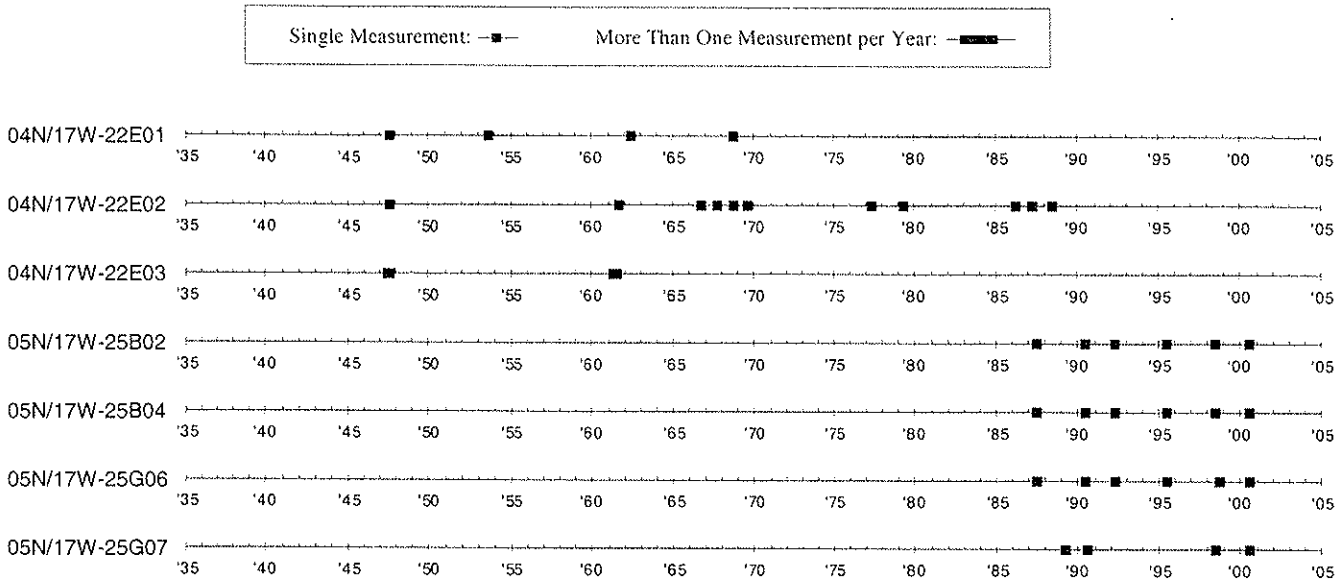
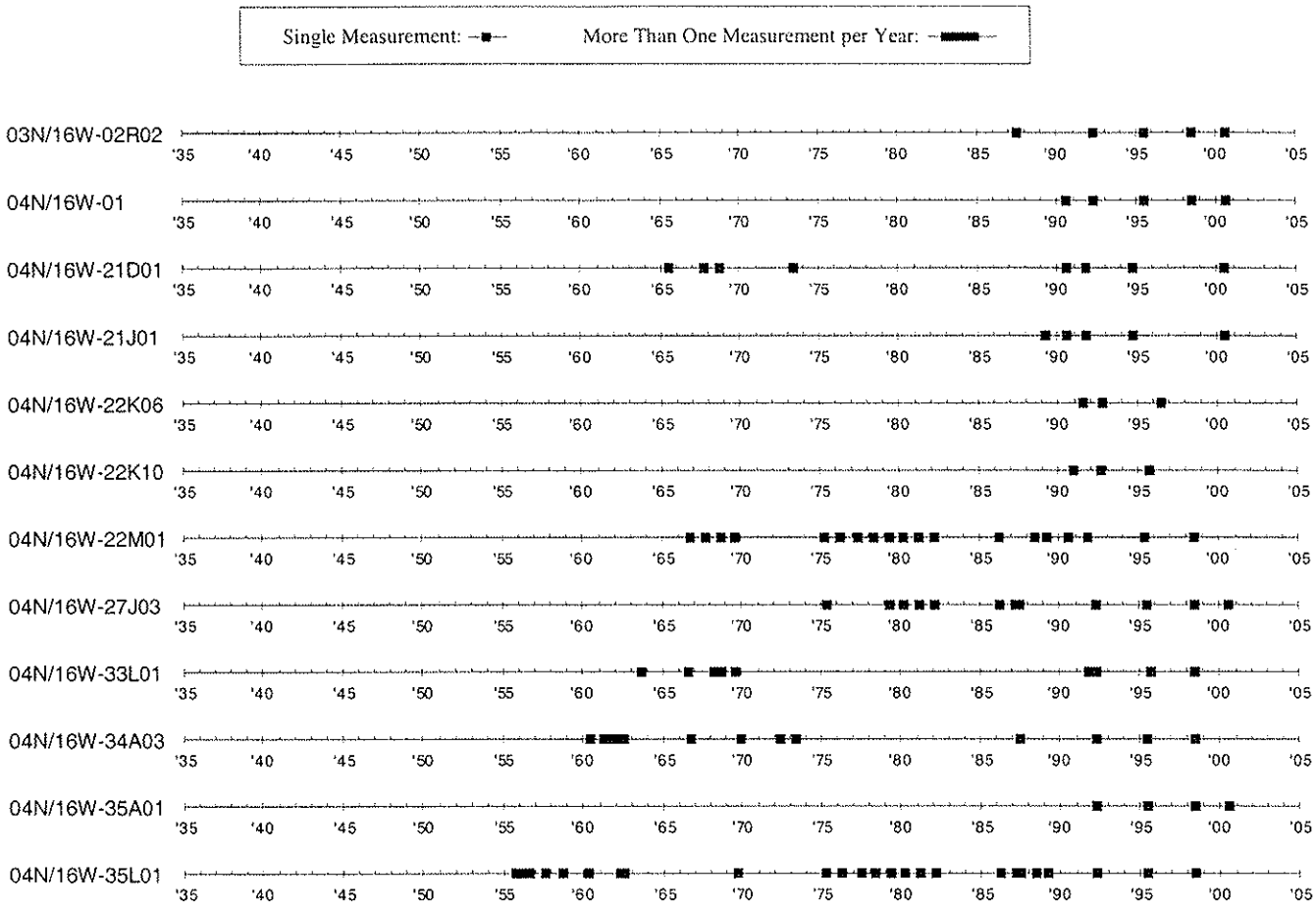
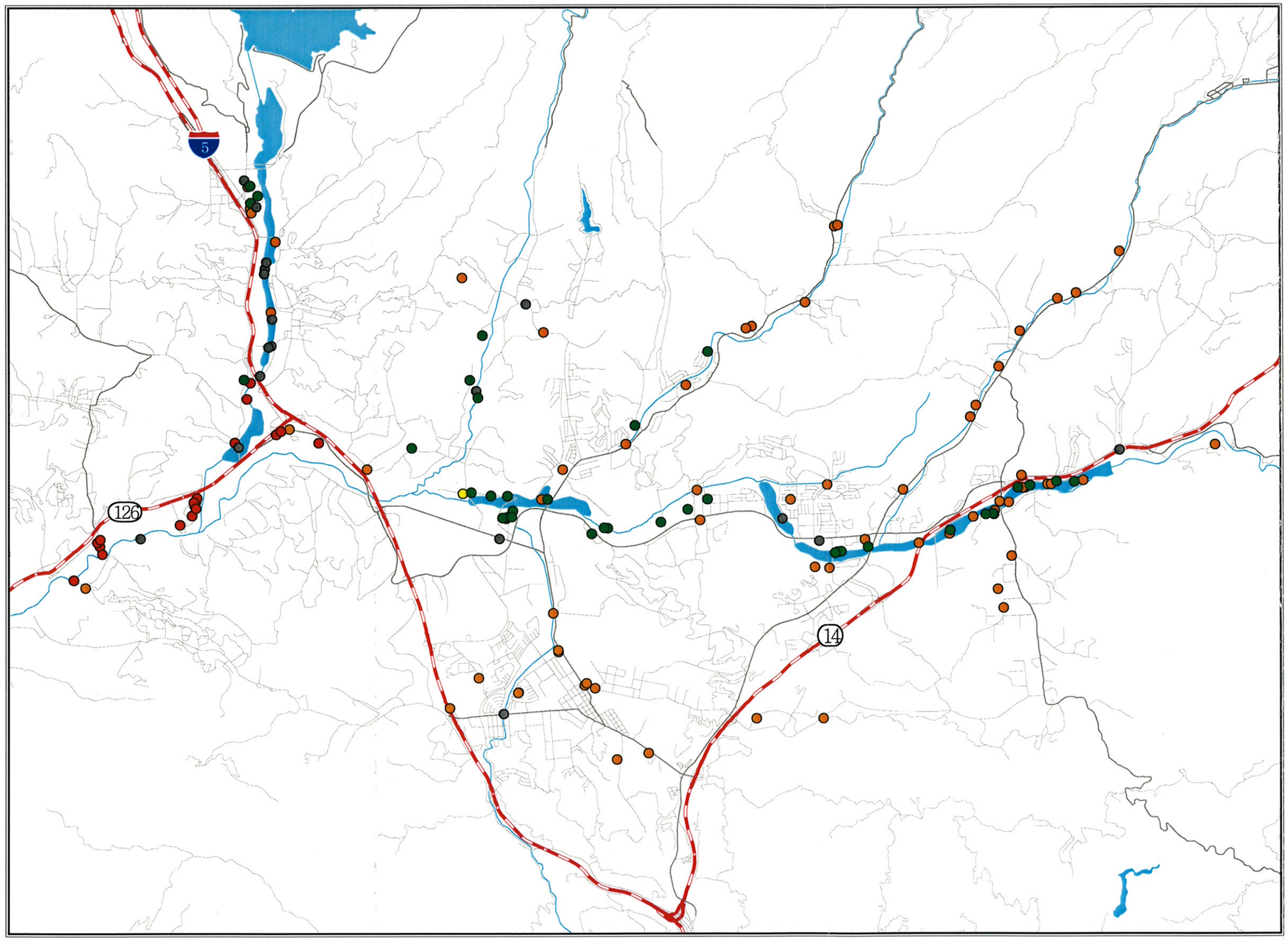


Table A4
Dates of Historic Water Quality Measurements (TDS) in Saugus Wells
Santa Clara River Valley Groundwater Basin, East Subbbasin





LEGEND

- Monthly
- Quarterly
- Twice Yearly
- Yearly
- Unknown Status

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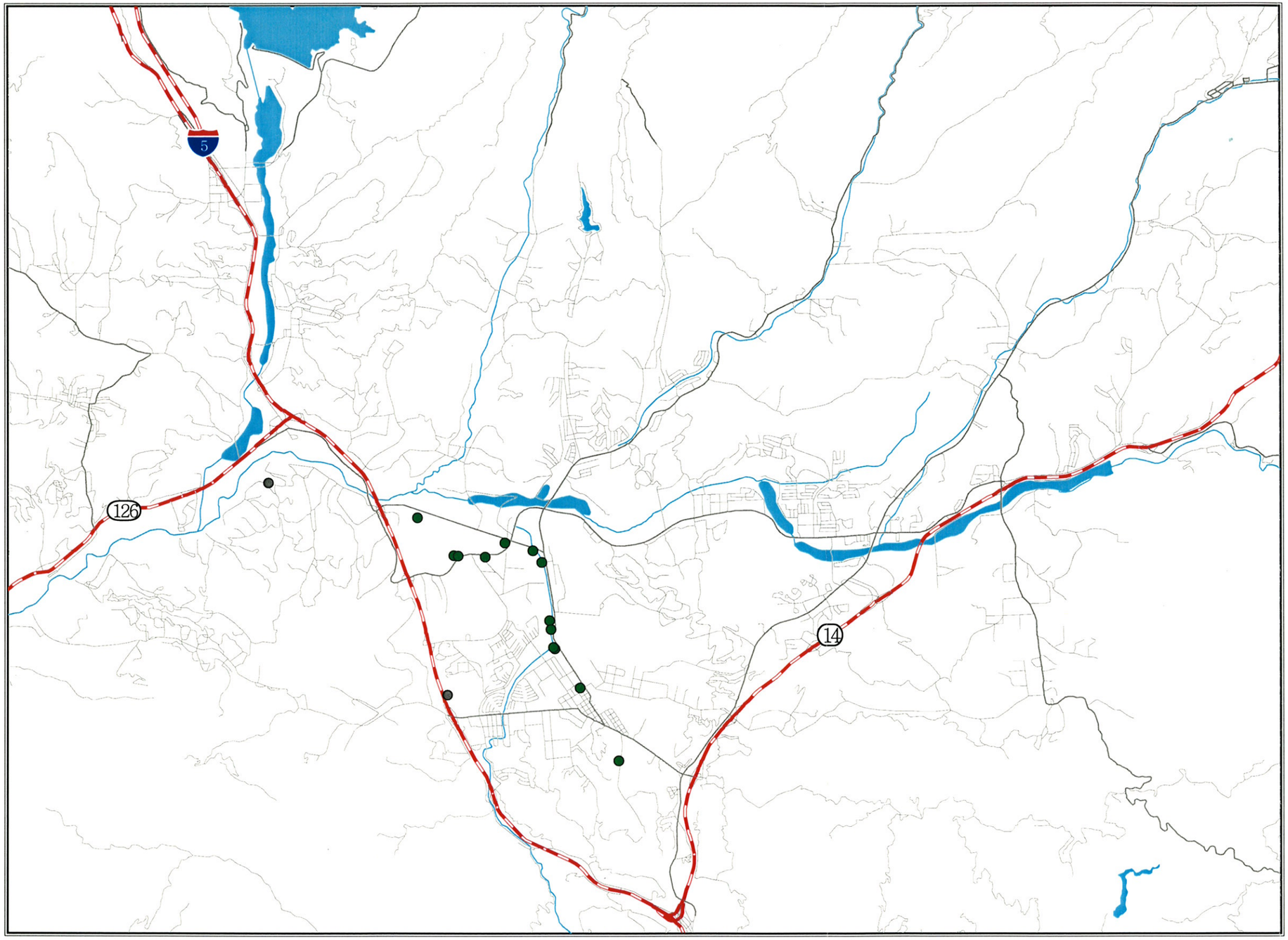
CONSULTING ENGINEERS

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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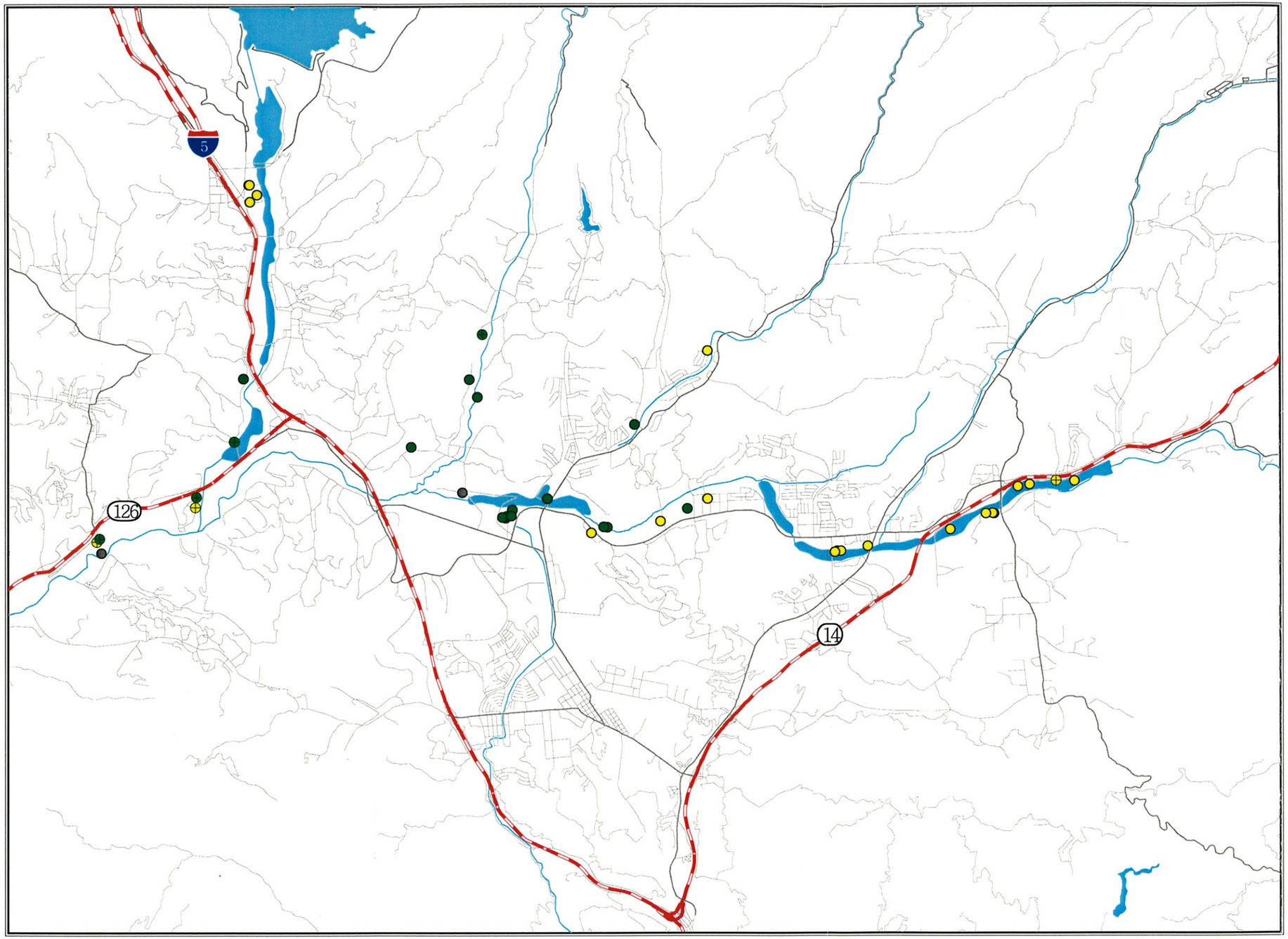
Figure A2
Frequency of Water Level Measurements in Saugus Wells
Santa Clara River Valley Groundwater Basin, East Subbasin



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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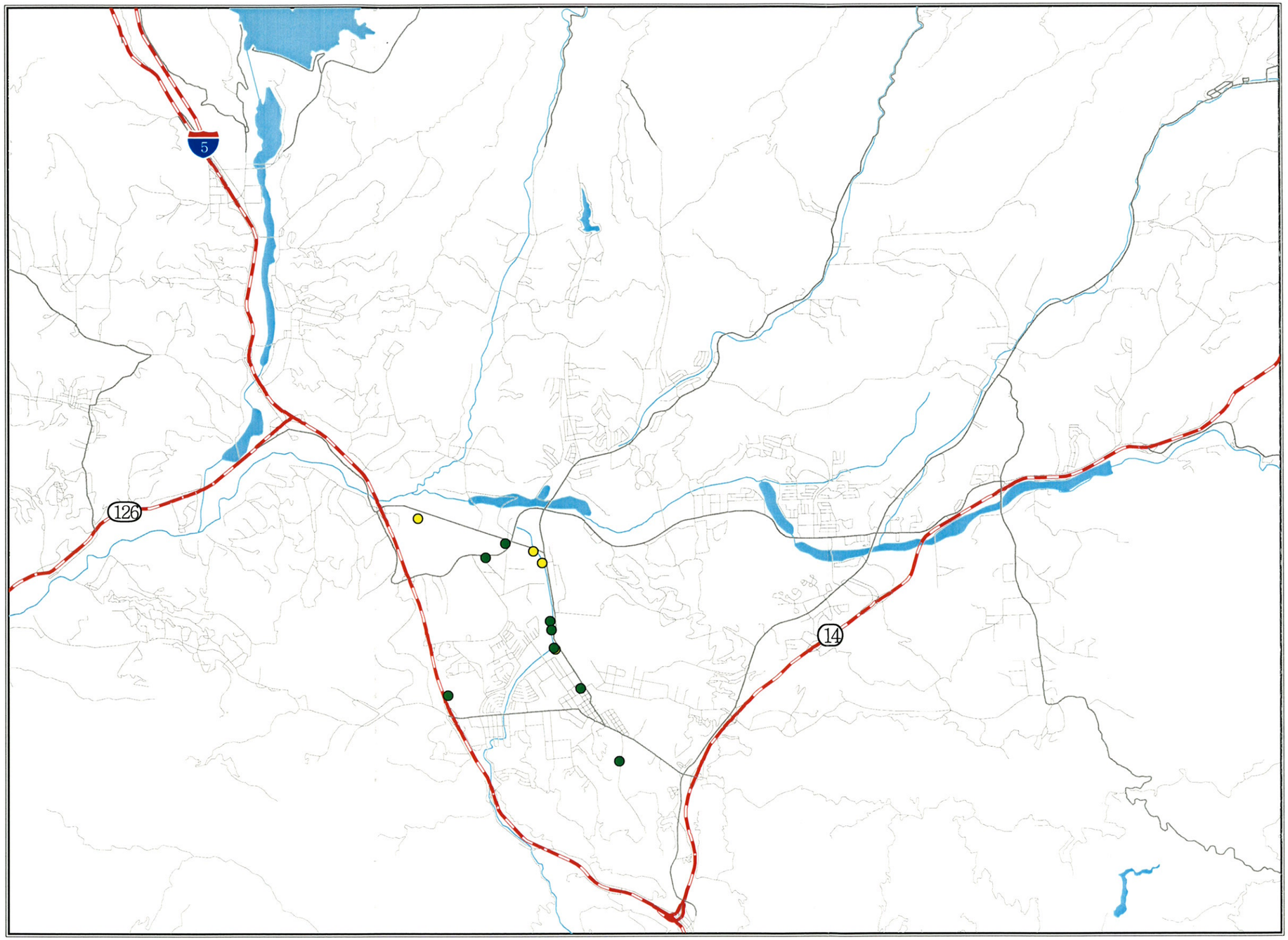
Figure A3
Frequency of Water Quality Measurements in Alluvial Wells
Santa Clara River Valley Groundwater Basin, East Subbasin



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 causing 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 riparian 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(l); 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 in-channel recharge areas in both the Santa Clara River and its tributaries.

[2] Stats. 1992, Ch. 947.
[3] Stats. 2001, Ch. 929.

PARTY	COMMENT	APPLICABLE GWMP SECTION/ COMPLIANCE[1]	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 134. 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 40,000 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(e).	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 usually 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 4 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 #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 #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 #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 #3	Advisory Board should include representatives from environmental groups and county agencies.	Water Code Appendix § 103-15.1(e)(2)	CLWA complied with the requirements of AB 134 regarding the composition of the Advisory Council.
Santa Clarita Sierra Club Group #1	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 3, 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 2.	See response to SCOPE Comment 5 and Friends Comment 2.

PARTY	COMMENT	APPLICABLE GWMP SECTION/ COMPLIANCE[1]	RESPONSE
Sierra Club #6	CLWA should involve the public and other government and private entities in its water supply planning.	Water Code Appendix § 103-15.1(e)(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 Trautman (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 pumpage), 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
Trautman #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.
Trautman #9	How is recycled water reprocessed?	Primary Element 7	Recycled water is not "reprocessed" at points of use such at 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.
Trautman #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 #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?	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 UWMP (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 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.

Board of Directors
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General Manager
Dana L. Wisenhart

UNITED WATER CONSERVATION DISTRICT

"Conserving Water Since 1927"

August 7, 2003

Dan Masnada
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 accomplished 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 1991. 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 15. 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 3-3, with a few groundwater quality time-series specific to the Saugus Formation;

Figure 5-3. 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 1968 and 1997. The high flow years were actually 1969 and 1998;

UNITED WATER CONSERVATION DISTRICT

Page 21. 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 yet 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, to this increased pumping. Irrespective of the modeling results, only real groundwater and surrface water data can verify the influence of significantly increased pumping within the sub-basin; and

Page 26, 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 declining during the 1950s and first half of the 1960s. The cumulative departure improved significantly during the period of 1978 through 1986; and
2. The amount of Alluvial Aquifer pumping may influence flow at the Ventura County line. During the latter half of the 1960s and through the 1970s, groundwater pumping of the Alluvial Aquifer declined by 70%. 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. Wisehart

Dana L. Wisehart
General Manager

cc: BRRF
Lowell Preston, Ph.D., Ventura County Water Resources Division

File: Castaic Lake Water Agency
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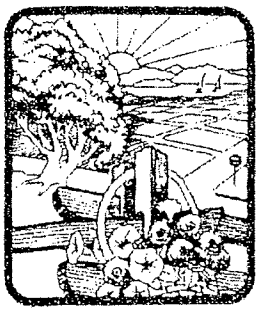
SCOPE

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 91386



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

RECEIVED
AUG 13 2003

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 out come 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, Luhdroff and Scalmanini revise the previous perennial yield estimate of the Santa Clara River by Richard Slade (perennial yield 32,000 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 re-charge during wet years. Urbanization has paved over most of this area, so re-charge 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.

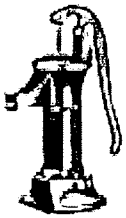
Sincerely

Pat Saletore

Pat Saletore

Cc: City of Santa Clarita
County of Los Angeles
Regional Water Quality Control Board
Local Newspapers

RECEIVED
AUG 08 2003
By L.S. 1:55 p.m.



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 Luhdroff 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 (Quericus 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 laud 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 Waldman

Friends of the Santa Clara River

660 Randy Drive, Newbury Park, California 91320-3036 • (805) 498-4323

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BY

August 7, 2003

Castaic Lake Water Agency
27234 Bouquet Canyon Road
Santa Clarita, CA 91350

Board of Directors

Ron Bottorff
Chair
Barbara Wampole
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Affiliated Organizations

California Native Plant Society
L.A./Santa Monica Mountains Chapter

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

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 occuring.

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 Bottorff

Ron Bottorff, 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

8/7/03

Castaic Lake Water Agency
272234 Bouquet Canyon Rd
Santa Clarita, CA 91350
FAX: 661-297-1611

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.

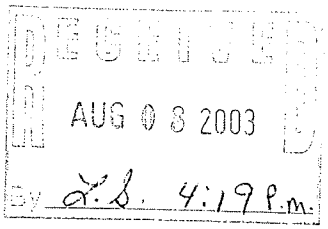
5. The Sierra Club strongly supports an active river-monitoring program so that potential and existing water quality issues can be addressed in a timely manner. This must be an integral part of the plan. In lieu of the water agency producing reliable data, a citizen-monitoring program will have to be 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 REAL 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
661-284-5613



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 134, 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.

Respectly 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 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.

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 3,500 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 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.).

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 none (no wells) exceeded 18 micro-grams per liter is false. See Exhibit C

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 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 #2:
The statement of this paragraph is misleading. The correction should show "out 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 23 years,

References to the Urban Water Management Plan (UWMP).
The UWMP of 2000 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.

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 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 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

References to the Urban Water Management Plan (UWMP).
The UWMP of 2000 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.

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 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 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

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 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 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.

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 (l).

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 inacurate 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 aluvium and 15,000 a/f from the Saugus 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. CLWA 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

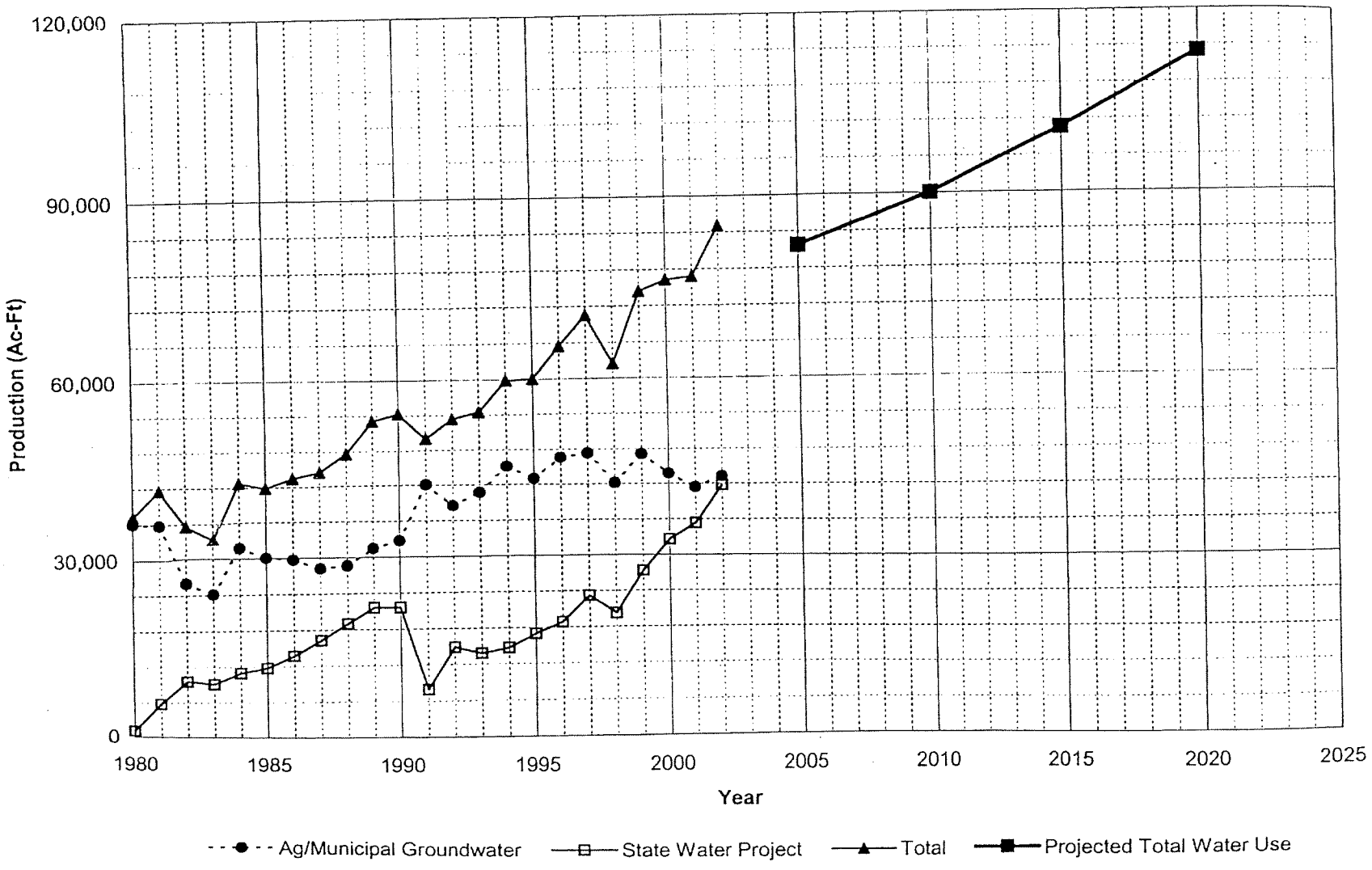


Figure 5-4

Plan, page #30 Dunn, 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. OH?

This Primary Element is included in this Plan to formalize the historical local and state agency

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.

(Not much truth 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 1 of this Plan, the potential groundwater management plan component

EXHIBIT A

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 to 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

Santa Clarita will turn to wells as state water supplies dry up

2-27-91 D.N.

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.

FOR PG. 17 + FIG. 5-4

EXHIBIT B

Officials say state's water delivery system inadequate

By Laura Myers
Associated Press

MONTEREY, Calif. — The tap has run dry too often and for too many years in California because of an inadequate water delivery system, representatives of the three main groups vying for the precious commodity complained Thursday.

The 5-year-old drought that saw everybody suffer when supplies were drastically cut only magnified the problem this year, said representatives of the urban, agriculture and wildlife interests.

"The biggest problem we have is that the reliability of the water supply is grossly inadequate," said Tim Quinn, conservation director for the urban Metropolitan Water District of Southern California. "The way the system works now, you just can't count on a steady water supply because the water delivery system just doesn't work like it should."

Quinn's comments came at 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 Hanson, representing wildlife and the environment, agreed with Quinn that the State Water Project and the federal Central Valley Water Project can't satisfy competing supply needs.

All three men presented dire pictures of what would happen if they weren't the first in line for water if the drought continues — the quality of urban life will decline, farms will go under, workers will be jobless and wildlife will dwindle, with some species becoming extinct.

But beyond the growing instant competition for scarce supplies, they said water officials must improve the delivery and storage system that essentially hasn't developed for decades.

"We shouldn't have to continue to fight one another for resources," said Hall, executive director of the California Farm Water Coalition.

The Sacramento-San Joaquin Delta, the cornerstone of the delivery system, is a bottleneck even in non-drought years, Quinn and Hall said.

Part of the problem, according to Hanson, who has an environmental consulting business, is the growing importance on protecting endangered and threatened species while making water transfers in the delta.

The winter-run chinook salmon already is listed by state and federal wildlife officials as threatened and the delta smelt also is expected to make the U.S. Fish and Wildlife Service list soon.

Certain water flow rates from the river must be met when those fish spawn, under wildlife protection rules, he said.

"We need to manage the allocations to provide adequate water throughout the year," Hanson said.

PG. 12

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@dailynews.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 Bertoni
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 inpacts 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 climatic 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 Dunn
Joan Dunn

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 materials 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.

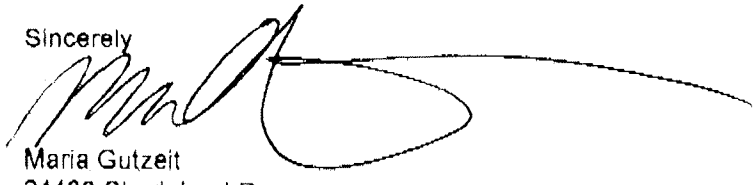
I did not see any indication of whether the collected monitoring data would be publicly available. I have heard comments from others that some well data is not being released to the public, even upon request. I think that concerned citizens and groups should be allowed access to the monitoring database.

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 this information go 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 it would be appreciated.

Sincerely



Maria Gutzeit
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Appendix H

Historical Imported Supply Deliveries by Purveyor
(Expanded Table 3-3 from Section 3)

APPENDIX H
HISTORICAL IMPORTED SUPPLY DELIVERIES BY PURVEYOR (AF)
(Expanded Table 3-3 from Section 3 Water Resources)

Santa Clarita Water Division

Year	SWP Deliveries to Service Area[a]	Withdrawals from Out-of-Service Area Storage[b]	Other Imported Deliveries to Service Area[c]	Total Imported Supplies to Service Area
1980	1,210	0	0	1,210
1981	4,558	0	0	4,558
1982	6,358	0	0	6,358
1983	5,379	0	0	5,379
1984	6,905	0	0	6,905
1985	7,248	0	0	7,248
1986	8,469	0	0	8,469
1987	9,642	0	0	9,642
1988	11,353	0	0	11,353
1989	12,850	0	0	12,850
1990	12,784	0	0	12,784
1991	5,686	0	0	5,686
1992	6,313	0	0	6,313
1993	3,417	0	0	3,417
1994	5,127	0	0	5,127
1995	8,304	0	0	8,304
1996	9,174	625	0	9,798
1997	9,410	0	0	9,410
1998	8,681	0	0	8,681
1999	11,368	0	0	11,368
2000	13,119	1,093	0	14,212
2001	15,764	0	0	15,764
2002	19,062	179	0	19,241
2003	24,072	0	0	24,072
2004	22,165	0	0	22,165
2005	15,954	0	0	15,954
2006	16,714	0	0	16,714
2007	15,921	0	5,015	20,937
2008	14,216	0	4,905	19,121
2009	12,009	759	5,062	17,830

Los Angeles County Waterworks District 36

Year	SWP Deliveries to Service Area[a]	Withdrawals from Out-of-Service Area Storage[b]	Other Imported Deliveries to Service Area[c]	Total Imported Supplies to Service Area
1980	0	0	0	0
1981	0	0	0	0
1982	143	0	0	143
1983	214	0	0	214
1984	250	0	0	250
1985	285	0	0	285
1986	346	0	0	346
1987	358	0	0	358
1988	431	0	0	431
1989	459	0	0	459
1990	525	0	0	525
1991	402	0	0	402
1992	419	0	0	419
1993	463	0	0	463
1994	460	0	0	460
1995	498	0	0	498
1996	521	35	0	556
1997	730	0	0	730
1998	564	0	0	564
1999	690	0	0	690
2000	763	64	0	827
2001	914	0	0	914
2002	1,077	10	0	1,087
2003	1,369	0	0	1,369
2004	859	0	0	859
2005	828	0	0	828
2006	1,257	0	0	1,257
2007	1,083	0	341	1,424
2008	1,035	0	357	1,392
2009	842	53	355	1,250

Newhall County Water District

Year	SWP Deliveries to Service Area[a]	Withdrawals from Out-of-Service Area Storage[b]	Other Imported Deliveries to Service Area[c]	Total Imported Supplies to Service Area
1980	0	0	0	0
1981	0	0	0	0
1982	0	0	0	0
1983	0	0	0	0
1984	0	0	0	0
1985	0	0	0	0
1986	0	0	0	0
1987	22	0	0	22
1988	141	0	0	141
1989	430	0	0	430
1990	815	0	0	815
1991	623	0	0	623
1992	797	0	0	797
1993	1,071	0	0	1,071
1994	919	0	0	919
1995	1,362	0	0	1,362
1996	1,186	81	0	1,266
1997	1,231	0	0	1,231
1998	1,727	0	0	1,727
1999	5,329	0	0	5,329
2000	5,747	479	0	6,226
2001	5,493	0	0	5,493
2002	6,031	57	0	6,087
2003	7,654	0	0	7,654
2004	5,928	0	0	5,928
2005	5,731	0	0	5,731
2006	5,749	0	0	5,749
2007	4,990	0	1,572	6,562
2008	4,149	0	1,432	5,581
2009	3,271	207	1,379	4,857

Valencia Water Company

Year	SWP Deliveries to Service Area[a]	Withdrawals from Out-of-Service Area Storage[b]	Other Imported Deliveries to Service Area[c]	Total Imported Supplies to Service Area
1980	0	0	0	0
1981	1,203	0	0	1,203
1982	3,015	0	0	3,015
1983	3,883	0	0	3,883
1984	4,321	0	0	4,321
1985	4,868	0	0	4,868
1986	5,113	0	0	5,113
1987	6,145	0	0	6,145
1988	6,979	0	0	6,979
1989	7,980	0	0	7,980
1990	8,014	0	0	8,014
1991	646	0	0	646
1992	6,301	0	0	6,301
1993	8,394	0	0	8,394
1994	8,097	0	0	8,097
1995	7,577	0	0	7,577
1996	6,805	463	0	7,269
1997	9,223	0	0	9,223
1998	8,799	0	0	8,799
1999	11,404	0	0	11,404
2000	11,452	954	0	12,406
2001	13,461	0	0	13,461
2002	15,910	149	0	16,059
2003	18,640	0	0	18,640
2004	18,511	0	0	18,511
2005	14,233	0	0	14,233
2006	15,902	0	0	15,902
2007	12,925	0	4,071	16,996
2008	12,478	0	4,306	16,784
2009	9,974	631	4,204	14,809

Los Angeles County Honor Farm

Year	SWP Deliveries to Service Area[(a)]	Withdrawals from Out-of-Service Area Storage[(b)]	Other Imported Deliveries to Service Area[(c)]	Total Imported Supplies to Service Area
1980	0	0	0	0
1981	0	0	0	0
1982	0	0	0	0
1983	0	0	0	0
1984	0	0	0	0
1985	0	0	0	0
1986	0	0	0	0
1987	0	0	0	0
1988	0	0	0	0
1989	0	0	0	0
1990	0	0	0	0
1991	0	0	0	0
1992	981	0	0	981
1993	441	0	0	441
1994	316	0	0	316
1995	6	0	0	6
1996	762	52	0	814
1997	992	0	0	992
1998	12	0	0	12
1999	21	0	0	21
2000	3	0	0	3
2001	0	0	0	0
2002	0	0	0	0
2003	0	0	0	0
2004	0	0	0	0
2005	0	0	0	0
2006	0	0	0	0
2007	0	0	0	0
2008	0	0	0	0
2009	0	1,650	0	38,746

Source: DWR Bulletin 132, Management of the California State Water Project; and DWR delivery files.

