To: Mr. Penia - Files

SIGNIFICANT ECOLOGICAL AREAS OF THE SANTA MONICA MOUNTAINS

Museum of Natural History Foundation

August 1982

August 10, 1982

Mr. Norman Murdoch
Planning Director
Department of Regional Planning
Los Angeles County
320 West Temple Street
Los Angeles, California 90012

Dear Mr. Murdoch:

LETTER OF TRANSMITTAL

In compliance with the contract (No. 41688, "Malibu/Santa Monica Mountains--Significant Ecological Areas Reconnaissance Study") awarded to the Los Angeles County Museum of Natural History Foundation, I hereby submit the final report.

Please note that the appendices are not included, as they are in final production for transmission to you. These documents of the flora and fauna will be submitted to you within a reasonable time.

Sincerely,

LEON G. ARNOLD
Acting Director

LGA:pr
Enc.

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SIGNIFICANT ECOLOGICAL AREAS OF THE SANTA MONICA MOUNTAINS REPORT

Prepared for

Los Angeles County
Department of Regional Planning

by
The Los Angeles County Museum of Natural History Foundation

Richard Dean Friesen, Ph.D., Principal Investigator

LIST OF FIGURES

Copies of the Vegetation Maps (4 maps covering 12 Figures) are on file at the Los Angeles County Department of Regional Planning, and at the Los Angeles County Museum of Natural History.

LIST OF TABLES

INTRODUCTION

Purpose of this Study

This study was designed to review and update the existing biological data base within each of the Significant Ecological Areas (SEAs) of the Santa Monica Mountains listed below:

a. Point Dume SEA (#2);
b. Zuma Canyon SEA (#3) and adjacent Buffer Area (#3A);
c. Upper La Sierra Canyon SEA (4) and adjacent Buffer Area (#3B);
d. Malibu Canyon and Lagoon SEA (#5);
e. Las Virgenes SEA (#6);
f. Hepatic Gulch SEA (#7);
g. Cold Creek SEA (#9) and adjacent Buffer Area (#5B);
h. Tuna Canyon SEA (#10);
i. Palo Comado SEA (#12).

In 1970 the California State Legislature mandated that "every city and county shall prepare and adopt--a local open-space plan (as part of a General Plan) for the comprehensive and long-range preservation and conservation of open-space land within its jurisdiction". The Legislature found that the preservation of open-space land is necessary not only for the maintenance of the economy of the state but also for the enjoyment of scenic beauty, for recreation, for the use of natural resources, and for the production of food and fiber. The definition of open space included "areas required for the preservation of plant and animal life, including habitat for fish and wildlife species; areas required for ecologic and other-scenic purposes, rivers, streams, bays and estuaries; and coastal beaches, lakeshores, banks of rivers and streams, and watershed lands".

Responding to this mandate the County of Los Angeles undertook,--starting in the early 1970's--the identification of areas within the county that seemed appropriate for designation as Significant Ecological Areas.

The Los Angeles County Department of Regional Planning has received input from various scientific, educational, and conservational organizations and governmental agencies to identify areas within the County that seem appropriate for inclusion in open space. An initial report was prepared in

1972 by scientists from the University of California Los Angeles, the Los Angeles County Museum of Natural History, and a number of other local academic institutions. A final set of Significant Ecological Areas were selected as part of the Land Capability/Suitability Study of the Los Angeles County General Plan Revision Program in 1976 by England and Nelson, Environmental Consultants. In November 1980, the Los Angeles County Board of Supervisors formally designated sixty-two significant ecological areas substantially as proposed by England and Nelson.

This 1976 study established a set of criteria to judge what "prerequisites must an area meet in order to be designated ecologically significant." The final criteria for selecting and classifying significant ecological areas in the County are as follows in decreasing order of importance: (1) The habitat of rare, endangered, and threatened plant and animal species. (2) Biotic communities, vegetative associations, habitat of plant and animal species that are either one of a kind, or are restricted in distribution on a regional basis. (3) Biotic communities, vegatative associations, and habitat of plant and animal species that are either one of a kind, or restricted in distribution in Los Angeles County. (4) Habitat that at some point in the life cycle of a species or Los Angeles group of species, serves as concenterated breeding, feeding, resting, or migrating grounds, and is

limited in availability. (5) Biotic resources that are of scientific interest because they are either an extreme in physical/geographical limitations, or they represent an unusual variation in a population or community. (6) Areas important as game-species habitat or as fisheries. (7) Areas that would provide for the preservation of relatively undisturbed examples of the natural biotic communities in Los Angeles County.

Significance of Natural Areas

The England and Nelson/ESRI (1976) report addressed the question, "Why preserve biotic diversity?" Many of the guiding principles for developing natural areas lie not only in academic or moral commitments, but also in practical, beneficial aspects of concern to the public and its representatives.

Natural vegetation slows runoff velocities during storms, allowing increased groundwater infiltration and recharge. It provides habitat for games species. Areas such as the Malibu Lagoon are the nurseries for certain oceanic fishes and the entry way for freshwater trout into streams. Wetland areas are important buffers for downstream and oceanic waters because they absorb pollutants and silt that interfere with the life cycles of many aquatic species.

Natural areas also support raptors (eagles, hawks, owls, and falcons) that help hold down populations of rodents and rabbits that live on the edges of urbanized areas. The production and fertility of topsoil is directly dependent upon the cycling of nutrients and decomposition of organic materials within the natural communities of an area.

Agricultural research is also linked with the availability of natural areas. Each day, at least one species of plant or animal is eliminated by man's activities. Among the gene pools of these extinct organisms may have been the clues or answers to world food problems, perhaps new strains of insect resistant crops, or drought-tolerant landscaping species. Many modern medical miracles were discovered as properties of obscure, little known species with biological characteristics that now save millions of lives.

Natural areas provide relief from urban pressures and give inspiration. Recreational and aesthetic amenities provide additional reasons for establishing natural areas. The importance of the aesthetic value of vegetation is perhaps best understood after a fire has removed most of it from an area.

Obviously, a large number of questions remain unanswered in ecology. Among some of the more interesting ones are: a) Which components of our habitats are of greatest significance in maintaining species diversity, or in understanding the origin, migration, and evolution of floras, faunas, and communities?; b) Which floral, faunal, or abiotic resource elements will be of the greatest value to man?; and c) What is the role of species diversity in maintaining habitat?

On a practical level, the Los Angeles County Significant Ecological Areas have a number of uses, including the following:

1. conservation of species, communities, and habitat diversity; and development of perspectives in the studies of the biology of rare, endangered, and threatened species;

2. ecological characterization of species, communities, and habitats; and development of perspectives in studies of biological community analysis and habitat significance.

3. predictive system for occurrence and distribution of species, communities, and habitats (what is

where and under what conditions) and interpretation of the origin, migration, and evolution of species, floras, faunas and biological communities.

4. foundation for research in applied problems in many field of endeavor such as hydrology, pedology, habitat cover, food productivity (i.e. streamtrout catch) community ecology, and others;

5. assisting in decisions on land use, impact evaluation, and management problems of many types; and

6. establishment of priorities through natural area basic inventory analysis for natural area acquisition and resource protection.

Methodology of this Study

This study involved four parts:

1. Reviewing available data identifying the resources known to be present within the SEAs,

2. Conducting a reconnaissance survey of each of the SEAs from its boundaries, documenting the ecological resources found within,

3. Interpreting the ecological data, and

4. Documenting the ecological communities on a vegetation map.

To help identify sources of literature that might contain resource information for the SEAs, a number of persons and agencies were contacted (see Appendix B). Resources within the Los Angeles County Department of Regional Planning were consulted. The original files utilized by England and Nelson in the production of their 1976 report were kindly provided by Steve Nelson. The Topanga-Las Virgenes Resource Conservation District Office contained numerous documents relating to the Santa Monica Mountain Region. The United States Department of Interior, National Park Service Draft Resource Management Plan was very helpful. Scientists with direct knowledge of some of the SEAs were contacted.

The original SEA maps prepared by England and Nelson in the files of Department of Regional Planning were reviewed. These maps are drawn on 7 1/2 minute USGS Quadrangles

including, for the study SEAs, Malibu Beach, Topanga, Point Dume, Thousand Oaks, and Calabasas Quadrangles. Using a light table, the original SEA and Buffer boundaries were transferred onto a set of identical (photorevised in 1967) maps for use in the field. Another set of USGS Quadrangle maps that had been enlarged to a scale of 1" = 500 feet were provided by the Department of Regional Planning. These enlarged maps were used to record the location of about 1000 slide photographs that were made within and along the boundaries of the SEAs and Buffers. The slides were taken at points along the boundaries at intervals of about one quarter mile during May and June 1982. Generally at each photo point, a slide was taken in the four cardinal directions to document the status of the SEA and/or Buffer inside, along, and outside the boundary at that point. Supplementary photos were taken in some cases. A number of slides were taken on two helicopter flights provided by the Los Angeles County Fire Department. These flights were flown over the SEAs and Buffers at a low enough altitude that the condition of the vegetation and development within an SEA could be assessed. A set of field notes were kept to document each photograph. In addition, a microcassette recorder was used to make note of the vegetation, animals, development, etc. at each photo point and elsewhere within the SEAs. About 200 typewritten notes were transcribed from these tapes.