Notes:

(a) Includes deliveries of Table A supplies, carryover water, Article 21 water, Turnback Pool water, local supply (from West Branch reservoirs) and water purchased through DWR.

(b) Out-of-service area storage includes flexible storage in Castaic Lake, the Semitropic Banking Program and the Rosedale-Rio Bravo Banking Program.

(c) Deliveries from Buena Vista-Rosedale.

Appendix I

Perchlorate Contamination and Impact on Groundwater Supplies in the Santa Clarita Valley

Appendix I

Perchlorate Contamination and Impact on Groundwater Supplies in the Santa Clarita Valley

Introduction

The detection of perchlorate in Santa Clarita Valley groundwater supplies has raised concerns over the reliability of those supplies, in particular the Saugus Formation where six wells have been impacted as a result of perchlorate. As discussed below, planning and implementation of remediation of the perchlorate, and restoration of impacted well capacity, have been substantially undertaken. While that work continues, non-impacted production facilities can be relied upon for the quantities of water projected to be available from the Alluvial Aquifer and Saugus Formation during the time necessary to fully restore perchlorate-impacted wells. CLWA, the local retail water purveyors, the California Department of Toxic Substances Control (DTSC) and the U.S. Army Corps of Engineers (ACOE) continue to work closely on the perchlorate contamination issue, which reasonably ensures a prompt response to any significant changes in conditions.

The following is a discussion of pertinent events related to perchlorate contamination. It illustrates that work toward the ultimate remediation of the perchlorate contamination, including the reactivation of impacted groundwater supply wells, has progressed on several integrated fronts over the last ten years. The following discussion is organized into several sections that focus on various aspects of the offsite impacts of perchlorate on water supply wells and the ongoing activities to remediate that problem and restore the impacted well capacity.

On-Site Investigations and Clean-up

On-site investigation and clean-up have continued at the former Whittaker-Bermite facility. The on-site investigation and clean-up activities at the source of the contamination are under the regulatory authority and control of DTSC.

Background

The Whittaker-Bermite site is located in the center of the Santa Clarita Valley and was operated as an explosives and munitions manufacturing, testing and storage facility since the late 1930's. It was first owned by the Los Angeles Powder Company and later by Golden State Fireworks, the Halifax Explosives Company, the Bermite Powder Company and the Whittaker Corporation (Whittaker), which assumed ownership of the site in 1967. Under contracts with the U.S. Department of Defense, Whittaker Corporation used perchlorate in the manufacture of solid propellants for rockets and missiles until operations ceased in 1987. There was a long history of perchlorate use and other chemical use at the site, and surface and subsurface investigations at the site revealed the presence of perchlorate and other contaminants in soil and groundwater.

The contaminants found in the soil that require clean-up are perchlorate and volatile organic compounds (VOCs). These chemicals were used in the manufacturing and testing of fireworks, dynamite, oil-field explosives, and munitions. The site encompasses 996 acres, with actual production facilities occupying approximately 50 acres. The property is characterized by chaparral covering the undisturbed portions of the site, fire breaks, dirt roads and remnants of facility foundations and buildings. The surrounding areas include commercial, light industrial and residential land uses. The facility was closed in 1987 and most of the structures on the property were removed at or about that time.

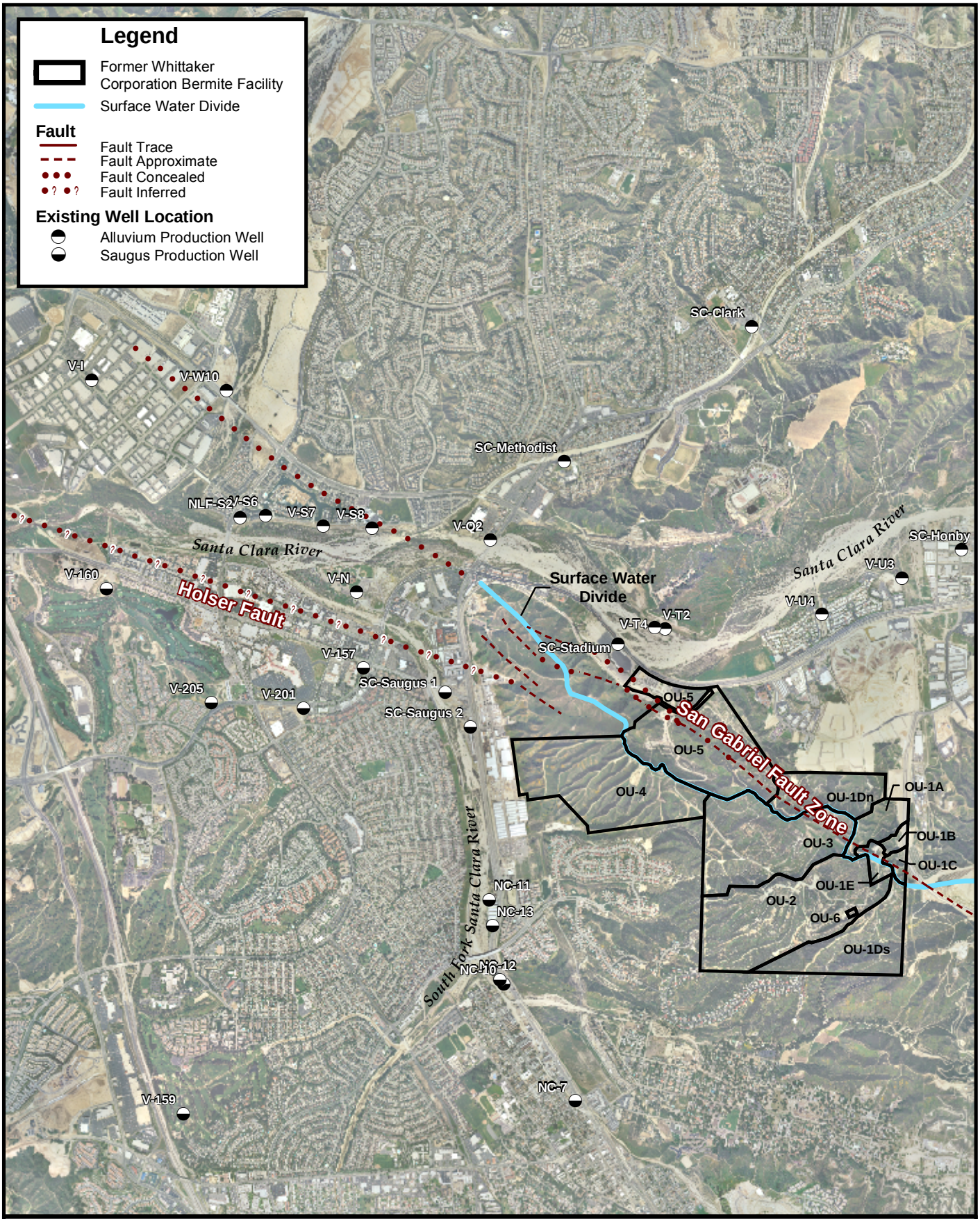
Between 1987 and 1998, Whittaker conducted environmental investigations and clean-up activities under the supervision of DTSC and its predecessor agency. In 1994, Whittaker entered into an enforceable agreement with DTSC to conduct a comprehensive site-wide investigation of areas of concern. In early 1997, with the remedial investigations under way, DTSC informed Whittaker that the soils, groundwater and surface runoff would have to be reassessed for the presence of perchlorate

In 1998, Whittaker sold the property to Santa Clarita LLC, a brownfield development company. In addition to assuming all clean-up responsibilities, Santa Clarita LLC acquired the right to develop the property contingent upon the full clean-up and certification of the property's reuse by DTSC. Between 1999 and 2001, Santa Clarita LLC expanded the site investigation and clean-up programs that had been initiated by Whittaker under the 1994 agreement. In 2002, however, with Santa Clarita LLC unable to fund additional site work due to financial difficulties, DTSC initiated negotiations with Whittaker to resume site investigation and clean-up work. In November 2002, DTSC issued an Order that required Whittaker to complete the site investigations and feasibility studies for all contaminants of concern under a tight time schedule.

Perchlorate Impacted Water Purveyor Wells

Perchlorate was initially detected in four Saugus Formation production wells operating near the former Whittaker-Bermite site in 1997. These wells – CLWA Santa Clarita Water Division's (SCWD) Wells Saugus 1 and Saugus 2, Newhall County Water District's (NCWD) Well NC-11 and Valencia Water Company's (VWC) Well V-157 – were removed from service. In 2002, perchlorate was detected in the SCWD Stadium well located directly adjacent to the Whittaker-Bermite site. This Alluvial well was also removed from service and subsequently capped in 2009. It was replaced with a new well, the SCWD Santa Clara well, also in 2009. Locations of the impacted wells and other nearby non-impacted wells, relative to the Whittaker-Bermite site are shown on Figure I-1. The restoration and/or replacement of these wells to service is discussed below.

Since the initial detection of perchlorate and resultant inactivation of impacted wells, the retail water purveyors have continued to conduct regular monitoring of active wells near the Whittaker-Bermite site. In late March 2005, that monitoring detected the presence of perchlorate in VWC's Well Q2, an Alluvial well located immediately northwest of the confluence of Bouquet Creek and the Santa Clara River.



CH2MHILL

Figure I-1
Site Location
Former Whittaker-Bermite Facility

As a result of the detection and confirmation of perchlorate in its Well Q2, VWC removed the well from active service and immediately pursued permitting and installation of wellhead treatment. The well was returned to water supply service in October 2005.

In 2006, Saugus well NCWD Well NC-13 had detectable concentrations of perchlorate below drinking water standards; it has remained in active water supply service.

Most recently, in August 2010, VWC's water sample tests, taken from August 2010 through April 2011, confirmed the presence of perchlorate above the regulatory standard at VWC's Saugus Well 201, located downgradient from the Whittaker Bermite site and downgradient from the initially impacted Saugus 1 and 2 and V-157 wells. VWC immediately took the well out of service and notified the California Department of Public Health (DPH). VWC continues to monitor the inactive well on a monthly basis. The most recent sample confirmed that perchlorate is still present and that remediation is needed as outlined by the 2007 Whittaker-Bermite Litigation Settlement Agreement (Settlement Agreement; discussed below in the section entitled "Water Supplier Litigation and Settlement Agreements").

VWC is currently evaluating remediation alternatives and intends to pursue restoration of the well's capacity through such means as wellhead treatment as provided for in the Settlement Agreement. This and several other wells were identified as being potentially threatened by perchlorate in the Settlement Agreement. Therefore, provisions were made in the Settlement Agreement to provide for treatment for any additional wells that may be impacted by perchlorate.

Analysis of the planned program for restoration of originally impacted wells using the basin groundwater model estimated that perchlorate-contaminated groundwater would be contained and captured by pumping Saugus 1 and 2. Ultimately, however, the combination of litigation, settlement, permitting and construction constrained actual implementation of the containment program until 2010, six years after the impact of the containment program on perchlorate migration in groundwater was analyzed. That time, combined with the preceding seven years since perchlorate first impacted water supply wells, resulted in a greater risk of downgradient migration of perchlorate in the Saugus Formation, and is interpreted to be the primary reason for the recent detection of perchlorate in VWC Well 201. However, as mentioned above, that possibility was addressed in the Settlement Agreement as it includes provisions for providing treatment to wells that are impacted by perchlorate not contained or captured by the original containment program.

Regulatory Standards for Perchlorate

Perchlorate is a chemical salt and is very soluble in water. It is also very mobile in water and is persistent (i.e., does not degrade) under typical environmental conditions. The maximum contaminant level (MCL) for perchlorate of 6 micrograms per liter (ug/L) was established by DPH in October 2007. MCLs are based on health protection, technical treatment feasibility, analytical detection limits and costs.

Water Supplier Litigation and Settlement Agreements

On November 29, 2000, CLWA and the local retail water purveyors filed suit against the current and prior owners of the Whittaker-Bermite facility. The lawsuit included causes of action relating to payment of all necessary costs of response, removal of the perchlorate contamination, payment of remediation action costs and compensation for other damages associated with the perchlorate contamination. CLWA and the local retail water purveyors had incurred substantial response costs and other expenses as a result of production lost on account of the contamination

In late summer 2003, CLWA, the local retail water purveyors, Whittaker and Remediation Financial, Inc. (RFI) and Santa Clarita LLC (SCLLC) entered into an interim settlement agreement, in which the parties agreed to work cooperatively for a minimum of one year to further define long-term costs and possibly achieve a long-term settlement. The interim settlement agreement specified that Whittaker, RFI and SCLLC and/or their insurers would reimburse certain past costs as well as fund studies and prepare cost estimates for the clean-up plan to restore water production and capacity of the impacted wells and protect other wells from future contamination. The interim settlement provided for a one-year stay of the lawsuit between the parties and was subsequently amended to extend the stay through January 31, 2005. This allowed the parties to focus on the final elements of the clean-up plan, which was submitted to the regulatory agencies in early 2005 and approved in 2007.

In May 2007, a comprehensive settlement was executed by CLWA, the retail purveyors and Whittaker, RFI and SCLLC (Settlement Agreement). The water suppliers were reimbursed certain costs incurred as a result of the perchlorate contamination and funds were deposited in escrow to pay for the costs of restoration of wells and construction of treatment facilities and related pipelines. The Settlement Agreement also provides funds to pay for operation and maintenance costs for the treatment system for up to 30 years, which the agencies estimate to cost as much as $50,000,000.

Approximately $31,000,000 has been reimbursed to the agencies for past expenditures pursuant to the Perchlorate Contamination Settlement. Another $5,000,000 to $10,000,000 will be used to construct wells and pipelines to supply water that will replace capacity lost from impacted wells. An additional $10,000,000 is available to allow the water suppliers to immediately treat any additional wells that could become impacted by perchlorate in the future (i.e., the “Rapid Response Fund”).

DTSC/CLWA/Purveyor Environmental Oversight Agreement

In February 2003, DTSC and CLWA, NCWD, SCWD, and VWC entered into an Environmental Oversight Agreement (Agreement) whereby DTSC provides review and oversight of the response activities being undertaken by CLWA and the local retail water purveyors relating to the detection of perchlorate in the initially impacted wells.

The significance of the Agreement lies in the response actions to be undertaken in its “Scope of Work” (Exhibit B to the Agreement). Under the Scope of Work, CLWA and the retail water purveyors prepared (1) Well Characterization Reports, (2) a Health-Based Risk Assessment,

(3) a Regional Groundwater Flow Model and (4) a Treatment Technology Evaluation Report. The regional groundwater flow model and the treatment technology evaluation were key inputs to the permitting for restoring the impacted wells by returning them to water supply service as described below. Both were completed and utilized in conjunction to control contamination migration and restore impacted water supply well capacity. Most important, under the Scope of Work, CLWA and the retail water purveyors prepared and implemented a Remedial Action Plan (RAP) that is being used in connection with water treatment programs and/or well relocation. The RAP remains important to the retail water purveyors, who have been working cooperatively with DTSC to implement the groundwater clean-up.

Treatment Technology

A number of full scale perchlorate treatment systems were evaluated by a technical group to ensure the most efficient and cost-effective process to remove perchlorate was selected. The technical group was comprised of representatives from CLWA, the retail water purveyors and consultants retained by Whittaker-Bermite. It initially agreed to solicit competitive bids for the design, construction and operation of two treatment systems – ion exchange and biological.

After thorough evaluation of several bids, the technical group determined that ion exchange was the preferred technology based upon treatment performance, ease of regulatory compliance and comparison of costs associated with construction and operations and maintenance.

The preferred single-pass ion exchange treatment technology does not generate a concentrated perchlorate waste stream that would require additional treatment before discharge to a sanitary sewer or a brine line (if one is available). This technology incorporates an active resin (a material that attracts perchlorate molecules) that safely removes the perchlorate from water. The resin is contained in pressure vessels and the water is pumped through the vessel. The resin is eventually replaced with new resin after a period of time. The old resin is removed and transported by truck to an approved waste disposal site where it is safely destroyed. This technology is robust and reliable for use in drinking water systems.

DPH has approved operation of the perchlorate treatment plants currently in operation at the following locations:

- La Puente Valley Water District (2,500 gpm)
- San Gabriel Valley Water Company, El Monte (7,800 gpm)
- California Domestic Water Company, Whittier (5,000 gpm)
- City of Riverside (2,000 gpm)
- West San Bernardino Water District, Rialto (2,000 gpm)
- City of Rialto (2,000 gpm)
- City of Colton (3,500 gpm)
- Fontana Union WC (5,000 gpm)
- City of Pomona (10,000 gpm)
- Valencia Water Company (1,700 gpm)
- CLWA Santa Clarita Water Division (2,400 gpm)

Based on (1) the results of CLWA's investigation of perchlorate removal technologies, (2) the technical group's evaluation and (3) DPH's approval of single-pass ion exchange for treatment in other settings, CLWA and the local retail water purveyors selected and installed single-pass ion exchange as the treatment technology for restoration of impacted capacity (wells). The perchlorate treatment facility includes an ion exchange process located at the Rio Vista Intake Pump Station. The same single-pass ion exchange wellhead treatment is being considered for installation at the recently impacted VWC Well 201 to restore that impacted Saugus well capacity. This same treatment also was successfully implemented at VWC Well Q2 in 2007.

Restoration of Perchlorate Impacted Water Supply

Since the detection of perchlorate in the four Saugus wells in 1997, CLWA and the retail water purveyors recognized that one element of an overall remediation program would include 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, CLWA and the retail water purveyors expected that the overall perchlorate remediation program could include dedicated pumping from some or all of the impacted wells, with appropriate treatment, such that two desirable objectives could both be achieved. The first objective is control of subsurface flow and protection of downgradient wells and the second is restoration of some or all of the contaminated water supply. Not all of the initially impacted pumping capacity is required for control of groundwater flow. Some of the remaining capacity has been replaced by construction of replacement wells at other nonimpacted locations; and some capacity remains to be replaced by future new wells.

In cooperation with state regulatory agencies and investigators working for Whittaker-Bermite, CLWA and the local retail water purveyors developed an off-site plan that focuses on the above concepts of groundwater flow control and restored pumping capacity and is compatible with onsite and possibly other off-site remediation activities. Specifically relating to water supply, the plan includes the following:

- Constructing and operating a water treatment process that removes perchlorate from two impacted 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 through the same hydraulic containment that results from pumping two of the impacted 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 retail water purveyor's operational plan for groundwater supply.

An extended test of the wells that were eventually returned to service was performed as part of restoring a portion of the impacted well capacity and controlling the migration of perchlorate in the aquifer. Concurrent with the testing of the wells, several specific ion exchange resins were also tested to evaluate their performance and longevity.

The Final Interim Remedial Action Plan for containment and extraction of perchlorate was completed and approved by DTSC in January 2006. Construction of the perchlorate treatment facility and related distribution system, the main components of the "pump and treat program," began in November 2007 and was completed in May 2010. In combination with start-up of the treatment system, the SCWD Saugus 1 and 2 wells (two of the four wells that were taken out of service in 1997) were returned to service in January 2011 after DPH issued an amendment to CLWA's Operating Permit in December 2010 (see discussion of "Compliance with DPH Policy Memo 97-005" below). After consideration of groundwater modeling results and engineering analysis, the parties to the Settlement Agreement agreed to operate the Saugus 1 and 2 wells at 1,100 gallons per minute (gpm) each (2,200 gpm total) in order to optimize both the contaminant plume containment and well production.

Additionally, VWC well 157 that was taken out of service in 1997 was replaced by Well 206 in 2005.

In light of the preceding, with regard to the adequacy of groundwater as the local component of water supply in this UWMP, the impacted capacity of the previously out of service wells (not including VWC Well 201) is being restored by a combination of treatment (i.e., Saugus 1 and 2) and new wells in non-impacted areas (all funded by the Settlement Agreement), providing well capacity that is sufficient to meet near-term normal and dry-year water requirements. Achievement of the full range of normal and multiple dry-year groundwater supply as provided in the groundwater operating plan will require additional new well construction, as well as restoration of the recently impacted VWC Well 201.

Compliance with DPH Policy Memo 97-005

Returning contaminated wells to municipal water supply service by installing treatment requires issuance of permit from DPH before the water can be considered potable and safe for delivery to customers. The permit requirements are contained in DPH Policy Memo 97-005 for direct domestic use of impaired water sources. Before issuing a permit to a water utility for use of an impaired source as part of the utility's overall water supply permit, DPH requires that studies and engineering work be performed to demonstrate that pumping the wells and treating the water will be protective of public health for users of the water. The Policy Memo requires that DPH review the local retail water purveyor's plan, establish appropriate permit conditions for the wells and treatment system and provide overall approval of returning the impacted wells to service for potable use. Ultimately, CLWA and the local retail water purveyors' plan and the DPH requirements are intended to ensure that the water introduced to the potable water distribution system has no detectable concentration of perchlorate.

The DPH 97-005 Policy Memo requires, among other things, the completion of a source water assessment for the impacted wells intended to be returned to service. The purpose of the assessment is to determine the extent to which the aquifer is vulnerable to continued migration of perchlorate and other contaminants of interest from the Whittaker-Bermite site. The assessment includes the following:

- Delineation of the groundwater capture zone caused by operating the impacted wells

- Identification of contaminants found in the groundwater at or near the impacted wells
- Identification of chemicals or contaminants used or generated at the Whittaker-Bermite facility
- Determination of the vulnerability of pumping the impacted wells to these contaminant sources

CLWA worked directly with the retail water purveyors and its consultants on the development of the DPH 97-005 Policy Memo permit application. Drafts of all six elements of the 97-005 Policy Memo were submitted to DPH and the retail purveyors for review, including the Source Water Assessment, Raw Water Quality Characterization, Source Protection Plan, Effective Monitoring and Treatment Evaluation, Human Health Risk Assessment and the Alternatives Sources Evaluation. The Engineer's Report, which summarizes these six elements for the 97-005 process, was completed in 2005.

As noted above, CLWA and the local retail water purveyors recognized the need for some form of pumping in or near the impacted wells to extract contamination and protect downgradient non-impacted wells. As part of the permitting for use of impacted wells with treatment, DPH 97-005 Policy Memo 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 SCWD, LACWWD #36, NCWD and VWC) and the United Water Conservation District in Ventura County.

The basin-wide groundwater model was initially intended for use in analyzing the yield and sustainability of groundwater in the Basin. That model, and the current updated model, was used to develop the sustainable groundwater pumping rates reflected in Section 3 of this UWMP. The model was also used to analyze both the sustainability of groundwater under an operational scenario that includes full restoration of perchlorate-contaminated supply and the containment of perchlorate near the Whittaker-Bermite property (i.e., by pumping some of the contaminated wells), including preventing 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's approval of the model, it was used to simulate the capture and control of perchlorate by restoring impacted wells, with treatment, as described above. The results of that work were summarized in a second report "Analysis of Perchlorate Containment in Groundwater Near the Whittaker-Bermite Property, Santa Clarita, California" (CH2M Hill, December 2004).

The modeling analysis indicated that the pumping of impacted wells Saugus 1 and Saugus 2 at a rate of 1,200 gpm each on a nearly continual basis would effectively contain perchlorate migrating westward in the Saugus Formation from the Whittaker-Bermite property (as previously noted, subsequent technical analysis resulted in the selection of a pumping rate of 1,100 gpm for each well). The analysis also indicates 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) pumping at Saugus 1 and 2 is

necessary to prevent continued migration of perchlorate to other portions of the Saugus Formation. The modeling report also includes the general design of a sentinel groundwater monitoring network and program required by DPH as part of its 97-005 Policy Memo permitting. The perchlorate containment report was approved by DTSC in November 2004. With that approval, the model was then used to support the source water assessment and the remainder of the permitting process required by DPH under its 97-005 Policy Memo.

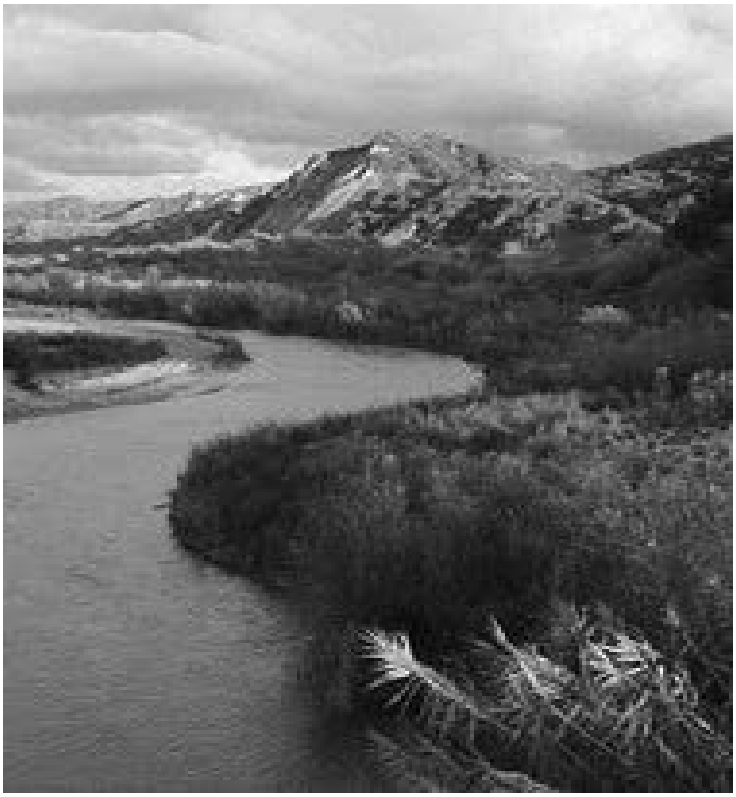
Conclusions Regarding VWC Well 201

As noted above and in Section 3, perchlorate was detected in VWC Well 201 in the August 2010. This well was taken out of service and its capacity is not included in active groundwater sources delineated in Table 3-9 of this UWMP. VWC plans to actively seek remediation under the settlement agreement and rapidly restore the impacted well capacity. Given its experience of (1) bringing its Q2 well back into production, (2) actions under the DPH 97-005 Policy Memo, (3) participating in bringing treatment facilities on line for the Saugus 1 and Saugus 2 wells and (4) replacing capacity for its Well 157, VWC has determined that it could either install wellhead treatment to bring the well back into service or replace the capacity with a new well within two years.

UPPER SANTA CLARA RIVER

CHLORIDE TMDL RECONSIDERATION, ~~AND~~ CONDITIONAL SITE SPECIFIC OBJECTIVES FOR CHLORIDE, AND INTERIM WASTELOAD ALLOCATIONS FOR SULFATE AND TOTAL DISSOLVED SOLIDS

STAFF REPORT



CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD - LOS ANGELES REGION

~~September, 30~~November 24 2008

Executive Summary

Chloride levels in the upper Santa Clara River (USCR) and in nearby groundwater basins have increased over the past three decades due to increased salt loadings from water imported into the Santa Clarita Valley and the increased number of self regenerating water softeners in the Santa Clarita Valley. Since the 1970s, growth in the Santa Clarita Valley has lead to chloride levels that exceed the water quality objective and impair beneficial uses for agricultural supply. Agriculture is the largest industry in the Santa Clara River Valley and the Regional Board has adopted a TMDL to restore the Santa Clara River to attain its beneficial uses.

This Staff Report discusses efforts under the Upper Santa Clara River Chloride TMDL to address these impairments with particular emphasis on the recent studies which have lead to a stakeholder developed plan for complying with the TMDL. The stakeholder plan, termed "Alternative Water Resources Management Plan" (AWRM) considers the results of key TMDL studies on the chloride sensitivity of crops and aquatic life and the interaction of groundwater and surface water in the USCR to fashion a plan that provides reduction of chloride loads from current levels, enhancement of water supplies for recycling and downstream uses, restoration of groundwater basins underlying the Upper Santa Clara River, and consideration of critical conditions such as a sustained drought. The AWRM requires a revision to existing water quality objectives for chloride, but it provides a significant reduction in chloride loading from current levels such that the most stringent beneficial uses are attained. During the critical condition of sustained drought, growers are provided alternative water to meet requirements and the chloride exported from the watershed still exceeds chloride into the watershed so that groundwater conditions will continue to improve.

The Regional Board first adopted a Total Maximum Daily Load (TMDL) for chloride in the USCR in 2000. The TMDL showed that chloride is loaded primarily into the Santa Clara River from Water Reclamation Plants serving residential, commercial and industrial users in the Santa Clarita Valley. The sources of the chloride which are loaded into the SCR are primarily chloride contained in the imported source water and chloride added by domestic uses, including self regenerating water softeners. As the Santa Clarita Valley has grown over the past decades, these TMDL source analyses also showed that the water quality objectives could not be met with source control alone, and that some type of advanced treatment would be necessary.

The identification of remedies for chloride impairments is challenging due to stakeholders with widely different interests in Los Angeles and Ventura Counties and potentially costly implementation measures. These factors lead to a remand of the TMDL from State Water Resources Control Board and after reconsideration by the Regional Board, the TMDL became effective on May 5, 2005. Key provisions of this TMDL include special studies to address scientific uncertainties and a consideration of site specific objectives by the Regional Board. This Staff Report summarizes the results of the special studies and discussions with stakeholders, which lead to an AWRM program to comply with the TMDL. This report considers the antidegradation and Water

Code Section 13241 requirements and recommends conditional site specific objectives to implement the AWRM.

Prior to completion of the special studies, the presumed implementation plan included two options: advanced treatment of effluent from the Saugus and Valencia water reclamation plants and disposal of brine in a new ocean outfall or disposal of effluent from the Saugus and Valencia water reclamation plants in a new ocean outfall. Both options entail construction of a pipeline from the Santa Clarita Valley WRPs and an ocean outfall. Concerns regarding the cost and feasibility of constructing this line lead caused controversy amongst stakeholders.

The TMDL Special Studies, all conducted in a facilitated stakeholder process in which stakeholders in scoping and reviewing the studies addressed three scientific uncertainties: 1) the levels of chloride required to support irrigation of salt sensitive crops; 2) the interaction of surface water and groundwater and the fate and transport of chloride in the USCR; 3) the effects of chloride on threatened and endangered fish in the USCR.

Regional Board staff finds that the work to date provides sufficient information on the chloride hazard threshold for salt-sensitive crops, the chloride threshold for endangered species, and the hydraulic and contaminant interactions between surface waters and groundwater basins in the USCR watershed to demonstrate that conditional site specific objectives can be combined with reverse osmosis technology to effectively reduce chloride loadings to the USCR and protect beneficial uses. Completion of the Literature Review and Evaluation (LRE) provided a scientifically defensible baseline to support a Water Quality Objective (WQO) of 117 milligrams per liter (mg/L) that is protective of agricultural supply beneficial use (AGR). The endangered species study shows that the chloride threshold for protection of salt sensitive agriculture is also protective of threatened and endangered species. The groundwater surface water interaction model shows that surface flows in the river recharge the Piru Basin with attendant chloride accumulation in that groundwater Basin. The AWRM consists of chloride source reduction actions and chloride load reduction through advanced treatment of the Valencia WRP effluent in conjunction with conditional site specific objectives. These source and load reductions mitigate the effect of any chloride accumulation in the groundwater basin.

The TMDL provides a ten-year schedule to attain compliance with the conditional SSOs. Key uncertainties at this point relate to identification of the optimum method for brine disposal. Several options, including deep-well injection in the vicinity of old oil fields in the Santa Clarita Valley, and drying and landfill disposal will be considered by the Santa Clarita Sanitation District of Los Angeles County in the first two years of the TMDL Implementation Plan. The recommended water quality objective changes before the Board are conditioned on implementation of the AWRM program; if the AWRM system is not built, the water quality objectives revert back to the current levels in the Basin Plan.

Staff's recommendation is to adopt the conditional site specific objectives for chloride. Staff finds that the costs of implementing the AWRM program will not increase monthly sewage rates substantially above the state average and median rates. Staff notes that the existing TMDL schedule can be accelerated by one year from 11 years to 10 years.

List of Acronyms

AGR – Agricultural Supply Beneficial Use
AWRM – Alternative Water Resources Management
BPA – Basin Plan Amendment
cfs – cubic feet per second
CLWA – Castaic Lake Water Agency
EIR – Environmental Impact Report
ESA – Extended Study Alternatives
ESP – Endangered Species Protection
GWR – Groundwater Recharge Beneficial Use
GSWI – Groundwater and Surface Water Interaction Model
LA – load allocation
LRE – Literature Review and Evaluation
LWA – Larry Walker Associates
MCL – Maximum Contaminant Level
MF/RO – microfiltration-reverse osmosis
MGD – million gallons per day
mg/L – milligrams per liter
NPDES – National Pollutant Discharge Elimination System
O&M – operation and maintenance
ppd – pounds per day
RARE – Rare and Endangered Species Habitat Beneficial Use
RO – Reverse Osmosis
SARI – Santa Ana Regional Interceptor
SB475 – Senate Bill 475
SCV – Santa Clarita Valley
SCVJSS – Santa Clarita Valley Joint Sewerage System
SCVSD – Santa Clarita Valley Sanitation District of Los Angeles County
SRWS – Self-Regenerating Water Softener
SSO- Site Specific Objective
SWP – State Water Project
SWRCB – State Water Resources Control Board
TAP – Technical Advisory Panel
TDS – Total Dissolved Solids
TMDL – Total Maximum Daily Load
USBR – United States Bureau of Reclamation
USCR – Upper Santa Clara River
USEPA – United States Environmental Protection Agency
USGS – United States Geological Survey
UWCD – United Water Conservation District
WLA – Wasteload Allocation
WQO – Water Quality Objective
WRP – Water Reclamation Plant

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1. Introduction

This staff report discusses the scientific and regulatory basis for proposed Basin Plan amendments to revise the Upper Santa Clara River Chloride Total Maximum Daily Load (TMDL) and establish conditional site-specific water quality objectives (SSOs) for chloride in reaches and groundwater basins in the Upper Santa Clara River watershed.

The Los Angeles Regional Water Quality Control Board (Regional Board) adopted a TMDL to address chloride impairments of the USCR on July 10, 2003 (Resolution 03-008). On May 6, 2004, the Regional Board amended the USCR chloride TMDL to revise the interim wasteload allocations (WLAs) and implementation schedule (Resolution 04-004). The amended TMDL was approved by the State Water Resources Control Board (State Board), Office of Administrative Law and United States Environmental Protection Agency (USEPA), and became effective on May 4, 2005.

At the time the TMDL was adopted and approved, there were key scientific uncertainties regarding the sensitivity of crops to chloride and the complex interactions between surface water and groundwater in the Upper Santa Clara River watershed. However, the TMDL found that the chloride sources are primarily imported source water from the State Water Project and chloride added by domestic uses, including self regenerating water softeners. These chloride sources are loaded into the USCR in effluent from the Saugus and Valencia Water Reclamation Plants (WRPs) that serve residents and industries in the Santa Clarita Valley. The TMDL recognized the possibility of revised chloride water quality objectives (WQOs) and included mandatory reconsiderations by the Regional Board to consider SSOs. The TMDL required the Santa Clarita Valley Sanitation District of Los Angeles County (SCVSD[1]) to implement special studies and actions to reduce chloride loadings from the Saugus and Valencia WRPs. The TMDL included the following special studies to be considered by the Regional Board:

- Literature Review and Evaluation (LRE) – review agronomic literature to determine a chloride threshold for salt sensitive crops.
- Extended Study Alternatives (ESA) – identify agricultural studies, including schedules and costs, to refine the chloride threshold.
- Endangered Species Protection (ESP) – review available literature to determine chloride sensitivities of endangered species in the USCR.
- Groundwater and Surface Water Interaction Study (GSWI) – determine chloride transport and fate from surface waters to groundwater basins underlying the USCR.

[1]Prior to 2005, the Santa Clarita Valley was historically served by the County Sanitation District Number 26 of Los Angeles County (Saugus WRP) and County Sanitation District Number 32 of Los Angeles County (Valencia WRP). Both of these Districts were collectively referred to as the County Sanitation Districts of Los Angeles County or CSDLAC in previous documents related to the Upper Santa Clara River Chloride TMDL. These two districts were merged into a single district, the Santa Clarita Valley Sanitation District of Los Angeles County or SCVSD as of July 1, 2005.

- Conceptual Compliance Measures – identify potential chloride control measures and costs based on different hypothetical WQO and final WLA scenarios.
- Site Specific Objectives and Antidegradation Analysis - consider a site-specific objective for chloride based on the results of the agricultural chloride threshold study and the GSWI.

The TMDL special studies were conducted in a facilitated stakeholder process in which stakeholders participated in scoping and reviewing the studies. This process has lead stakeholders to develop an alternative TMDL implementation plan that addresses chloride impairment of surface waters and degradation of groundwater. The alternative, termed Alternative Water Resources Management (AWRM) was first set forth by Upper Basin water purveyors and United Water Conservation District (UWCD), the management agency for groundwater resources in the Ventura County portions of Upper Santa Clara River watershed.

This Staff Report first presents a background on the TMDL, including regulatory history, the stakeholder collaborative process, a description of the watershed and the sources of chloride, and other salinity management programs in the state. The report then discusses the results and conclusions of the special studies which led to the development of the AWRM Program and proposed conditional SSOs. The AWRM Program and the proposed conditional SSOs needed to support the AWRM are then discussed. The report then discusses one of the special studies in detail, the Site Specific Objectives/ Antidegradation Analysis, which provides the regulatory basis for the conditional SSOs. Finally, the staff report reviews the alternatives for TMDL implementation based on the results of the special studies, provides staff's recommendation for conditional SSOs and TMDL revisions, and discusses how the recommended conditional SSOs and TMDL revisions would be implemented.

2. Background

This section provides background information on chloride issues in the USCR watershed.

2.1. Regulatory History

The Regional Board has adopted several resolutions that regulated chloride in the USCR, starting with Resolution 75-21 in 1975, which established WQOs throughout the region.

In 1990, the Regional Board adopted the Drought Policy, Resolution 90-04. This resolution was intended to provide short-term and temporary relief to dischargers who were unable to comply with limits for chloride due to the effects of drought on chloride levels in supply waters imported to the Region. The Regional Board temporarily reset limits on concentration of chloride at the lesser of: (i) 250 mg/L, or (ii) the chloride concentration of supply water plus 85 mg/L. The Regional Board renewed the Drought Policy in 1993 and again in 1995 because the chloride levels in supply waters remained higher than the chloride levels before the onset of the drought. The Regional Board did not revise the chloride WQOs in the Santa Clara River and Calleguas Creek because of the potential to affect present and anticipated agricultural beneficial uses.

In 1997, the Regional Board adopted the Chloride Policy, Resolution No. 97-02. The Chloride Policy revised the chloride objective for the Los Angeles River, Rio Hondo, and San Gabriel River. Due to concerns expressed about the potential for future adverse impacts to agricultural resources in Ventura County, WQOs for chloride in the Santa Clara River and Calleguas Creek were not revised. Rather, the chloride policy provided surface water interim limits of 190 mg/L in the Santa Clara River that extended for three years following approval of the amendment. The Regional Board did not revise the chloride WQOs in the Santa Clara River and Calleguas Creek because of the potential to affect existing and anticipated AGR. Similarly, the Regional Board did not revise the groundwater objectives for chloride.

The Regional Board first adopted a TMDL for chloride in the USCR in October 2002 (Resolution No. 2002-018). The TMDL showed that the chloride sources are primarily chloride contained in the imported source water from the State Water Project and chloride added by domestic uses, including self regenerating water softeners. These chloride sources are loaded into the USCR in effluent from the Saugus and Valencia WRPs that serve residents and industries in the Santa Clarita Valley. The TMDL source analysis also showed that the water quality objectives could not be met with source control alone, and that some type of advanced treatment would be necessary. The TMDL contained an 8-1/2 year implementation plan to attain chloride WQOs.

Because of differing stakeholder interests and potentially costly implementation measures, the State Board remanded the Chloride TMDL (State Board Resolution No. 2003-0014) to the Regional Board in February 2003 due to concerns about the duration of the interim effluent limits and concerns that the original implementation plan could have required the SCVSD to embark on planning and construction of an advanced treatment even though such studies might have demonstrated a need that could have been proved unnecessary in the end. The remand resolution also directs the Regional Board to consider an integrated solution for all water quality pollutants in the SCR basin on the Clean Water Act 303(d) list. The Regional Board revised the TMDL Implementation Plan to extend the interim wasteload allocations and final compliance date to 13 years after the TMDL effective date. It also included two additional special studies and several mandatory reconsiderations of the TMDL by the Regional Board. The Regional Board adopted the revised TMDL in July 2003 (Resolution No. 2003-008).

The TMDL was amended in 2004 (Resolution No. 04-004) to conform the interim wasteload allocations for the Saugus and Valencia WRPs to the effluent limits in 1994 Time Schedule Orders associated with National Pollutant Discharge Elimination System (NPDES) permits. In May 2004, the Regional Board and SCVSD signed a Settlement Agreement and Stipulation Concerning Chlorides in the UCSR. The Regional Board and SCVSD agreed that, if or when new or revised NPDES permits are subsequently issued to the Saugus or Valencia treatment plants prior to the date that a revised WQO or final wasteload allocations take effect in accordance with the Chloride TMDL Amendments, interim chloride effluent limitations reflecting the interim wasteload allocations in the TMDL, including any revisions thereto, will be included in the revised permits.

In 2006, the Regional Board reconsidered the TMDL and amended the TMDL schedule. The Board considered the results of the special studies to date and found it appropriate to accelerate the study period of the Implementation Plan based on the Literature Review and Evaluation, which showed that the range of chloride values protective of AGR and GWR beneficial uses was significantly smaller than originally anticipated.

In 2007, the Regional Board amended the Basin Plan to divide Reach 4 into two separate reaches. This action was based on historical and current water quality, flow, and land use data showing significant water quality differences between the western and eastern portions of Reach 4. Staff found that Reach 4 of the SCR contains unique hydrogeologic conditions due to the significant alterations to land uses and waste discharges within the USCR watershed that supported the separation of the reach into two separate reaches, 4A and 4B, divided at the confluence of Piru Creek.

This proposed action represents the second Regional Board reconsideration of the TMDL, which is scheduled 3-years after the TMDL effective date. Specifically, Tasks 10.a and 10.d of the TMDL Implementation Schedule state, “Preparation and Consideration of a Basin Plan Amendment (BPA) to revise the chloride objective by the Regional Board” and “Reconsideration of and action taken on the Chloride TMDL and Final Wasteload Allocations for the Upper Santa Clara River by the Regional Board.”

2.2. Stakeholder Collaborative Process

Based on the Chloride Agreement and Stipulation discussed in Section 2.1, the Regional Board and the SCVSD entered into a collaborative process in June of 2004 to implement the TMDL special studies. The Regional Board and SCVSD have set up a facilitated process to allow for stakeholder input and review of the special studies as they are developed. The SCVSD, Regional Board, facilitators, consultants and stakeholders attended Technical Working Group meetings on a monthly basis in the Cities of Santa Clarita, Fillmore, and Santa Paula to discuss the TMDL special studies as well as other planning issues regarding chloride impairments within the Santa Clara River. About thirty people who represent a wide range of stakeholder interests, including Municipalities, County government, agricultural interests, water purveyors, and environmental interests, attend the meetings. There is a website, www.santaclarariver.org, which updates activities and progress on the USCR Chloride TMDL.

Additionally, an independent technical advisory panel (TAP) of recognized agricultural experts was engaged to review the results of the LRE. The TAP issued a separate report, which provides technical guidance on the use of the LRE for policy development. The TAP report largely confirmed the results of the LRE. Both the TAP Report and LRE are available to the public on the website listed above.

Finally, Regional Board staff has been meeting with SCVSD' staff and representatives of the Upper Basin Water Purveyers, UWCD, and Ventura County Agricultural Water Quality Coalition, to explore the potential implementation actions and site specific objectives for the TMDL. This process has lead to development of the AWRM and the development of proposed conditional SSOs to support the AWRM and protect beneficial uses.

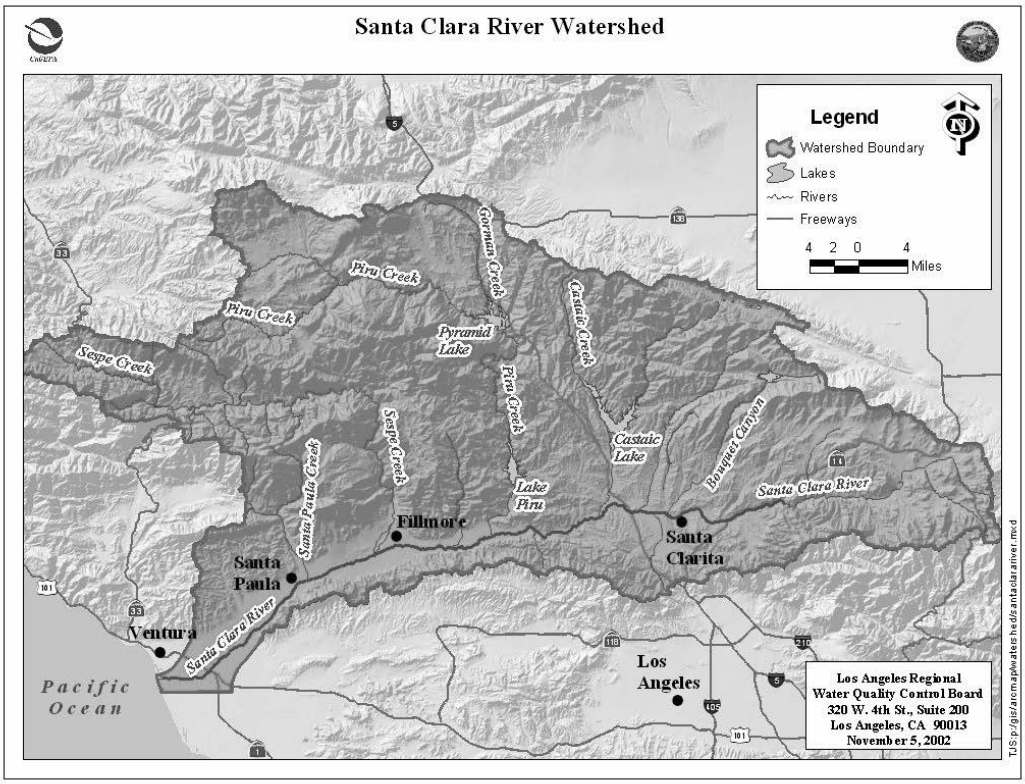
2.3. Environmental Setting

The Santa Clara River is the largest river system in Southern California that remains in a relatively natural state. The river originates on the northern slope of the San Gabriel Mountains in Los Angeles County, traverses Ventura County, and flows into the Pacific Ocean between the cities of San Buenaventura (Ventura) and Oxnard. Municipalities within the watershed include Santa Clarita, Newhall, Fillmore, Santa Paula, and Ventura (Figure 1).

Extensive patches of high quality riparian habitat exist along the length of the river and its tributaries. Two endangered fish, the unarmored stickleback and the steelhead trout, are resident in the river. One of the Santa Clara River's largest tributaries, Sespe Creek, is designated a wild trout stream by the state of California and a wild and scenic river by the United States Forest Service. Piru and Santa Paula Creeks, tributaries to the Santa Clara River, also support steelhead habitat. In addition, the river serves as an important wildlife corridor. The Santa Clara River drains to the Pacific Ocean through a lagoon that supports a large variety of wildlife.

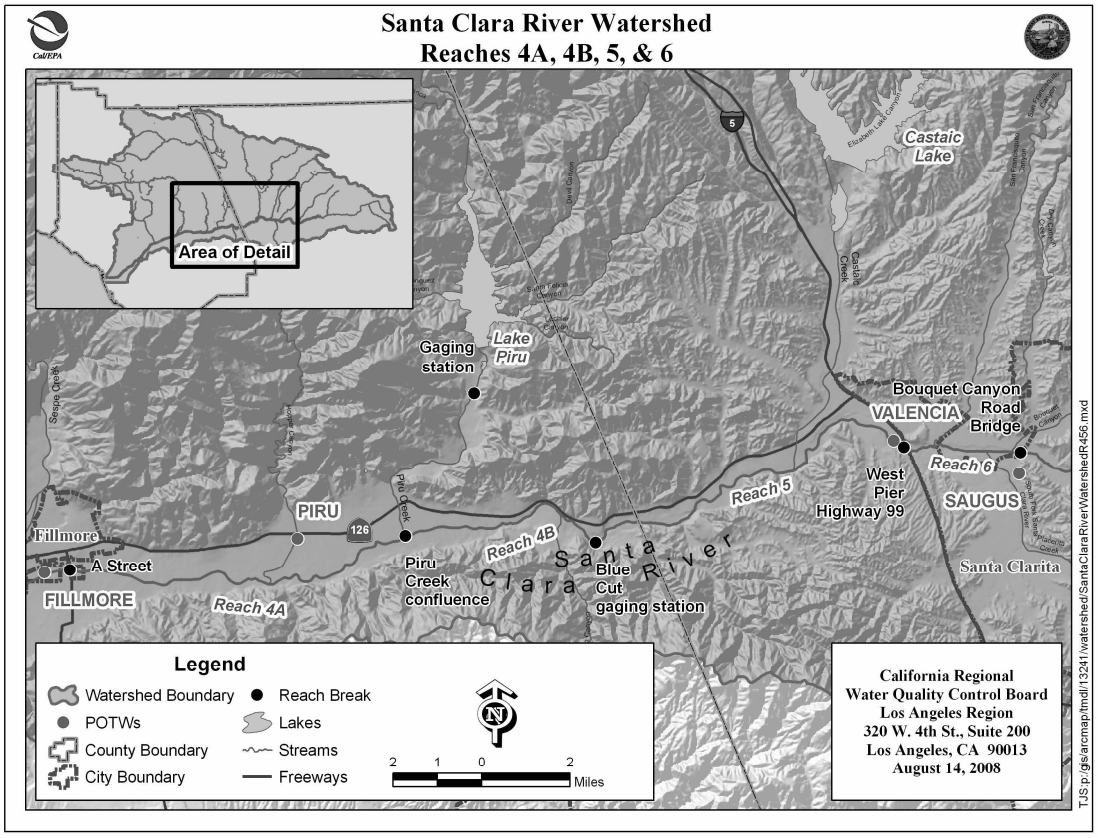
The predominant land uses in the Santa Clara River watershed include agriculture, open space, and residential uses. Revenue from the agricultural industry within the Santa Clara River watershed is estimated at over $700 million annually. Residential use is increasing rapidly both in the upper and lower watershed. The number of housing units in the watershed is estimated to increase by 187 percent from 1997 to 2025.

Figure 1. Santa Clara River Watershed



The upper reaches of the Santa Clara River include Reaches 5 and 6, which are located upstream of the Blue Cut gauging station, west of the Los Angeles - Ventura County line between the Cities of Fillmore and Santa Clarita. The upper boundary extends to Bouquet Canyon, upstream of the City of Santa Clarita. The portion of the river within Los Angeles County is generally described as the Upper Santa Clara River, and the portion within Ventura County is generally referred to as the Lower Santa Clara River. Two major point sources, the Saugus and Valencia WRPs, discharge to the USCR. Below Reach 5 are reaches 4A and 4B, divided at the confluence of Piru Creek (Figure 2).

Figure 2. Santa Clara River Watershed Reaches 4A, 4B, 5, and 6



2.4. Beneficial Uses and WQOs

Key beneficial uses and WQOs for the USCR are described in the Basin Plan and include agricultural supply (AGR), groundwater recharge (GWR) and rare and endangered species habitat (RARE). A full description of each of these beneficial uses is included in the Basin Plan. AGR is designated as existing or potential for all reaches of the Santa Clara River, including the USCR, except the headwaters. GWR is designated as an existing or potential beneficial use for the USCR. RARE is an existing and potential designated beneficial use for the upper reaches included in this TMDL. Two types of endangered and rare aquatic species are known to reside in the watershed: steelhead trout and unarmored three-spine stickleback.

The current WQO for chloride in Reaches 4A, 4B, 5 and 6 of the Santa Clara River is 100 milligrams per liter (mg/L). The groundwater quality objectives for the Santa Clara – Piru Creek area are: 200 mg/L chloride in the Upper area (above Lake Piru), 200 mg/L in the Lower area east of Piru Creek, and 100 mg/L west of Piru Creek.

2.5. Chloride Sources and Water Quality

This section summarizes chloride sources in the USCR watershed and projections of the effects of future growth and chloride reduction measures on the final WRPs effluent quality. Regional Board and SCVSD staff analyzed chloride sources in the USCR watershed in the 2002 Regional Board TMDL Staff Report and in the SCVSD's 2002, 2005, 2006 and 2007 chloride reports. These analyses utilized mass balance techniques to identify and quantify chloride loads from imported water and residential, commercial, and industrial sources.

The key findings from these reports include:

- The average chloride concentration in the USCR, as measured at the Blue Cut gauging station and at the Ventura/Los Angeles county line, was 131 mg/L in 2002 and 126 mg/L in 2003. The average chloride concentration at the Blue Cut gauging station frequently exceeds the WQO of 100 mg/L.

- The total chloride load from the Saugus and Valencia WRPs ranged from 23,500 pounds per day (ppd) to 28,500 ppd in 2001 through 2007.

- The WRP effluent chloride load is comprised of two main sources: chloride present in the imported water supply and chloride added by residents, businesses, and institutions in the Saugus and Valencia WRP service area. The chloride load added by users can be further divided into two parts: brine discharge from self-regenerating water softeners (SRWSs) and all other loads added by users. Excluding the imported chloride load that exists in the water supply, non-SRWS sources of chloride include: residential, commercial, industrial, infiltration, and wastewater disinfection. The two largest sources of chloride in the WRP effluent are the imported water supply and SRWSs, which have historically comprised from 37% to 45% and from 26% to 33% of the chloride in the WRP effluent, respectively.

- Municipal supply in Santa Clarita Valley (SCV) water supply is a blend of State Water Project (SWP) water and local groundwater. Over the past 30 years, chloride concentrations in water from the SWP ranged from 28 mg/L to 128 mg/L. The quantity of SWP water served by SCV water purveyors has increased from 41,768 acre-feet in 2002 to 47,205 acre-feet in 2004. The use of imported water has grown steadily. As reported by the Castaic Lake Water Agency (CLWA), the use of SWP water by SCV water purveyors is projected to grow to 69,500 acre-feet by 2015.

- The chloride loads from SRWSs increased markedly from 1997 to 2003, when a ban on residential SRWSs was struck down by legislative action in 1997. A prospective ban on installation of new SRWSs was reinstated in 2003. The SCVSD reported a sharp decline in residential SRWS chloride contribution from 66 mg/L in 2004 to 35 mg/L during the first half of 2007. This large change in chloride loading represents the removal or inactivation of roughly 2,200 SRWSs, from a high in 2004 of 6,800 to 4,600 by July of 2007.

- In 2006, The SCVSD and the City of Santa Clarita co-sponsored Senate Bill 475 (SB475), which is authored by Senator George Runner of the 17th Senate District. SB 475 provides the SCVSD with the authority to require removal all SRWS remaining in the Santa Clara Valley that were installed prior to SCVSD's 2003 ordinance. SB 475 also includes establishments of a phased voluntary and mandatory program to compensate residents for the reasonable value and cost of removal and disposal of SRWS. SB 475 was passed by the Legislature on August 31, 2006, and signed into law on September 22, 2006. The SCVSD has enacted a new ordinance on June 11, 2008 banning the use of existing SRWS, which will become effective on January 1, 2009, contingent upon voter approval by the qualified voters in the SCVSD's service area. This ordinance will be considered for voter approval by qualified voters in the district's service area in the November 2008 general election.

The relative magnitude of chloride loads from different sources is summarized below:

Table 1. Relative Chloride Loadings to Saugus and Valencia WRPs Effluent by Source

Year	Water Supply	Ind.	Com.	Residential Non-SRWS	Residential SRWS	Inf.	Disinf.	Total Load
2001	42%	3%	4%	14%	33%	0%	4%	100%
2002	45%	2%	3%	13%	29%	0%	8%	100%
2003	45%	1%	3%	13%	31%	0%	7%	100%
2004	41%	1%	3%	14%	33%	0%	8%	100%
2005	37%	2%	3%	16%	30%	3%	9%	100%
2006	42%	2%	3%	18%	26%	0%	9%	100%
2007 (through June)	43%	2%	4%	17%	26%	0%	8%	100%

Note: Ind. indicates Industrial, Com. indicates Commercial, Inf. indicates Infiltration, Disinf. indicates Disinfection

2.6. Future Growth

Presently, there is extensive residential growth planned for the USCR watershed over the next several decades. The population of the SCV is growing very rapidly. The City of Santa Clarita is projected to grow from 151,800 residents in 2000 to 243,104 residents in 2010. The SCVSD estimates effluent flow from wastewater treatment plants will grow from approximately 20 million gallons per day (MGD) presently to about ~~32~~ 34 MGD ~~in~~ by 2027~~30~~. The effects of this growth on the chloride levels in the Santa Clara River and underlying aquifers were investigated through GSWI Study (see Section 3.4).

The Landmark Village project site is located in unincorporated Los Angeles County, within the SCV. The project site is located along the SCR, immediately west of the confluence of Castaic Creek and the SCR. The county line forms the western

boundary. The SCR forms the southern boundary of the project site, while the northern project boundary is defined by State Route 126. The project applicant proposes to develop the 292.6-acre Landmark Village tract map site, located in the first phase of the Riverwood Village within the boundary of the approved Newhall Ranch Specific Plan. The Landmark Village tract map site proposes construction of 1,444 residential dwelling units, 1,033,000 square feet of mixed-use/commercial uses, a 9-acre elementary school, a 16-acre community park, public and private recreational facilities, trails, and road improvements. Several off-site project-related components would also be developed on an additional 679.2 acres of land. The project also includes a 6.8 MGD WRP (Newhall Ranch WRP) as associated facility (Impact Sciences, Inc., 2006).

Projections of future chloride loading to the USCR are dependent on several factors. Most importantly, the chloride contribution from the blended water supply varies greatly according to hydrologic conditions in Northern California because the salinity of SWP is dependent on the mix of fresh and brackish water in the San Francisco Bay – Delta which is the source of the water imported into the SCV. The timing and duration of future droughts are uncertain but based on review of more than thirty years of water quality data it is not unreasonable to conclude that California will experience several droughts within the next few decades.

Staff notes that growth within the SCV is accompanied by increasing demand for imported water and increasing chloride loads. In 1980, imported SWP comprised 1,125 acre-feet, approximately 5% of the total water supply to the SCV. By 1998, imported SWP comprised approximately 20,000 acre-feet, approximately 50% of the total water supply to the SCV.

Additionally, staff notes that the SCVSD's chloride report indicates that that chloride loading from non-SRWS residential sources in terms of ppd has been increasing. This increase is likely correlated with residential growth and increased residential wastewater flow and increased demand on water resources. The chloride load from non-SRWS residential sources increased from 3,562 ppd in 2002 to 4,272 ppd in 2006.

2.7. Salinity Management – Recent State and Regional Boards Actions

Water quality impairments by salts and chloride are a statewide issue. This section provides a brief overview of several current issues addressed by the State Board and the Central Valley, Santa Ana, and Los Angeles Regional Boards. It also reviews the status of salinity implementation activities in Northern California.

In the Central Valley region, salts in surface and ground water are largely derived from supply water from the SWP and the Delta Mendota Canal and from surface soil. Salinity impairments are exacerbated locally by other sources, such as discharges to land associated with municipal wastewater disposal. The Central Valley Regional Board has adopted several approaches for basin management within their jurisdiction. The Central Valley Regional Board established a policy to control groundwater degradation for the Tulare Basin, a policy to promote the maximum export of salt from the San Joaquin River

Basin, and a policy to control point source discharges to the Sacramento River Basin. At this time, salinity TMDL for the San Joaquin River has been developed to meet the objectives at Vernalis and a second phase of this TMDL is being developed for upstream stretches of the river. Further, the State Board may consider whether to adopt Cease and Desist Orders against the United States Bureau of Reclamation (USBR) and the Department of Water Resources with regard to their potential violation of conditions in their water right permits that require the USBR and the California Department of Water Resources to meet salinity standards in the Southern Delta.

In southern California, the USBR led a comprehensive regional salinity management study in support of the Southern California Water Recycling Projects Initiative. The study was conducted by CH2M Hill and identified a range of projected brine discharge volumes for Southern California. Some of the factors influencing this projected range are the salinity of imported water, the stringency of wastewater effluent regulation, and the level of seawater desalting. The study predicted a regional brine discharge volume ranging from 43.7 MGD to 2,011 MGD. In addition to predicting future brine discharge volumes, the study identified the location of existing and potential future brine/concentrate management facilities in southern California. These facilities include 86 pipelines, 113 wastewater treatment plants, 32 groundwater desalters, 9 seawater desalination facilities, and 9 major groundwater basins (with 91 sub-basins).

An established Southern California salinity management facility is the Arlington Desalter Facility and the Santa Ana Regional Interceptor (SARI). The Desalter, using Reverse Osmosis (RO) technology, produces up to 6 MGD of blended desalinized water, with another estimated 1 MGD of concentrated brine generated by the plant discharged to the SARI line. The SARI line, a regional brine line, is designed to convey 30 MGD of non-reclaimable wastewater from the upper Santa Ana River basin to the ocean for disposal, after treatment. The non-reclaimable wastewater consists of Desalter concentrate and industrial wastewater. Domestic wastewater is also received on a temporary basis. To date over 73 miles of the SARI line have been completed. The most recent extension (23 miles in length), the Temescal Valley Regional Interceptor line was completed in 2002. The upstream extension was completed in 1995 to the City of San Bernardino Wastewater Treatment Plant. The SARI also serves the Chino Basin area and the City of Riverside.

Desalinization treatment facilities have been planed in several regions of the state. The Northern California Salinity Coalition is planning RO treatment facilities to draw and treat water with a high salinity concentration from shallow aquifers in order to reduce net salt loading in groundwater basins of the Bay Area. The USBR proposed using RO to treat reused drainage water from an agricultural subsurface drainage system in the San Luis and Northerly Area of the Central Valley. Drainage will be collected from the fields and sent to one of 16 reuse areas to irrigate salt tolerant crops. The drainage from the reuse areas will then be collected and sent to Point Estero for ocean disposal or to a treatment facility.

Staff also notes that within the Region, the City of Los Angeles has implemented a RO facility at the Terminal Island Treatment Plant in order to meet local water quality targets. The facility processes 4.5 MGD and produces potable water for injection to the seawater barrier in the Dominguez Gap. The reverse osmosis effluent meets standards established by the Department of Health Services and is suitable not only for injecting into groundwater basins but also as boiler feed water for local industries.

In 2006, the Los Angeles Regional Board adopted the Calleguas Creek Watershed Salts TMDL based on a salts balance for that watershed. The Regional Board found that the water quality impairments and groundwater degradation in the Calleguas Creek watershed are due to a greater mass of salts imported to the watershed than exported from the watershed. The TMDL requires salt export throughout the watershed to achieve a salt balance, reduce salt load to surface and groundwater, and achieve and maintain water quality objectives for salts in the watershed. The Calleguas Creek watershed TMDL Implementation Plan is based on construction of a regional brine line and ocean outfall through which brines from the advanced treatment of degraded groundwater in the Calleguas Creek watershed are discharged directly to the ocean in compliance with the state Ocean Plan. The TMDL implementation plan also includes increased use of POTW effluent and advanced treated (reverse osmosis) groundwater for recycled water use. This plan has collateral benefits of increasing local sources of water supply in the watershed.

3. Results of TMDL Special Studies

This section describes the results of TMDL Special Studies and other chloride management activities in the USCR watershed, which were considered by staff in proposing TMDL revisions and conditional SSOs for the USCR watershed.

3.1. Literature Review and Evaluation

The first TMDL special study, the LRE, was completed in September 2005 and presented to the Regional Board on November 3, 2005. The LRE reviewed approximately 200 technical articles on the chloride and salinity sensitivities of avocado, strawberry and nursery plants. The LRE found a guideline concentration range for chloride sensitivity for avocado of 100 –117 mg/L. There is not sufficient technical literature to determine a guideline range for strawberry and nursery crops. The LRE concluded that a conservative guideline concentration for chloride hazard is 100-117 mg/L. The LRE was reviewed by an independent TAP and the majority TAP opinion concurred with the 100 –117 mg/L guideline concentration range. One minority TAP opinion advocated a higher guideline concentration and another minority TAP opinion recommended a maximum guideline concentration of 100 mg/L. As a supplement to the LRE, a memorandum on averaging period analysis was prepared by Newfields Agricultural and Environmental Resources (Newfields), in consultation with the TAP co-chairs, to determine what the applicable compliance averaging periods are for the LRE guideline concentration. The memorandum found that the minimum time between the beginning of exposure to chloride stress and signs of visible leaf chloride injury is between 2 and 9 weeks when high chloride concentrations are applied (at least 170 mg/L), and usually between 4 and 8 weeks. Based on an analysis of the literature and the receiving water variability, a three-month averaging period was recommended. (Newfields, 2008)

3.2. Extended Study Alternatives

This task provided an overview of the types of agricultural studies that are available to further define an appropriate threshold for protection of AGR in the Santa Clara River Watershed. The ESA evaluated study options ranging from surveys to field experiments and estimated a period of 2 to 10 years to develop adequate local data to define a site-specific threshold different from the threshold determined by the LRE. The ESA also documented the complexities of determining the effects of chloride on crop productivity under field conditions. Staff finds that the duration of time and the treatments proposed by the ESA might not be sufficient to address all the factors that may affect the chloride threshold level, and, absent a lengthy TMDL schedule extension, might not provide conclusive data to meet the TMDL requirements.

3.3. Endangered Species Protection

This task provided a review of technical literature regarding the chloride sensitivity of several endangered aquatic and riparian species to better understand the potential exposure and tolerance of these species to chlorides in the USCR. Special attention was given to resident species including Unarmored Three-Spine Stickleback, Steelhead Trout, Arroyo Toad, Red-Legged Frog and Cottonwood tree. Evaluation of overall toxicity data indicates that chloride concentrations for acute and chronic toxicity would be fully protective of Threatened and Endangered species in the USCR. Thus, the existing US EPA chronic chloride criteria of 230 mg/L can be considered to be fully protective of local biota. These conclusions indicate that endangered species can tolerate higher levels of chloride than salt-sensitive agricultural crops. The study results were reviewed by an independent TAP with the TAP finding the report supports the conclusion that the existing US EPA criteria are protective of threatened and endangered species in the Santa Clara River.

3.4. Groundwater and Surface Water Interaction Model

The GSWI model study was developed to determine the linkage between surface water and groundwater quality with respect to chloride and total dissolved solids (TDS) in the USCR. The model simulated historical water levels, flows, and concentrations and movement of chloride in surface water and groundwater in the USCR watershed from 1975 through 2005. The calibrated model was reviewed and approved as an appropriate and adequate modeling tool by the stakeholders and an independent GSWI TAP. The model was then used to assess the assimilative capacity of the surface water in Reaches 4, 5 and 6 and the groundwater basins underlying those reaches. The model was also used to determine the gradient of chloride concentrations from the Saugus and Valencia WRP outfalls to downstream receiving water stations and to assess the impacts of WRP effluent on underlying groundwater in the USCR. The model was then used to simulate future potential chloride impacts from 2007 to 2030 based on various combinations of high, intermediate and low reuse of recycled water from the with various levels of advanced treatment or SRWS removal rates. The results of the initial GSWI study are presented in a report entitled “Task 2B-1 Numerical Model Development and Scenario Results” (CH2M Hill, 2008; Geomatrix, 2008a).

Based on the model, none of the alternatives were predicted to comply with the existing chloride WQO of 100 mg/L at all times and at all locations (Table 2).

Table 2. Attainment Frequencies of Compliance Options-Existing Water Quality Objective

Compliance Options	Surface Water at Blue Cut Reach 4B Surface Water WQO 100 mg/L	East Piru Basin Groundwater Reach 4B Surface Water WQO 100 mg/L	East Piru Basin Groundwater Reach 4B Ground-water WQO 200 mg/L	West Piru Basin Groundwater Reach 4A Surface Water WQO 100 mg/L	West Piru Basin Groundwater Reach 4A Ground-water WQO 100 mg/L
Advanced Treatment	66.8	55.0	100.0	100.0	100.0
Minimal Discharge	65.5	62.1	100.0	100.0	100.0
Zero Discharge	63.8	68.3	100.0	100.0	100.0
Alternate WRP Discharge Location	48.9	46.1	100.0	100.0	100.0
AWRM	43.5	56.3	100.0	100.0	100.0

Note: Values represents percentage of days during simulation period that chloride is predicted to be equal to or less than the WQO concentration

Only the advanced treatment scenarios would produce surface water chloride concentrations less than the upper bound of the LRE chloride threshold of 120 mg/L (Table 3).

Table 3. Attainment Frequencies of the Compliance Options-LRE Water Quality Objective

Compliance Options	Surface Water at Blue Cut Reach 4B Surface Water WQO 120 mg/L	East Piru Basin Groundwater Reach 4B Surface Water WQO 120 mg/L	East Piru Basin Groundwater Reach 4B Ground-water WQO 200 mg/L	West Piru Basin Groundwater Reach 4A Surface Water WQO 120 mg/L	West Piru Basin Groundwater Reach 4A Ground-water WQO 100 mg/L
Advanced Treatment	99.0	99.6	100.0	100.0	100.0
Minimal Discharge	87.8	98.8	100.0	100.0	100.0
Zero Discharge	80.7	97.5	100.0	100.0	100.0
Alternate WRP Discharge Location	76.0	80.5	100.0	100.0	100.0
AWRM	88.0	93.0	100.0	100.0	100.0

Note: Values represents percentage of days during simulation period that chloride is predicted to be equal to or less than the WQO concentration

As a result, stakeholders in the USCR developed the AWRM Program, which increases chloride WQOs in certain groundwater basins and reaches of the USCR watershed, decreases the chloride objectives in the eastern Piru Basin, and results in an overall reduction in chloride loading as well as water supply benefits.

3.5. Conceptual Compliance Measures (AWRM)

The GSWI model was used to assess the ability of the AWRM to achieve compliance with proposed conditional SSOs under future water use scenarios within the USCR watershed. The model was based on design capacities at Valencia WRP and Saugus WRP of 27.6 MGD and 6.5 MGD, for a total system design capacity of 34.1 MGD by year 2027. The results of this effort are presented in a report entitled "Task 2B-2 Assessment of Alternatives for Compliance Options Using the Groundwater/Surface Water Interaction Model" (Geomatrix, 2008b). The model predicted that the AWRM could achieve proposed conditional SSOs for chloride under both drought and non-drought conditions (Table 4).