The California Natural Diversity Data Base (CNDDB State of California) provided a computer printout and set of maps describing the rare, endangered, and threatened species of plants and animals found in the Santa Monica Mountains. This list was checked and augmented by the official publication of the State of California listing the legislatively-designated Rare, Endangered, and Threatened Species of both the State and Federal Governments (At the Crossroads 1980). A list of Endangered, Rare, and Threatened Animals of California and a List of Designated Endangered or Rare Plants of California (received from the California Department of Fish and Game) was also consulted. A list of Endangered and Threatened species reprinted from the Federal Register was reviewed. Each population of officially-listed species known to occur in the SEAs was field checked during this study in cooperation with the California Native Plant Society's Rare Species Coordinator, Tim Thomas.

Vegetation Maps

A set of vegetation maps were produced for the SEAs during this study. These maps were prepared from low altitude, stereo-pair imagery using the Maps and Imagery Laboratory at the University of California, Santa Barbara, in June 1982. The photo imagery was taken on April 6,

1980 at a scale of 1:12,000, with an average flight line elevation of between 7,500 and 8,500 feet. The film type is Kodak Aerial IR 2443, processed as transparencies. Photointerpretation and graphing for vegetation maps were prepared by R. Plantrich with field-truthing by T. Thomas in July 1982. All photointerpreted information was cross-referenced with Wieslander's 1938 Vegetation Maps of the Santa Monica Mountains. Photointerpretation was executed on a Bausch and Lomb Stereo Zoom Transfer Scope.

The polygons on these maps are conceived to represent aggregations of plant and animal species that together and separately have mutual relationships among themselves and their environments. Polygons on the maps necessarily have distinct borders but in actuality, the various communities of the SEAs are generally highly intergrading, discontinuous, and interdigitating. Often, ecotones (blending areas) are broader than the communities themselves. Accordingly, the lines on the maps should be viewed as areas of considerable overlap in most cases. The biotic communities are most conveniently characterized by their dominant plant species because of the stationary characteristics of vegetation and the ability to map these communities based upon aerial photography. More easily overlooked is that animal species, though more mobile, just as clearly could be used to characterize the biotic resources of the SEAs. To do so,

however, would require several additional magnitudes of research effort and evaluation.

The dominant and co-dominant species shown in each polygon, nevertheless, largely regulate the "food web" within that area of the SEA, strongly influencing the environment of all other species in the community. Their major controlling influence largely derives from the numbers, sizes, and productivities of these dominant species where they occur.

Riparian areas on the maps require some consideration. In general, riparian designations on the maps represent water courses and associated plants which are dependent upon extra moisture. Many of these plant species are not trees. Their representation on the maps, however, is tree-like and often labelled as "Quercus agrifolia" (Coast Live Oak), although many of these areas support Ceanothus spinosus (Greenbark Ceanothus) in abundance.

The Zuma Canyon Vegetation shown on the map is best considered as "climax" vegetation rather than the actual vegetation now present and present when the infared photos were taken. The map depicts, instead, the vegetation that will most likely occupy Zuma Canyon in 10 to 15 years. The polygons were produced by considering vegetation in adjacent

areas that were not so recently burned and by comparing them with the Wieslander Maps of 1938.

The maps were produced in a relatively short time and require additional refinement for certain purposes. However, as they now stand, these maps can be useful for general planning activities within the SEAs and as a fire management tool. The finer distinctions of the ecological matrix which can be found in the infared imagery may be required for some scientific purposes.

VEGETATIVE COMMUNITY DESCRIPTIONS

The Significant Ecological Areas of the Santa Monica Mountains included in this study support examples of a variety of biotic communities as shown in Table One. The Malibu Canyon and Lagoon SEA contain the greatest variety (13) of vegetative communities. The Hepatic Gulch SEA contains the fewest (2), but is also the smallest of the SEAs. Each of the vegetative communities found in the SEAs is briefly described below as discussed by Thorne (1976) and the Los Angeles County Environmental Resource Committee (LACERC) Report (1972, Appendix B). Some of these communities could, of course, be divided into several additional subtypes.

Marine Aquatic Surfweed and Rocky Coastal Community

This is an area of surf-beaten rocky beaches, shores, and totally submerged rocks found along the edges of the Point Dume SEA. Submerged aspects of this community lie off the Malibu Lagoon in a sublittoral zone (below the action of waves). Two flowering plants, Phyllospadix scouleri and Phyllospadix torreyi, are found here attached firmly to submerged rocks by holdfasts along with numerous species of algae. Exposed rocks and those within the surf zone

Table One. Biological Communities found in the SEAs.

TABLE OF BIOTIC COMMUNITIES OF THE SIGNFICANT ECOLOGICAL AREAS

Biological Communities*	Significant Ecological Areas Nos.											
	2	3	3A	3B	4	5	B5	6	7	9	10	12
Marine Aquatic Surfweed..	X					X						
Coastal Dune Sand Plant..	X					X						
Coastal Salt Tidal Marsh.						X						
Coastal Salt-flat Succulent Marsh.....						X						
Freshwater Marsh.....		X				X						X
Freshwater Lake, Pond, and Quiet Stream.....		X			X	X	X			X	X	
Riparian Woodland.....	X	X		X	X	X	X			X	X	X
Southern Coastal Sea-Bluff Succulent.....	X											
Southern Coastal Maritime Sage Scrub.....	X	X				X					X	
Southern Coastal Inland Sage Scrub.....	?	X	X	X		X	X	X	X	X	X	X
Southern California Grassland.....		X	X	X		X	X	X		X	X	X
Southern Oak Woodland....		X		X	X	X	X	X		X	X	X
Chaparral.....		X	X	X	X	X	X	X	X	X	X	X
Developed Areas—Cleared of Vegetation.....	X	X	X	X	X	X	X	X		X	X	X
Bare Areas of Major Rock Outcrops.....		X				X	X			X	X	
Cultivated Areas includes orchards.....	X			X		X	X			X		X

*Classification based upon Thorne (1976).

frequently are encrusted with species of red, brown, and green algae, including Sea Lettuce (Ulva lactuca). A very large number of animal species are found exclusively in this community. Representatives of every major animal phylum (primary classification divisions) occur within the narrow band of life zone. Some of the species are the Acorn Barnacle (Balanus glandula), Beach Flea Hopper (Orchestoidea columbiana), Beach Isopod (Lygia occidentalis), Purple Sea Urchin (Strongylocentrotus purpuratus), and Elegant Sea Anemone (Anthopleura elegantissima) to name a few. Several species of terrestrial/wave-zone insects occur in this community including Marine Midges (Telmatogeton) and Intertidal Springtails (Entomobrya laguna).

The exposed rocky intertidal zone is easily harmed by heavy foot traffic, by indiscriminate collecting (if rocks are not returned to their original positions, for instance), and by pollutants. A number of shorebirds utilize this habitat, including the Wandering Tattler and Surfbird.

Coastal Dune Sand Plant (Psamnophytic Plants) Community

Loose sand, sea salt, strong winds, fog, and extreme insolation characterize these areas of dunes and upper sandy beaches found along Point Dume SEA and in small patches at the mouth of Malibu Lagoon. A number of rhizomatous grasses

or other monocot species, such as Giant California Rye (Elymus), and succulent, sprawling species, such as Sand-Verbena (Abronia maritima, Abronia umbellata), Shore Sandbur (Franseria chamissonis), and introduced Iceplants (Mesembryanthemum nodiflorum, Mesembryanthemum crystallinum, Mesembryanthemum chilense) are characteristic of this harsh environment. White-leafed Saltbush (Atriplex leucophylla) and Lupine (Lupinus chamissonis) are shrubs found here.

Characteristic animals found in this community include insects such as Dune Weevils (Trigonoscuta spp.), Sand Roaches (Arenivaga spp.), Sand Wasps (Bembix spp.), Velvet Ants (Dasymutilla spp.), Tiger Beetles (Cicindela spp.), Beach Amphipods (Orchestia traskiana, Orchestoidea californica, Orchestoidea columbiana) and the Rove Beetle (Thinopinus pictus) and Sand Crab (Emerita analoga). Amphibians are generally absent from this habitat. One reptile is notable in sand dunes, although it has not been reported from the SEAs: The California Legless Lizard (Anniella pulchra) is associated with more stabilized sand dune areas in coastal southern California.

Salt Tidal Marsh and Lagoon

These are areas of 0 to 10 feet elevation above sea

level that are inundated with salt water regularly as represented by Malibu Lagoon when the sand bar is open to the inflow of tidal water. Because of the limited size of Malibu Lagoon, this community is not well developed in the mouth of the lagoon. Typical species include Pickleweed (Salicornia spp.), Salt Grass (Distichlis spicata), Sea-Blite (Suaeda californica) and Sea Heath (Frankenia grandiflora). These plants are generally low with non-reflective leaf structures. Open water plant species are also present, including Duckweed (Lemna sp.), and several species of algae (Enteromorpha sp. and Spirogyra sp.).