Table 4. Attainment Frequencies of the AWRM Compliance Option for Revised WQO

Compliance Options	Reach 4B (at Blue Cut) Surface Water WQO 117 mg/L	Surface Water WQO 130 mg/L	Ground-water WQO 150 mg/L	Reach 5 Surface Water WQO 150 mg/L	Ground-water WQO 150 mg/L	Reach 6 Surface Water WQO 150 mg/L	Ground-water WQO 150 mg/L
AWRM Alternative	99.9	99.2	100.0	98.3-99.7	100.0	98.6-99.7	100.0

Note: Values represents percentage of days during simulation period that chloride is predicted to be equal to or less than the WQO concentration

3.6. Site Specific Objectives and Antidegradation Analysis

The Site Specific Objectives and Antidegradation analysis has been completed and is included in a report entitled "Task 7 and 8 Report Site Specific Objective and Antidegradation Analysis" prepared by Larry Walker Associates (LWA). This report also presents the costs associated with the AWRM compliance alternatives identified in the GSWI reports. The report found that adoption of proposed conditional SSOs, when implemented with the AWRM Program, would be consistent with the state and federal antidegradation policies. The results of the SSO/Antidegradation analysis are discussed further in Sections 6 and 7.

4. Alternative Water Resources Management Program

The AWRM Program is a result of joint efforts of the Upper Basin Water Purveyors[2], Ventura County agricultural and water interests[3], and the SCVSD to find a regional watershed solution for compliance with the TMDL that benefits parties in both Los Angeles and Ventura Counties. The AWRM Program, which is described in detail in the GSWI Task 2B-2 Report (Geomatrix, 2008b), consists of advanced treatment for a portion of the recycled water from the SCVSD's Valencia WRP, constructing a well field in the eastern Piru basin to pump out higher chloride groundwater, discharging the blended pumped groundwater and advanced treated recycled water to Reach 4A at the western end of the Piru basin at a chloride concentration not to exceed 95 mg/L (Reach 4A WQO is 100 mg/L), and providing supplemental water and advanced treated recycled water to the river.

The objectives of the AWRM program are to lower chloride concentrations crossing the County Line, comply with conditional SSOs, protect agricultural water users in the eastern Piru basin, mitigate high-chloride groundwater in the eastern Piru basin, and maximize water resources in Ventura County. The key elements of the AWRM Program focus on reducing chloride in the water reclamation plant effluent through:

- SRWS removal
- Conversion of treated wastewater disinfection from chlorine injection to ultra-violet light disinfection
- Construction of 3 MGD microfiltration-reverse osmosis (MF/RO) facility at the Valencia WRP
- Brine disposal via deep well injection
- Groundwater extraction from the Piru Basin
- Discharges of blended MF/RO water and extracted groundwater in Reaches 4A and 4B

These facilities would typically be operated in two modes depending on the SCVSD's ability to comply with applicable water quality objectives, which is correlated to ~~the~~ chloride concentrations in the State Water Project (SWP) supply water (Figure 3~~2~~). During typical hydrologic cycles, when the supply water concentration is below 80 mg/l, the SCVSD WRPs would be able to comply with applicable water quality objectives a majority of the time without having to discharge ~~the~~ RO permeate produced at the Valencia WRP to the Santa Clara River. Under these conditions, the RO permeate

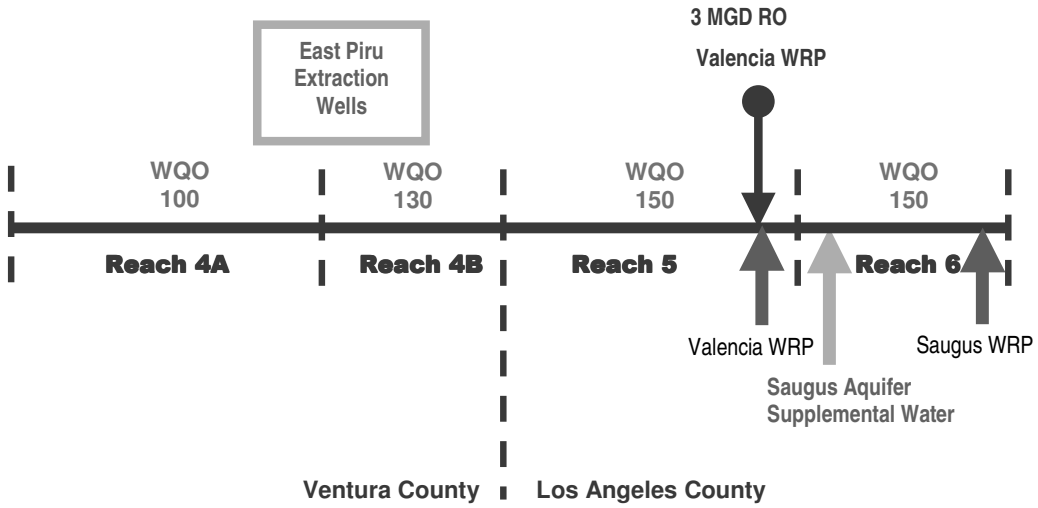
[2] The Upper Basin Water Purveyors are the Castaic Lake Water Agency, Valencia Water Company, Newhall County Water District, Los Angeles County Water Works District No. 36, and the Santa Clarita Water Division of the Castaic Lake Water Agency

[3] Represented by Ventura County Agricultural Water Quality Coalition (VCAWQC) and UWCD

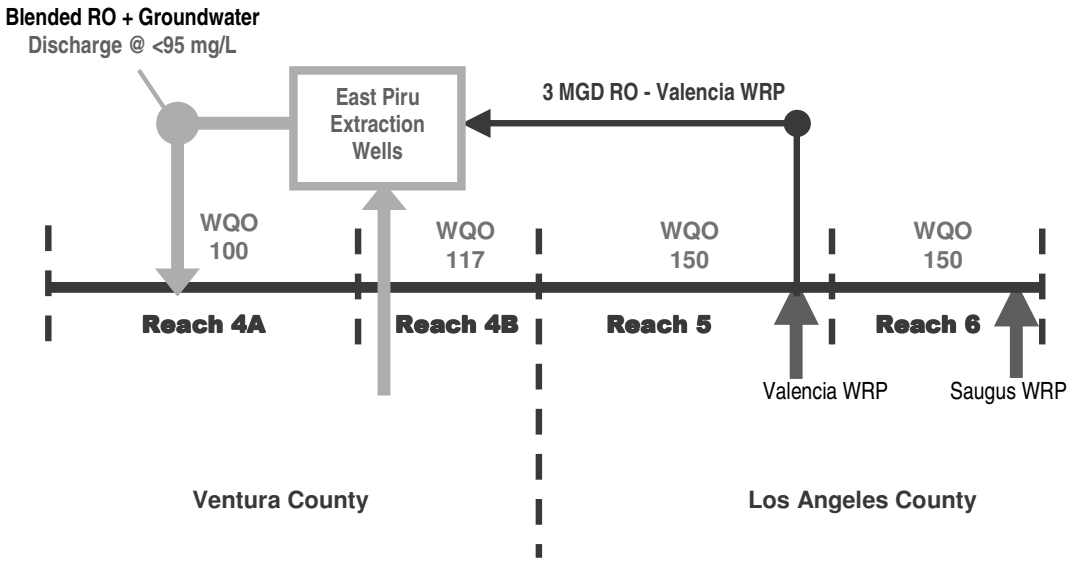
cwould be delivered to the extraction wells, blended with pumped groundwater, and discharged to Reach 4A for Ventura County water supply benefit. This option provides further water quality benefits for Ventura County because increased flows can mitigate sea water intrusion to the Oxnard Plain. During periods when the supply water concentration is above 80 mg/l, is typically when most, if not all of the RO permeate will be need to be discharged directly to 4B the Santa Clara River to comply with applicable water quality objectives. In addition some supplemental water would also be discharged as necessary to the Santa Clara River to reduce chloride concentrations in Reach 4B and comply with applicable water quality objectives.

Figure 32. Schematic of AWRM Facilities

Typical AWRM facility operation to comply with WQOs, when SWP > 80 mg/L



Typical AWRM facility operation to comply with WQOs, when SWP < 80 mg/L



Stakeholders have agreed upon the primary objectives for the uses of RO permeate from the MF/RO facility at the Valencia WRP. The primary objectives are prioritized as follows:

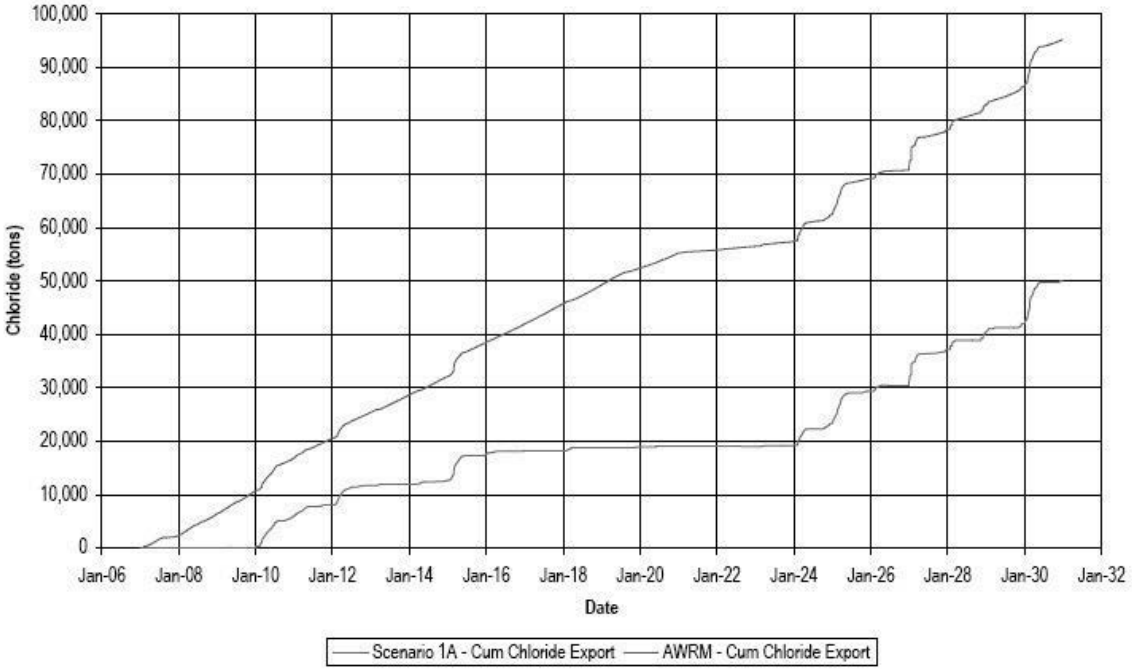
1) Compliance with conditional SSOs in the Santa Clara River at the County Line.
2) Provide alternative water supply to Camulos Ranch.
3) Achieve salt-balance in East Piru groundwater basin for past loading from surface water greater than 117 mg/L.
4) Achieve salt-balance in East Piru groundwater basin for any future loading from surface water greater than 117 mg/L.

The effects of the AWRM on surface water and groundwater have been evaluated using several tools. For Reaches 4B, 5, and 6 and the Piru basin, the primary tool was the GSWI model. Using the GSWI model, the AWRM has been shown to provide multiple water resource benefits, including:

- Increased flows in reaches 4A and downstream reaches of the USCR
- Improvement of groundwater quality in the Eastern Piru Basin
- Increased availability of irrigation and barrier water

The results of the GSWI model were used to calculate a mass balance to compare the predicted amount of salt exported under the AWRM compliance option with the predicted amount of salt exported under other compliance options to demonstrate the benefits to the East Piru Basin under the AWRM. Figure 4~~3~~ illustrates the cumulative salt export capabilities of the AWRM compliance option compared with the salt export capabilities of a maximum advanced treatment compliance option to meet the 100 mg/L chloride WQO (Scenario 1A).

Figure 4~~3~~. Cumulative Chloride Mass Export from East Piru Groundwater Basin: AWRM Option vs. Advanced Treatment Option (Scenario 1A)



Additionally, a study was prepared analyzing the effects of the AWRM Program in Ventura County (Bachman, 2008). The report found that the lowering of chloride concentrations in Reach 4B results in improved quality of water recharged to the East Piru Basin. Additionally, high chloride water that is pumped from the basin is recharged by lower chloride water during wet years. Using output from the GSWI model, UWCD's routing and percolation model was used to predict increased yield at the Freeman Diversion from implementation of the AWRM Program. The difference in yield at the Freeman Diversion between the Minimum Discharge option and the AWRM option is 11,500 AFY, which is approximately double the increased yield of 6,000 AFY when the permanent Freeman Diversion was constructed. This could result in a significant decrease in saline intrusion in the Oxnard Plain.

4.1. Conditional Site Specific Objectives to Support AWRM

The AWRM compliance option provides greater benefits than other potential scenarios and compliance options that have been identified. However, it will not result in compliance with the 100 mg/L water quality objectives at all times and in all locations for Reaches 4B, 5 and 6 of the USCR. Given the benefits of chloride reduction and protectiveness of the AWRM compliance option and in the context of achieving a salt balance for the watershed and protecting beneficial uses, staff proposes conditional SSOs that support the AWRM, while still being protective of beneficial uses (see Sections 5 and 6). Conditional SSOs for surface water and groundwater are presented in Tables 5 and 6. These conditional SSOs shall apply and supersede the existing regional water quality objectives of 100 mg/L only when chloride load reductions and/or chloride export

projects are in operation by the SCVSD according to the implementation provisions in Section 8 of the staff report.

Table 5. Conditional SSOs for Surface Water to Support AWRM Program

Reach	Current Instantaneous Chloride Objective (mg/L)	Conditional Chloride SSO (mg/L)[a]	Averaging Period
6	100	150	12-month~~Annual~~
5	100	150	12-month~~Annual~~
4B	100	117	3-month
4B Critical Conditions	100	130[b]	3-month[c]

a. The conditional SSOs for chloride in the surface water of Reaches 4B, 5, and 6 shall apply and supersede the existing regional water quality objectives of 100 mg/L only when chloride load reductions and/or chloride export projects are in operation by SCVSD according to the implementation provisions in Section 8.

b. The conditional SSO for Reach 4B under critical condition applies, only if the following conditions and implementation requirements are met:

1. Water supply concentrations measured in Castaic Lake are ≥ 80 mg/L.
2. Salt-sensitive agricultural uses that are irrigated with surface water are provided supplemental water during periods when Reach 4B surface water exceeds 117 mg/L.
3. ~~Beginning~~ By May 4, 2020~~16~~, the 10-year cumulative net chloride loading above 117 mg/L ($CNCl_{117}$)[i] to Reach 4B of the SCR, calculated annually, from the SCVSD Water Reclamation Plants (WRPs) ~~is~~ shall be zero or less~~, where:~~.

[i] $CNCl_{117} = Cl_{(Above\ 117)} - Cl_{(Below\ 117)} - Cl_{(Export\ Ews)}$

Where:

$Cl_{(Above\ 117)}$ = [WRP Cl Load[1]/Reach 4B Cl Load[2]] * [Reach 4B Cl $Load_{>117}$[3]]

$Cl_{(Below\ 117)}$ = [WRP Cl Load[1]/Reach 4B Cl Load[2]] * [Reach 4B Cl $Load_{\leq 117}$[4]]

$Cl_{(Export\ EWs)}$ = Cl Load Removed by Extraction Wells

[1] WRP Cl Load is determined as the monthly average Cl concentration multiplied by the monthly average flow measured at the Valencia WRP.

[2] Reach 4B Cl Load is determined as the monthly average Cl concentration at SCVSD Receiving Water Station RF multiplied by the monthly average flow measured at USGS Gauging Station 11109000 (Las Brisas Bridge).

[3] Reach 4B Cl $Load_{>117}$ means the calculated Cl load to Reach 4B when monthly average Cl concentration is above 117 mg/L.

[4] Reach 4B Cl $Load_{<=117}$ means the calculated Cl load to Reach 4B when monthly average Cl concentration is below or equal to 117 mg/L.

4. The chief engineer of the SCVSD signs under penalty of perjury and submits to the Los Angeles Regional Water Quality Control Board (Regional Board) a letter documenting the fulfillment of conditions 1, 2, and 3.

c. The averaging period for the critical condition SSO may be reconsidered based on results of chloride trend monitoring after the alternative water resources management (AWRM) system is applied.

The conditional SSOs for chloride in Reach 4B are applied as 3 month rolling averages because there is salt-sensitive agriculture in the area of Reach 4B and the LRE supplemental study recommended a three-month averaging period for salt-sensitive crops (Newfields, 2008). The conditional SSOs for chloride in Reaches 5 and 6 are applied as 12-month~~annual~~ rolling averages since agriculture in these reaches is identified as non-salt sensitive. ~~Annual~~ Twelve-month averaging periods have been used historically in the Los Angeles Region and throughout California for salts objectives, and an 12-month~~annual~~ average would protect the groundwater recharge and non-salt sensitive agricultural beneficial uses in Reaches 5 and 6 (LWA, 2008).

Table 6. Conditional SSOs for Groundwater to Support AWRM Program

Constituent		Santa Clara--Bouquet & San Francisquito Canyons		Castaic Valley		Lower area east of Piru Creek[1]	
		Conditional SSO (mg/L)	Current Objective (mg/L)	Conditional SSO (mg/L)	Current Objective (mg/L)	Conditional SSO (mg/L)	Current Objective (mg/L)
	Chloride	150	100	150	150	150	200
Averaging period		~~Annual~~12-month	None	12-month	None	~~Annual~~ 12-month	None

[1] Applies only to San Pedro formation. Existing objective of 200 mg/L applies to shallow alluvium layer above San Pedro formation.

The conditional SSOs for chloride in groundwater in Santa Clara-Bouquet & San Francisquito Canyons, Castaic Valley, and the lower area east of Piru Creek (San Pedro formation) shall apply and supersede the existing regional water quality objectives ~~of 100 mg/L~~ only when chloride load reductions and/or chloride export projects are in operation by the SCVSD according to the implementation provisions in Section 8 of the staff report.

4.2. Conditional Wasteload Allocations to Support AWRM

The conditional WLAs for chloride for all point sources shall apply only when chloride load reductions and/or chloride export projects are in operation by the SCVSD according to the implementation provisions in Section 8 of the staff report. If these conditions are not met, WLAs are based on existing water quality objectives for chloride of 100mg/L.

Discharges to Reach 4B by the Saugus and Valencia WRPs will receive the concentration-based conditional wasteload allocations for chloride presented in Table 7.

Table 7. Conditional Reach 4B Wasteload Allocations for chloride for Saugus and Valencia WRPs

Reach	Conditional Chloride SSO (mg/L)[a]	~~Averaging Period~~
4B	117 (3-month Average), 230 (Daily Maximum)	~~3-month~~
4B Critical Conditions	130[a] (3-month Average[b]), 230 (Daily Maximum)	~~3-month~~[b]

a. The Conditional WLA under critical conditions shall apply~~ies~~ only if the following conditions and implementation requirements are met:
   1. Water supply concentrations measured in Castaic Lake are ≥ 80 mg/L.
   2. Salt-sensitive agricultural uses that are irrigated with surface water are provided supplemental water during periods when Reach 4B surface water exceeds 117 mg/L.
   3. ~~Beginning~~ By May 4, ~~2016~~2020, the 10-year cumulative net chloride loading above 117 mg/L ($CNCl_{117}$)[i] to Reach 4B of the SCR, calculated annually, from the Saugus and Valencia WRPs ~~is~~ shall be zero or less~~, where:~~.

[i] $CNCl_{117} = Cl_{(Above\ 117)} - Cl_{(Below\ 117)} - Cl_{(Export\ Ews)}$

Where:

$Cl_{(Above\ 117)}$ = ([WRP Cl Load[1]/Reach 4B Cl Load[2]] * [Reach 4B Cl $Load_{>117}$[3]])
$Cl_{(Below\ 117)}$ = ([WRP Cl Load[1]/Reach 4B Cl Load[2]] * [Reach 4B Cl $Load_{\leq 117}$[4]])
$Cl_{(Export\ EWs)}$ = [Cl Load Removed by Extraction Wells]

[1] WRP Cl Load is determined as the as the monthly average Cl concentration multiplied by the monthly average flow measured at the Valencia WRP.
[2] Reach 4B Cl Load is determined as the monthly average Cl concentration at SCVSD Receiving Water Station RF multiplied by the monthly average flow measured at USGS Gauging Station 11109000 (Las Brisas Bridge).
[3] Reach 4B Cl $Load_{>117}$ means the calculated Cl load to Reach 4B when monthly average Cl concentration is above 117 mg/L.

[4] Reach 4B Cl Load$_{\leq 117}$ means the calculated Cl load to Reach 4B when monthly average Cl concentration is below or equal to 117 mg/L.

4. The chief engineer of the SCVSD signs under penalty of perjury and submits to the Regional Board a letter documenting the fulfillment of conditions 1, 2, and 3.

b. The averaging period for the critical condition WLA may be reconsidered based on results of chloride trend monitoring after the AWRM system is applied.

Beginning May 4, 2015, discharges to Reaches 5 and 6 by the Saugus and Valencia WRPs, will have conditional concentration-based and mass-based WLAs for chloride based on conditional SSOs (Table 8).

Table 8. Conditional WLAs for Saugus and Valencia WRPs

WRP	Concentration-based Conditional WLA for Chloride ~~(12-month Average)~~	Mass-based Conditional WLA for Chloride (12-month Average)
Saugus	150 mg/L (12-month Average), 230 (Daily Maximum)	Q_{Design}*150 mg/L*8.34
Valencia	150 mg/L (12-month Average), 230 (Daily Maximum)	Q_{Design}*150 mg/L*8.34 – AF_{RO}

AF_{RO} is the chloride mass loading adjustment factor for operation of RO facilities, where:

If RO facilities are operated at ≥ 50% ~~rated capacity~~Capacity Factor[a] in preceding 12 months

$$AF_{RO} = 0$$

If RO facilities are operated at < 50% Capacity Factor~~rated capacity~~[b] in preceding 12 months

$$AF_{RO} = (50\% \text{ Capacity Factor } \sout{\text{rated capacity}} - \%\text{RO Capacity}) * ChlorideLoadRO^{c}$$

[a] ~~Rated capacity~~Capacity Factor is based on 3 MGD of recycled water treated with RO, 90% of the time.

[b] If operation of RO facilities at <50% ~~rated~~ capacity factor is the result of conditions that are outside the control of SCVSD, then under the discretion of the Executive Officer of the Regional Board, the AF_{RO} may be set to 0.

[c] Chloride load reduction is based on operation of a ~~3 MGD~~ RO treatment plant treating 3 MGD of recycled water with chloride concentration of 50 mg/L + Water Supply Chloride. Assumes operational capacity factor of 90% and RO

membrane chloride rejection rate of 95%. Determination of chloride load based on the following:

$$ChlorideLoadRO = 90\% \times [(Q_{RO} \times C_{WRP} \times 8.34) \times r] \times \left(30 Days / Month \right)$$

where:

Q_{RO} = ~~RO Treatment Flow in MGD (~~3 MGD of recycled water treated with RO~~)~~
C_{WRP} = Chloride Concentration in State Water Project + 50 mg/L
r = % RO chloride rejection (95% or 0.95)
8.34 = Conversion factor (ppd/(mg/L*MGD))

The GSWI model accounted for existing major and minor NPDES dischargers located within the model boundaries. The future modeling scenarios were based on:

- Projected flow for the Saugus and Valencia WRPs and chloride concentrations equal to conditional WLAs,
- projected flow for the Newhall WRP and a chloride concentration of 100 mg/L, and
- existing flow and chloride concentrations for the other major and minor NPDES dischargers.

The affect of assigning conditional WLAs to the Newhall WRP and the other major and minor NPDES discharges on net chloride loading was not modeled. Therefore, other major NPDES dischargers (as defined in Table 4-1 of the Basin Plan), including Newhall WRP, receive WLAs equal to 100 mg/L. The Newhall Ranch WRP already has a permit limit of 100 mg/L for chloride in Order No. R4-2007-0046 based on the current WQO. The Regional Board may consider assigning conditional WLAs for other major NPDES dischargers, including Newhall WRP, based on an analysis of the downstream increase in net chloride loading to surface water and groundwater as a result of implementation of conditional WLAs. The Regional Board may require chloride mass removal quantity that is proportional to mass based chloride removal required for the Valencia WRP in order to receive conditional WLAs.

Other minor NPDES dischargers (as defined in Table 4-1 of the Basin Plan) receive conditional WLAs. Minor discharges receive conditional WLAs without the additional analysis because, based on their flows, the impact of minor discharges is negligible compared to the WRPs.

~~Other NPDES discharges contribute a minor chloride load.~~ The conditional WLAs for minor~~these~~ point sources are presented in Table 9.

Table 9. Conditional WLAs for Minor~~Other~~ NPDES Discharges

Reach	Concentration-based Conditional WLA for Chloride (mg/L)	~~Averaging Period~~
6	150 (12-month Average), 230 (Daily Maximum)	~~Annual~~
5	150 (12-month Average), 230 (Daily Maximum)	~~Annual~~
4B	117 (3-month Average), 230 (Daily Maximum)	~~3-month~~

The WLA of 230 mg/L for daily maximum for chloride is to protect threatened and endangered species. The Endangered Species Protection study indicates that the existing US EPA chronic chloride criteria of 230 mg/L can be considered to be fully protective of local biota.

The final WLAs for TDS and sulfate are equal to existing surface water and groundwater quality objectives for TDS and sulfate in Tables 3-8 and 3-10 of the Basin Plan. The Regional Board may revise the final WLAs based on review of trend monitoring data as detailed in the monitoring section (Section 8.7) of this staff report.

4.3. Conditional Load Allocations to Support AWRM

The source analysis indicates nonpoint sources are not a major source of chloride. The conditional load allocations (LAs) for nonpoint sources are presented in Table 10.

Table 10. Conditional LAs for Nonpoint Sources

Reach	Concentration-based Conditional LA for Chloride (mg/L)	~~Averaging Period~~
6	150 (12-month Average), 230 (Daily Maximum)	~~Annual~~
5	150 (12-month Average), 230 (Daily Maximum)	~~Annual~~
4B	117 (3-month Average), 230 (Daily Maximum)	~~3-month~~

The conditional LAs shall apply only when chloride load reductions and/or chloride export projects are in operation by the SCVSD according to the implementation

provisions in Section 8 of the Staff Report. If these conditions are not met, LAs are based on existing water quality objectives of 100 mg/L.

The LA of 230 mg/L for daily maximum for chloride is to protect threatened and endangered species. The Endangered Species Protection study indicates that the existing US EPA chronic chloride criteria of 230 mg/L can be considered to be fully protective of local biota.

5. Water Code Section 13241 Analysis

In setting site specific objectives, Porter-Cologne section 13241 requires consideration of six factors relating to beneficial uses, economics, the environmental setting, water quality that can be reasonably attained, housing and the need for recycled water. Further, because some of these site specific objectives are greater than the existing water quality objectives, state and federal antidegradation provisions must be considered. These considerations were provided in the Task 7 and 8 Report (LWA, 2008) and are summarized below. Because the agricultural beneficial use of water has been determined to be the most sensitive use under the chloride TMDL, the 13241 analysis focused on salt sensitive agricultural uses. Based on an analysis of the Task 7 and 8 Report, staff concludes that the conditional SSOs, when implemented with the AWRM Program, will support beneficial uses and is in the best interests of the people of California.

5.1. Past, present, and probable future beneficial uses of water

Probable future beneficial uses of the surface waters in Reaches 4, 5, and 6 are likely to remain consistent with past and present uses with the exception of agriculture supply. Agricultural uses in Reaches 5 and 6 will likely decline over time due to increasing urbanization. Agricultural uses in Reaches 4A and 4B will likely remain constant.

The proposed conditional SSOs of 150 mg/L for surface and groundwater within Reaches 5 and 6 are protective of the AGR beneficial use because these waters are not currently and have not historically been used as an irrigation supply for salt-sensitive crops. Newhall Land and Farm is the only landowner with existing agricultural operations that could potentially be impacted by groundwater-surface water interactions within Reach 5 of the Santa Clara River. Newhall has not historically and does not plan in the future to cultivate salt-sensitive crops in Reaches 5 or 6 because of adverse climatic conditions. A number of commercial and wholesale nurseries are located in the Santa Clarita Valley along the Castaic Creek and South Fork tributaries and east of Reach 6, but these nurseries are not likely impacted by surface flows from the Santa Clara River. This situation is unlikely to change due to climatic conditions that impact the ability to grow salt sensitive crops and because the use of irrigation water for crops is anticipated to decline in Reaches 5 and 6 due to planned urban development.

When implemented with the AWRM compliance option, the proposed conditional SSOs of 117 mg/L during normal conditions and 130 mg/L during drought conditions in Reach 4B and the underlying groundwater will protect agricultural uses in the area. Local growers in this area irrigate crops primarily with groundwater from local aquifers fed by releases from Lake Piru and the Santa Clara River, as well as surface diversions from the Santa Clara River. Agricultural supply water originating from Lake Piru are unaffected by chloride levels in the Santa Clara River because Lake Piru is fed with State Water Project water and local runoff. Camulos Ranch is the only known avocado grower that irrigates crops using water originating from Reach 4B waters. The proposed

conditional SSOs in Reach 4B and the underlying groundwater are fully protective of agricultural uses in this area based on the result of the LRE for salt-sensitive crops (a 117 mg/L chloride threshold value) and supplemental water supply to Camulos during drought conditions.

5.2. Environmental characteristics

The environmental setting of the proposed conditional SSOs and TMDL conditional WLA revisions is presented in Section 2.3. The proposed conditional SSOs and TMDL revisions will impact reaches 4B, 5, and 6 of the Santa Clara River and the groundwater basins underlying those reaches. The proposed conditional SSOs, when implemented with the AWRM Program, will ensure protection of beneficial uses considering the environmental characteristics of and the water quality available to the USCR.

Surface flows in the USCR correspond to seasonal precipitation within the region. Portions of the river are perennial, but various reaches are ephemeral and intermittent and flow only during significant storm events. Base flow in the USCR is comprised of surfacing groundwater, discharges from the Saugus and Valencia WRPs, conservation releases of imported and local waters from reservoirs, and agricultural and urban runoff. Base flow in Reach 6 is largely dependent on discharges from the Saugus WRP. Base flows in Reaches 5 and 4B are dependent on Saugus and Valencia WRP discharges as well as rising ground water. Further downstream, in Reach 4A between the confluence at Piru Creek and Las Brisas, surface flow is typically present only during parts of the wet season, which varies by water year. This “dry gap” seasonally separates the upper Santa Clara River hydrologically from the lower river, which, during normal or below normal water years, impedes inter-reach migration and movement of aquatic life. The Vern Freeman Diversion, at the bottom of Reach 3, diverts up to 375 cubic feet per second (cfs) from the Santa Clara River to the El Rio and Saticoy spreading grounds, where the water recharges the underground aquifers and is distributed for agricultural irrigation.

The largest source of chloride to the Upper Santa Clara River is the water supply (see Section 2.5). Dry and critically dry periods affecting the Sacramento and San Joaquin River Valleys reduce fresh-water flow into the Sacramento-San Joaquin Delta and result in higher than normal chloride concentrations in the SWP supply within the California aqueduct system. Typically, water pumped through the Sacramento-San Joaquin Delta takes approximately 1 to 2 years to show up as deliverable SWP water sold by the Santa Clarita Valley wholesaler, CLWA, to local retail water purveyors, due to reservoir storage and turnover time. Salinity fluctuations in the SWP are reflected in both the imported water treated and delivered by the CLWA and the WRP effluent quality. The quality of the SWP water can be high enough to cause or contribute to exceedances of the current water quality objective.

The proposed conditional SSOs are more stringent than historical effluent limitations for the Saugus and Valencia WRPs and would result in improved water quality over existing conditions. In addition, the proposed conditional SSOs are below

the USEPA aquatic life chloride criteria, which according to the TES Study are protective of the most chloride-sensitive organisms for which data are available. Therefore, it is not expected that the proposed conditional SSOs will harm in-stream or riparian species or habitat.

5.3. Water quality conditions that could reasonably be achieved

A detailed discussion of the compliance options and water quality that can be achieved through different approaches to compliance is presented in the Task 2B-1 and Task 2B-2 Reports (Geomatrix, 2008a, CH2MHill 2008, and Geomatrix 2008b). As discussed in Section 5, the AWRM compliance strategy will result in compliance with the proposed conditional SSOs. Other compliance measures, such as large scale advanced treatment facilities, could achieve 100 mg/L in Reaches 5 and 6, but would not meet 100 mg/L during all times in Reach 4B. Given the technical constraints on large scale advanced treatment facilities and the environmental and water resource benefits of the AWRM, staff recommends the adoption of conditional SSOs. Implementation of the AWRM will protect beneficial uses, improve the water quality in the Eastern Piru groundwater basin through export of salts, and result in an overall salt balance in the watershed.

5.4. Economic Considerations

Costs of complying with the existing WQOs were compared with costs of complying with conditional SSOs, including with facility upgrades to the Saugus and Valencia WRPs and other AWRM actions and summarized below.

5.4.1 Compliance with existing WQOs

The costs of two advanced treatment alternatives were analyzed for compliance with existing WQOs. One alternative involves constructing a 3.6 MGD MF/RO facility at the Saugus and WRP and a 15.4 MF/RO facility at the Valencia WRP, so that the entire discharge at each plant meets 100 mg/L in all conditions. This alternative would require brine waste disposal through a pipeline and ocean outfall. A second alternative involves reducing the amount of discharge from each WRP, so that only the minimum amount of discharge necessary to maintain habitat complies with 100 mg/L under all conditions. In this alternative, approximately 6 MGD would be treated with MF/RO at both plants and the remaining balance of effluent would be disposed to a pipeline to the ocean. The estimated capital and operation and maintenance (O&M) costs for these treatment alternatives are in Table 11.

Table 11: Costs for Advanced Treatment to Comply with Existing Objectives

Facility	Capital Cost	Annual O&M
Maximum Advanced Treatment	$118,000,000	$~~8,7~~9,00,000
Brine Disposal	$230,000,000	$7~~5~~00,000
Total Maximum Advanced Treatment and Brine Disposal	**348,000,000**	**$9, 7~~2~~00,000**
Minimum Advanced Treatment	$~~49~~52,000,000	$4, 4~~2~~00,000
Ocean Discharge	$419,000,000	500,000
Total Minimum Advanced Treatment and Ocean Discharge	**$~~468~~471,000,000**	**$4, 9~~7~~00,000**

Assuming an interest rate of 5.5% and a period of 20 years, the combined present worth of the estimated Capital and O&M Costs for compliance by providing maximum advanced treatment and brine disposal is approximately $~~460~~ 470 Million and by providing minimum advanced treatment and ocean discharge is $~~524~~ 530 Million. Therefore, the range of costs for facilities required to comply with the existing water quality objectives is between $47~~6~~0 Million and $~~524~~ 530 Million.

5.4.2 Compliance with Conditional SSOs

Cost estimates were prepared for the various elements of the AWRM Program (Table 12). The costs of source control measures are based on SRWS removal and conversion of bleach-based disinfection processes at the WRPs to UV disinfection facilities. The AWRM program also includes construction and operation of a 3-MGD MF/RO facility at the Valencia WRP and brine waste disposal through deep well injection technology. During periods of extreme drought and prior to construction and operation of the MF/RO facility, the AWRM Program includes supplemental water from local water purveyors to reduce chloride levels in the surface water in Reach 4B. Costs for this element were estimated based on a need for approximately 30,000 acre-feet of supplemental water at an assumed cost of approximately $1,000 per acre-feet (based on discussions with local water purveyors) as well as infrastructure for conveyance of the supplemental water at a cost of approximately $7.5 Million. Finally, the costs of water supply facilities needed to achieve salt export from the Piru groundwater basin and blend groundwater with RO permeate include the costs of 10 groundwater extraction wells, a 12-mile RO permeate conveyance pipeline, and a 6-mile blended water supply pipeline.

Table 12. Costs for AWRM Program

AWRM Element	Capital Cost	Present Worth O&M	TOTAL
Source Control Measures	$185,590,000	$6,000,000	$241,950,000
Advanced Treatment and Brine Disposal	$78,400,000	$44,200,000	$122,600,000
Supplemental Water	$37,500,000	N/A	$37,500,000
Ventura Water Supply Facilities	$70,100,000	$3,600,000	$73,700,000
TOTAL AWRM Program	**$2041,1900,000**	**$53,8600,000**	**$2584,700,000**

Note: All costs are as of September 2007

Assuming an interest rate of 5.5% and a period of 20 years, the combined present worth of the Capital and O&M cost for the AWRM facilities required to comply with the proposed site-specific objectives is estimated at approximately $2595 Million.

Amortizing the total costs at 5.5% per year for 20 years yields an annual cost estimate of $36.4005 per month per connection for maximum advanced treatment and brine disposal, $41.5507 for minimum advanced treatment and ocean discharge, and $20.3019.96 for the AWRM. Amortizing the total costs at 5.5% per year for 30 years yields an annual cost estimate of $29.6331.54 per month per connection for maximum advanced treatment and brine disposal, $34.9733.76 for minimum advanced treatment and ocean discharge, and $176.431 for AWRM. This rate analysis does not include additional costs related to procurement of bonds, provision for rate ramp-up periods, nor actual increased costs of project implementation that can occur in the field (e.g., construction change orders, increased cost of materials, and increased cost of construction).