Characteristic animals of this community include insects such as the Saltmarsh Fly (Ephydra riparia), Wandering Skipper (Panoquina panoquinoides), Saltmarsh Mosquito (Aedes spp.), and Sandhill Skipper (Polites sabuleti). Other invertebtrate animals include polychaete worms, small crabs, snails and clams, as well as open water planktonic forms (microscopic animals drifting with the surface currents). Malibu Lagoon supports a population of Steelhead (Salmo gairdnerii) that migrate through the lagoon into Malibu Creek after winter rains. Two fish species utilize the Malibu Lagoon for nurseries. The Staghorn Sculpin (Leptocottus armatus) and Striped Mullet (Mugil cephalus) produce juveniles that utilize the lagoon from late November to March. At least 262 species of birds have been reported from Malibu Lagoon. The area is notable for the large number of

waterfowl and shorebirds that feed and rest on the lagoon and adjacent coastal and stream waters. The lagoon is a body of quiet water that provides a haven for numerous species of migrants. A number of species overwinter on the lagoon, including species of Loons, Coots, Rails, Plovers, Sandpipers, Phalaropes, Gulls, and Terns. Mammals include the Deer Mouse (Peromyscus maniculatus) and Long-tailed Weasel (Mustela frenata).

This biotic community is dependent upon both freshwater entering the lagoon via Malibu Creek and also from tidal waters that enter when the sand bar has been breeched. Tidal fluctuations are a strong controlling element in this complex ecosystem.

Coastal Salt-flat Succulent Marsh

This community is found along side of Malibu Lagoon and is generally above normal tidal action. It receives large amounts of seawater during spring or storm tides, causing a high concentration of salt content in the soil. Typical species of this community include Salt Grass (Distichlis spicata), Pickle Weed (Salicornia), Saltbush (Atriplex), and Sea-Blite (Suaeda californica). In general, animals of this community are identical to those mentioned above except for the open water forms.

Freshwater Marsh

This community is found along permanently saturated, nutrient-rich areas where the water table is just at or just above the surface on the shallow margins of lakes, ponds, ditches, quiet streams, and hollows behind sand dunes on the coast. Typical plants of this community include such species as the California Bulrush (Scirpus californicus), Common Tule (Scirpus acutus), Cat-tails (Typha latifolia, Typha angustifolia), Spike Rushes (Eleocharis spp.), Pondweeds (Potamogeton), and Sedges (Carex spp.).

Characteristic animals of this community include a number of insect varieties such as the Predaceous Diving Beetles (Dytiscus spp.), Toadbug (Gelastocoris variegatus), Giant Water Bug (Lethocerus americanus), Buckmoth (Hemileuca calfornica), Rush Borer (Arxama gargantua), and Spotted Halisidota (Halisidota maculata). Amphibians likely found in these areas include the Western Toad (Bufo boreas), Bullfrog (Rana catesbeiana), and Pacific Treefrog (Hyla regilla). Reptiles associated with these wet areas include the Pacific Pond Turtle (Clemmys marmorata) and Two-striped Garter Snake (Thamnophis couchi hammondi). Birds frequently observed in freshwater marshes include the Red-winged Blackbird, Sora Rail, Clapper Rail, and Green Heron. Freshwater marshes are

major stopping areas for a large number of birds not listed here but include Bitterns, Ducks, and Herons. Mammals, such as the Ornate Shrew (Sorex ornatus), Western Harvest Mouse (Reithrodontomys megalotis), California Vole (Microtus californicus), Long-tailed Weasel (Mustela frenata), and Raccoon (Procyon lotor), are found in this community.

Freshwater marshes are sensitive to changes in water levels and are easily polluted. Over time, siltation frequently fills in such marshy areas, resulting in the replacement of the aquatic vegetation with a natural evolution to grasses, herbs, and shrubs or trees.

Freshwater Lake, Pond, and Quiet Stream

This community is found in permanent bodies of water where the water is not too swift, turbid, polluted, or deep. The distribution of various aquatic species within any particular freshwater community depends upon factors such as depth, temperature, substratum, and turbidity of the water. Plants consist of emergent, submerged, and partially submerged herb and graminoid (grass-related) species. Free-floating species like the Water-fern (Azolla filiculoides) and various Duckweeds (Lemna spp.) also are abundant at certain times of the year. Other genera of

plants include Buttercups (Ranunculus), Pondweed (Potamogeton), Waterweed (Elodea), and many others.

Characteristic animals of this community include insects such as Caddisflies (Hesperophylax), Dragonflies (Libellula saturata, Tarnetrum illotum), Water Scavenger (Hydrophilus triangularis), and the Giant Crane Fly (Holorusia grandis). Characteristic amphibians include the Western Toad (Bufo boreas), Bullfrog (Rana catesbeiana), and Pacific Treefrog (Hyla regilla). The Pacific Pond Turtle (Clemmys marmorata) and Two-striped Garter Snake (Thamnophis couchi) are typical reptiles. Mammals are basically identical with those of freshwater marsh communities.

This community, like freshwater marshes, is subject to destruction by pollution, improper recreational use, lowered water levels, and exotic plant introductions. Very few such areas remain in Los Angeles County. A few bird species, like Grebes, Ducks, Gulls, and Terns require this habitat during part of their normal yearly activities.

Riparian Woodland

A number of stream courses in the Santa Monica Mountains support a community of shrubs, semiaquatic trees, and herbs along their margins. Generally, these riparian woodlands are best developed alongside perennial streams where water runs near or above ground level all year round. These woodlands support trees such as Bigleaf Maple (Acer macrophyllum), Western Sycamore (Platanus racemosa), White Alder (Alnus rhombifolia), Coast Live Oak (Quercus agrifolia), and Fremont Cottonwood (Populus fremontii). An understory layer of shrubs frequently include Willows (Salix), Blue Elderberry (Sambucus mexicana), and Coyote Brush (Baccharis pilularis), but these shrubby species often occur alone, in the absence of trees. Another shrub frequently found in riparian situations of the Santa Monica Mountains is the Greenbark Ceanothus (Ceanothus spinosus). Frequently, a rich layer of herbs, grasses, and other plants are found below the canopy of the shrubs and trees. The Giant Chain Fern (Woodwardia fimbriata) and other ferns are frequently found in this setting. A large variety of microhabitats are provided within the riparian stream bottoms with its moist leaf litter, quiet pools, and damp stream banks. The canopy of trees and shrubs provide numerous resources for a great variety of bird species. Accordingly, riparian habitat is of great value as a wildlife habitat.

A large variety of animal species utilize riparian communities. Typical species include insects such as Underwing Moths (Catocala spp.), the Sylvan Hairstreak (Strymon sylvinus), Satyr Angelwing (Polygonia satyrus), Western Tiger Swallowtail (Papilio rutulus), Lorquin's Admiral (Limenitis lorquini), Edward's Glassy Wing (Hemihyalea edwardsi), Western Popular Sphinx (Pachysphinx occidentalis), and Velvety Tree Ant (Dasymutilla sp.). Amphibians supported by this habitat include the California Newt (Taricha torosa), Eschscholtz's Salamander (Ensatina eschscholtzi), California Slender Salamander (Batrachoseps attenuatus), Western Toad (Bufo boreas), and Pacific Treefrog (Hyla regilla). Reptiles characteristic of this habitat include the Western Skink (Eumeces skiltonianus), Two-striped Garter Snake (Thamnophis couchi), Western Fence Lizard (Sceloporus occidentalis), Striped Whipsnake (Masticophis lateralis), Common Kingsnake (Lampropeltis getulus), California Mountain Kingsnake (Lampropeltis zonata), Gopher Snake (Pituophis melanoleucus), Ring-necked Snake (Diadophis punctatus), Western Rattlesnake (Crotalus viridis), and the Pacific Pond Turtle (Clemmys marmorata). Bird species specifically associated with riparian areas include the Cooper Hawk and Red-shouldered Hawk. Mammals found in this community include the Broad-footed Mole (Scapanus latimanus), Ornate Shrew (Sorex ornatus), Western Harvest Mouse

(Reithrodontomys megalotis), California Vole (Microtus californicus), White-footed Mice (Peromyscus spp.), Long-tailed Weasel (Mustela frenata), Raccoon (Procyon lotor), and Striped Skunk (Mephitis mephitis). A number of bat species (Chiroptera) require riparian habitat for nightly feeding activity.

Riparian woodlands are subject to destruction by urbanization, channelization of their water courses, and fire. Siltation and sedimentation frequently damage the root systems of riparian species, causing their early death. However, riparian communities are generally able to slowly recover (self-restoration) after floods and fires. Unmodified riparian woodlands are relatively rare in Los Angeles County.

Southern Coastal Sage Scrub Community

Three distinct phases of this community are found within the SEA: namely the Inland Phase, the Sea-Bluff Succulent Phase, and one Malibu Phase. Although they share many characteristics each phase is presented separately in the following discussion. The Inland Phase is by far the most abundant.

Southern Coastal Inland Sage Scrub Community

This community phase is found on well-drained clay or gravelly, sometimes rocky or rock-strewn, soils at generally higher altitudes and on drier and hotter slopes and hilltops than the other two phases. It has fewer species than the other phases but also shares many of the same widespread species. Dominant species are generally half-woody shrubs about 1-5 feet tall, forming a partially open community including California Sagebrush (Artemesia californica), California Wild Buckwheat (Eriogonum fasciculatum), Bird's Foot Trefoil (Lotus scoparius), Valley Cholla (Opuntia parryi), Maritime Cholla (Opuntia littoralis), Purple Nightshade (Solanum xanti), Our Lord's Candle (Yucca whipplei), Golden Yarrow (Eriophyllum confertiflorum), and species of Monkey-Flowers (Diplacus and Mimimulus), Malacothamnus, Lupines (Lupinus), Sages (Salvia), and Sumac (Rhus). Poison-Oak (Toxicodendron diversilobum) is scattered throughout this community. In sandy washes, additional species include Calabazilla (Cucurbita foetidissima), Scale-Broom (Lepidospartum squamatum), and several species of Buckthorn (Rhamnus). Numerous annuals also occur in this community.

A number of animals are characteristic of this community. Insects include the Minor Ground Mantid (Litaneutra minor), California Mantid (Stagmomantis californica), Pink Glowworm (Microphotus angustus), Snakeflies (Agulla), Rain Beetles (Pleocoma), Tarantula Hawk (Pepsis mildei), Carpenter Bee (Xylocopa californica), Rose-winged Grasshopper (Dissosteira pictipennis), Jerusalem Cricket (Stenopelmatus fuscus), Ringlet (Coenonympha tullia), Common Checkerspot (Euphydryas chalcedona), Bramble Hairstreak (Callophrys dumetorum), Leanira Checkerspot (Melitaea laenira), and the Mormon Metalmark (Apodemia mormo). Amphibians found in this community include the Western Toad (Bufo boreas) and the Garden Slender Salamander (Batrachoseps major). Characteristic reptiles include the Western Fence Lizard (Sceloporus occidentalis), Coast Horned Lizard (Phrynosoma coronatum), California Legless Lizard (Anniella pulchra), Side-blotched Lizard (Uta stansburiana), Southern Alligator Lizard (Gerrhonotus multicarinatus), Gopher Snake (Pituophis melanoleucus), Common Kingsnake (Lampropeltis getulus), Striped Whipsnake (Masticophis lateralis), and Western Rattlesnake (Crotalus viridis). Common bird species include the Sage Sparrow, Song Sparrow, and Bewick's Wren, plus numerous others. Typical mammals include the Deer Mouse (Peromyscus maniculatus), Desert Woodrat (Neotoma lepida), Western Harvest Mouse (Reithrodontomys megalotis), California Vole (Microtus californicus), California Pocket Mouse

(Perognathus californicus), Pacific Kangaroo Rat (Dipodomys agilis), Audubon Cottontail (Sylvilagus audubonii), Coyote (Canis latrans), and several species of bats, including the California Myotis (Myotis californicus).

Fire plays an important role in the ecology of Coastal Sage Scrub. Because this community generally interdigitates with Chaparral communties, the comments concerning fire ecology in the Chaparral section generally apply to this community as well. Coastal Sage Scrub generally recovers within a few years after a fire through a series of transitional stages (seres), each with characteristic species. Depending upon slope and terrain, this community is subject to destruction or injury by heavy pedestrian, horse, and vehicular traffic. Although fine examples of this community persist within the Santa Monica Mountain SEAs, this community has become relatively scarce in Los Angeles County.

B. Southern Coastal Sea-Bluff Succulent Community

The crests and precipitous faces of the oceanic cliffs at Point Dume support an example of this community with a scattering of shrubs and herbs, including the Giant Coreopsis (Coreopsis gigantea), Live-forevers (Dudleya spp.), Calandrinia (Calandrinia maritima), and Haplopappus (Haplopappus veneus) plus others.

A number of birds utilize these bluffs for roosting and nesting. For example, White-throated Swifts and Rock Doves use the bluffs at Point Dume as nesting sites. A few other birds, such as Brandt's and Pelagic Comorants, likely would use Point Dume bluffs for nest sites if human disturbances were reduced. These cliffs are of ecological importance. Because only a small amount of this habitat remains undevedoped in Los Anneles County.

C. Southern Coastal Maritime Sage Scrub Community

This species-rich community is found along the immediate coast covering hill tops and slopes of the SEAs that are immediately adjacent to the ocean (Point Dume, Malibu Canyon and Lagoon, Tuna Canyon, and a small part of lower Zuma Canyon). Characteristic plants include California Sagebrush (Artemesia californica), Encelia (Encelia californica), California Wild Buckwheat (Eriogonum fasciculatum) and species of Lupines (Lupinus), Sages (Salvia), Bird's Foot Trefoils (Lotus), Cactuses (Opuntia), plus other showy plants such as Paint-Brushes (Castilleja) and Golden-Yarrow (Eriophyllum confertiflorum).

This position overlooking the ocean is highly valued as home sites and, accordingly, this biological community has been eliminated throughout much of its range in Los Angeles County.

Southern California Grassland Community

Grasslands in California are generally found in open flats and hills with deep, fine-textured soils. Development each year is directly related to the amount of precipitation. Perennial native grasses of the genera of Triple-Awned Grasses (Aristida), Oatgrasses (Danthonia), Fescues (Festuca), Bluegrasses (Poa), and Needlegrasses (Stipa) among others, once occupied grasslands of California, but have now largely been replaced by introduced annual species that die in the summer. In general, all grasslands in southern California--especially those that have been used for cattle grazing--now support stands of annuals species such as Oats (Avena), Bromes (Bromus), Fescues (Festuca), and Barley (Hordeum). A large number of wildflowers, in addition to the grasses, characterize these grasslands. Colorful species in the genera of Fiddlenecks (Amsinckia), Coreopsis, Shooting Stars (Dodecatheon), Storksbills (Erodium), Poppies (Eschscholzia), Lupines (Lupinus), Goldenfields (Lasthenia), Malacothrix, Owl's-Clovers (Orthocarpus), Phacelia, Popcorn Flowers (Plagiobothrys), Sages (Salvia), Clovers (Trifolium),

and Violets (Viola) to name a few, abound in this community, especially after and during winter and spring rains.

Characteristic insects include the Painted Arachnis Moth (Arachnis picta), Bumblebee (Bombus spp.), Western Bush Cricket (Hoplosphyrum boreale), Western Short-horned Walkingstick (Parabacillus hesperus). An arachnid, the Trapdoor Spider (Bothriocyrtum californicum) also is found in this community. Amphibians are not particularly characteristic of grasslands. Typical reptiles include the Side-blotched Lizard (Uta stansburiana), Coast Horned Lizard (Phrynosoma coronatum), Gopher Snake (Pituophis melanoleucus), Common Kingsnake (Lampropeltis getulus) and Western Rattlesnake (Crotalus viridis). The Western Meadowlark is perhaps the most characteristic bird species. The Pocket Gopher (Thomomys bottae), Deer Mouse (Peromyscus maniculatus), Western Harvest Mouse (Reithrodontomys megalotis), and the Pacific Kangaroo Rat (Dipodomys agilis-on the edges near shrubby areas) are all characteristic mammals of grassland communities.

In addition to the introduction of non-native species, grasslands are subject to agricultural conversions, urbanization, and to brush encroachment. This community is scarce in southern California, especially those that still retain remnants of native perennial species. Nevertheless

most of the SEAs have patches of grasslands where some native perennial species survive.

Southern Oak Woodland Community

This frequently savanna-like, open oak woodland is dominated by Coast Live Oak (Quercus agrifolia) on slopes with deep moist soils. Generally it is found in canyon bottoms and on moist north-facing slopes where other species such as the California Walnut (Juglans californica), and members of the genera of California-Lilacs (Ceanothus), Sumacs (Rhus), Currents (Ribes), and Poison Oak (Toxicodendron) intrude from adjacent chaparral areas. In open places within the woodland canopy, large tree-size shrubs such as Toyon (Heteromeles arbutifolia) and Blue Elderberry (Sambucus mexicana) frequently occur. In places, trees in this woodland are more scattered and have an understory of typical Southern California Grasslands, forming a typical oak savanna.