Regional Board staff also reviewed the State Board report, Wastewater User Charge Survey Report F.Y. 2007-2008. This report is prepared annually by the State Board and summarizes and analyzes cost data from a survey of California wastewater agencies. The report shows that the monthly user charge for the City of Santa Clarita was $16.29 per month. The report also shows the statewide monthly service charge average is $33.82 per month and the median is $26.83 per month, with a high of $231.92. For Los Angeles County, the monthly service charge average is $23.90 per month and the median is $12.28 per month. For Ventura County, the monthly service charge average is $38.47 per month and the median is $35.35 per month. The rate will likely increase to a level similar to thenot substantially above the statewide average if applying the AWRM program, and to a level substantially higher than the statewide average if applying the other two options. Potential cost savings to community residents which could be acquired through funding programs to assist in the construction costs, and avoidance of additional treatment costs for other pollutants (i.e. future TMDL requirements) are not included.

5.5. The Need to Develop Housing

The proposed water quality objectives would not restrict the development of housing near the reaches of the Santa Clara River affected by the proposed conditional SSOs because they do not result in discharge requirements that affect housing or housing development. The proposed conditional SSOs and AWRM Program were developed based on projected population and housing growth in the Santa Clarita Valley. The GSWI model considered increased effluent flow from the WRPs and the effects of this growth on the chloride levels in the Santa Clara River and underlying aquifers. The proposed conditional SSOs will support water recycling and the use of the AWRM compliance option in the USCR. Both of these factors will provide water resources to support housing that may be lost with other compliance options.

5.6. The Need to Develop and Use Recycled Water

The proposed water quality objectives will support the expansion of recycled water uses in the Santa Clarita Valley consistent with the California's stated goal of increasing the use of recycled water to help meet the state's growing demand for potable water. The CLWA 2005 Urban Water Management Plan projects that water demand in the area will continue to increase, and that additional sources of water including recycled water will be necessary to meet projected demand. Recycled water use in CLWA's service area is projected to increase from 448 acre-feet per year (actual use in 2004) to 17,400 acre-feet per year by 2030. This 2030 figure represents 70% of the imported water portion of the ultimate wastewater flow projected for the Saugus and Valencia WRPs of approximately 34 MGD. The increased flow from the WRPs from current flows of 21 MGD to future flows of 34 MGD is expected to accommodate most of the increased recycled water demand in the watershed.

The proposed conditional SSOs will support the expansion of recycled water uses by protecting municipal supply. For groundwater recharge reuse projects, Maximum Contaminant Level (MCL) codified in California Administrative Code, Title 22 provide reasonable protection of groundwater quality for the beneficial use of municipal supply. The proposed groundwater objectives for chloride are below the Recommended Secondary Maximum Contaminant Levels for drinking water sources codified in Title 22. Given the demonstrated need to expand recycling in the USCR to meet the region's future water requirements, the proposed conditional SSOs are needed to ensure the required compliance mechanisms allow for the recycling to take place. Additionally, the proposed conditional SSOs are consistent with the secondary MCLs in Title 22 and will not result in water quality for chloride that exceeds these levels.

6. Antidegradation Analysis

State Board Resolution 68-16, “Statement of Policy with Respect to Maintaining High Quality Water” in California, known as the "Antidegradation Policy," protects surface and ground waters from degradation. It states that waters having quality that is better than that established in effective policies shall be maintained unless any change will be consistent with the maximum benefit to the people of the State, will not unreasonably affect present and anticipated beneficial uses, and will not result in water quality less than that prescribed in the policies.

The federal antidegradation policy (40 CFR 131.12) requires states to maintain and protect existing instream water uses and the water quality necessary to protect the existing uses (Tier I), maintain high quality waters unless the State finds after satisfaction of intergovernmental and public participation provisions of the states continuous planning process that allowing lowering water quality is necessary to accommodate important economic and social development (Tier II), and maintain and protect water quality in waters the state has designated as outstanding National resource waters (Tier III).

Adoption of proposed conditional SSOs, when implemented the AWRM Program, would be consistent with the state and federal antidegradation policies. Staff worked with stakeholders to develop a complete antidegradation analysis that is contained in the Task 7 and 8 report (LWA, 2008). The following contains a summary of the antidegradation analysis.

The proposed conditional site specific surface and groundwater objectives are protective of present and anticipated beneficial uses. The proposed conditional SSOs in Reaches 5 and 6 of 150 mg/L are protective of present and anticipated uses for irrigation of non-salt sensitive crops in the area, municipal supply, and aquatic life. The proposed conditional SSOs for Reach 4B, when implemented with the AWRM compliance option, are protective of the present and anticipated beneficial uses of these waters, including the most sensitive beneficial use, salt sensitive agriculture. The proposed SSO of 117 mg/L is within the LRE guidelines for protection of salt sensitive agricultural uses. The proposed SSO of 130 mg/L, which applies during critical conditions when source water is greater than 80 mg/L chloride, is protective when alternative water supplies are provided to salt sensitive agriculture uses (conditional SSO = 130 mg/L) and salt export projects as described in Section 8 are operated such that the net chloride loading above 117 mg/L is zero or less.

The proposed implementation activities, which will increase chloride export from the East Piru groundwater basin, will offset any increases in chloride discharges. If higher water quality objectives (130 mg/L) are in place in Reach 4B due to elevated concentrations in source water, the groundwater basin will be protected from degradation through the required salt export. The AWRM proposal will improve water quality in the basin over time and offset any increase in chloride concentrations that result from the

higher objective during some periods. The AWRM proposal was evaluated based on design capacities at Valencia WRP and Saugus WRP of 27.6 MGD and 6.5 MGD, for a total system design capacity of 34.1 MGD. If the capacity of the WRPs ever exceeds the current total system design capacity of 34.1 MGD, then the amount of water required for salt reduction and/or export should increase proportionally to the increase in the total system design capacity, and an additional antidegradation analysis should be conducted.

Under the AWRM Program, the blended extraction well and RO permeate discharge into Reach 4A will not exceed a chloride concentration of 95 mg/L. The current chloride WQO of 100 mg/L in Reaches 3 and 4A is within the LRE guidelines and will protect salt-sensitive agricultural uses. Therefore, the blended extraction well and RO permeate discharge into Reach 4A will not exceed the WQO of the receiving water at the point of discharge (Reach 4A) or in the reach downstream of the discharge point (Reach 3) and the designated beneficial uses for the reaches are still protected. This satisfies EPA's Tier 1 requirements in 40 CFR 131.12(a). Ongoing trend monitoring and additional modeling will determine whether the blended extraction well and RO permeate discharge would increase chloride concentrations in high quality waters downstream in Reaches 4A and 3 and in the Fillmore and Santa Paula groundwater basins. The GSWI model will be extended to the Freeman Diversion to assess the interaction of groundwater and surface water through the Piru, Fillmore, and Santa Paula groundwater basins and the overlying surface waters.

The proposed conditional SSOs and implementation of the AWRM are consistent with the maximum benefit to the people of the state and will result in social and economic benefits. It has been shown that AWRM Program will support water recycling and provide for additional water resources for agriculture and aquatic habitat. The GSWI model demonstrates that the AWRM compliance option results in benefits from the County Line to the area of seawater intrusion on the Oxnard Plain. The model shows that the ARWM option allows for more water diverted at the Freeman Diversion than conventional advanced treatment options, which then has a significant effect on saline intrusion in the Oxnard Plain. At the downstream end of the Piru basin, modeled surface water chloride concentrations are higher in the river about 40% of the time with the AWRM operating, but still in compliance with the existing water quality objective of 100 mg/L. Groundwater chloride concentrations in Piru Basin are improved by pumping and replacing groundwater with stormwater recharge during wet years when chloride concentrations are lower. As a result, surfacing groundwater from the Piru basin in Reach 4A may decrease over time as a result of the AWRM. The AWRM will also result in increased surface water flows in Reaches 3 and 4A as compared to other compliance options. Additionally, the proposed groundwater and surface water objectives for Reaches 5 and 6 will support the expansion of recycled water uses in the Santa Clarita Valley, which is consistent with the maximum public benefit and not unreasonably adverse to present and anticipated beneficial uses. Finally, in general, the AWRM compliance option has more water quality benefits to Ventura County than do the conventional advanced treatment based compliance options.

The proposed conditional SSOs will not result in water quality less than that prescribed in the policies. The proposed conditional SSOs comport with the Chloride Policy in Regional Board resolution 97-002 and its requirements for a watershed chloride reduction plan.

Finally, the proposed conditional SSOs will be implemented through NPDES permits, including effluent limits and required minimum salt export requirements. The effluent limits will ensure that the current performance of the WRPs continues at a minimum and will most likely require additional actions to achieve the water quality objectives. Additionally, receiving water limits will ensure that downstream water quality is not degraded as a result of wastes discharged. Finally, minimum salt export requirements will be included to ensure that excess salt loadings to the groundwater basin due to periods of elevated water supply concentrations are removed from the groundwater basin through pumping and export.

7. Alternatives Analysis and Staff Recommendation

Based on the results of the TMDL special studies, Regional Board staff analyzed two alternatives for Regional Board consideration. The first entails a TMDL based on the existing surface water Basin Plan objectives; the second alternative entails a TMDL based on a suite of site specific objectives for both surface water and groundwater underlying the Upper Santa Clara River to support the AWRM approach. Both alternatives rely on implementation of RO technology; however, the first alternative requires larger capacity RO facilities and ocean brine disposal while the second alternative requires smaller capacity RO facilities and no ocean disposal.

7.1. Alternative 1 - Maintain Current Basin Plan Objectives – No Action

Under this alternative, the Regional Board takes no action at this time to adopt SSOs or amend the TMDL Wasteload Allocations and Implementation Schedule. Staff notes several concerns with Alternative 1.

First, a key factor in implementation of RO is safe disposal of the resultant brine waste. Several options for brine disposal include ocean discharge, deep well injection, and drying and subsequent landfill disposal. Cost-effective brine disposal is based on several factors including the brine quantity generated and proximity to available disposal facilities. Because it requires larger capacity RO to meet more stringent objectives, the first alternative would require brine disposal via an ocean discharge. The second alternative, which requires smaller capacity RO, would enable disposal via deep well injection. Ocean disposal options generally provide greater capacity than disposal wells, but for the Santa Clarita Valley, would require construction of a large pipeline through two counties over 43-miles. Deep well injection involves retrofitting abandoned oil production wells or constructing new injection wells in areas near the Santa Clarita Valley and injecting the brine into stable geological formations. Local disposal of the smaller volumes brine associated with second alternative through deep well injection or landfilling is likely more cost effective and would likely have less environmental impacts than ocean disposal for this site. In particular, facilities for deep well injection are closer to the RO facilities than ocean disposal sites and therefore require a shorter pipeline. Further, the capacity limits the size of the RO plant so that electrical resources are lower than the first option.

Another concern with the first alternative is under an ocean disposal scenario, a pipeline and outfall could potentially be used for discharge of treated wastewater rather than the discharge of brine. If the SCVSD were to discharge wastewater directly to the Ocean, this option would reduce flows in the Upper Santa Clara River.

7.2. Alternative 2 - Adopt Conditional SSOs and Revised TMDL Conditional WLAs

Under this alternative, the Regional Board adopts a suite of site specific objectives that are conditioned on implementing a chloride balance that is based on advanced treatment of the Valencia WRP effluent to reduce chloride loading to the USCR by a level greater than any loading contributed by the Valencia WRP in excess of loading corresponding to 117 mg/L (see section 8.2). TMDL conditional WLAs for chloride are revised to reflect the conditional SSOs. In addition, interim WLAs for sulfate and TDS are included to facilitate the use of supplemental water to Reach 4B when chloride objectives exceed 117 mg/L.

The AWRM Program uses smaller-scale reverse osmosis to provide greater flexibility for disposal of brine generated by the reverse osmosis system. The AWRM Program also provides capability for aquifer restoration and resource conservation through blending the advanced treated wastewater with extracted groundwater from degraded underlying basin in the upper Santa Clara River. In order to implement an alternative implementation plan, conditional SSOs that are in excess of the existing WQOs for surface water are required. However, because the AWRM facilitates the feasibility of aquifer restoration, the groundwater WQOs can be more stringent. This alternative is analyzed in accordance with a salt balance in the Upper Santa Clara River Watershed.

7.3. Staff Recommendation

Staff recommends the adoption of Alternative 2- adopt conditional site specific objectives and revised TMDL conditional WLAs. The conditional site specific objectives will maintain beneficial uses and the implementation of the AWRM program will result in decreased salt loading to the USCR with fewer environmental and economic impacts than Alternative 1. Additional benefits in both water supply and water quality accrue in areas downstream of the USCR.

- Staff finds that the key technical issues of cumulative chloride impacts to groundwater have been addressed by GSWI. Details of staff's findings on the GSWI model are presented in Appendix I, "GSWI Study for the USCR Chloride TMDL – Staff Report."

- Staff find that the GSWI model has been adequately calibrated by 88 groundwater level, 50 groundwater chloride, 6 streamflow, and 12 surface-water quality target locations that are spatially distributed throughout the GSWI domain and it has been considered as an appropriate model for groundwater and surface water interaction modeling purposes.

- Staff finds that, based on the GWSI model, none of the simulated chloride concentrations derived from the proposed compliance options result in chloride concentrations less than the existing WQO of 100 mg/L in surface water at all

times over 24-year simulation periods (2007-2030) and at all locations in Reaches 4B, 5 and 6. All of the predicted chloride concentrations in groundwater for all compliance options consistently met the existing WQO of 200 mg/L in groundwater of the Piru Basin except the area between Blue Cut and SCR-RF monitoring locations.

- Staff finds that the model predicted high chloride concentrations of 350 mg/L or greater in the alluvial groundwater (thickness of 50-100 ft) in the areas between Blue Cut and receiving water station SCR-RF during drought periods for all proposed compliance options. The high chloride concentration in this area will migrate downstream through the pumping activity in the proposed extraction well locations for the AWRM compliance option and will affect the chloride concentration of the mixed water with RO and then will affect the chloride concentration in SCR in Reach 4A. Geomatrix has prepared a technical memo stating that there is no current or expected future use of the shallow groundwater for beneficial uses in this area (Geomatrix, 2008c). The memo states that groundwater production in Reach 4B for existing beneficial uses occurs downstream of Blue Cut area, where the aquifer has a greater saturated thickness, yields more water, and has lower chloride concentrations. The memo also states that the alluvial groundwater concentrations are predicted to quickly recover once the drought period has ended. Staff therefore recommends that the proposed SSOs of 150 mg/L be set for the deeper San Pedro Formation and that the existing WQOs of 200 mg/L be retained for the shallow alluvium layer.

- Staff finds that the predicted chloride concentrations in both groundwater and surface water at Blue Cut were generally related to concentrations of chloride in the discharges to the SCR from the Saugus and Valencia WRPs.

- Staff finds that the Advanced Treatment and Brine Disposal Compliance Option can not result in full attainment of the 100 mg/L WQO for the USCR at Blue Cut at all times and in all locations of the receiving water. In addition, other compliance options like conveying all recycled water discharges from the Valencia and Saugus WRPs to the ocean outfall (Zero Discharge Compliance Option), limiting discharges from the WRPs and conveying the balance of WRPs recycled water discharges to ocean outfall (Minimal Discharge Compliance Option), and moving the discharge location of WRPs to the beginning of Reach 7 near Lang gauge (Alternative WRP Discharge Location Compliance Option) are also not likely to achieve attainment of the existing 100 mg/L WQO at all times and all locations.

- Staff notes that an alternative compliance option is required to achieve the site specific objectives (SSOs) when the original proposed compliance options were not able to achieve the existing WQO of 100 mg/L. Staff also notes that the SSOs shall be carefully evaluated based on the GSWI model results of different averaging periods to ensure they are fully protective of the agricultural beneficial uses in the study area.

- Staff finds that the AWRM compliance option can produce better chloride concentrations than other proposed compliance options during drought periods and the salt export capability of the AWRM compliance option will help to substantially reduce the amount of chloride loading from salt-water intrusion in the Oxnard Plain.

- Staff finds that the AWRM compliance alternative will result in timely attainment of conditional SSOs and reduce the chloride load to the USCR and underlying groundwater basins during the TMDL implementation period. Staff further finds that the AWRM will help provide enough mass loading to protect the SCR downstream from sea water intrusion.

- Staff finds that the proposed conditional SSOs would be consistent with state and federal antidegradation policies. The antidegradation analysis shows that the Alternative Water Resources Management Plan, involving conditional SSOs that are less stringent than existing WQOs used in conjunction with advanced treatment and salt export, are protective of beneficial uses in the USCR.

- Staff finds that the proposed conditional SSOs considered section 13241 requirements including: (a) past, present, and probable future beneficial uses of water, (b) environmental characteristics of the hydrographic unit under consideration, (c) water quality conditions that could reasonably be achieved, (d) economic considerations, (e) the need for developing housing within the Region, and (f) the need to develop and use recycled water.

- Staff finds that the AWRM Program is consistent with the draft State Board Water Recycling Policy. A stakeholder draft of the policy was presented to the State Board on September 3, 2008. This draft policy states that salts from all sources should be managed on a basin-wide or sub basin-wide basis to attain water quality objectives and support beneficial uses through the development of regional salt management plans. The draft policy provides some specific requirements to be met in the salt management plans, including:

    1. Basin or sub basin-wide monitoring;

    2. Determination of all sources and loading of salts, the basin's assimilative capacity of salts, and fate and transport of salts;

    3. Implementation measures to manage salt loading on a sustainable basis;

    4. An antidegradation analysis demonstrating that projects included with the plan will satisfy State Board Resolution 68-16; and

    5. Water recycling and stormwater recharge/reuse goals and objectives.

Although no salt management plan has yet been developed for the Santa Clara River watershed, the AWRM program can serve as a basis for a future salt management plan. The AWRM Program elements have many similarities to the required salinity management plan elements. The AWRM Program was developed using the G~~W~~SWI model. Based on the total system design capacity of 34.1 MGD for the Saugus and Valencia WRPs and accommodated future growth, the GSWI model ~~, which~~ assessed the fate and transport of chloride from all sources in the surface waters and groundwater in the Santa Clara River watershed. The GSWI model also assessed water quality impacts associated with the planned recycled water uses in the future. Given that the AWRM program will eventually be implemented through various NPDES permits issued in the future, it also will involve a number of monitoring requirements to assess actual fate and transport of chloride during and after project implementation. While the GSWIM was developed specifically to assess the fate and transport of chloride, the evaluations and assessments will largely apply to other salts in the region, which behave similarly to chloride. The facilities that will be implemented through the AWRM (i.e., advanced treatment of wastewater, salt export facilities) will also remove and manage other salts. Hence, with some minor modifications and assessments, the AWRM program could be deemed a salinity management plan for the watershed, since it would provide for (1) watershed-wide monitoring, (2) determination of all sources, loading, fate and transport of salts, (3) salt management measures and implementation, (4) an antidegradation analysis; and (5) water recycling goals and objectives.

8. Implementation

The conditional SSOs proposed in Section 4.1 are conditioned on implementation of the AWRM program; if the AWRM system is not built, the water quality objectives revert back to the current levels in the Basin Plan (100 mg/L). These conditions comport with the Chloride Policy in Regional Board resolution 97-002 and its requirements for a watershed chloride reduction plan. The watershed chloride reduction plan will be implemented through NPDES permits for the Valencia WRP and a new NPDES permit for discharge into Reach 4A. The conditional site specific objectives for chloride in the USCR watershed shall apply and supersede the regional water quality objectives only when chloride load reductions and/or chloride export projects are in operation and reduce chloride loading in accordance with Table 13.

Table 13. Watershed Chloride Reduction Plan

Water Supply Chloride[1]	Chloride Load Reductions[2]
40 mg/L	58,000 lbs per month
50 mg/L	64,000 lbs per month
60 mg/L	71,000 lbs per month
70 mg/L	77,000 lbs per month
80 mg/L	83,000 lbs per month
90 mg/L	90,000 lbs per month
100 mg/L	96,000 lbs per month

[1] Based on measured chloride of the SWP water stored in Castaic Lake

[2] Chloride load reduction is based on operation of a ~~3 MGD~~ RO treatment plant treating 3 MGD of recycled water with chloride concentration of 50 mg/L + Water Supply Chloride. Assumes operational capacity factor of 90% and RO membrane chloride rejection rate of 95%. Determination of chloride load based on the following:

$$ChlorideLoad = 90\% \times [(Q_{RO} \times C_{WRP} \times 8.34) \times r] \times \left(30 Days / Month \right)$$

where r = % chloride rejection (95%)
Q_{RO} = 3 MGD of recycled water treated with RO~~RO treatment flow (3 MGD)~~
C_{WRP} = SWP Cl + 50 mg/L

8.1. Implementation of Reach 4B Conditional WLAs

The Saugus and Valencia WRP NPDES permits will have receiving water limits for the District's receiving water station, RF, located in Reach 4B of the Santa Clara River. The receiving water limits will be based on the Reach 4B conditional WLAs for chloride as presented in section 4.2.

8.2. Implementation of Reach 5 and 6 Conditional WLAs

Beginning May 4, 2015, Reach 5 and 6 conditional WLAs for the Saugus and Valencia WRPs (Table 5) will become effective. Prior to May 4, 2015, Saugus and Valencia WRPs will have interim WLAs for chloride equal to ~~the interim limits for chloride specified in order Nos. R4-2003-0143 and R4-2003-0145 as amended by order Nos. R4-2005-0031 and R4-2005-0032 (Table 14).~~ the interim limit for chloride specified in order No. R4-04-004.

Table 14. Interim WLAs for Valencia and Saugus WRPs

Reach	Interim Chloride WLA (mg/L)	Interim Sulfate WLA (mg/L)	Interim TDS WLA (mg/L)	Averaging Period
5	[SWP] + 114 not to exceed 230	450	1000	12-month~~Annual~~
6	[SWP] + 134 not to exceed 230	450	1000	12-month~~Annual~~

In addition, in order to support water recycling in the USCR, which is critical to the success of and stakeholder support for the AWRM Program, the Saugus and Valencia WRPs will receive interim WLAs for sulfate and TDS (Table 14). When the water reclamation requirements for these WRPs are renewed, they will likely contain limits based on groundwater WQOs. Current levels of sulfate and TDS in the WRP effluent will not meet limits based on existing WQOs. Instead the Saugus and Valencia WRPs must meet interim WLAs equal to 450 mg/L sulfate and 1000 mg/L TDS, which will apply for discharges to the Santa Clara River and recycled water uses from the Saugus Valencia WRPs. This will allow the SCVSD time to conduct special studies on the impacts of sulfate and TDS concentrations at these levels on groundwater quality and the potential for sulfate and TDS SSOs. These interim WLAs will expire on May 4, 2015 and will be replaced either with final WLAs based on the results of SSOs, if developed, or existing WQOs.

The interim WLAs are protective of beneficial uses and consistent with historical surface and groundwater objectives for basins underlying Reaches 5 and 6. A recent report prepared for the SCVSD used a weight of evidence approach to demonstrate that the interim WLAs for sulfate are protective of USCR aquatic life uses, including threatened and endangered fish and amphibians, and their prey organisms (Environ, 2008). The report states that the species mean acute value of the most acutely sulfate-sensitive invertebrate species was more than four times greater than the interim WLA of 450 mg/L. The report also states that the available toxicity data for sulfate confirm the relatively low sensitivity of fish, including threatened and endangered species in the USCR, to sulfate. Thus, protective values based on highly sensitive invertebrates will be additionally protective of TES fish and amphibians given their low sensitivity to ions.

Additionally, the interim WLAs are protective of groundwater recharge uses. These levels are consistent with the upper range of the secondary MCLs in Title 22.

8.3. Blended RO and Groundwater Discharge to Reach 4A

An NPDES permit and associated Monitoring and Reporting Program (MRP) will be required for any new discharge of the blend of RO-treated recycled water and extracted groundwater from the east Piru Basin, as contemplated in the AWRM Program. The Permittee shall submit a report of waste discharge and initiate an application to receive an NPDES permit for these facilities prior to their discharge to the SCR. Permit writers will consider ambient water quality when establishing permit limits to meet WQOs for Reach 4A.

8.4. Supplemental Water

Supplemental water released to Reach 6 of the Santa Clara River will require an NPDES permit. The AWRM contemplates the use of existing Saugus aquifer wells to deliver low chloride supplemental water directly to the USCR because infrastructure already exists and would not need to be constructed. These supplemental waters would be delivered through contractual arrangements between the SCVSD and the Upper Basin Water Purveyors and would be discharged directly to the USCR. However, although chloride concentrations in these alternative supplemental water wells are very low (20 to 42 mg/L), sulfate concentrations consistently exceed the existing surface water quality objective of 300 mg/L for Reach 6 and the TDS groundwater objectives of 700 mg/L for the groundwater basin underlying Reach 6.

Interim wasteload allocations (Table 12) are developed for sulfate and TDS for the dilution water discharges. These wasteload allocations would apply until then end of the TMDL Implementation period in order to allow (1) time for construction of infrastructure to connect the supplemental water to the Valencia WRP and be diluted with the RO permeate, or (2) time for the SCVSD to conduct additional special studies to provide adequate justification for SSOs for sulfate and TDS. If infrastructure to remove the direct discharge of supplemental water to the USCR is not constructed or if the Regional Board does not approve SSOs for sulfate and TDS, the interim WLAs would expire.

Table 12. Interim WLAs for Reach 6 Supplemental Water Discharges

Reach	Interim Sulfate WLA (mg/L)	Interim TDS WLA (mg/L)	Averaging Period
6	450	1000	12-

	month~~Ann ual~~

The interim WLAs are protective of beneficial uses and consistent with historical surface and groundwater objectives for Reach 6 (see discussion in section 8.2).

The final WLAs for TDS and sulfate are equal to existing surface water and groundwater quality objectives for TDS and sulfate in Tables 3-8 and 3-10 of the Basin Plan. The Regional Board may revise the final WLAs based on review of trend monitoring data as detailed in the monitoring section (Section 8.7) of this staff report.

8.5. Downstream Effects of TMDL Implementation

Implementation of the USCR Chloride TMDL, including implementation of AWRM and the discharge to Reach 4A of the blended RO permeate and pumped groundwater will not cause exceedances of surface water quality objectives for downstream reaches. The water discharged to Reach 4A will meet the WQO of 100 mg/L for Reaches 4A and 3. Furthermore, US EPA has established a TMDL for chloride in Reach 3 of the Santa Clara River (US EPA, 2003). The TMDL for Reach 3 sets a numeric target of 80 mg/L of chloride. The linkage analysis for the Reach 3 TMDL demonstrates that the numeric target of 80 mg/L will be attained if upstream discharges from Reach 4 have a chloride concentration of 100 mg/L.

Although the discharge to Reach 4A will have a concentration below the surface WQO of 100 mg/L, it will have a concentration greater than the existing chloride concentrations in Reach 4A and the Fillmore groundwater basin downstream. The average chloride concentration in Reach 4A is 59 mg/L, based on data collected from 1992 to 2006 downstream of the Fillmore Fish Hatchery. The GWSI model was used to calculate the average mass loading, average chloride concentration, and average flow from the discharge to 4A of blended RO permeate and extracted groundwater. This was compared with historic chloride concentration and flow data to determine the incremental increase in Reach 4A surface water chloride concentrations caused by the blended discharge. Depending on the flows and existing surface chloride concentrations, the discharge could increase chloride concentrations by up to 20 mg/L in Reach 4A

The increased concentrations in surface water could impact groundwater quality in the Fillmore Basin, depending on how much surface water recharges the groundwater. The average chloride concentration in the Fillmore Basin is 49 mg/L, 62 mg/L, and 46 mg/L based on data collected at wells V-0309, V-0340, and V-0342, respectively, located in the eastern portion of the Fillmore Basin from 1987 to 2006. Therefore, there is a potential to degrade water quality below existing ambient conditions in groundwater by implementation of the AWRM compliance option. The extent of this potential degradation needs to be further assessed through an evaluation of hydrology and the amount of surface water recharge that occurs in Reach 4A and downstream.

In addition, the potential increases in chloride concentrations in the Fillmore Basin, which is the water supply for the City of Fillmore, could impact the levels of chloride in Fillmore treatment plant effluent discharged to Reach 3.

Therefore, it is likely that an antidegradation analysis will be required during the permitting stage for the discharge to Reach 4A. The permit will require further evaluation of this discharge and any impacts on downstream uses, groundwater and surface water monitoring, and enforceable effluent limits. An initial antidegradation analysis is presented here. State and federal antidegradation requirements include the following conditions:

- The reduction in water quality will not unreasonably affect actual or potential beneficial uses.
- The proposed action is necessary to accommodate important economic or social development in the area.
- The reduction in water quality is consistent with maximum public benefit.
- Water quality will not increase above water quality objectives prescribed in the Basin Plan.

The current chloride WQO of 100 mg/L in Reaches 3 and 4A will protect the most sensitive beneficial use of the river's water, which is salt-sensitive agricultural use and has threshold value of 117 mg/L. Under the AWRM Program, the blended extraction well and RO permeate discharge into Reach 4A will not exceed a chloride concentration of 95 mg/L, and may be further adjusted downward as needed to protect water quality. Therefore, the blended extraction well and RO permeate discharge into Reach 4A will not exceed the water quality objective of the receiving water at the point of discharge or in the reach downstream of the discharge point.

Further water quality assessments will be used to determine whether the discharge to 4A would increase chloride concentrations in groundwater in the Fillmore and Santa Paula Basins. Responsible parties, including SCVSD and the ultimate permit holder for the 4A discharge, will be required to conduct chloride trend monitoring in the Fillmore Basin and in Reaches 3, 4A to evaluate impacts of compliance measures to downstream groundwater and surface water quality, including areas downstream of the Fillmore treatment plant. This TMDL shall be reconsidered if chloride trend monitoring indicates degradation of groundwater or surface water due to implementation of compliance measures.

The water quality analyses discussed above will be utilized in conjunction with an extension of the GSWI model to assess the interaction of groundwater and surface water and any potential impacts to downstream water quality by the AWRM option. Specifically, key stakeholders have agreed through a memorandum of understanding to extend the GSWI model through the Piru, Fillmore, and Santa Paula groundwater basins and the overlying surface waters to the Freeman Diversion. If the extended GSWI model results indicate the blended extraction well and RO permeate discharge as currently proposed by the AWRM option would cause an exceedance of water quality objectives,

the GSWIM will be utilized to determine the level of chloride in the blended extraction well and RO permeate discharge necessary to preclude such an exceedance.

The important social and economic benefits of the AWRM Program could warrant some degradation of the downstream reaches. It has been shown that AWRM Program will support water recycling and provide for additional water resources for agriculture and aquatic habitat. Additionally, chloride concentrations in the Santa Clara River will be lower at the Ventura-Los Angeles County Line, and will result in better-quality recharge to the east Piru basin. As a result, surfacing groundwater from the Piru basin in Reach 4A may decrease over time as a result of the AWRM. The AWRM will also result in increased surface water flows in Reaches 3 and 4A as compared to other compliance options. Finally, in general, the AWRM compliance option has more water quality benefits to Ventura County than do the conventional advanced treatment based compliance options.

It is important to note that any degradation in water quality can be averted by operating the extraction wells in the Piru basin in a manner that will not cause increases in the baseline water quality for the Fillmore and Santa Paula groundwater basins and surface water reaches (4A and 3). For example, the maximum concentration of the extraction well and RO permeate blend could be adjusted downward from 95 mg/L, as warranted based on GSWIM modeling.

The Reach 3 Chloride TMDL may be re-evaluated in the context of the findings of the Upper Santa Clara River Chloride TMDL studies, chloride trend monitoring, and the extended GSWI model results.

8.6. Implementation Schedule

The TMDL provides a ten-year schedule to attain compliance with the conditional SSOs and conditional wasteload allocations. Key uncertainties at this point relate to identification of the optimum method for brine disposal. Several options, including deep-well injection in the vicinity of old oil fields in the Santa Clarita Valley, and drying and landfill disposal will be considered by the SCVSD in the first two years of the TMDL Implementation Plan.

The Implementation schedule includes 6 years for implementation of compliance measures including planning, completing Environmental Impact Report, engineering design, and construction. The Regional Board will re-valuate the schedule to implement control measures needed to meet final conditional WLAs at year 6 (2011) and year 9.5 (2014) after the effective date of the TMDL.

8.7. Monitoring for the AWRM Program

NPDES Permittee will conduct TDS, chloride, and sulfate monitoring to ensure that water quality objectives are being met. This monitoring will be consistent with and at least equivalent to monitoring specified in existing permits.

The SCVSD will submit a monitoring plan to conduct chloride, TDS, and sulfate trend monitoring to ensure that the goal of chloride export in the watershed is being achieved, water quality objectives are being met, and downstream groundwater and surface water quality is not degraded due to implementation of compliance measures. The SCVSD monitoring plan shall include plans to monitor chloride, TDS, and sulfate in groundwater and identify representative wells to be approved by the Regional Board Executive Officer, in the following locations: (a) Shallow alluvium layer in east Piru Basin, (b) San Pedro Formation in east Piru Basin, and (c) groundwater basins under Reaches 5 and 6, which shall be equivalent or greater than existing groundwater monitoring required by NPDES permits for Saugus and Valencia WRPs. The monitoring plan shall also include a plan for chloride, TDS, and sulfate trend monitoring for surface water for Reaches 4B, 5 and 6. The monitoring plan shall include plans to monitor chloride, TDS, and sulfate at a minimum of once per quarter for groundwater and at a minimum of once per month for surface water. The plan should propose a monitoring schedule that extends beyond the completion date of this TMDL to evaluate impacts of compliance measures to downstream groundwater and surface water quality. This TMDL shall be reconsidered if chloride, TDS, and sulfate trend monitoring indicates degradation of groundwater or surface water due to implementation of compliance measures.

The Reach 4A permittee will submit a monitoring plan to conduct chloride, TDS, and sulfate trend monitoring to ensure that the goal of chloride export in the watershed is being achieved, water quality objectives are being met, and downstream groundwater and surface water quality is not degraded due to implementation of compliance measures. The Reach 4A permittee monitoring plan shall include plans to monitor chloride, TDS, and sulfate in groundwater and identify representative wells to be approved by the Regional Board Executive Officer in the following locations (a) Fillmore Basin, and (b) Santa Paula Basin. The monitoring plan shall also include a plan for chloride, TDS, and sulfate trend monitoring for surface water for Reaches 3 and 4A. The monitoring plan should include plans to monitor chloride, TDS, and sulfate at a minimum of once per quarter for groundwater and at a minimum of once per month for surface water. The plan should propose a monitoring schedule that shall extend beyond the completion date of this TMDL to evaluate impacts of compliance measures to downstream groundwater and surface water quality. This TMDL shall be reconsidered if chloride, TDS, and sulfate trend monitoring indicates degradation of groundwater or surface water due to implementation of compliance measures. ~~The SCVSD and Reach 4A Permittee will conduct chloride, sulfate, and TDS trend monitoring to ensure that the goal of chloride export in the watershed is being achieved, water quality objectives are being met, and downstream groundwater and surface water quality is not degraded due to implementation of compliance measures. Trend monitoring for groundwater shall be conducted by the SCVSD at the following locations measured at representative wells as determined by the Regional Board Executive Officer: (a) Shallow alluvium layer in east Piru Basin, (b) San Pedro Formation in east Piru Basin, and (c) groundwater basins under~~

~~Reaches 5 and 6, which shall be equivalent or greater than existing groundwater monitoring required by NPDES permits for Saugus and Valencia WRPs. Trend monitoring for groundwater shall be conducted by the Reach 4A Permittee at the following locations measured at representative wells as determined by the Regional Board Executive Officer: (a) Fillmore Basin, and (b) Santa Paula Basin. Chloride trend monitoring for surface water shall be conducted by the SCVSD for Reaches 4B, 5 and 6, while trend monitoring for surface water shall be conducted by the Reach 4A Permittee for Reaches 3 and 4A. Trend monitoring shall be conducted at a minimum of once per quarter for groundwater and at a minimum of once per month for surface water. Trend monitoring shall extend beyond the completion date of this TMDL to evaluate impacts of compliance measures to downstream groundwater and surface water quality. A monitoring plan shall be submitted by the SCVSD and Reach 4A Permittee to the Regional Board for Executive Officer approval within six months after the completion date of Task 10. Monitoring will begin one year after Executive Officer approval of the monitoring plan to allow time for the installation of any monitoring wells and/or surface water monitoring stations. Trend monitoring in Fillmore and Santa Paula Basins and in Reaches 3 and 4A will begin one year after Executive Officer approval of the monitoring plan and upon issuance of NPDES permit for the Reach 4A Permitee. This TMDL shall be reconsidered if chloride trend monitoring indicates degradation of groundwater or surface water due to implementation of compliance measures.~~

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CLWA, February 24, 2010, Letter from CLWA (Dan Masnada) to County of Los Angeles (Mitch Glaser)

RECEIVED
MAR 01 2010
By

CASTAIC LAKE WATER AGENCY

February 24, 2010

Mr. Mitch Glaser
Los Angeles County
Department of Regional Planning
320 West Temple Street
Los Angeles, California 90012

Re: Castaic Lake Water Agency Additional Information on Comments on the One Valley One Vision, Draft Environmental Impact Report

Dear Mr. Glaser:

The Castaic Lake Water Agency (CLWA) is the provider of imported water to the Santa Clarita Valley. The CLWA service area covers most of the proposed project area and the determination of water demand and availability for CLWA's service area is addressed in the 2005 Santa Clarita Valley Urban Water Management Plan (UWMP) prepared by CLWA and the local water retailers. As such, CLWA has an interest in Santa Clarita Valley water issues and previously submitted a letter in response to the Draft Environmental Impact Report (DEIR) on the One Valley One Vision (OVOV) plan.