Characteristic animals of this community are partly shared from adjacent communities, such as open grasslands or chaparral areas. This is especially true for savanna situations. Insects typical of Southern Oak Woodlands include the Ironclad Beetle (Phloedes pustulosus), California Sister (Adelpha bredowi), Ringlet (Coenonympha tullia),

Callippe Silverspot (Speyeria callippe), Western Treehole Mosquito (Aedes sierrensis), Sylvan Satyr (Cercyonis silvestris), California Hairstreak (Strymon californica), Snowy Tree Cricket (Oecanthus niveus), California Oak Moth (Phryganidia californica), Brown Ctenucha (Ctenucha brunnae), California Timema (Timema californica), Winter Sphinx (Arctonotus lucidus), and Elegant Sphinx (Sphinx perelegans). Several amphibians, including the Arboreal Salamander (Aneides lugubris), Eschscholtz's Salamander (Ensatina eschscholtzi), Garden Slender Salamander (Batrachoseps major), and Western Toad (Bufo boreas), are typical species. Typical reptiles include the Coast Horned Lizard (Phrynosoma coronatum), Western Fence Lizard (Sceloporus occidentalis), Southern Alligator Lizard (Gerrhonotus multicarinatus), Ring-necked Snake (Diadophis punctatus), Gopher Snake (Pituophis melanoleucus), Common Kingsnake (Lampropeltis getulus), Striped Whipsnake (Masticophis lateralis), and Western Rattlesnake (Crotalus viridis). Birds, such as the Acorn Woodpecker, Plain Titmouse, Band-tailed Pigeon, Screech Owl, and Lawrence's Goldfinch, are typical inhabitants of this community. Mammals, such as the Brush Mouse (Peromyscus boylei), Western Gray Squirrel (Sciurus griseus), Beechey Ground Squirrel (Citellus beecheyi), Raccoon (Procyon lotor), Bobcat (Lynx rufus), and a number of bat species (Myotis, Lasiurus, Eumops), also are typical inhabitants.

Southern Oak Woodlands are subject to use for subdivisions and recreational conversions, such as parks. In general, oaks are very sensitive to changes in the water table surrounding their extensive root systems. Compaction of the soils under the tree canopy itself can interfere with the normal physiological processes of these trees. The large trees in this woodland (20 to 60 feet tall) provide very important habitat for a number of animals.

Chaparral Community

Chaparral is probably most characteristic of southern California. This evergreen, broad-leaved scrub has characteristic species that typically possess thick leathery leaves and are widespread over dry slopes and ridges throughout California. It generally is found on rocky, sandy, or gravelly mesas, plains, slopes, and hilltops, often forming thick, impenetrable stands. The diversity of species in this community is notable. The dominant shrubs include Chamise (Adenostoma fasciculatum), Manzanitas (Arctostaphylos), California-Lilacs (Ceanothus), Oaks (Quercus), Buckthorns (Rhamnus), and Sumacs (Rhus). Additionally, Mountain-Mahogany (Cercocarpus betuloides), Tree Poppy (Dendromecon rigida), Toyon (Heteromeles

arbutifolia), Hollyleaf Cherry (Prunus ilicifolia), and Our Lord's Candle (Yucca whipplei) are notable throughout this community. The species composition of the chaparral changes from slope to slope but still retains a generally characteristic appearance. Several phases or kinds of chaparral are found within the SEAs. Mixed chaparral is the most widespread within the SEAs. This chaparral is dominated by a rich mixture of the shrubs described above and of many species of herbs in the more open areas. Chamisal, another kind of chaparral, occurs where nearly pure stands of chamise (Adenostoma fasciculatum) are prevalent. A third kind of chaparral, Red-shanks Chaparral, occurs in the Cold Creek SEA and a few other areas where Red-shanks (Adenostoma sparsifolium) dominates.

Characteristic insects of chaparral include Snakeflies (Agulla), Rain Beetles (Pleocoma), Ceanothus Silk Moth (Hyalophora euryalus), Silk Moths (Saturnia walterorum, Saturnia albofasciata), Gray Hairstreak (Strymon adenostomatis), Arota Copper (Lycaena arota), Hedge-row Hairstreak (Strymon saepium), Callippee Fritillary (Speyeria callippe), California Timema (Timema californicas), and Camel Cricket (Gammarotettix genitalis). The Western Toad (Bufo boreas) is typical of many chaparral areas. Reptiles frequently found in chaparral include the Western Fence Lizard (Sceloporus occidentalis), Southern Alligator Lizard

(Gerrhonotus multicarinatus), Gopher Snake (Pituophis melanoleucus), Common Kingsnake (Lampropeltis getulus), Striped Whipsnake (Masticophis lateralis), and Western Rattlesnake (Crotalus viridis). Birds that are frequently encountered in chaparral include the California Thrasher, Rufous-sided Towhee, Wrentit, and Mountain Quail. Mammals include such species as the Deer Mouse (Peromyscus maniculatus), Cactus Mouse (Peromyscus eremicus), Brush Mouse (Peromyscus boylei), Desert Woodrat (Neotoma lepida), California Pocket Mouse (Pergonathus californicus), Pacific Kangaroo Rat (Dipodomys agilis), Brush Rabbit (Sylvilagus bachmani), California Ground Squirrel (Citellus beecheyi), Gray Fox (Urocyon cinereoargenteus), Bobcat (Lynx rufus), Coyote (Canis latrans), Spotted Skunk (Spilogale putorius), Badger (Taxidea taxus), Mountain Lion (Felis concolor), Ringtail (Bassariscus astutus), Raccoon (Procyon lotor), Mule Deer (Odocoileus hemionus), and several species of bats (Myotis spp.).

Burning plays an important role in the ecology of chaparral. Many chaparral species are fire conditioned: After a fire, these shrub species resprout from their stumps and underground root systems, producing a relatively rapid regrowth (perhaps in 10 to 15 years). Other chaparral species are fire-annuals. These plants germinate only after a fire passes over, searing the seeds that persist in the

soil. This acts as a signal for germination. Some of these plant seeds are known to lie dormant for decades in readiness for the season after a fire, during which they germinate, produce vegetative structures and seeds, then die, remaining as dormant seeds until the next fire. Because of general fire prevention efforts in chaparral areas, this vegetation frequently builds up very high levels of fuels so that when a fire finally does pass through, the fires are extremely intense. A large number of animal species are dependent upon chaparral and require adjacent expanses of chaparral for existence after a fire passes through a particular area.

Special Biological Community Designations

The California Natural Diversity Data Base has identified plant communities and habitat types in California that are of primary importance for data acquisition. These communities were selected because of their distinctness, rarity, endangerment, and protection status. Table Two lists the Special Plant Communities of California that happen to be found within the SEAs covered in this study. A brief description of each of these habitat types is given below.

Table Two. Special Plant Communities and Habitats within the SEAs. Based on the California Natural Diversity Data Base Working Lists 16 March 1981.

TABLE OF CNDDB SPECIAL COMMUNITES OF CALIFORNIA

Biological Communities	Significant Ecological Areas Nos.											
	2	3	3A	3B	4	5	B5	6	7	9	10	12
Native Grasslands at low elevations.....				X		?	?	?		X	?	?
Rare Plant Enclaves.....		X		X	X	X				X		
Southern California Walnut Forests.....		X		X	X	X				X		X
Southern Coastal Salt Marsh.....						X						
Valley Oak Savanna at low elevations.....						X*		X				X
Mainland Giant Coreopsis Scrub.....	X											
Outstanding Stands.....	X	X		X		X		X	X	X	X	
Disjunct Communities....		X	X		X			X	X	X		
Sycamore Woodlands.....		X				X	?			?		

*At the edge of a larger community ?Does not clearly qualify

1. Native Grassland at low elevations. Remnants of herbaceous vegetation widely scattered at low elevations in cismontane (mountains west of the Sierra Crest) California.

2. Rare Plant Enclaves. All communities not otherwise listed, which are dominated by rare and endangered plant species. These enclaves within the SEAs are generally small if measured in terms of the area over which the listed species "dominates" the community, but these areas are generally influenced by wider environmental factors, such as drainage channels upstream or erosion processes upslope.

3. Southern Coast Saltmarsh. The salt marsh near Malibu Lagoon is critical habitat for many bird species and other less-visible animals.

4. Mainland Giant Coreopsis Scrub. Communities on the California Mainland where Coreopsis gigantea is dominant or co-dominant.

5. Valley Oak Savanna at low elevations. These are communities found on alluvial bottomlands where Quercus lobata is the sole dominant tree but provides less than 50 percent absolute cover.

6. Outstanding Stands. Particularly old, mature, unusual or outstanding stands of the more common plant communities.

7. Disjunct Communities. These are communities found far disjunct from their main range.

8. Sycamore Woodland. Riparian communities in which Platanus racemosa is the dominant tree.

RARE, ENDANGERED, AND THREATENED SPECIES IN THE SEAs

The SEAs covered in this study provide habitat for two species of plants designated by the California Department of Fish and Game as rare. A species that has been declared rare, although not presently threatened with extinction, exists in such small numbers throughout its range that it may become endangered if its environment worsens. State endangered species are plants or animals whose continued existence is jeopardized by one or more causes, including loss of habitat, change in habitat, overexploitation, predation, competition, or disease.

The U.S. Fish and Wildlife Service designates as threatened, any species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range. Federally endangered species are those that are in danger of extinction throughout all or a significant portion of its range other than for a species of Insect (Class Insecta) determined by the Secretary of Interior to constitute a pest whose protection under the provisions of the 1973 Endangered Species Act would present an overwhelming and overriding risk to man.

Two species of plants have been designated by the California Department of Fish and Game as Rare (Section 670.2, Title 14, California Administrative Code). The same two species, plus a third, have been nominated for listing by the U.S. Fish and Wildlife Service as Endangered (Federal Register 45[242]:82480-82569).