In an October 28, 2009 letter, CLWA commented on the Water Resources section of the DEIR. CLWA stated that it would be revising its comments after the California Department of Water Resources (DWR) updated its 2007 State Water Project SWP Delivery Reliability Report. On January 26, 2010, DWR released its Draft 2009 SWP Delivery Reliability Report.

The 2009 draft report shows reductions in average water deliveries when compared to the 2007 report which, in turn, shows reductions in SWP deliveries from the 2005 report that was used to prepare the 2005 UWMP. The 2007 report shows current SWP annual Table A deliveries averaging 63% of the maximum contract amount of 4,133 thousand acre-feet (taf) per year (CLWA's portion of this total is 95,200 af). The 2009 draft report shows a corresponding value of 60%. The 2007 report projects an annual average of 66% to 69% for the future condition, whereas the updated 2009 draft report uses 60% for all years 2009 through 2029. Conversely, the annual deliveries during drier conditions are projected to be slightly higher than estimated in the 2007 report.

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Attached is a revised estimate of the water supply projections for all of the scenarios in the 2005 UWMP, which incorporate the results of the 2009 draft report. The chart includes additional sources of supply that CLWA has identified since the 2005 UWMP. These include water from Newhall Land sources in Kern County and recycled water that will be generated by the Newhall Ranch Water Reclamation Plant and utilized by the Newhall Ranch development (Newhall Ranch projected demand is included in the 2005 UWMP).

The attached charts represent a reasonable estimate of the available supplies for the CLWA service area. ***The charts show that, for the demand projected in the 2005 UWMP, the supply would be adequate for all scenarios and all years through 2030.*** The 2030 scenarios in the 2005 UWMP used a population projection of 428,209 for the CLWA service area. The DEIR should consider this projected number in its demand analysis in relation to the 460,000 to 485,000 residents reflected in the OVOV Plan buildout population in the DEIR Project Description.

The demand figures in the updated 2005 UWMP charts have not been adjusted to reflect the recent passage of SB 7X-7. This law requires that CLWA and the local retailers demonstrate a per capita water reduction of 10% in 2015 and 20% by 2020. The 2005 UWMP includes a 10% conservation factor through the year 2030. The 2010 UWMP will address a number of projected demand scenarios including one that reflects the impact of the 20%-conservation-by-2020 legislation.

Additionally, the updated 2005 UWMP charts do not incorporate demands or supplies for the OVOV planning area that are outside of the CLWA service area and which constitute part of the 460,000 to 485,000 population projection cited above. Analysis of these demands and supplies should be performed independent of CLWA's updated 2005 UWMP charts.

While the 2009 draft report reflects the most current information on SWP reliability, it may be subject to revision as a result of the public review process. Additionally, the Biological Opinions that were the primary reason for the reductions in SWP supply reliability are subject to change due to ongoing legal challenges and new scientific information given to the resource agencies responsible for the Biological Opinions. Such changes that may occur in the future would require that the attached charts be revised and appropriate revisions made in the County's planning and environmental documents.

CLWA appreciates the efforts of the County and the City of Santa Clarita on the OVOV plan update and the DEIR and looks forward to assisting you in providing information for the DEIR. If you have any questions, please contact Jeff Ford, Senior Water Resources Planner, at (661) 513-1281 or by e-mail at jford@clwa.org.

Sincerely,

Dan Masnada
General Manager

Attachments

cc: Paul Brotzman, City of Santa Clarita
Jason Smisko, City of Santa Clarita
Steve Cole, Newhall County Water District
Robert DiPrimio, Valencia Water Company
Mauricio Guardado, Santa Clarita Water Company
Adam Ariki, Los Angeles County Waterworks District #36
Tom Worthington, Impact Sciences, Inc.

Table 5-1 Summary of Current and Planned Water Supplies and Banking Programs(1)						
Water Supply Sources	Supply (af)					
	2007	2010	2015	2020	2025	2030
Existing Supplies (1)						
Wholesale (Imported)	61,800	75,787	75,787	74,407	74,407	74,407
SWP Table A Supply (2)	57,120	57,120	57,120	57,120	57,120	57,120
Buena Vista-Rosedale	0	11,000	11,000	11,000	11,000	11,000
Nickel Water - Newhall Land	0	1,607	1,607	1,607	1,607	1,607
Flexible Storage Account (CLWA) (3)	4,680	4,680	4,680	4,680	4,680	4,680
Flexible Storage Account (Ventura County) (3) (4)	0	1,380	1,380	0	0	0
Local Supplies						
Groundwater	40,000	46,000	46,000	46,000	46,000	46,000
Alluvial Aquifer	35,000	35,000	35,000	35,000	35,000	35,000
Saugus Formation	5,000	11,000	11,000	11,000	11,000	11,000
Recycled Water	1,700	1,700	1,700	1,700	1,700	1,700
Total Existing Supplies	103,500	123,487	123,487	122,107	122,107	122,107
Existing Banking Programs (3)						
Semitropic Water Bank (5)	50,870	50,870	0	0	0	0
Rosedale-Rio Bravo (7)	64,898	64,898	64,898	64,898	64,898	64,898
Semitropic Water Bank Newhall Land (8)	0	18,828	18,828	18,828	18,828	18,828
Total Existing Banking Programs	115,768	134,596	83,726	83,726	83,726	83,726
Planned Supplies (1)						
Local Supplies						
Groundwater	0	10,000	10,000	20,000	20,000	20,000
Restored wells (Saugus Formation)	0	10,000	10,000	10,000	10,000	10,000
New Wells (Saugus Formation)	0	0	0	10,000	10,000	10,000
Recycled Water - CLWA (6)	0	0	1,600	6,300	11,000	15,700
Recycled Water - Newhall Ranch	0	0	1,500	2,500	3,500	5,400
Total Planned Supplies	0	10,000	13,100	28,800	34,500	41,100
Planned Banking Programs (3)						
Additional Planned Banking	0	0	20,000	20,000	20,000	20,000
Total Planned Banking Programs	0	0	20,000	20,000	20,000	20,000

1. The values shown under "Existing Supplies" and "Planned Supplies" are supplies projected to be available in average/normal years. The values shown under "Existing Banking Programs" and "Planned Banking Programs" are total amounts currently in storage.
2. SWP supplies are calculated by multiplying CLWA's Table A Amount of 95,200 af by percentages of average deliveries projected to be available, based on Tables 6-12 and 6-13 of DWR's "State Water Project Delivery Reliability Report 2009". Year 2030 figure is calculated by multiplying by DWR's 2029 percentage of 60%. Figures shown in red represent changes from the 2005 UWMP due to the Draft State Water Project Delivery Reliability Report 2009. Figures shown in blue are additional sources of supply identified since the 2005 UWMP.
3. Supplies shown are total amounts that can be withdrawn, and would typically be used only during dry years. Each water bank has annual limitations on withdrawals that are reflected in Tables 5-3 and 5-4.
4. Initial term of the Ventura County entities' flexible storage account is ten years (from 2006 to 2015).
5. Supplies shown are the total amount currently in storage, and would typically be used only during dry years. Once the current storage amount is withdrawn, this supply would no longer be available and in any event, is not available after 2013.
6. Recycled water supplies based on projections provided in CLWA's 2005 UWMP Chapter 4, Recycled Water.
7. CLWA has 64,898 af of recoverable water as of 12/31/09 in the Rosedale-Rio Bravo Water Banking and Recovery Program.
8. Supplies shown are the total amounts currently in storage. As of December 31, 2009, there is 18,828 af of water stored in the Semitropic Groundwater Storage Bank by The Newhall Land and Farming Company for the Newhall Ranch Specific Plan. The stored water can be extracted from the bank in dry years in amounts up to 4,950 afy. Newhall Ranch is located within the CLWA service area.

Table 5-2 Projected Average/Normal Year Supplies and Demands					
Water Supply Sources	Supply (af)				
	2010	2015	2020	2025	2030
Existing Supplies					
Wholesale (Imported)	69,727	69,727	69,727	69,727	69,727
SWP Table A Supply (1)	57,120	57,120	57,120	57,120	57,120
Buena Vista-Rosedale	11,000	11,000	11,000	11,000	11,000
Nickel Water - Newhall Land (6)	1,607	1,607	1,607	1,607	1,607
Flexible Storage Account (CLWA) (2)	0	0	0	0	0
Flexible Storage Account (Ventura County) (2)	0	0	0	0	0
Local Supplies					
Groundwater	46,000	46,000	46,000	46,000	46,000
Alluvial Aquifer	35,000	35,000	35,000	35,000	35,000
Saugus Formation	11,000	11,000	11,000	11,000	11,000
Recycled Water	1,700	1,700	1,700	1,700	1,700
Total Existing Supplies	117,427	117,427	117,427	117,427	117,427
Existing Banking Programs					
Semitropic Water Bank (2)	0	0	0	0	0
Rosedale-Rio Bravo (2)	0	0	0	0	0
Semitropic Water Bank – Newhall Land (2)	0	0	0	0	0
Total Existing Banking Programs	0	0	0	0	0
Planned Supplies					
Local Supplies					
Groundwater	0	0	0	0	0
Restored wells (Saugus Formation) (2)	0	0	0	0	0
New Wells (Saugus Formation) (2)	0	0	0	0	0
Recycled Water - CLWA (3)	0	1,600	6,300	11,000	15,700
Recycled Water - Newhall Ranch	0	1,500	2,500	3,500	5,400
Total Planned Supplies	0	3,100	8,800	14,500	21,100
Planned Banking Programs					
Additional Planned Banking (2)	0	0	0	0	0
Total Planned Banking Programs	0	0	0	0	0
Total Existing and Planned Supplies and Banking	117,427	120,527	126,227	131,927	138,527
Total Estimated Demand (w/o conservation) (4)	100,050	109,400	117,150	128,400	138,300
Conservation (5)	(8,600)	(9,700)	(10,700)	(11,900)	(12,900)
Total Adjusted Demand	91,450	99,700	106,450	116,500	125,400

1. SWP supplies are calculated by multiplying CLWA's Table A Amount of 95,200 af by 60%.
2. Not needed during average/normal years.
3. Recycled water supplies based on projections provided in CLWA's 2005 UWMP Chapter 4, Recycled Water.
4. Demands are for uses within the existing CLWA service area. Demands for any annexations to the CLWA service area are not included.
5. Assumes 10 percent reduction on urban portion of total demand resulting from conservation best management practices, as discussed in CLWA's 2005 UWMP, Chapter 7.
6. Figures shown in red represent changes from the 2005 UWMP due to the Draft State Water Project Delivery Reliability Report 2009. Figures shown in blue are additional sources of supply identified since the 2005 UWMP.

Table 5-3 Projected Single-Dry Year Supplies and Demands					
Water Supply Sources	Supply (af)				
	2010	2015	2020	2025	2030
Existing Supplies					
Wholesale (Imported)	25,331	26,283	25,855	26,807	27,759
SWP Table A Supply (1)	6,664	7,616	8,568	9,520	10,472
Buena Vista-Rosedale	11,000	11,000	11,000	11,000	11,000
Nickel Water - Newhall Land	1,607	1,607	1,607	1,607	1,607
Flexible Storage Account (CLWA)	4,680	4,680	4,680	4,680	4,680
Flexible Storage Account (Ventura County)(2)	1,380	1,380	0	0	0
Local Supplies					
Groundwater	*47,500*	*47,500*	*47,500*	*47,500*	*47,500*
Alluvial Aquifer	32,500	32,500	32,500	32,500	32,500
Saugus Formation	15,000	15,000	15,000	15,000	15,000
Recycled Water	1,700	1,700	1,700	1,700	1,700
Total Existing Supplies	74,531	75,483	75,055	76,007	76,959
Existing Banking Programs					
Semitropic Water Bank (3)	17,000	0	0	0	0
Rosedale-Rio Bravo (5)	20,000	20,000	20,000	20,000	20,000
Semitropic Water Bank – Newhall Land (10)	4,950	4,950	4,950	4,950	4,950
Total Existing Banking Programs	41,950	24,950	24,950	24,950	24,950
Planned Supplies					
Local Supplies					
Groundwater	*10,000*	*10,000*	*20,000*	*20,000*	*20,000*
Restored wells (Saugus Formation)	10,000	10,000	10,000	10,000	10,000
New Wells (Saugus Formation)	0	0	10,000	10,000	10,000
Recycled Water - CLWA (4)	0	1,600	6,300	11,000	15,700
Recycled Water - Newhall Ranch	0	1,500	2,500	3,500	5,400
Total Planned Supplies	10,000	13,100	28,800	34,500	41,100
Planned Banking Programs					
Additional Planned Banking (6)	0	20,000	20,000	20,000	20,000
Total Planned Banking Programs	0	20,000	20,000	20,000	20,000
Total Existing and Planned Supplies and Banking	126,481	133,533	148,805	155,457	163,009
Total Estimated Demand (w/o conservation) (7) (8)	110,100	120,300	128,900	141,200	152,100
Conservation (9)	(9,500)	(10,700)	(11,700)	(13,100)	(14,200)
Total Adjusted Demand	100,600	109,600	117,200	128,100	137,900

1. SWP supplies are calculated by multiplying CLWA's Table A Amount of 95,200 af by percentages of single dry year deliveries projected to be available on Tables 6-4 and 6-13 of DWR's "State Water Project Delivery Reliability Report 2009". Year 2030 figure is calculated by multiplying by DWR's 2029 percentage of 11%. Figures shown in red represent changes from the 2005 UWMP due to the Draft State Water Project Delivery Reliability Report 2009. Figures shown in blue are additional sources of supply identified since the 2005 UWMP.
2. Initial term of the Ventura County entities' flexible storage account is ten years (from 2006 to 2015).
3. The total amount of water currently in storage is 50,870 af, available through 2013. Withdrawals of up to this amount are potentially available in a dry year, but given possible competition for withdrawal capacity with other Semitropic banking partners in extremely dry years, it is assumed here that about one third of the total amount stored could be withdrawn.
4. Recycled water supplies based on projections provided in CLWA's 2005 UWMP Chapter 4, Recycled Water.
5. CLWA has 64,898 af of recoverable water as of 12/31/09 in the Rosedale-Rio Bravo Water Banking and Recovery Program.
6. Assumes additional planned banking supplies available by 2014.
7. Assumes increase in total demand of 10 percent during dry years.
8. Demands are for uses within the existing CLWA service area. Demands for any annexations to the CLWA service area are not included.
9. Assumes 10 percent reduction on urban portion of total normal year demand resulting from conservation best management practices ([urban portion of total normal year demand x 1.10] * 0.10), as discussed in CLWA's 2005 UWMP, Chapter 7.
10. Delivery of stored water from the Newhall Land Semitropic Groundwater Bank requires further agreements between CLWA and Newhall Land.

Table 5-4 Projected Multiple-Dry Year Supplies and Demands(1)					
Water Supply Sources	Supply (af)				
	2010	2015	2020	2025	2030
Existing Supplies					
Wholesale (Imported)	46,485	46,485	47,097	47,097	47,097
SWP Table A Supply (2)	32,368	32,368	33,320	33,320	33,320
Buena Vista-Rosedale	11,000	11,000	11,000	11,000	11,000
Nickel Water - Newhall Land	1,607	1,607	1,607	1,607	1,607
Flexible Storage Account (CLWA) (3)	1,170	1,170	1,170	1,170	1,170
Flexible Storage Account (Ventura County) (3)	340	340	0	0	0
Local Supplies					
Groundwater	47,500	47,500	47,500	47,500	47,500
Alluvial Aquifer	32,500	32,500	32,500	32,500	32,500
Saugus Formation (4)	15,000	15,000	15,000	15,000	15,000
Recycled Water	1,700	1,700	1,700	1,700	1,700
Total Existing Supplies	96,685	95,685	95,297	96,297	96,297
Existing Banking Programs					
Semitropic Water Bank (3)	12,700	0	0	0	0
Rosedale-Rio Bravo (6) (7)	5,000	15,000	15,000	15,000	15,000
Semitropic Water Bank – Newhall Land (12)	4,950	4,950	4,950	4,950	4,950
Total Existing Banking Programs	22,650	19,950	19,950	19,950	19,950
Planned Supplies					
Local Supplies					
Groundwater	6,500	6,500	6,500	6,500	6,500
Restored wells (Saugus Formation) (4)	6,500	6,500	5,000	5,000	5,000
New Wells (Saugus Formation) (4)	0	0	1,500	1,500	1,500
Recycled Water (5)	0	1,600	6,300	11,000	15,700
Recycled Water - Newhall Ranch	0	1,500	2,500	3,500	5,400
Total Planned Supplies	6,500	9,600	15,300	21,000	27,600
Planned Banking Programs					
Additional Planned Banking (7) (8)	0	5,000	15,000	15,000	15,000
Total Planned Banking Programs	0	5,000	15,000	15,000	15,000
Total Existing and Planned Supplies and Banking	124,835	130,235	146,547	152,247	158,847
Total Estimated Demand (w/o conservation) (9) (10)	110,100	120,300	128,900	141,200	152,100
Conservation (11)	(9,500)	(10,700)	(11,700)	(13,100)	(14,200)
Total Adjusted Demand	100,600	109,600	117,200	128,100	137,900

1. Supplies shown are annual averages over four consecutive dry years (unless otherwise noted). Figures shown in red represent changes from the 2005 UWMP due to the Draft State Water Project Delivery Reliability Report 2009. Figures shown in blue are additional sources of supply identified since the 2005 UWMP.
2. SWP supplies are calculated by multiplying CLWA's Table A Amount of 95,200 af by percentages of average deliveries projected to be available during the worst case four-year drought of 1931-1934 as provided in Tables 6-4 and 6-13 of DWR's "State Water Project Delivery Reliability Report 2009." Year 2030 figure is calculated by multiplying by DWR's 2029 percentage of 35%.
3. Based on total amount of storage available divided by 4 (4-year dry period). Initial term of the Ventura County entities' flexible storage account is ten years (from 2006 to 2015).
4. Total Saugus pumping is the average annual amount that would be pumped under the groundwater operating plan, as summarized in Table 3-6 of the 2005 UWMP ([11,000+15,000+25,000+35,000]/4).
5. Recycled water supplies based on projections provided in CLWA's 2005 UWMP Chapter 4, Recycled Water.
6. CLWA has 64,898 af of recoverable water as of 12/31/09 in the Rosedale-Rio Bravo Water Banking and Recovery Program.
7. Average dry year period supplies could be up to 20,000 af for each program depending on storage amounts at the beginning of the dry period.
8. Assumes additional planned banking supplies available by 2014.
9. Assumes increase in total demand of 10 percent during dry years.
10. Demands are for uses within the existing CLWA service area. Demands for any annexations to the CLWA service area are not included.
11. Assumes 10 percent reduction on urban portion of total normal year demand resulting from conservation best management practices ([urban portion of total normal year demand x 1.10] * 0.10), as discussed in CLWA's 2005 UWMP, Chapter 7.
12. Delivery of stored water from the Newhall Land Semitropic Groundwater Bank requires further agreements between CLWA and Newhall Land.

Interconnection Agreement Between County Sanitation Districts Nos. 26 and 32 of Los Angeles County and the Newhall Land and Farming Company

CSD Contr#3868

AGREEMENT

BETWEEN COUNTY SANITATION DISTRICTS NOS. 26 AND 32 OF LOS ANGELES COUNTY AND THE NEWHALL LAND AND FARMING COMPANY REGARDING A PLAN FOR THE COORDINATION OF WASTEWATER MANAGEMENT FACILITIES RELATING TO THE NEWHALL RANCH SPECIFIC PLAN DEVELOPMENT

This Agreement is made and entered into this 9th day of January, 2002, by and between **County Sanitation Districts Nos. 26 and 32 of Los Angeles County** (collectively **Districts** and individually **District No. 26** or **District No. 32**, respectively), special districts organized and existing pursuant to the County Sanitation District Act, California Health and Safety Code Sections 4700 et seq., and **The Newhall Land and Farming Company (NLFC)**, a California limited partnership.

RECITALS

1. NLFC owns land in unincorporated Los Angeles County adjacent to and west of the Districts and is proposing to construct a new development pursuant to the Newhall Ranch Specific Plan.

2. NLFC is currently planning, designing, and engineering the wastewater conveyance, treatment and disposal systems to serve the Newhall Ranch Specific Plan development.

3. A site for a new wastewater treatment plant within the proposed development area is identified in the Newhall Ranch Specific Plan.

4. NLFC has proposed the formation of a new county sanitation district to provide wastewater management services for the Newhall Ranch Specific Plan area pursuant to the County Sanitation District Act of 1923 and the Cortese-Knox-Hertzberg Reorganization Act of 2000.

5. The Districts currently provide wastewater management services for areas immediately adjacent to the Newhall Ranch Specific Plan area.

6. The Districts, together with all of the other County Sanitation Districts of Los Angeles County, are signatory to the "Amended Joint Administration Agreement," effective July 1, 1980, (JAA) providing for the joint management, administration and staffing of the signatory districts.

002556

7. The Districts are signatory to the "Joint Powers Agreement for a Regional Sewerage System in the Santa Clarita Valley," effective May 8, 1984, (SCVJSSA), which provides for the joint operation of the wastewater management facilities within the Districts.

8. There are benefits in coordinating the wastewater management services between the Districts and the areas that would be served by a new county sanitation district. To this end, NLFC and the Districts have previously entered into a Reimbursement Agreement to cover the expenses for joint planning of wastewater management facilities.

9. It is desirable to prepare a plan for coordinated wastewater management facilities prior to the formation of the new county sanitation district. This plan will serve as a "road map" for the formation of the new county sanitation district and its subsequent operation.

10. The anticipated total flow originating from within the boundaries of the new county sanitation district is 6.9 million gallons per day (mgd).

NOW, THEREFORE, in consideration of the promises and mutual covenants herein contained, the parties hereto agree as follows:

I. FORMATION AND GOVERNING AGREEMENTS

A. NLFC shall request that the Los Angeles County Board of Supervisors petition the Local Agency Formation Commission (LAFCO) to:

1. approve the formation of a new county sanitation district; and

2. use the terms of this Agreement as a guide for the preparation of the conditions of formation for the new county sanitation district; and

3. require, as conditions of the formation, that the new county sanitation district make formal application to the Districts:

a. to become signatory to the JAA, and

b. to enter into an agreement substantially similar to the existing SCVJSSA regarding the ownership and operation of wastewater management facilities in the Santa Clarita Valley.

NLFC shall be responsible for preparing and submitting any necessary documents requested by the Board of Supervisors to complete the petition for formation. The Districts shall provide assistance and information to LAFCO and NLFC as requested.

B. The agreement specified in Section I.A.3.b shall be functionally the same as the existing SCVJSSA attached as Exhibit A hereto, except that it shall contain the following modifications:

1. All existing and future treatment and disposal facilities and all existing and future conveyance facilities that carry wastewater from more than one District shall be jointly owned by all of the parties signatory to the modified SCVJSSA. These jointly owned facilities shall be referred to as the Santa Clarita Valley Joint Sewerage System (SCVJSS). The rights to use these facilities shall be on a first-come, first-serve basis, except as provided below:

   a. The new county sanitation district, at its own cost and expense, shall have the right to build and use up to 6.9 mgd of capacity at the site identified in the Newhall Ranch Specific Plan for the proposed Newhall Ranch Water Reclamation Plant (NRWRP).

   b. The new county sanitation district shall have limited rights to use capacity at the Valencia Water Reclamation Plant (VWRP), pursuant to Section II.

2. The cost of operating the jointly owned facilities shall be apportioned to each party on the basis of the number of sewage units, as that term is defined in the JAA, attributable to that party's use of the wastewater management facilities. Any costs not attributable to jointly owned facilities shall be the sole responsibility of the party that caused those costs to be incurred.

3. The decision to expand the capacity of the NRWRP shall only require the approval of one party to the modified SCVJSSA until the new county

sanitation district uses 6.9 mgd of capacity in the SCVJSS. After the new county sanitation district uses 6.9 mgd of capacity in the SCVJSS, the decision to expand the capacity of the NRWRP shall require majority approval.

II. INITIAL CONNECTION OF DISCHARGERS IN THE NEW COUNTY SANITATION DISTRICT

A. NLFC shall be allowed to connect parcels located within the new county sanitation district to the SCVJSSA with a discharge of up to 3,000 capacity units, upon compliance with all of the following conditions:

1. The new county sanitation district is formed.

2. The new county sanitation district becomes a party to both the JAA and modified SCVJSSA with the consent of the other parties thereto.

3. The new county sanitation district has enacted appropriate connection fee ordinances providing for the new county sanitation district to pay into the SCVJSS Capital Improvement Fund the same amount for each discharger within the new county sanitation district that District No. 32 would have paid into the SCVJSS Capital Improvement Fund if that discharger had been located within District No. 32.

4. The new county sanitation district and NLFC have executed an agreement pertaining to the initial management expenses pursuant to Section VIII.

5. NLFC conveys title to 21.5 acres of land to the new county sanitation district for siting the NRWRP.

B. In addition to the 3,000 capacity units allowed in Section II.A, NLFC shall be allowed to connect additional parcels with a discharge of up to 3,000 capacity units provided that:

1. The conditions of Section II.A are fulfilled.

2. An NPDES permit has been obtained for the initial 2 mgd stage of the NRWRP, pursuant to the terms of Section III of this Agreement.

III. NEWHALL RANCH WATER RECLAMATION PLANT

A. NLFC will design and obtain necessary permits from the Regional Water Quality Control Board for, and fund construction of, the initial 2 mgd stage of the NRWRP, including any necessary agreements or facilities for effluent disposal.

B. The initial 2 mgd stage of the NRWRP will be designed and permitted to have an effluent disposal system independent of the existing Districts' facilities, discharging either directly to the river or other permitted place of discharge or reuse. When the initial 2 mgd stage of the NRWRP is designed and permitted, a plan will be put in place to guarantee the discharge of up to 6.9 mgd of effluent to be disposed or reused in a manner similar to the first 2 mgd. This plan will be subject to the review and approval of the Districts' Chief Engineer and General Manager (Chief Engineer). This plan will include an agreement with the reclaimed water purveying agency to take effluent from the NRWRP. The Districts will allow, under terms agreeable to the Districts, available reclaimed water from the VWRP to be taken by a reclaimed water purveying agency for use on Newhall Ranch.

C. Upon completion of the construction of the initial 2 mgd stage of the NRWRP and a successful demonstration of its operation, the NRWRP shall become a jointly owned facility of the Districts and the new county sanitation district, and the Districts and the new county sanitation district will assume ownership of and responsibility for the operation and maintenance of the NRWRP and for future expansions of the NRWRP.

D. NLFC agrees to compensate the SCVJSS for any costs incurred by the SCVJSS to make the initial 2 mgd stage of the NRWRP compliant with any of the permits required for the operation and maintenance thereof if, upon initial start up and operation, it is unable to meet its permit conditions or requirements. The SCVJSS shall be responsible for bringing the NRWRP into compliance with any future changes to permit conditions or requirements.

IV. MANAGEMENT OF THE SANTA CLARITA VALLEY JOINT SEWERAGE SYSTEM

A. Upon acceptance of the initial 2 mgd stage of the NRWRP by the SCVJSS, the Chief Engineer shall have the right to divert flow from the Districts to the NRWRP as he deems necessary for the proper and economic operation of the NRWRP and the SCVJSS as a whole.

B. Upon the initial 2 mgd stage of the NRWRP becoming a SCVJSS facility, the SCVJSS shall be responsible for future expansions of the NRWRP except that the new county sanitation district will retain its right to construct up to 6.9 mgd of capacity at the NRWRP site at its own cost and expense pursuant to Section 1.B. The SCVJSS shall be relieved of this responsibility to construct additional capacity for the use of the new county sanitation district if insufficient disposal capacity exists for the proposed NRWRP expansion.

V. CONVEYANCE FACILITIES

A. NLFC will design, fund, and construct a sewer system to collect and convey all of the wastewater to be generated within the new county sanitation district to the proposed NRWRP.

B. NLFC will design, fund, and construct all sewers, pumping plants, or force mains required to convey any flow generated within the new county sanitation district that will be treated at the VWRP.

C. The Chief Engineer will identify those sewers, pumping plants, and force mains that will be owned and operated by the new county sanitation district or the SCVJSS during the review of the design for the sewer system. Sewers that will be owned by the new county sanitation district or the SCVJSS will be designated trunk sewers. Generally, an individual district or the SCVJSS will assume ownership of and operation and maintenance responsibilities for any sewers 18 inches in diameter and larger. The design of all sewers, pumping plants, and force mains to be owned by the new county sanitation district or the SCVJSS shall be subject to the design review and approval of the Chief Engineer.

D. NLFC will be responsible for operation and maintenance of the local sewers, pumping plants, and force mains, or transfer these responsibilities to another party willing to assume that responsibility.

E. If, during the design review, the Chief Engineer determines that the trunk sewers, pumping plants, or force mains should be increased in size for uses other than those in the new county sanitation district, then NLFC shall construct these facilities with the increased capacity specified by the Chief Engineer, subject to the reimbursement provisions, below.

VI. REIMBURSEMENT

A. NLFC shall be reimbursed for its costs for the design, permitting, and construction of the initial 2 mgd stage of the NRWRP and the conveyance system.

1. NLFC's reimbursable costs for the initial 2 mgd stage of the NRWRP shall be determined as follows:

   a. The costs for the construction shall be based on the amount approved by Chief Engineer.

   b. The costs for the design and planning (including permitting) shall be based on the amount of the construction contract and the allowance factors utilized under the State Revolving Fund (SRF) loan program.

   c. The costs for the site improvements shall be based upon the difference between the cost of the site improvements for all 21.5 acres and the cost to improve the site to accommodate a 6.9 mgd treatment facility.

2. The costs for the conveyance facilities related to upsizing requested by the Chief Engineer shall be based on the difference between the actual cost of the conveyance facilities as designed and constructed, and the Chief Engineer's determination of the estimated cost for design and construction of the conveyance facilities if upsizing had not been requested by the Chief Engineer.

3. The costs for the conveyance system not related to upsizing shall be based upon the difference between the actual cost of the conveyance system designed and constructed, excluding the cost of upsizing, as calculated in accordance with Section VI.A.2, and the Chief Engineer's determination of the estimated cost to design and construct a conveyance system to serve the initial stages of the Newhall Ranch Specific Plan development. The size of the conveyance system required to support the initial stages of the Newhall Ranch Specific Plan Development shall be determined by the parties hereto, including the new county sanitation district if already formed, following the completion of design.

4. The reimbursement of costs and expenses related to the construction of the initial 2 mgd stage of the NRWRP shall be in the form of:

   a. A cash payment equivalent to the amount of the connection fees paid for up to 3,000 capacity units connected pursuant to Section II.B during construction of the initial 2 mgd stage of the NRWRP. This payment shall be made at the time the NRWRP becomes a jointly owned facility of the new county sanitation district and the Districts pursuant to Section III.C.

   b. Credits to be applied against connection fees imposed by the new county sanitation district on connections made after the NRWRP becomes a jointly owned facility of the new county sanitation district and the Districts pursuant to Section III.C.

   For purposes of this Section, no credit or reimbursement shall be given for costs that were financed pursuant to Section VII of this Agreement.

5. The reimbursement for costs related to upsizing of the conveyance system requested by the Chief Engineer shall be, at the option of NLFC, in the form of either a credit to be applied against future connection fees imposed by the new county sanitation district or a cash payment.

6. The reimbursement for costs for conveyance facilities for the new county sanitation district not related to upsizing requested by the Chief Engineer

shall be in the form of a credit to be applied against future connection fees imposed by the new county sanitation district.

VII. STATE REVOLVING FUND LOANS

NLFC and the Districts agree to cooperate and use their best efforts to obtain low interest State Revolving Fund (SRF) loans to fund construction of the initial 2 mgd stage of the NRWRP. NLFC shall guarantee repayment of debt service if the connection fee revenue in the new county sanitation district is insufficient to meet the annual debt repayment.

VIII. INITIAL MANAGEMENT COSTS FOR THE NEW COUNTY SANITATION DISTRICT

NLFC agrees to pay the new county sanitation district for all costs related to operation of the new county sanitation district until the new county sanitation district begins collecting user fees adequate to fund its ongoing obligations. Terms for this agreement, including reimbursement, will be delineated in an agreement between NLFC and the new county sanitation district following its formation.

IX. CHLORIDE CONTROL MEASURES

A. NLFC shall support the efforts of both the new county sanitation district and the Districts (i) to implement ordinances regarding the control of chlorides; (ii) to defend the ordinances regulating chlorides against any legal or political challenges; and (iii) to implement or change chloride related legislation or regulatory requirements. As part of its assistance, NLFC shall not unreasonably withhold approval for the Districts to utilize lands owned by NLFC for a chloride threshold evaluation study.

B. NLFC will use its best efforts to assist in providing information to residential and commercial properties in the new sanitation district concerning regulations and issues pertaining to the control of chlorides.

X. FAILURE TO IMPLEMENT/COMPLY

A. If, following formation of the new county sanitation district, the new county sanitation district fails to make formal application to become signatory to the JAA, or refuses to sign the JAA, this Agreement shall terminate, except that NLFC shall

continue to be responsible for any cost or expense incurred by the Districts pursuant to the terms of the Reimbursement Agreement. If any of the other County Sanitation Districts of Los Angeles County refuse to allow the new county sanitation district to become a party to the JAA, this Agreement shall terminate, except that NLFC shall continue to be responsible for any cost or expense incurred by the Districts pursuant to the terms of the Reimbursement Agreement and the Districts shall continue to be responsible for reimbursing NLFC for any cost or expense incurred on behalf of the Districts pursuant to Section V.E of this Agreement.

B. If, following the formation of the new county sanitation district, the new county sanitation district fails to request that the Districts enter into an agreement substantially similar to the SCVJSSA or refuses to sign such an agreement, this Agreement shall terminate, except that NLFC shall continue to be responsible for any cost or expense incurred by the Districts pursuant to the terms of the Reimbursement Agreement. If the Districts refuse to enter into such an agreement with the new county sanitation district, this Agreement shall terminate, except that NLFC shall continue to be responsible for any cost or expense incurred by the Districts pursuant to the terms of the Reimbursement Agreement and Districts shall continue to be responsible for reimbursing NLFC for any upsizing cost or expense incurred on behalf of the Districts pursuant to Section V.E of this Agreement.

C. If NLFC fails to obtain an NPDES permit pursuant to the terms of Sections II and III of this Agreement, then NLFC shall pay to the Districts the full amount of the fees required to annex to District No. 32 any parcels that have been connected pursuant to Section II, and this Agreement shall terminate except that the Districts shall retain title to any lands transferred pursuant to Section II.

XI. EXCLUSIVE REMEDY

The parties to this agreement understand and agree that if the Districts or the SCVJSSA are unable, for reasons beyond their control, to construct further stages of the NRWRP, NLFC's sole and exclusive remedy is to construct or request the new county sanitation district to construct any needed capacity for the Newhall Ranch Specific Plan development at the NRWRP.

XII. ASSIGNMENT

Any of the parties may assign their interests in this Agreement to a third party with the approval of the other parties. This approval shall not be unreasonably withheld. NLFC hereby consents and approves any assignment by the Districts to any of the other County Sanitation Districts of Los Angeles County.

XIII. INDEMNIFICATION

A. NLFC agrees that neither the Districts, nor any of their officers, directors, or employees shall be liable for any costs or expenses arising out of NLFC's performance of its duties under the terms of this Agreement including, but not limited to, the formation of the new county sanitation district, the transfer of property related to the siting of the NRWRP, and the design and permitting of the initial 2 mgd stage of the NRWRP. NLFC shall fully indemnify and hold the Districts harmless from any and all claims, actions, liabilities, costs or expenses arising out of NLFC's performance of this Agreement, including reasonable attorneys fees, losses and/or liabilities incurred by the Districts as a result thereof.

B. NLFC agrees that neither the Districts, nor the SCVJSSA, nor any of their officers, directors, or employees shall have any liability to NLFC or its successors or assigns or otherwise have any responsibility to NLFC if, after assuming ownership and operation of the NRWRP, the SCVJSS is unable, for reasons beyond its immediate control, to construct further expansions of the NRWRP. NLFC shall hold the Districts and the SCVJSS harmless from any and all costs, expenses, and/or losses resulting from NLFC's inability to develop its holdings within the new county sanitation district under such conditions.