State Designated Rare Species

1. Common name: Santa Monica Mountain Live-forever.
   Family name: Crassulaceae - Stonecrop family.
   Scientific name: Dudleya cymosa (Lem.) Britt. & Rose ssp. marcescens Moran.
   Flowering dates: May-June.
   General habitat: Shaded rocky slopes (mostly Conejo Volcanics) near canyon bottoms often growing with Club Moss (Selaginella bigelovii).
   Distribution: Endemic (restricted) to the central western Santa Monica Mountains, Los Angeles and Ventura Counties.

2. Common name: Santa Susana Tarweed.

Family name: Asteraceae - Sunflower family.

Scientific name: Hemizonia minthornii Jepson.

Flowering dates: July-October.

General Habitat: Dry chaparral slopes in sandstone outcrops.

Distribution: Los Angeles and Ventura Counties, scattered through the Simi Hills, Calabasas and Castro Peaks in the Santa Monica Mountains.

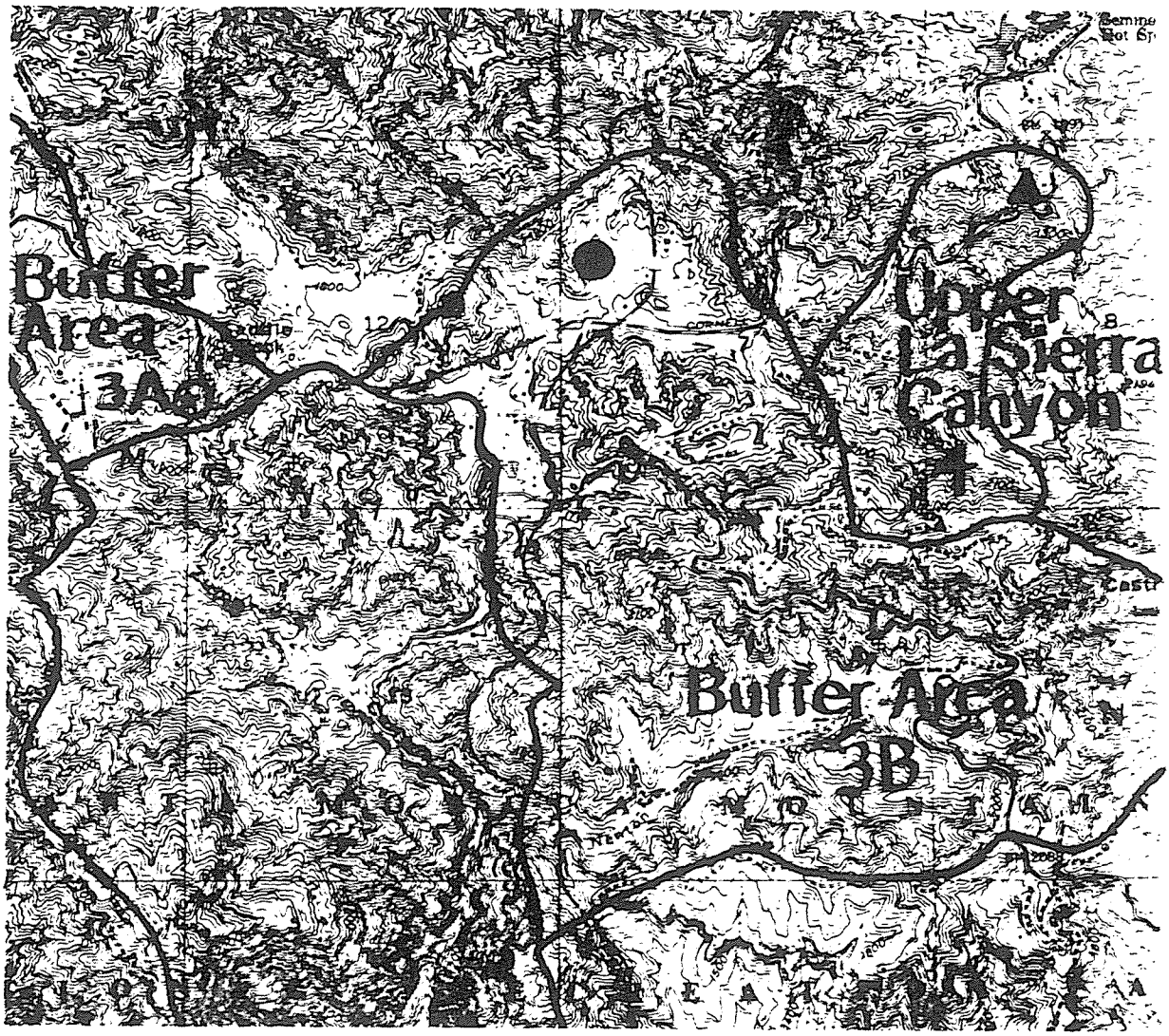
The Santa Monica Mountain Live-forever occurs in the Uppers La Sierra Canyon and in the Malibu Canyon SEAs. The Santa Susana Tarweed is found in the Zuma Canyon and Cold Creek SEAs. Figures One and Two indicate the locations.

Federally-Nominated Endangered Species

Both of the species listed above have been nominated for listing as Endangered by the U.S. Fish and Wildlife Service. A third plant species that was nominated with the other two is described here:

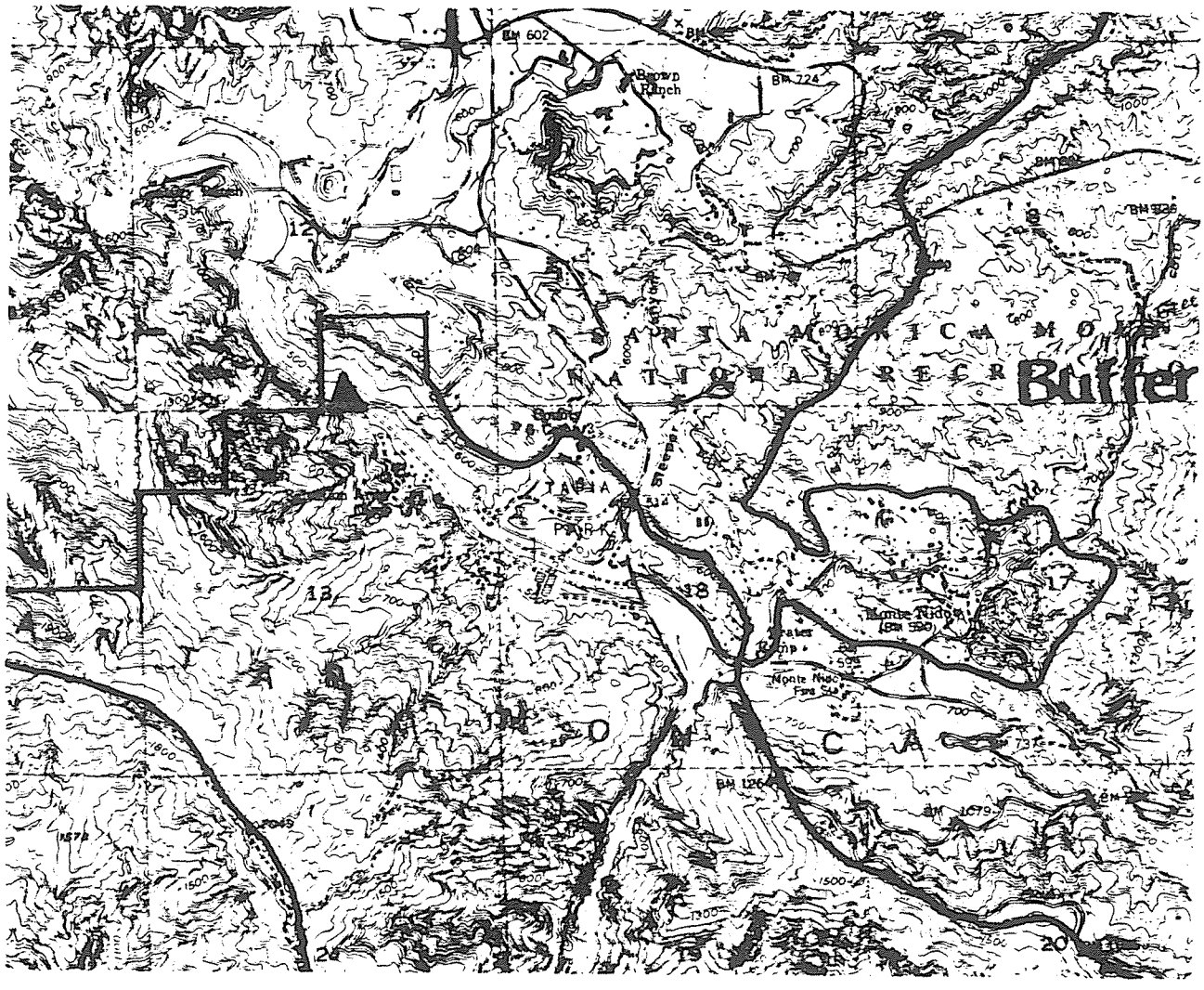
3. Common name: Lyon's Pentachaeta.