C. The Districts agree that neither NLFC, nor any of its officers, directors, or employees shall be responsible for any claims, liability, demands or actions arising out of the operation of the NRWRP once the SCVJSS has assumed ownership. It is also understood and agreed that the Districts shall fully indemnify and hold NLFC harmless from any and all costs or expenses incurred, including reasonable attorneys fees, losses and/or liability attributable to any such claims resulting from the Districts' actions unless otherwise provided for in this Agreement.

XIV. MISCELLANEOUS

A. Entire Agreement. This Agreement (i) contains, and is intended as, a complete statement of all the terms of the arrangements of the parties with respect to the matters provided for herein; (ii) supersedes any previous agreements, written or oral, and understandings among the parties with regard to those matters; and (iii) cannot be changed or terminated orally. Notwithstanding the foregoing, the parties acknowledge that the provisions of any other valid mutual written agreements shall remain in full force and effect.

B. Waiver. Any party may waive compliance by the other party with respect to any provisions of this Agreement. No waiver of any provision shall be construed as a waiver of any other provision. No waiver shall be construed as an ongoing waiver with respect to subsequent events unless it expressly so provides. Any waiver must be in writing, signed by the waiving party and recite the provisions being waived.

C. Binding Effect. Subject to the terms and conditions elsewhere in this Agreement, this Agreement shall be binding upon and inure to the benefit of the parties and their respective successors and assigns. Except for rights created pursuant to the indemnity provisions of this Agreement, nothing in this Agreement shall create or be deemed to create any third party beneficiary rights of any person or entity not a party to this Agreement.

D. Duplicate Originals. This Agreement shall be executed in duplicate originals.

E. Further Assurances. Upon request by any party, the parties covenant, at any time and from time to time, to cooperate reasonably with each other and take all such further actions, including without limitation the execution and filing of additional instruments or documents, as may be reasonably necessary to carry out the intent, purposes and terms of this Agreement. Such cooperation shall be exercised in good faith with respect to any additional instruments or documents that may be necessary to carry out the intent, purposes, and terms of this Agreement, and any such additional instruments or documents shall be reviewed on their own merits, and not as a basis for the introduction of unrelated matters, nor require any additional consideration.

F. Applicable Law. This Agreement shall be construed in accordance with the laws of the State of California. Venue for any proceeding shall be the Superior Court of Los Angeles County.

G. Incorporation of Recitals. The Recitals to this Agreement are incorporated herein by this reference and are acknowledged by the parties to be true and correct.

H. Action By The Chief Engineer. Except as otherwise provided in this Agreement, the Chief Engineer shall have the authority to take all actions on behalf of the Districts in connection with any approvals or actions required of or by the Districts under this Agreement.

I. No Joint Venture. This Agreement does not constitute and shall not be construed as constituting a partnership or joint venture between the Districts and NLFC in any matter whatsoever.

J. Construction/Interpretation. The parties to this Agreement acknowledge that they have been represented by counsel in respect of the negotiation and drafting of this Agreement, and that no term, covenant or condition of this Agreement shall be construed or interpreted by reference to the extent to which either party participated in the drafting of the Agreement, or any party thereof.

K. Attorneys' Fees. In any action or proceeding arising under this Agreement, or to enforce the provisions of this Agreement, the parties shall bear their own attorneys' fees and costs.

L. Amendments in Writing/Cooperation. This Agreement may be amended or modified, but only in writing, duly executed by the parties to this Agreement. The parties shall cooperate in good faith with respect to any amendment or modification proposed in order to clarify the intent and application of this Agreement, and shall treat any such proposal on its own merits, and not as a basis for the introduction of unrelated matters.

M. Time of Essence. Time is of the essence in the performance of the provisions of this Agreement.

N. Notices. All notices, requests, demands, or other communications under this Agreement shall be in writing (except for any emergency notice, which must be followed by written notice as soon as reasonably possible but in no event more than twenty-four (24) hours from the oral notice) and sent to the addressees of each party. Notice will be sufficiently given for all purposes as follows:

PERSONAL DELIVERY: When personally delivered to the recipient. Notice is effective on delivery.

FIRST-CLASS MAIL: When mailed first-class to the last address of the recipient known to the party giving notice. Notice is effective five mail delivery days after it is deposited in a United States Postal Service office or mailbox.

CERTIFIED MAIL: When mailed certified mail, return receipt requested. Notice is effective on receipt, if a return receipt confirms delivery.

OVERNIGHT DELIVERY: When delivery by an overnight delivery service such as Federal Express, charged prepaid or charged to the sender's account. Notice is effective on delivery, if delivery is confirmed by the delivery service.

FACSIMILE DELIVERY: When transmitted by facsimile to a party's fax number, a written notice shall be contemporaneously sent by personal delivery, first-class mail, certified mail or overnight delivery. A facsimile notice is effective if received within the hours of 8:00 a.m. to 4:00 p.m. (local time of the recipient) during the business day and a transmission report is generated reflecting the accurate transmission of this facsimile. If a facsimile is received at any other time, it shall be deemed received the next business day. A "business day" shall be Monday through Friday except for any holiday recognized by the Districts.

Addresses for purpose of giving notice are as follows:

DISTRICTS:

Mr. James F. Stahl
Chief Engineer and General Manager
County Sanitation Districts of Los Angeles County
1955 Workman Mill Road
Whittier, CA 90601-1400
Post Office Box 4998
Whittier, CA 90607-4998
Facsimile No.: (562) 695-8660

COPY TO:

B. Richard Marsh, Esq.
Daniel V. Hyde, Esq.
Lewis, D'Amato, Brisbois & Bisgaard LLP
221 North Figueroa Street, Suite 1200
Los Angeles, CA 90012
Facsimile No.: (213) 250-7900

NLFC:

Steven Zimmer
Vice President
The Newhall Land and Farming Company
23823 Valencia Boulevard
Valencia, CA 91355
Facsimile No.: (661) 288-1052

IN WITNESS HEREOF, THE NEWHALL LAND AND FARMING COMPANY AND COUNTY SANITATION DISTRICTS NOS. 26 AND 32 OF LOS ANGELES COUNTY hereby cause this Agreement to be executed and agree to be bound by the terms and conditions set forth herein.

THE NEWHALL LAND AND FARMING COMPANY (A CALIFORNIA LIMITED PARTNERSHIP)

By: Newhall Management Limited Partnership, a California limited partnership, Its Managing General Partner

By: Newhall Management Corporation, a California corporation, Its Managing General Partner

By: _____
Its Vice President

By: _____
Its Assistant Secretary

ATTEST:

COUNTY SANITATION DISTRICT NO. 26 OF LOS ANGELES COUNTY

By: M. Alma Horvath
Secretary

By: Jo Anne Darcy
Chairperson, Board of Directors
JAN 0 9 2002

APPROVED AS TO FORM:
LEWIS, D'AMATO, BRISBOIS & BISGAARD, LLP

By: Daniel V. Hyde
District Counsel

ATTEST:

COUNTY SANITATION DISTRICT NO. 32 OF LOS ANGELES COUNTY

By: M. Alma Horvath
Secretary

By: Jo Anne Darcy
Chairperson, Board of Directors
JAN 0 9 2002

APPROVED AS TO FORM:
LEWIS, D'AMATO, BRISBOIS & BISGAARD, LLP

By: Daniel V. Hyde
District Counsel

APPENDIX A

Joint Powers Agreement for a Regional Sewerage System
in the Santa Clarita Valley

COSTR # 2694

JOINT POWERS AGREEMENT FOR A REGIONAL SEWERAGE SYSTEM IN THE SANTA CLARITA VALLEY

THIS AGREEMENT is made and entered into this 8th day of May, 1984 by and between

COUNTY SANITATION DISTRICT NO. 26 OF LOS ANGELES COUNTY, hereinafter referred to as "DISTRICT NO. 26", and

COUNTY SANITATION DISTRICT NO. 32 OF LOS ANGELES COUNTY, hereinafter referred to as "DISTRICT NO. 32".

WITNESSETH

WHEREAS, pursuant to the provisions of the County Sanitation District Act of 1923 (Chapter 3, Part 3, Division 5, of the Health and Safety Code of the State of California), DISTRICT NO. 26 and DISTRICT NO. 32, hereinafter referred to collectively as the "Districts", have heretofore acquired necessary lands and rights-of-way and have carried out the construction of a sewage collection and treatment system to serve certain areas in the Santa Clarita Valley; and

WHEREAS, the Districts and their potential areas for annexation and expansion lie in the same drainage basin; and

WHEREAS, the projected wastewater flow from future development in the drainage basin exceeds the existing capacity of the treatment plants in both Districts; and

WHEREAS, the nature of the land adjacent to the Saugus Water Reclamation Plant (District No. 26) limits the area available for construction of expanded treatment works; and

WHEREAS, the Valencia Water Reclamation Plant (District No. 32) site has suitable land adequate in size for the construction of a regional treatment plant that would meet the needs of both Districts; and

WHEREAS, the wastewater flows attributable to both Districts can be managed most efficiently and economically through the creation and operation of a regional sewerage system; and

WHEREAS, the Districts entered into an Interim Joint Sewage Disposal Agreement dated April 24, 1979, which provided for the short-term disposal needs of both Districts and provided for the preparation of a facilities plan to assist in the development of a long-term regional wastewater treatment and disposal plan; and

WHEREAS, the Districts prepared a facilities plan dated April 1980, setting forth the long-term needs and solutions for the provision of adequate wastewater conveyance, treatment, and disposal facilities for both Districts; and

WHEREAS, it is the intent of the Districts to jointly finance, construct, and operate the regional conveyance, treatment, and disposal facilities necessary to provide for the long-term needs of the Districts;

NOW, THEREFORE, it is hereby agreed as follows:

1. DEFINITIONS

As used in this Agreement, the following terms shall have the meanings herein set forth:

a. Capital Improvement Fund

A separate fund for which any monies deposited therein and any interest derived thereon are to be used exclusively for payment of capital facilities, either local sewerage facilities or Santa Clarita Valley Joint Sewerage System facilities, as hereinafter defined.

b. Capital Costs

All expenditures made for the acquisition of or addition to fixed assets and all allocations to a fund for such purposes.

c. Chief Engineer

The Chief Engineer and General Manager of District No. 26 and District 32 or his duly authorized deputy or agent.

d. Connection Fee Ordinance(s)

Connection fee ordinance(s) shall refer to the "Connection Fee Ordinance for County Sanitation District No. 26 of Los Angeles County" adopted January 12, 1984 and as thereafter amended; and to the "Connection Fee Ordinance for County Sanitation District No. 32 of Los Angeles County", adopted January 12, 1984 and as thereafter amended.

e. Local Costs

Costs expended for the acquisition, construction, repair, replacement, reconstruction, and operation and maintenance of local sewerage facilities, as hereinafter defined.

f. Local Sewerage Facilities

Those sewer lines or portions thereof, pumping plants, and other sewerage facilities utilized solely by one District, and which serve to benefit only that District, and which have not been defined as part of the Santa Clarita Valley Joint Sewerage System, as hereinafter defined.

g. Joint Costs

Costs expended for the acquisition, construction, repair, replacement, reconstruction, and operation and maintenance of the Santa Clarita Valley Joint Sewerage System, as hereinafter defined.

h. Operation and Maintenance

The operation and maintenance of, and the repair, replacement, and upkeep of all sewerage facilities inclusive of all expenses incidental thereto.

i. Santa Clarita Valley Joint Sewerage System

The system of wastewater collection, treatment, and disposal facilities that provides a benefit to more than one District, which will initially consist of the facilities defined in Exhibit I; and as those facilities may from time to time be modified or expanded.

j. Service Charge Ordinance(s)

Service Charge Ordinance(s) shall refer to the "1983 Service Charge Ordinance of County Sanitation District No. 26", adopted April 12, 1983, and as thereafter amended; and to the "1983 Service Charge Ordinance of County Sanitation District No. 32", adopted April 12, 1983, and as thereafter amended.

k. Sewage Unit

The average daily quantity of sewage flow and strength from a single family home measured in terms of flow, chemical oxygen demand, and suspended solids as defined in the Service Charge Ordinance.

l. Surcharge Revenue

The revenue derived from the Wastewater Treatment Surcharge Program as provided in the Wastewater Ordinance, as hereinafter defined.

m. Wastewater Ordinance

An ordinance providing for the administration of an industrial wastewater control system, for regulating sewer construction or use, for the imposition of a permit requirement for industrial wastewater dischargers, for the prohibition or pretreatment of industrial wastewaters, for the imposition of fees and charges for the distribution of revenue and for other methods of controlling and regulating the discharge of wastewaters, adopted April 1, 1972, as amended July 1, 1980 and as thereafter amended.

2. ESTABLISHMENT OF AND JOINT PARTICIPATION IN A REGIONAL SEWERAGE SYSTEM

The parties hereto shall participate jointly according to proportions hereinafter specified in the acquisition, construction, ownership, mainte-

nance, and operation of the system of main trunk sewers, pumping plants, treatment plants, and sanitation works herein referred to as the "Santa Clarita Valley Joint Sewerage System" including the parts heretofore acquired or which may hereafter be acquired and/or constructed; and to pay for such ownership, maintenance, and operation in the manner hereinafter specified.

District No. 26 and District No. 32, together with other County Sanitation Districts of Los Angeles County, entered into an Amended Joint Administration Agreement on July 1, 1980, providing for a single and centralized administrative organization. District No. 26 and District No. 32 agree that this Joint Powers Agreement shall be administered and executed pursuant to the provisions of said Amended Joint Administration Agreement.

All contracts for construction of Santa Clarita Valley Joint Sewerage System facilities shall be awarded and administered by the District in which the facilities will be located. However, no such contract shall be awarded without the approval of both Districts.

3. CAPITAL IMPROVEMENT FUND

Each District shall establish a capital improvement fund, hereinafter referred to as the "Local Capital Improvement Fund", which shall be solely owned and maintained by that District. The Districts shall also establish a capital improvement fund, hereinafter referred to as the "Joint Capital Improvement Fund," which shall be jointly owned and maintained by both Districts.

All connection fees, as provided for in the connection fee ordinances, shall be apportioned into local and joint shares. The allocation percentages for the local and joint shares shall be determined annually by the Chief Engineer and shall be based upon the percentages of the connection fee which are attributable to local and joint costs, respectively. The local share shall be deposited into the Local Capital Improvement Fund of the District which collected the funds and the joint share shall be deposited into the Joint Capital Improvement Fund. All interest shall remain with the capital improvement fund from which it was derived.

Any monies on deposit in the existing local capital improvement funds at the execution of this Agreement shall likewise be apportioned between the local and joint capital improvement funds established by this Agreement. The allocation percentages for this procedure shall be the same as those in effect at the time of execution of this Agreement.

No monies shall be withdrawn from the Joint Capital Improvement Fund without the approval of both Districts.

4. ALLOCATION OF COSTS ATTRIBUTABLE TO THE SANTA CLARITA VALLEY JOINT SEWERAGE SYSTEM

a. Operation and Maintenance

All costs for operations and maintenance which are attributable to the Santa Clarita Valley Joint Sewerage System shall be apportioned

to each District in the ratio that the number of sewage units originating from each District bears to the aggregate number of sewage units in both Districts. The Chief Engineer and General Manager shall determine annually the total number of sewage units attributable to each District.

b. Original Capital Construction

Each District agrees that certain facilities, described in Exhibit 2 hereof, would have been constructed irrespective of this Agreement. Both Districts agree to construct those same facilities and allocate costs for such facilities not funded through the Joint Capital Improvement Fund as set forth in Exhibit 2.

c. Expansion Capital

All capital costs for projects which increase the capacity of the Santa Clarita Valley Joint Sewerage System but do not provide a greater level of treatment or disposal shall be financed through the use of the Joint Capital Improvement Fund to the extent possible. If the cost of such a project exceeds the resources available in the Joint Capital Improvement Fund, the remaining cost shall be apportioned to each District in the ratio that the number of sewage units attributable to each District bears to the aggregate number of sewage units in both Districts.

d. Upgrade Capital

All capital costs for projects which provide a greater level of treatment or disposal but do not increase the capacity of the Santa Clarita Valley Joint Sewerage System shall be apportioned to each District in the ratio that the number of sewage units attributable to each District bears to the aggregate number of sewage units in both Districts. If the capacity of the Santa Clarita Valley Joint Sewerage System exceeds the requirements of both Districts at the time a contract for an upgrade capital project is awarded, the costs associated with the excess capacity shall be financed through the use of the Joint Capital Improvement Fund to the extent possible.

5. LOCAL SEWERAGE FACILITIES

All costs associated with local sewerage facilities shall be the responsibility of the District for whose benefit such costs are incurred, and shall not be allocated in any manner to the other District.

6. ALLOCATION OF REVENUES

a. Grants

All monies received as grants to be expended for capital projects associated with the Santa Clarita Valley Joint Sewerage System shall be apportioned to each District in the same ratio that the cost of

said projects is apportioned to each District as provided for in Article 4 hereof.

b. Joint Contract Revenue

All revenue which is derived from a Joint Contract for the disposal of sewage, brine, or industrial wastewater originating from outside of the Districts' boundaries, as hereinafter defined, shall be apportioned into joint and local shares based upon the ratio of the local and joint costs to the total costs incurred due to said contract. The allocation percentages shall be determined annually by the Chief Engineer. The local share of said revenue shall be given to the District which has incurred local costs in conjunction with the execution of said contract. The joint share shall be apportioned to each District according to the ratio of its obligation to pay for the operation and maintenance costs of the system as provided in Article 4 hereof.

c. Other Joint Revenues

All revenue received from the sale of sludge, effluent, surplus energy or other by-products or which otherwise arises out of the ownership or operation of any Santa Clarita Valley Joint Sewerage System facility shall be apportioned to each District according to the ratio of its obligation to pay for operation and maintenance cost of the system as provided for in Article 4 hereof.

d. Local Revenue

All other revenue including, but not limited to, ad valorem taxes, surcharge revenue derived pursuant to the Wastewater Ordinance, service charges, annexation fees, investment income, payments from local contracts as hereinafter defined, and local capital improvement fund monies shall remain with the District from which it originates.

7. DISPOSAL OF SEWAGE ORIGINATING OUTSIDE DISTRICTS

Each District undertakes and agrees that it will not permit or knowingly countenance the use of the Santa Clarita Valley Joint Sewerage System, directly or indirectly, for the disposal of sewage, brine, or industrial wastes originating outside of its territorial limits except in the manner, to the extent, and on the conditions agreed upon by both Districts. In the event, however, that the anticipated sewage units from said outside source do not exceed one-half of one percent (.5%) of the aggregate number of sewage units originating from both Districts, such agreement by both Districts shall not be required. Any disposal contract for which agreement is not required shall be considered a local contract and the sewage units received from such a contract shall be regarded as having originated from the District with which the contract is made for the purpose of determining the total number of sewage units attributable to that District.

Any disposal contract heretofore or hereafter entered into, for which the actual or anticipated sewage units exceeds one-half of one percent (0.5%)

of the aggregate number of sewage units originating from both Districts shall be considered a joint contract. The sewage units attributable to a joint contract shall be apportioned to each District in the ratio that the number of sewage units originating in each District bears to the aggregate number of sewage units originating in both Districts.

8. TITLE TO REAL PROPERTY

Fee title to real property required for the Santa Clarita Valley Joint Sewerage System for the use and benefit of both Districts shall be acquired by, and in the name of, the District in which the said real property is located, whether such acquisition is by purchase, condemnation, gift, or otherwise.

9. SETTLEMENT OF DISPUTE OR CONTROVERSY

Should any dispute or controversy arise in connection with the books, records, or accounts of either District pertaining to the Santa Clarita Valley Joint Sewerage System or in connection with the acquisition, construction, maintenance, operation, repair, reconstruction, or enlargement of the Santa Clarita Valley Joint Sewerage System, or in connection with any of the affairs or operation thereof, the Boards of Directors of the Districts shall appoint a mutually agreed upon arbitrator, and the determination of said arbitrator shall be binding and conclusive.

10. WITHDRAWAL

This Agreement and the Santa Clarita Valley Joint Sewerage System provided hereby shall continue in effect so long as it shall be in the interest of both Districts. If at any time it should cease to be in the interest of either District to continue as a party to this Agreement, and its Board of Directors shall so find and declare by resolution, it may withdraw herefrom and terminate its obligation hereunder after sixty (60) days notice in writing of its intention to do so, and by the full and complete discharge of all its debts and obligations hereunder for which it shall be or become liable up to the date of its withdrawal.

Disposition of all assets of the Santa Clarita Valley Joint Sewerage System shall be in proportion to the number of sewage units attributable to each District on the date of withdrawal.

11. EFFECTIVE DATE

This Agreement shall become effective on July 1, 1984.

12. TERMINATION OF PRIOR AGREEMENT

It is mutually agreed that, upon the effective date of this Agreement; the Interim Joint Sewage Disposal Agreement, dated April 24, 1979, shall terminate and be of no further force and effect but the parties to such Agreement shall nevertheless pay and discharge all obligations previously accrued thereunder.

IN WITNESS WHEREOF, the parties have executed this Agreement the date and year above set forth.

ATTEST:

By _____
Secretary

COUNTY SANITATION DISTRICT NO. 26
OF LOS ANGELES COUNTY

By _____
Chairman

ATTEST:

By _____
Secretary

COUNTY SANITATION DISTRICT NO. 32
OF LOS ANGELES COUNTY

By _____
Chairman

APPROVED AS TO FORM:

KNAPP, GROSSMAN & MARSH

By _____
B. Richard Marsh, Counsel
for County Sanitation Districts
of Los Angeles County

EXHIBIT 1

The following facilities shall be defined as being part of the Santa Clarita Valley Joint Sewerage System:

(1) Saugus Water Reclamation Plant

(2) Valencia Water Reclamation Plant

(3) District 26 Interceptor

(4) District 32 Main, Sections 1 and 2

(5) Saugus Water Reclamation Plant Waste Activated Sludge Force Main

EXHIBIT 2

Per Article 4b of this Agreement, the facilities to be constructed are as follows:

Saugus Water Reclamation Plant (WRP) Filtration and Chlorination Facilities (Existing plant to be upgraded to advanced treatment):

- Primary sedimentation tank
- Return sludge pumps
- Waste activated sludge pump
- Filters with filter feed and backwash pump stations
- Filter waste backwash recovery tanks
- Chlorine contact tank
- Chlorination/dechlorination systems
- Alum/Polymer systems and appurtenances
- Standby power
- High pressure effluent system
- Office/lab addition

Saugus WRP Waste Activated Sludge Force Main (will convey waste activated sludge to the Valencia WRP):

- An approximately 14,900 L.F. force main

Valencia WRP Stage III Expansion (3.0 mgd expansion of plant capacity to receive additional flow):

- Influent pumps and metering
- Primary sedimentation tanks
- Aeration tank
- Final clarifier
- Return activated sludge pumps
- Waste activated sludge pumps
- Filters with filter feed pump station
- Waste backwash decant tank
- Chlorination/dechlorination equipment
- Maintenance building
- Effluent discharge line with meter
- High pressure effluent and non-potable water systems

Saugus/Valencia Solids Processing Facilities (construction of sludge digestion and dewatering facilities to handle solids from both District 26 and District 32):

- Dissolved air flotation thickener
- Anaerobic digesters
- Digester cleaning decant facility with submersible pump
- Digested sludge holding tanks
- Frame plate filter press and appurtenances

EXHIBIT 2 (cont.)

Filtrate equalization tank
Energy recovery system
Truck Maintenance Facility
Sludge Hauling Trucks

The Districts further agree to allocate the costs of these facilities according to the following percentages:

FACILITY	DISTRICT NO. 26 PERCENTAGE	DISTRICT NO. 32 PERCENTAGE
Saugus WRP Filtration and Chlorination Facilities	100%	0%
Saugus WRP Activated Sludge Force Main	100%	0%
Valencia WRP Stage III Expansion (2.0 mgd which is grant fundable)	100%	0%
Valencia WRP Stage III Expansion (1.0 mgd which is not grant fundable)	55%	45%
Anaerobic Digesters at Valencia WRP (7.0 mgd which is grant fundable)	100%	0%
Anaerobic Digesters at Valencia WRP (1.0 mgd which is not grant fundable)	55%	45%
Solids Processing Facility (excluding anaerobic digesters)	60%	40%
Draft Tubes for Existing Valencia WRP Digesters	0%	100%

SCVSD memorandum to the County Board of Supervisors, dated March 8, 2011

SANITATION DISTRICTS OF LOS ANGELES COUNTY

STEPHEN R. MAGUIN
Chief Engineer and General Manager

Memorandum

Date: March 8, 2011

To: Supervisor Michael D. Antonovich, Mayor
Supervisor Gloria Molina
Supervisor Mark Ridley-Thomas
Supervisor Zev Yaroslavsky
Supervisor Don Knabe

From: Stephen R. Maguin SR Maguin
Chief Engineer and General Manager

Subject: **Response to SCOPE Letter and Testimony to the Board of Supervisors Regarding Formation of the Newhall Ranch Sanitation District (January 18, 2011 Board Agenda Item 25)**

On January 18, 2011, the Board of Supervisors (Board) approved a motion by Supervisor Antonovich directing the Sanitation Districts (Districts) to prepare a memorandum that responds to the issues raised by the testimony of Ms. Lynne Plambeck and Ms. Cam Noltemeyer of the Santa Clarita Organization for Planning and the Environment (SCOPE), and the letter from Ms. Plambeck dated January 13, 2011 (both documents are attached with issues numbered).

The memorandum presents background information on the proposed Newhall Ranch Development and the prior actions by the County and the Districts that provide context for the issues raised. SCOPE's issues are shown in bold followed by the Districts' response.

I. Background

On March 23, 1999, and, again, on May 27, 2003, the Board certified the environmental documents (collectively, Newhall Ranch EIR) for the Newhall Ranch Specific Plan and Newhall Ranch Water Reclamation Plant (NRWRP). The certified Newhall Ranch EIR evaluated the NRWRP at a project level of detail, and the Board approved the NRWRP under Conditional Use Permit No. 94-087-(5). The NRWRP is to provide treatment of the wastewater generated within the Specific Plan area as well as produce recycled water for the Specific Plan area.

The environmental analysis of the NRWRP is found in Section 5.0 of the Newhall Ranch Revised Draft EIR (March 8, 1999) and Section 3.0 of the Newhall Ranch Revised Additional Analysis, Volume VIII (May 2003). Section 3.0 assessed and updated various NRWRP alternatives including the approved NRWRP site.

The Newhall Ranch EIR contained a mitigation measure (Mitigation Measure 5.0-52), also reflected in the adopted Mitigation Monitoring Plan, requiring formation of a county sanitation district for the Specific Plan area. To fulfill mitigation requirements and establish a logical plan for development of the new district and its infrastructure, the Newhall Land and Farming Company (NLFC) and Sanitation Districts Nos. 26 and 32, later consolidated as Santa Clarita Valley Sanitation District (SCVSD), entered into an agreement (Interconnection Agreement) dated January 9, 2002.

On December 13, 2005, the Board adopted the resolution of intent to form the county sanitation district to be known as the Newhall Ranch County Sanitation District (NRSD). The Board also approved an Addendum to the Newhall Ranch EIR and Additional Analysis, which evaluated the environmental effects of NRSD formation. The Addendum determined that formation of the NRSD would not result in new or substantially more severe environmental impacts than those discussed in the prior Newhall Ranch environmental documents.

Thereafter, the County initiated proceedings for the formation of the NRSD, pursuant to the Cortese-Knox-Hertzberg Local Government Reorganization Act of 2000. On June 14, 2006, the Local Agency Formation Commission (LAFCO) for Los Angeles County adopted a resolution approving formation of the NRSD. On July 27, 2006, LAFCO issued a Certificate of Completion for formation of the NRSD.

On January 18, 2011, the Board considered a resolution confirming formation of the NRSD within the scope of the previously certified Newhall Ranch EIR and Addendum. At the January 18, 2011 Board meeting, representatives from SCOPE expressed their concerns by oral testimony and a letter.

II. Districts' Responses to SCOPE's Issues

1. "**Without the construction of the Sanitation plant as required by the Newhall Ranch Specific Plan, the public will bear the burden of the expensive clean up of chlorides required to comply with the Clean Water Act. This will entail a sharp increase in sewer fees to the general public."**

   Discharge of Newhall Ranch wastewater to the Valencia Water Reclamation Plant (VWRP) would be temporary until construction of the Newhall Ranch Water Reclamation Plant (NRWRP). The Newhall Ranch wastewater would neither add nor alleviate the SCVSD's financial burden to comply with the Upper Santa Clara River Chloride Total Maximum Daily load (Chloride TMDL).

   The Interconnection Agreement sets conditions under which the first 6,000 homes in Newhall Ranch may temporarily discharge wastewater to the VWRP. The conditions include payment of the standard SCVSD connection fee (fair share of the cost of the existing infrastructure) and transfer of title of the 22-acre NRWRP site to the NRSD. Newhall Ranch residents also would pay the SCVSD an annual service charge to recover the full cost of treating their wastewater at the VWRP. Temporary treatment of wastewater at the VWRP would not eliminate the need for the developer to construct the NRWRP. Prior to building more than 6,000 homes, the developer must construct the NRWRP.

   When operating at flows equal to or below the permitted plant capacity, compliance with the Chloride TMDL will depend on the chloride concentration in the treatment plant effluent. This concentration results from two primary sources: chloride concentration of the local water supply, and increased chloride concentration due to use of the water by the community. Local groundwater is the planned potable water source for the Specific Plan's Landmark and Mission Villages, the two developments whose wastewater might be temporarily treated at the VWRP under the Interconnection Agreement. The groundwater chloride levels for those communities are similar to that of the groundwater used by existing Santa Clarita Valley communities. Thus, no difference in chloride concentration is expected due to the water supply.

   Like Santa Clarita, Newhall Ranch will be a mixture of residential, commercial and industrial land uses. Use of automatic water softeners (AWS) was a significant chloride source for SCVSD wastewater prior to the 2008 ban on AWS. Per Specific Plan mitigation measure 5.0-52(b), the Newhall Ranch developer must request that NRSD ban AWS in Newhall Ranch. Districts' staff will also recommend that NRSD enact an AWS ban similar to the ban in the SCVSD. Consequently, the two communities are expected to produce similar increases in chloride concentrations due to use and similar overall wastewater chloride concentrations. Since final compliance will be determined by concentration, the addition of Newhall Ranch wastewater to the VWRP would neither add to nor alleviate the SCVSD's financial burden to comply with the Chloride TMDL.

2. **"…In addition, the agreement between the Santa Clarita Valley Sanitation District of Los Angeles County (SCV) and Newhall Land and Farming allows up to 6,000 capacity units to be treated at existing SCV wastewater treatment facilities as needed during construction of the Newhall Ranch Water Reclamation Plant. SCV has sufficient capacity to accommodate the use of its facilities." This statement cannot be made because the County is currently in the middle of analyzing the impacts for the first tract maps of Newhall Ranch. No certified EIR exists on either the Landmark tract or the Mission Village**

tract, which comprise approximately 6,000 units. Further, there is not even a Development Monitoring System analysis for sewer capacity included in the Mission Village EIR as required by the Court Decision in 2003."

Certification of an EIR is not required to estimate future flows and determine whether there is available capacity at existing treatment facilities. The 2003 Court Ruling by Judge Randall (Case Number S-1500-CV-239324, RDR) does not specify any requirements regarding a Development Monitoring System (DMS) analysis.

Wastewater flow projections for the two Newhall Ranch communities have been reviewed by the Districts. Estimates are 0.3 million gallons per day (mgd) for Landmark Village and 1.0 mgd for Mission Village (collectively 1.3 mgd). The Interconnection Agreement allows for temporary treatment at VWRP for up to 6,000 homes (about 1.6 mgd). The VWRP treated approximately 15 mgd in 2010 and currently has a capacity of 21.6 mgd (yielding 6.6 mgd of surplus capacity). Thus, the VWRP has sufficient capacity to accommodate the temporary use of its facilities as stated in the staff report for the January 18, 2011 Board agenda item. CEQA for the VWRP was addressed by the certified 2015 Santa Clarita Valley Joint Sewerage System Facilities Plan and EIR, which examined the environmental impacts of treating 27.6 mgd of wastewater at the VWRP.

The Newhall Ranch EIRs, certified by the Board in 1999 and 2003, evaluated the environmental impacts related to development of the Specific Plan, including construction of the NRWRP and the new sewage facilities to serve the Specific Plan area. At the project level, the County is in the process of completing further CEQA analysis for both Landmark Village and Mission Village. The CEQA compliance for Landmark Village is contained in the Landmark Village Draft EIR (November 2006), Final EIR (November 2007), and Recirculated Draft EIR (January 2010). CEQA compliance for Mission Village is contained in the Mission Village Draft EIR (October 2010). The EIRs contain a County DMS analysis and evaluate each project's wastewater conveyance/disposal effects including temporary wastewater treatment at the VWRP.

3. "**If the Sanitation Plant is not built in accordance with the mitigation requirements of the Newhall Ranch Specific Plan, the Plan cannot meet its requirements to provide non-potable water or to finance its own infrastructure expansion costs."**

   Temporary use of the VWRP for treatment of Newhall Ranch wastewater does not eliminate the Specific Plan requirement for the developer to construct the NRWRP and finance the new sewerage system. The temporary use of the VWRP addresses practical engineering considerations such as the need to build-up an adequate and steady flow of wastewater before start-up of the NRWRP. Whether Newhall Ranch wastewater is treated at the NRWRP or VWRP, the treated wastewater will be suitable for reuse and offsetting Newhall Ranch water demands.

4. "**Further, the Sanitation discharge permit granted by the Regional Water Quality Board required reverse osmosis treatment for the effluent from this plant. By attempting to evade this requirement, Newhall will put the added burden of removing salts from the Newhall Ranch effluent on the backs of the public."**

   Temporary use of the VWRP for treatment of Landmark Village and Mission Village wastewater does not eliminate the requirement for the developer to construct the NRWRP or finance the new sewerage system within the Specific Plan area. The developer must construct the NRWRP per the Specific Plan and must have it operating properly before the next phase after Landmark Village and Mission Village. As noted in the Item 1 response, temporary treatment of Landmark Village and Mission Village wastewater at the VWRP would neither add to nor alleviate the SCVSD's financial burden to comply with the Chloride TMDL.

   Temporarily treating wastewater from the first 6,000 Newhall Ranch homes at the VWRP is a practical engineering decision based on the need to build up an adequate, steady flow of wastewater before starting up

the NRWRP, especially the reverse osmosis units. Such an approach would match the slower pace of the development but would not eliminate the Specific Plan requirement for construction of the NRWRP.

5. "**The Santa Clarita Sanitation District's failure to meet the Clean Water TMDL standard for chloride of 100 mg/l in the Santa Clara River is a result in part due to the sharp and continuing increase in the use of imported State Water Project (SWP) water as seen by the chart below, (also supplied by the Sanitation Districts). This problem is aggravated by high levels of chlorides in the wells proposed to be used for these tracts, according to information found in both the Landmark and Mission Village DEIRs as indicated in the chart below. Therefore, if Newhall uses the Valencia treatment plant rather than building their own Sanitation Plant as required by the Specific Plan, the chloride levels in the effluent of that treatment plant will be substantially increased. Without the immediate construction of the Newhall Ranch Water Reclamation Plant, approved as an RO (reverse osmosis salt removal system) facility, the high chlorides in the wells proposed to be used by this project in the chart below and the additional imported Nickels water will add to this load."**

   Imported water did not cause the chloride standard to be exceeded. Effluent from the VWRP has exceeded 100 mgd/l since the 1970s despite the fact that imported water was not delivered to Santa Clarita Valley until the 1980s. Nonetheless, as noted in the Item 1 response, the chloride concentrations of Newhall Ranch and SCVSD wastewater are expected to be similar. Thus, temporary treatment of Newhall Ranch wastewater at the VWRP would not change the SCVSD's ability to comply with the Chloride TMDL.

   SCOPE implies that use of Nickel water[1] would contribute to increase the chloride load at the VWRP. While the Landmark Village and Mission Village projects are part of the potable water system for the entire Specific Plan, the projects do not rely on Nickel water to satisfy their potable water demands. As reported in the Newhall Ranch Revised Additional Analysis, Section 2.5, Water Resources (Volume VIII, May 2003), the Nickel water would only be needed in years when the Newhall Ranch agricultural water has been used, which is estimated to occur after approximately the 21st year of project construction. Therefore, the comment regarding use of Nickel water is not appropriate at this time.

6. **"How does a side agreement between the developer and the Sanitation Districts fit into the planning oversight purview of the Board of Supervisors? How can the Planning Department substantiate that sewer service complies with the County Development Monitoring System or is consistent with the general plan or specific plans if developers make side agreements with the Sanitation Districts?"**

   Formation of a new sanitation district was identified in the Specific Plan EIR as a mitigation measure. The Interconnection Agreement was developed to fulfill this Specific Plan requirement and establish a logical plan for the development and administration of the new district and its infrastructure. This agreement ensures that the developer provides the necessary land and infrastructure. The Interconnection Agreement was considered and approved by the Sanitation Districts Nos. 26 and 32 Boards at their January 9, 2002 meetings, which were open to the public. Further, this agreement was referenced in previous County and LAFCO resolutions supporting formation of the new sanitation district.

   As noted in the Item 2 response, the EIRs for both Landmark Village and Mission Village contain County DMS analysis. Moreover, the Newhall Ranch developer is required to build a new sewerage system to serve Newhall Ranch developments and, thus, the Specific Plan does not rely upon existing County sewerage facilities. The Districts and County have coordinated their efforts with regard to establishment of the new sanitation district and its sewerage conveyance system. This coordination enables the County to verify that the development is consistent with the County's General Plan and Specific Plan requirements.

[1] Nickel water refers to a source of potable water owned by NLFC that can be delivered to the Newhall Ranch development to supplement existing sources of potable water.

7. **"The agreement between the developer of the Newhall Ranch Project and the Sanitation District violates the conditions of the Newhall Ranch Specific Plan and puts the Santa Clarita Valley in jeopardy of continued non-compliance with the Clean Water Act Chloride TMDL. We therefore strongly object to this agreement and ask that the Board of Supervisors take action to rectify this issue."**

   The Interconnection Agreement is not in conflict with the Specific Plan and does not impact the SCVSD's ability to comply with the Chloride TMDL. As noted in the Item 1 and 4 responses, temporary treatment of Landmark Village and Mission Village wastewater at the VWRP would not eliminate the need for the developer to construct the NRWRP and to finance the new sewerage system, nor would it impact compliance with the Chloride TMDL. As presented in the Item 2 response, the VWRP has available capacity for temporary treatment of Landmark Village and Mission Village wastewater. Thus, no negative impact to the SCVSD's sewerage system is expected, and this approach does not conflict with the Specific Plan's requirement for construction of the NRWRP.

8. **"The public should not have to pay the costs of bringing the chloride level into compliance with an increase to their sewer fees."**

   By law, the users of the SCVSD's wastewater system must pay for Chloride TMDL compliance. As noted in the Item 1 and 4 responses, temporary treatment of Newhall Ranch wastewater would neither add to nor alleviate the SCVSD's financial burden to comply with the Chloride TMDL.

9. **"…but for the statement within the resolution that says that "The first 6,000 units of Newhall Ranch will be put through the Valencia Treatment Plant." That's not consistent with the Newhall Ranch that was passed for the formation of this, the Newhall Ranch sanitation plant."**

   The temporary treatment of Landmark Village and Mission Village wastewater at VWRP does not conflict with Specific Plan's requirements as described in the Item 4 and 7 responses.

10. **"And we ask that that be struck from the staff report because it seems to be a backdoor way of getting those approved when there's no E.I.R. on that and it's not consistent with the Specific Plan."**

    As noted in the Item 4 and 7 responses, temporary treatment of Landmark Village and Mission Village wastewater at the VWRP is not in conflict with the Specific Plan. Prior CEQA compliance was not required because temporary treatment at the VWRP was not proposed until the release of the Draft EIRs for both Landmark Village and Mission Village. Draft EIRs for both projects, including the Landmark Village Recirculated Draft EIR, have been the subject of extensive public review and comment as part of the County's environmental review process.

    As stated in the Item 2 response, the environmental implications of the build-out of the VWRP to its capacity were assessed in the SCVSD's certified EIR for the 2015 Santa Clarita Valley Joint Sewerage System Facilities Plan. The Newhall Ranch EIR, evaluated the environmental impacts related to development of the Specific Plan, including construction of the NRWRP to a project level and the new sewerage facilities at a programmatic level to serve the Specific Plan. The County is in the process of completing further CEQA compliance at a project level for both Landmark Village and Mission Village.

11. **"The addendum itself that … was passed … for the formation on the Sanitation District specifically says that the wastewater treatment plant will be built in stages as the specific plan area is developed and will ultimately be sized to treat up to 6.8 million gallons. So it, too, is not consistent with what is being said in the Staff Report. So we wonder how the Sanitation District would have made an agreement like that that's in violation of your environmental documents and the Specific Plan."**

    There is no inconsistency between the Staff Report and the Specific Plan. The fact that the Staff Report only addressed the temporary treatment of Newhall Ranch wastewater at the VWRP does not eliminate the Specific

Plan requirement for the developer to build the NRWRP and other sewerage infrastructure to serve the Specific Plan. For more information regarding consistency with the Specific Plan, see the Item 6 response. Regarding claims of violating CEQA, please see the Item 10 response.

12. **"Now we appear before you, and Newhall Land is claiming that they have this agreement with the Sanitation -- actually Santa Clarita Valley Sanitation District of Los Angeles County to allow these 6,000 units to be treated in our existing Santa Clarita wastewater facilities. Those facilities are not reverse osmosis plants. And if this is allowed, it will only create additional problem as far as the chlorides for our community. The reverse osmosis plant that is required with this Newhall Treatment Plant that will take care of chlorides. So definitely, they shouldn't be allowed to use any other treatment plant."**

    Discharge of Landmark Village and Mission Village wastewater to the VWRP will be temporary until construction and startup of the NRWRP. The Landmark Village and Mission Village wastewater would neither add to nor alleviate the SCVSD's financial burden to comply with the Chloride TMDL. For further explanation, see the Item 1 and 4 responses.

13. **"And it's a very, very expensive issue for our community. And we were promised that we would not be funding anything for the Newhall Ranch."**

    Temporary treatment of Landmark Village and Mission Village wastewater at the VWRP would neither add to nor alleviate the SCVSD's financial burden to comply with the Chloride TMDL as explained in the Item 1 and 4 responses.

14. **"And if that's what they're going to do, they have to have additional environmental analysis on it."**

    As noted in the Item 10 response, the EIRs for both Landmark Village and Mission Village evaluate wastewater disposal options including temporary treatment of Landmark Village and Mission Village wastewater at the VWRP. There will be no temporary treatment at the VWRP, unless and until the Board has considered and certified the project EIRs in accordance with CEQA.

Should you have any questions or concerns, please contact me, or Mr. Thomas J. LeBrun at (562) 908-4288, extension 2751 or via email at tlebrun@lacsd.org.

cc: Board of Directors – Santa Clarita Valley Sanitation District
Department of Public Works
Regional Planning Commission

SRM:TJL:ddg

WATER RECLAMATION
SOLID WASTE MANAGEMENT

COUNTY SANITATION DISTRICTS
OF LOS ANGELES COUNTY

1955 Workman Mill Road, Whittier, CA 90601-1400
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STEPHEN R. MAGUIN
Chief Engineer and General Manager

March 8, 2011

Board of Directors
Santa Clarita Valley Sanitation District
of Los Angeles County

Directors:

Memorandum to Board of Supervisors – Newhall Ranch Sanitation District

Enclosed is the memorandum requested by the Board of Supervisors regarding formation of the Newhall Ranch Sanitation District and responses to the issues raised by the Santa Clarita Organization for Planning and the Environment.

Please contact me should you have any questions.

Very truly yours,

Stephen R. Maguin

Stephen R. Maguin

SRM:TJL:ddg

Enclosure

DOC # 1800048

Recycled Paper

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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
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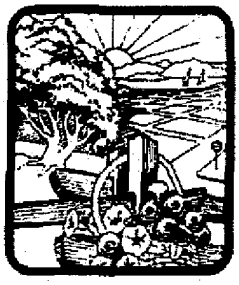


1-13-11

Attn: Executive Office
LA County Board of Supervisors
500 W. Temple St.
Los Angeles, CA 90012

Re: Agenda Item # 25 – Inconsistency with Newhall Ranch Specific Plan
Please copy to all Supervisors

Dear Sirs:

It has come to our attention that, while the staff report for this agenda item correctly states the timeline of the formation of the Newhall Ranch Sanitation District, it also includes erroneous information and brings to light an agreement made between the Sanitation Districts and Newhall Land and Farming that is inconsistent with the Newhall Ranch Specific Plan. Further, it misinforms the Board as to the financial impacts of such an agreement.

We ask that the Supervisors, and particularly Mr. Antonovich, as our representative on the Board of Sanitation District 26 and 32, immediately investigate and set aside this agreement. We request that Board of Supervisors, as ultimate oversight authority for the approval and conformity of the Newhall Ranch Specific Plan, object to this agreement between the Newhall Land Co. and the Sanitation Districts. We request that the Board delay approval of this agenda item until this investigation is completed and the staff report is corrected.

We particularly object to these two sections of the staff report:

1. **"FISCAL IMPACT/FINANCING**

   It is anticipated that the operation and maintenance of the District and its facilities would be funded through the imposition of service charges, which would be collected on the tax roll, and construction of the facilities would be financed by the developer for the Newhall Ranch project."

1 **Without the construction of the Sanitation plant as required by the Newhall Ranch Specific Plan, the public will bear the burden of the expensive clean up of chlorides required to comply with the Clean Water Act. This will entail a sharp increase in sewer fees to the general public.**

2. **"IMPACT ON CURRENT SERVICES (OR PROJECTS)**

   This project will not have an adverse impact on current sewage services because the District will build facilities to serve all new developments within the Newhall

2 Ranch Specific Plan area. In addition, the agreement between the Santa Clarita Valley Sanitation District of Los Angeles County (SCV) and Newhall Land and

Farming allows up to 6,000 capacity units to be treated at existing SCV wastewater treatment facilities as needed during construction of the Newhall Ranch Water Reclamation Plant. SCV has sufficient capacity to accommodate the use of its facilities."

2 **This statement cannot be made because the County is currently in the middle of analyzing the impacts for the first tract maps of Newhall Ranch. No certified EIR exists on either the Landmark tract or the Mission Village tract, which comprise approximately 6000 units. Further, there is not even a Development Monitoring System analysis for sewer capacity included in the Mission Village EIR as required by the Court Decision in 2003.**

Background

The Mitigation Monitoring Plan of the Newhall Ranch Specific Plan states that:
SP 4.11-1 The proposed Specific Plan **SHALL**[1] implement a water reclamation plant in order to reduce to specific plan's demand for imported potable water, The Specific Plan **SHALL** install a distribution system to deliver non-potable reclaimed water to irrigate land uses suitable to accept reclaimed water, pursuant to the Los Angeles County Department of Health Standards. **Mitigation 4.11-8 requires Newhall to pay for the cost of water expansion** by paying for connection fees and **Mitigation 4.12-7** ensured the public would not have to pay for the development of Newhall Ranch by requiring that future tracts would have to be annexed into a sewer district.
SP 4.12-2 A 5.8 to 6.9 mgd water reclamation plant **SHALL** be constructed on the Specific Plan site, pursuant to County, State, and Federal design standards, to serve the Newhall Ranch Specific Plan.
SP 4-12-3 A Conceptual Backbone Sewer Plan **SHALL** be implemented pursuant to County, state and federal design standards.

Please note: The mitigation monitoring system does NOT say "may", it says, "**SHALL**".

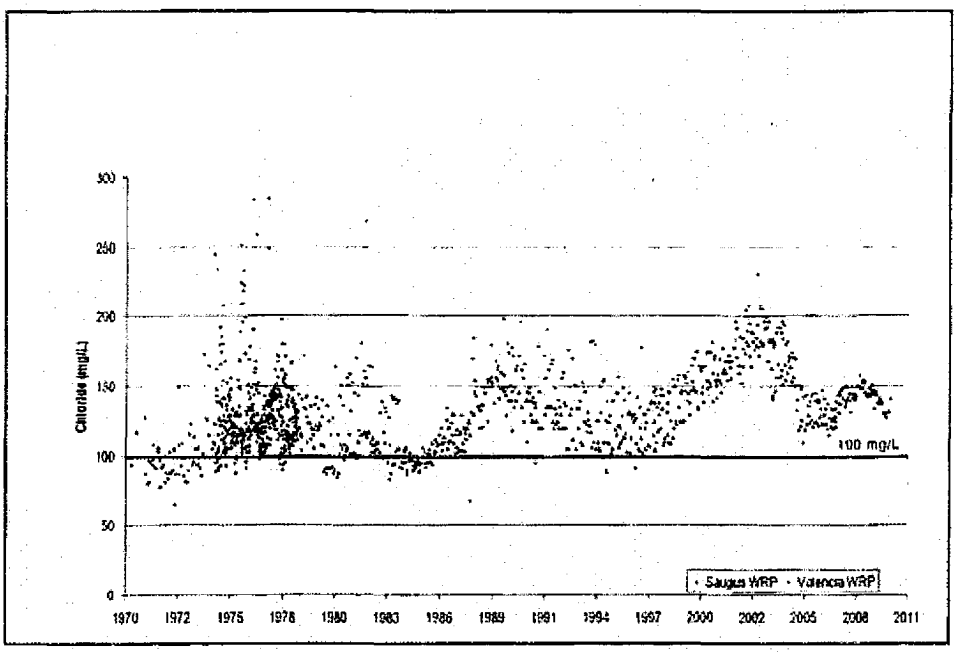
3 If the Sanitation Plant is not built in accordance with the mitigation requirements of the Newhall Ranch Specific Plan, the Plan cannot meet its requirements to provide non-potable water or to finance its own infrastructure expansion costs.

4 **Further, the Sanitation discharge permit granted by the Regional Water Quality Board required reverse osmosis treatment for the effluent from this plant. By attempting to evade this requirement, Newhall will put the added burden of removing salts from the Newhall Ranch effluent on the backs of the public.**

The CHLORIDE issue

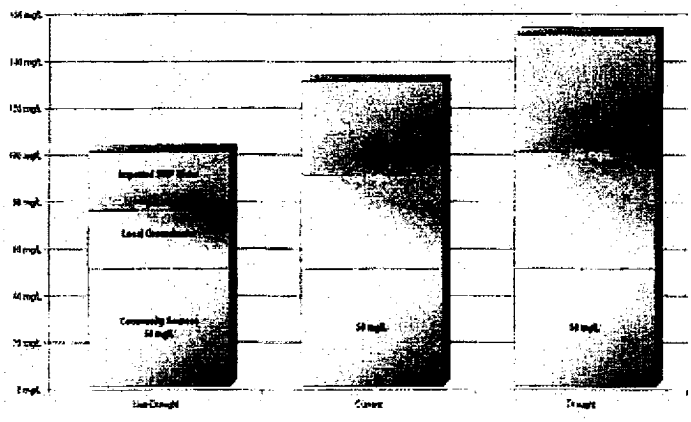
Currently the Sanitation Districts 26 and 32 in the Santa Clarita Valley do not comply with the Clean Water Act Act Total Maximum Daily Load (TMDL) effluent standard of 100 ugl for Cholride as indicated by the chart below supplied at a recent Sanitation District public hearing:

[1] Emphasis added to all "shalls" in this section



5 The Santa Clarita Sanitation Districts' failure to meet the Clean Water TMDL standard for chloride of 100mg/l in the Santa Clara River is a result in part due to the sharp and continuing increase in the use of imported State Water Project (SWP) water as seen by the chart below, (also supplied by the Sanitation Districts).

Chloride Sources During
Drought & Non-Drought Conditions



5 This problem is aggravated by high levels of chlorides in the well proposed to be used for these tracts, according to information found in both the Landmark and Mission Village DEIRs as indicated in the chart below. Therefore, if Newhall uses the Valencia treatment plant rather than building their own Sanitation Plant as required by the Specific Plan, the chloride levels in the effluent of that treatment plant will be substantially increased. Without the immediate construction of the Newhall Ranch Water Reclamation Plant, approved as an RO (reverse

osmosis salt removal system) facility, the high chlorides in the wells proposed to be used by this project in the chart below and the additional imported Nickels water will add to this load.

Water Quality Constituents of Concern
Secondary Standards:
(from Mission Village DEIR Appendix F4.8)

Parameter	MCL	DLR	Units	E-14	E-15	E-16	E-17
Chloride	250-500-600	NA	mg/L	75	88	89	74
	pH 6.5 - 8.5	NA	units	7.5	7.7	7.3	7.4
Specific Conductance (E.C.)	900-1600-2,200	NA	umho/cm	1240	1290	1390	1360
Sulfate	250-500-600	0.5	mg/L	340	330	340	340
Total Dissolved Solids (TDS)	500-1000-1500	NA	mg/L	900	890	950	960

Conclusion and Questions

How does a side agreement between the developer and the Sanitation Districts fit into the planning oversight purview of the Board of Supervisors? How can the Planning Department substantiate that sewer service complies with the County Development Monitoring System or is consistent with the general plan or specific plans if developers make side agreements with the Sanitation Districts? 6

The agreement between the developer of the Newhall Ranch Project and the Sanitation District violates the conditions of the Newhall Ranch Specific Plan and puts the Santa Clarita Valley in jeopardy of continued non-compliance with the Clean Water Act Chloride TMDL. We therefore strongly object to this agreement and ask that the Board of Supervisors take action to rectify this issue. 7

The public should not have to pay the costs of bringing the chloride level into compliance with an increase to their sewer fees. Thank you in advance for addressing these issues. 8

Sincerely,

Lynne Plambeck
President

LYNNE PLAMBECK: GOOD AFTERNOON. WHO WOULD YOU LIKE TO START? OKAY. MY NAME IS LYNN PLAMBECK, AND I'M HERE REPRESENTING SANTA CLARITA ORGANIZATION FOR PLANNING AND THE ENVIRONMENT. AND WE'RE CONCERNED ABOUT THIS AGENDA ITEM NOT FOR THE RESOLUTION ITSELF, WHICH IS PERFECTLY CORRECT, BUT FOR THE STATEMENT WITHIN THE RESOLUTION THAT SAYS THAT "THE FIRST 6,000 UNITS OF NEWHALL RANCH WILL BE PUT THROUGH THE VALENCIA TREATMENT PLANT." THAT'S NOT CONSISTENT WITH THE NEWHALL RANCH THAT WAS PASSED FOR THE FORMATION OF THIS, THE NEWHALL RANCH SANITATION PLANT. THE NEWHALL RANCH SANITATION PLANT IS SUPPOSED TO BE A REVERSE OSMOSIS PLANT, WHICH WILL HELP HANDLE THE CHLORIDE PROBLEM WHICH MAYOR ANTONOVICH, I KNOW YOU'RE WELL AWARE OF, AS YOU SIT ON OUR SANITATION DISTRICT AND HAD TO GO THROUGH ALL THOSE HEARINGS. SO OUR OBJECTION IS NOT TO THE RESOLUTION ITSELF, BUT TO THE FACT IN THE STAFF REPORT THAT SAYS THOSE FIRST 6,000 UNITS WILL GO THROUGH THE EXISTING VALENCIA TREATMENT PLANT, OR UP TO 6,000 UNITS. AND WE ASK THAT THAT BE STRUCK FROM THE STAFF REPORT BECAUSE IT SEEMS TO BE A BACKDOOR WAY OF GETTING THOSE APPROVED WHEN THERE'S NO E.I.R. ON THAT AND IT'S NOT CONSISTENT WITH THE SPECIFIC PLAN. THE ADDENDUM ITSELF THAT WAS PASSED FOR THE FORMATION IN 2005 AT L.A.F.C.O. FOR THE FORMATION OF THE SANITATION DISTRICT SPECIFICALLY SAYS THAT THE WASTEWATER TREATMENT PLANT WILL BE BUILT IN STAGES AS THE SPECIFIC PLAN AREA IS DEVELOPED AND WILL ULTIMATELY BE SIZED TO TREAT UP TO 6.8 MILLION GALLONS.

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SO IT, TOO, IS NOT CONSISTENT WITH WHAT IS BEING SAID IN THE STAFF REPORT. SO WE WONDER HOW THE SANITATION DISTRICT WOULD HAVE MADE AN AGREEMENT LIKE THAT THAT'S IN VIOLATION OF YOUR ENVIRONMENTAL DOCUMENTS AND THE SPECIFIC PLAN. SO WE ASK YOU TO INVESTIGATE THAT. AND THEN FURTHER WE ASK THAT THIS INFORMATION THAT 6,000 UNITS IS GOING TO GO THROUGH THE VALENCIA TREATMENT PLANT BE STRUCK FROM THE STAFF REPORT. BECAUSE THE NEXT THING THAT WILL HAPPEN IS IT WILL SHOW UP IN THE TRACT MAPS AS THOUGH YOU HAD APPROVED IT. WE DID SEND LETTERS TO EACH SUPERVISOR'S OFFICE. WE'D LIKE TO RESUBMIT THOSE LETTERS AT THIS TIME. THANK YOU. ONLY ENOUGH FOR THE SUPERVISORS. I'M SORRY I DIDN'T PROVIDE IT FOR YOU. THAT'S ALL I HAVE TO SAY, EVEN THOUGH I HAVE 35 SECONDS LEFT.

SUP. ANTONOVICH, MAYOR: THANK YOU, LYNNE, GOOD JOKE.

CAM NOLTEMEYER: MY NAME IS CAM NOLTEMEYER, ALSO SPEAKING FOR SANTA CLARITA ORGANIZATION FOR PLANNING AND THE ENVIRONMENT. MAYOR ANTONOVICH, I KNOW YOU WERE AT A MEETING IN SANTA CLARITA ALONG WITH A COUPLE OF OUR COUNCIL MEMBERS WITH REGARD TO THE SANITATION DISTRICT TRYING TO PUT UPON THE TAXPAYERS 250 MILLION TO 500 MILLION FOR THE COST OF A REVERSE OSMOSIS TREATMENT PLANT TO REMOVE CHLORIDES TO MEET THE CLEAN WATER STANDARD. BECAUSE OF THAT, THERE WAS A LOT OF PUBLIC PROTEST, AND THAT MEETING DECISION HAS BEEN POSTPONED. AT THAT TIME,

THEY NOT ONLY WERE OBJECTING TO THE COST OF 250 TO 500 MILLION, BUT THEY WERE ALSO CONCERNED ABOUT THE FACT THAT THEY WERE FUNDING THE SANITATION DISTRICT FOR NEWHALL RANCH. AT THAT TIME, THE SANITATION DISTRICT MADE IT VERY CLEAR THAT THAT WOULDN'T HAPPEN. NOW WE APPEAR BEFORE YOU, AND NEWHALL LAND IS CLAIMING THAT THEY HAVE THIS AGREEMENT WITH THE SANITATION -- ACTUALLY SANTA CLARITA VALLEY SANITATION DISTRICT OF LOS ANGELES COUNTY TO ALLOW THESE 6,000 UNITS TO

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BE TREATED IN OUR EXISTING SANTA CLARITA WASTEWATER FACILITIES. THOSE FACILITIES ARE NOT REVERSE OSMOSIS PLANTS. AND IF THIS IS ALLOWED, IT WILL ONLY CREATE ADDITIONAL PROBLEM AS FAR AS THE CHLORIDES FOR OUR COMMUNITY. THE REVERSE OSMOSIS PLANT THAT IS REQUIRED WITH THIS NEWHALL TREATMENT PLANT, THAT WILL TAKE CARE OF CHLORIDES. SO DEFINITELY, THEY SHOULDN'T BE ALLOWED TO USE ANY OTHER TREATMENT PLANT. THEY CAN BUILD THIS PLANT, AND IT'S QUITE CLEAR IN THE DOCUMENTS WE HAVE HERE THAT THEY CAN BUILD THAT IN STAGES IN THE SAME WAY THEY ARE PLANNING TO BUILD THE HOUSES IN STAGES. SO WE DEFINITELY ARE OBJECTING TO ANY IDEA OF 6,000 UNITS OF NEWHALL RANCH BEING ALLOWED TO USE THE CURRENT SANITATION FACILITIES BECAUSE OF THE CHLORIDE ISSUE. AND IT'S A VERY, VERY EXPENSIVE ISSUE FOR

13

OUR COMMUNITY. AND WE WERE PROMISED THAT WE WOULD NOT BE FUNDING ANYTHING FOR THE NEWHALL RANCH. I HAVE 31 SECONDS, BUT THAT IS ALL I HAVE FOR TODAY, THANK YOU.

14

LYNNE PLAMBECK: AND IF THAT'S WHAT THEY'RE GOING TO DO, THEY HAVE TO HAVE ADDITIONAL ENVIRONMENTAL ANALYSIS ON IT.

SUP. ANTONOVICH, MAYOR: OKAY.

MARK DILLON: MARK DILLON. GOOD AFTERNOON, SUPERVISORS. HERE SIMPLY TO SUPPORT YOUR STAFF AND THE ACTION HERE TODAY THAT IS BEFORE YOU. AND IF THERE ARE ANY QUESTIONS, I'M HERE TO ANSWER THOSE.

SUP. ANTONOVICH, MAYOR: OKAY, THANK YOU. THANK YOU. LET ME ASK DEPARTMENT OF PUBLIC WORKS? COULD YOU RESPOND TO THE NUMBER OF ISSUES THAT HAVE BEEN RAISED RELATIVE TO THIS PROPOSAL?

SPEAKER: TOM LE BRUN WITH THE SANITATION DISTRICT IS HERE WITH ME. HE MAY BE ABLE TO ANSWER THE QUESTIONS REGARDING THE CONCERNS REGARDING THE 6,000 UNITS.

TOM LEBRUN: THE SANTA CLARITA VALLEY BOARD APPROVED AN AGREEMENT WITH NEWHALL LAND AND FARMING IN 2002 WHICH ALLOWED UP TO 6,000 OF THE FIRST HOMES OF THE NEWHALL RANCH DEVELOPMENT TO GO THROUGH THE VALENCIA W.R.P. BUT IT REQUIRES THE NEWHALL COMPANY TO PAY THE SAME RATES THAT ANY OTHER DEVELOPER WOULD HAVE IN SANTA CLARITA SANTITATION DISTRICT, THAT BEING A CONNECTIONS FEE TO BUY INTO THE EXISTING SYSTEM,

AND THEN AN ANNUAL PAYMENT FOR THE COST TO OPERATE AND TREAT THE 6,000, THE WASTE FROM THE 6,000 HOMES. SO THAT AGREEMENT PREDATED SOME OF THE OTHER AGREEMENTS AND ACTIONS THAT THE BOARD AND L.A.F.C.O. HAVE TAKEN PREVIOUSLY. AND I THINK THAT WAS THE ONE QUESTION ABOUT WOULD THERE BE FUNDING BY SANTA CLARITA VALLEY RESIDENTS FOR NEWHALL RANCH? THE ANSWER IS NO. NEWHALL LAND AND FARMING WOULD HAVE TO PAY, JUST LIKE ANY OTHER DEVELOPMENT, TO USE THE VALENCIA W.R.P. I DON'T KNOW IF THERE WAS ANY OTHER SPECIFIC QUESTIONS ON --

SUP. ANTONOVICH, MAYOR: SO WHO PAYS FOR THE -- WHEN IT HAS TO BE ENLARGED, WHO PAYS FOR IT?

TOM LE BRUN: WHEN THE VALENCIA PLANT WOULD BE ENLARGED --

SUP. ANTONOVICH, MAYOR: THE NEW PROPOSAL, THE NEW DEVELOPMENT, IS THAT GOING TO HAVE A BUILT-IN FEE FOR EXPANSION OF THAT UNIT?

TOM LE BRUN: THE 6,000 HOMES WOULD USE UP SOME AVAILABLE CAPACITY IN SANTA CLARITA VALLEY. THIS IS A TEMPORARY ARRANGEMENT UNTIL THE NEWHALL RANCH W.R.P. IS CONSTRUCTED. THAT WOULD BE PAID FOR BY NEWHALL LAND AND FARMING. AND THEN THE FLOWS WOULD, INSTEAD OF BEING PUMPED TO VALENCIA, WOULD FLOW BY GRAVITY TO THE NEW TREATMENT PLANT AT THE COUNTY LINE.

SUP. ANTONOVICH, MAYOR: SO THEIR ADDITION IS NOT GOING TO MAXIMIZE THE CAPACITY, IT'S GOING TO USE EXISTING RESERVE CAPACITY SO WE DON'T HAVE TO BUILD A FUTURE ONE?

TOM LE BRUN: THAT IS CORRECT.

SUP. ANTONOVICH, MAYOR: AND THEY'RE GOING TO PAY A FEE TO USE THE EXISTING FACILITY WHILE THE NEW ONE'S BEING CONSTRUCTED?

TOM LE BRUN: THAT IS CORRECT.

SUP. ANTONOVICH, MAYOR: AND THE EXISTING FEE WILL PAY FOR ALL MAINTENANCE?

TOM LE BRUN: YES.

SUP. ANTONOVICH, MAYOR: IT WILL COVER THE MAINTENANCE.

TOM LE BRUN: THEY WILL PAY A FEE TO CONNECT, WHICH IS THE SAME THAT ANY DEVELOPER WOULD PAY ANYWHERE IN SANTA CLARITA VALLEY SANITATION DISTRICT, AND THEY WOULD HAVE TO PAY EVERY YEAR THE COST TO TREAT THE WASTE FROM THOSE 6,000 HOMES.

SUP. ANTONOVICH, MAYOR: WHAT ABOUT THE OTHER ISSUES THAT WERE RAISED?

TOM LE BRUN: I AM UNABLE TO TELL YOU BY MEMORY WHAT C.E.Q.A. COVERAGE THERE WAS IN 2002 WHEN THE AGREEMENT WAS PASSED. I JUST DO NOT HAVE THE ANSWER TO THAT. AND IN TERMS OF THE SPECIFIC COVERAGE IN THE NEWHALL SPECIFIC PLAN WITH THE ABILITY FOR THIS WASTEWATER TO TEMPORARILY GO TO THE VALENCIA PLANT, I AM UNAWARE OF THE DETAILS OF HOW THAT ISSUE'S COVERED IN THE NEWHALL RANCH SPECIFIC PLAN, THE E.I.R.

SUP. ANTONOVICH, MAYOR: COULD YOU ALSO REPORT TO THE BOARD ON THE POINTS THAT WERE RAISED AND THEIR TESTIMONY SO WE COULD HAVE THAT?

TOM LE BRUN: I'M SORRY, I DIDN'T HEAR YOU, SUPERVISOR.

SUP. ANTONOVICH, MAYOR: I WOULD LIKE YOU TO RESPOND TO THE BOARD IN A MEMO THE POINTS THAT WERE RAISED BY THE THREE SPEAKERS ON THIS ISSUE.

TOM LE BRUN: CERTAINLY.

LYNNE PLAMBECK: MR. MAYOR, COULD YOU SPECIFICALLY ASK HIM TO RESPOND TO WHO IS GOING TO PAY FOR THE COST OF THE CHLORIDES IN THE WATER? BECAUSE THERE IS NO REVERSE OSMOSIS.

SUP. ANTONOVICH, MAYOR: THAT'S ONE OF THE QUESTIONS THAT YOU RAISED, AND THAT WILL BE INCLUDED IN THAT REPORT.

LYNNE PLAMBECK: THANK YOU VERY MUCH.

SUP. ANTONOVICH, MAYOR: OKAY, THANK YOU. THANK YOU, THANK YOU. SO MOVED. SECONDED BY SUPERVISOR RIDLEY-THOMAS. WITHOUT OBJECTION, SO ORDERED. ITEM NO. 5. DAVID CZAMANSKE, LAURIE GOULD, CAMRON STONE, GLEN OWENS, AND CAROL, YOU'LL FOLLOW AFTER THE FIRST SPEAKER, OKAY? THAT'S THE ARTICLE FROM THE "WALL STREET JOURNAL." SO THE FIVE OF YOU ARE STILL HERE, RIGHT? COME ON UP AND TAKE YOUR SEAT. OKAY. YOU CAN GO IN THE ORDER YOU WANT.

LAURIE GOULD: I'M SPEAKING TO THE ESTABLISH A WORKING GROUP WITH COMMUNITY REPRESENTATIVES TO PROVIDE INPUT TO THE LOS ANGELES --

SUP. ANTONOVICH, MAYOR: GIVE YOUR NAME FOR THE RECORD, FIRST SO THAT WE CAN IDENTIFY YOU.

APPENDIX F3.19

Population and Housing

Los Angeles Times News Article Regarding
Antelope Valley Housing Market
June 1, 2011

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Antelope Valley housing market feels like early '90s again

In the Antelope Valley, a housing slump awakens painful memories

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By Kim Christensen
Los Angeles Times Staff Writer

By Kim Christensen, Times Staff Writer

John Rockey has been hanging drywall for 35 years, and he's seen it all in the boom-again, bust-again Antelope Valley housing market.

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As residential construction flourished in the late 1980s, his company's ranks swelled to 200 -- then shriveled to five when the economy tanked a couple of years later.

By the time a new building spree peaked in 2005, Rockey's payroll had again grown to 200. But then came slumping home sales and a sharp rise in mortgage defaults and foreclosures.

Now, his Lancaster-based Progression Drywall Corp. is down to 50 employees, and he's got a serious case of deja vu.

"This is looking like 1990 all over again," he said.

For many in the high desert north of Los Angeles, those are chilling words.

The economic downturn that racked California in the early 1990s hit especially hard there. The mere mention of the time summons images of squatters taking over their neighbors' abandoned houses, of spiking crime rates and unprecedented gang killings, of hemorrhaging home values that took a decade to rebound.

With foreclosures on the upswing and a fresh crop of "For Sale" signs sprouting in frontyards, Rockey and others are bracing for a return trip to a decade they'd rather forget.

"A lot of people are panicking," said Jaimes Gumaro, a North Hollywood real estate agent who has a listing in a Palmdale neighborhood dotted with homes for sale. "They were expecting to have all this equity, and then it suddenly stopped. Now, they just want to get their money out of it. They're saying, 'I'm outta here.' "

Regional economists say such fears are overblown, pointing out that the job market is much stronger now than it was then.

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QUOTE: Symbol or Name GO

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But they also agree that outlying suburbs like the Antelope Valley are especially susceptible to the weakening housing market and the mortgage lending crisis playing out across the country.

"Right now the areas which are most vulnerable to real estate volatility would be those areas where there were a lot more new homes being built," said Mark Schniepp, director of the California Economic Forecast, a consulting firm based in Goleta. "The development community is much quicker to cut prices than existing-home sellers are, because they've got to move inventory. It's not an emotional decision for them."

Relatively low home prices have long been one of the Antelope Valley's chief drawing cards, but that benefit has been diminished by flat or falling prices elsewhere.

"Outlying areas do better when prices are going up because people are seeking more home for the money," said Patrick S. Duffy, managing director of Hanley Wood Market Intelligence. "If prices come down ... then the Antelope Valley has to compete with softening prices in other areas."

Rising gas prices also could take a toll on the area's housing market, as prospective buyers think twice about the increasingly expensive commute to jobs "down below" in Los Angeles.

What's more, the Antelope Valley has attracted waves of first-time buyers and others with modest incomes and sometimes spotty credit who must rely on high-cost sub-prime loans. It's these borrowers who are now defaulting in record numbers, leading to a precipitous jump in foreclosures.

The numbers help tell the story.

* Foreclosure sales in Lancaster and Palmdale rose to nearly 200 between Dec. 1 and Feb. 28, an eightfold increase in a year. That's still well below mid-1990s levels, however, according to DataQuick Information Systems, a La Jolla research firm.

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Article From The Signal Regarding SCV Land Deals
July 19, 2011

Article rank | *19 Jul 2011* | *The Signal* | *By Jim Holt Signal Senior Staff Writer*

SCV land deals to get axed

Development: County planning officials say more than 70 cases are to be cut due to economy and inactivity

More than 70 land development deals slated for the Santa Clarita Valley are likely to get the ax in the next few months, a county planning official said Monday.

A depressed economy and inactivity have motivated planners to get rid of old cases, which could include at least 72 land development deals presently before the Los Angeles County Department of Regional Planning.

"Some of these projects are very old," county planner Ramon Cordova said Monday, "and they have not impacted on the (Santa Clarita) Valley because they've just been sitting there on the shelf gathering dust.

"So, because there's a lull right now in subdivisions being started, it's given us an opportunity to clean house."

At a public hearing expected to get under way today at the department's office on Temple Street in Los Angeles, two local projects and one in Palmdale will be denied due to inactivity, Cordova said.

Twenty homes slated to become neighbors of the planned 21,000-home Newhall Ranch project are expected to be cut during today's hearing.

The 20 single-family homes were to be constructed south of Highway 126 between Knudsen Parkway and the Ventura County line.

Three homes on 16 acres on Sierra Highway near Agua Dulce Canyon Road are also expected to get the ax.

This would be the second project in Agua Dulce to be killed in the last two weeks.

On July 5, county supervisors abandoned plans for an easement on an Agua Dulce road after five years of inactivity on the proposal.

Agate Hill Lane and its slope, about four miles northeast of Vasquez Rocks, were dedicated to county plans for roadwork more than five years ago.

"The projects are being denied due to inactivity," Cordova said.

"Right now, we're trying to clean house and we're starting with the oldest projects first," he said Monday. When department planners get through the list, at least 72 local projects will be gone, he said.

Some of the projects were started in 1984, when Ronald Reagan was reelected president.

The specific reasons for killing the two local projects hinged on failure to meet environmental assessments on time, Cordova said.

The plan slated for development in Palmdale involved 22 homes on 26 acres near the intersection of West Avenue S and Tierra Subida Avenue.

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