Figure One. Location of Endangered and Nominated Endangered plant species in upper Zuma Canyon SEA, Upper La Sierra Canyon SEA, and the 3B Buffer.



The triangle represents the Santa Monica Mountain Live-forever (Dudleya cymosa marcescens).
The closed circle represents Lyons' Pentachaeta (Pentachaeta lyonii).
The starred circle represents the Santa Susana Tarweed (Hemizonia minthornii).

Figure Two. Location of a population of the Endangered Santa Monica Live-forever (Dudleya cymosa marcescens) in the Malibu Canyon SEA.



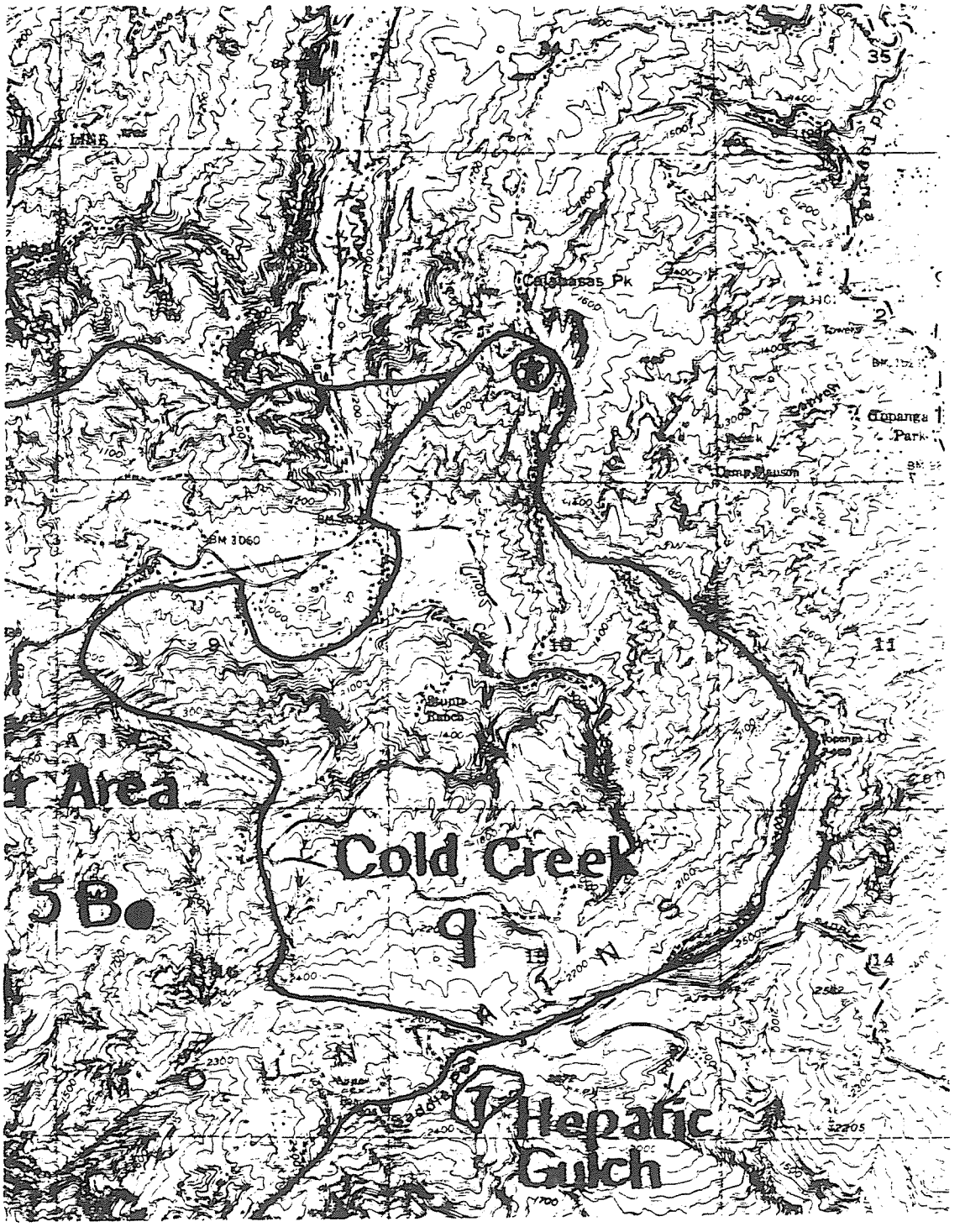
The triangle represents the population on the edge of the SEA.

Family name:	Asteraceae - Sunflower family.
Scientific name:	Pentachaeta lyonii, (Chaetopappa lyonii (Gray) Keck).
Flowering dates:	March-May.
General habitat:	Clay soils of grassland areas (now highly impacted and restricted).
Distribution:	Originally Santa Catalina Island and Coastal Los Angeles County, but now only known from the Santa Monica Mountains, Stunt Ranch, Rocky Oaks, & Saddle Rock in Los Angeles County; a small population in Ventura County.

Figures One and Three show the locations of this species.

The Federal Endangered Species Act of 1973 provides for severe penalties for those convicted of violating provisions of the Act, and a reward system to encourage apprehension is provided. A person, other than a state or federal official, who gathers evidence leading to the conviction can be rewarded up to a maximum or $2,500.00. A person can commence a civil suit enjoining any person or governmental agency from violating provisions of the Act.

Figure Three. Location of a population of the Endangered Santa Susana Tarweed (Hemizonia minthornii) and Lyons' Pentachaeta (Pentachaeta lyonii) in the Cold Creek SEA.



The closed circle represents Lyons' Pentachaeta.

The starred circle represents the Santa Susana Tarweed.

The species listed above may not include all of the native species within the SEAs that are endangered, rare, or threatened, but these are the known ones. The official lists of the Federal and State governments are reviewed regularly. Some species are removed from these lists when new studies indicate this to be appropriate. The population of the Santa Susana Tarweed previously known to occur at Calabasas Peak was found to be more extensive than known before this study was conducted. Conceivably, this information could eventually contribute to the removal of this species from the State or Federal lists. On the other hand, these lists are dynamic and new species of rare or endangered plants or animals may be discovered and added to the lists.

The Santa Monica Mountains support a number of species that are considered locally rare or uncommon. These are species that are not frequently found, or are found in increasingly smaller numbers due to changes or elimination of their habitats. The Santa Monica Mountains National Recreation Area Draft Natural Resource Management Plan lists 62 species of locally uncommon plant species. The great majority of these are found in habitats that occur within the SEAs. Six species of locally rare raptorial birds found in the Santa Monica Mountains include the White-tailed Kite (Elanus leucurus), Golden Eagle (Aquila chrysaetos), Merlin

(Falco columbarius), Prairie Falcon (Falco mexicanus), Long-eared Owl (Asio otus), and Short-eared Owl (Asio flammeus). Four species of locally rare mammals include the Ringtail (Bassariscus astutus), Long-tailed Weasel (Mustela frenata), Badger (Taxidea taxus), and the Mountain Lion (Felis concolor). Locally rare reptiles include Pacific Pond Turtle (Clemmys marmorata), Coast Horned Lizard (Phyrnosoma coronatum), Silvery Legless Lizard (Anniella pulchra), Mountain Kingsnake (Lampropeltis zonata), and the Two-striped Garter Snake (Thamnophis couchi).

DESCRIPTION OF THE SIGNIFICANT ECOLOGICAL AREAS

This section summarizes the biological resources found within each of the SEAs and Buffers covered in this study. For each area, the following information is given:

A. Name and number of the SEA or Buffer;

B. Location of the SEA or Buffer on USGS 7 1/2 minute Quadrangles, showing the Township, Range, and Section numbers, and the total acreage;

C. The ecological communities mapped on the vegetation maps within the SEA or Buffer;

D. Rare, endangered, or threatened species found within the SEA or Buffer;

E. An evaluation of the present ecological significance of the SEA or Buffer;

F. Man-made impacts upon ecological resources in the area.

POINT DUME SIGNIFICANT ECOLOGICAL AREA (#2)

Quadrangle

Point Dume 7 1/2'

Township 1 South, Range 18 West

Total area: 389 acres

Vegetation

The mapped units of vegetation within this SEA include:

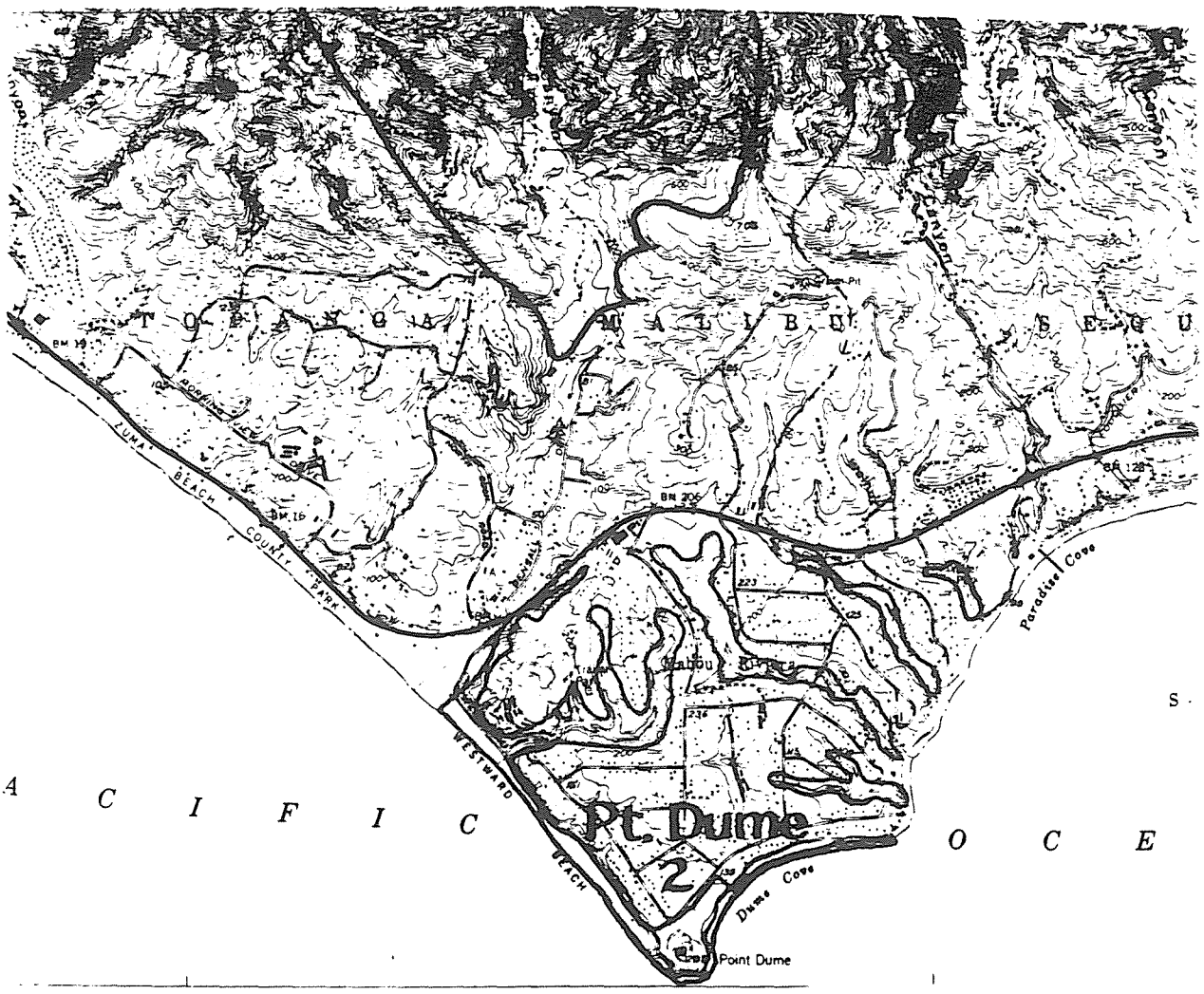
Primarily California Sagebrush (*Artemesia californica*) and Giant Coreopsis (*Coreopsis gigantea*) dominated communities with patches of nearly pure Poison Oak (*Toxicodendron diversiloba*) and patches of Willow (*Salix*) dominated communities in ravine bottoms.

Coastal Bluff Community

Coastal Strand Community

Some Bare areas

Figure Four. USGS topographic map of the Point Dume SEA (Point Dume Quadrangle).



Patches of exotic species

Rocky Coastal Community

Rare, Endangered, and Threatened Species

No State or Federally listed rare, endangered, or threatened species of plant or animal is known to occur within the boundaries of the Point Dume SEA.

Of historic interest is the Bald Eagle (Haliaeetus leucocephalus) aerie (nesting area) known to have existed on the western edge of the Point Dume SEA early in this century.

Ecological Significance of the Point Dume SEA

The Point Dume SEA possesses a mainland Giant Coreopsis scrub that is relatively rare in California. Coreopsis gigantea is dominant and co-dominant on Point Dume itself and at the mouth of the large canyon draining into Westward Beach where it grows on generally highly erodable sea bluffs. Other vegetation includes several species of introduced Ice Plants (Mesembryanthemum), native Prickly-Pear (Opuntia littoralis), and other shrubs and herbs. Other Giant Coreopsis individuals occur on the bluff to the northwest of this canyon and a few scattered clumps are left in the exotic

vegetation on the westwardmost edge of the SEA along Westward Beach Road.

Point Dume possesses a small strip of Rocky Intertidal Shore Community, another relatively uncommon resource in Los Angeles County. This rocky shore is accessible by hiking trails that have been cut through the sea bluffs. This community has five distinct bands of marine life, each with its own characteristic set of plant and animal species. Examples of almost all major animal phyla are found within the intertidal zone, with each species having its own special habitat.

Point Dume is an unusual headland that extends into the Santa Monica Bay more than a mile beyond the rest of the Malibu Coast. It remains an important feeding, resting, and migrating ground for diversity of bird species, including Pelagic and Brandt's Comorants, and Rock Doves, for example. Riparian, Coastal Scrub, and Rocky Coast habitats are all valuable in this regard. Though long-time residents report a decrease in the number of animal species that utilize canyon bottoms throughout the Point, a number of mammals, such as Raccoons (Procyon lotor), Coyotes (Canis latrans), Stripped Skunks (Mephitis mephitis), and Red Foxes (Vulpes fulva), are reported to still utilize these canyons as wildlife corridors.

Dudleya caespitosa, a small, inconspicuous plant (only 2-5 cm tall), occurs at its southwestern distribution limits at Point Dume. As this species flowers, the lower portion of the plant withers away until the entire plant is consumed into the reporductive parts. This plant most usually grows at the uppermost edges of the SEA canyons where housing developments generally occur. Accordingly, individuals of this species are easily overlooked and destroyed.

Giant Coreopsis also reaches its eastward distribution extremes at Point Dume. Such biogeographical situations are useful in understanding genetic diversity and plasticity of different taxa of both plants and animals. Populations of plants and animals at their extremes, or in disjunct situations, serve as "genetic reservoirs" of variability that are important to the adaptability and survival of the species when either short term (e.g. fire) or long term (e.g. climate changes) environmental changes occur. Additionally, genetic variability appears to be necessary for maintenance of healthy populations.

Point Dume SEA has a variety of natural biotic communities. The Coastal Sea-Bluff Succulent Community is found in only a few other places in Los Angeles County and covers such small areas wherever it does occur, that all

remaining examples of this community are important from an ecological viewpoint--even though they are not pristine.

The small drainages that cut through the bluffs of Point Dume are the only examples of one kind of biotic community in Los Angeles County. For this unique setting to be preserved in the county, the canyons in the bluffs of Point Dume will need to be preserved.

Present Impacts upon Ecological Resources in the Point Dume SEA

The sea bluffs that support the Giant Coreopsis/Ice Plant stands are crisscrossed with foot trails that are causing significant erosion on the bluffs. These trails are also used regularly by horseback riders and some motorbikes.

In general, the mapped boundaries of this SEA do not match the present boundaries of the vegetation in the inland ravines. This, plus a number of enclaves of exotic vegetation, leave the significant ecological resources in a somewhat fragmented circumstance. The ravines are not very well protected by their owners. The natural vegetation along the SEA canyons has been removed from a number of places to make way for yards, horse corrals, small barns, foot paths, bridges, roads, gardens, drain pipes, and landfill.

Continuing encroachment upon these narrow ravines would eventually eliminate the natural vegetation in some areas. In several cases, homeowners have placed chain-link fences down along the canyon bottom, evidently to surround their properties. In some cases, clearing of natural vegetation has occurred inside the fences, but in other cases, natural vegetation has been retained. Nearly all available housing sites are now occupied along the bluffs and ravine edges. Rapid runoff and erosion are additional primary impacts upon ecological resources in these ravines.

The narrow rocky intertidal area in Dume Cove is relatively small in surface area and is moderately impacted from use by the general public. To some extent, the numbers and kinds of organisms in this community probably vary from year to year from natural causes. But collecting and observing intertidal organisms by the general public (by digging or turning over rocks) tends to eliminate many forms, especially if materials are not returned to their original, undisturbed positions.

A small wastewater treatment plant servicing about 700 residents is located in a deleted area in the large westcentral canyon. Effluent is sprayed onto this deleted area dn onto deleted areas on the southwesternmost canyon bluffs adjacent to Westward Beach Road before it reaches the

beach. Exotic shrubs and trees have entirely replaced natural vegetation in all these areas.

ZUMA CANYON SIGNIFICANT ECOLOGICAL AREA (#3)

Quadrangle

Point Dume 7 1/2'

Township 1 South, Range 18 West parts of Section 19, 30, 31, and one unsurveyed section;

Township 1 South, Range 19 West parts of Section 11, 12, 13, 14, 23, 24, 25, 36, and on unsurveyed section.

Total Area; 3,253 acres.

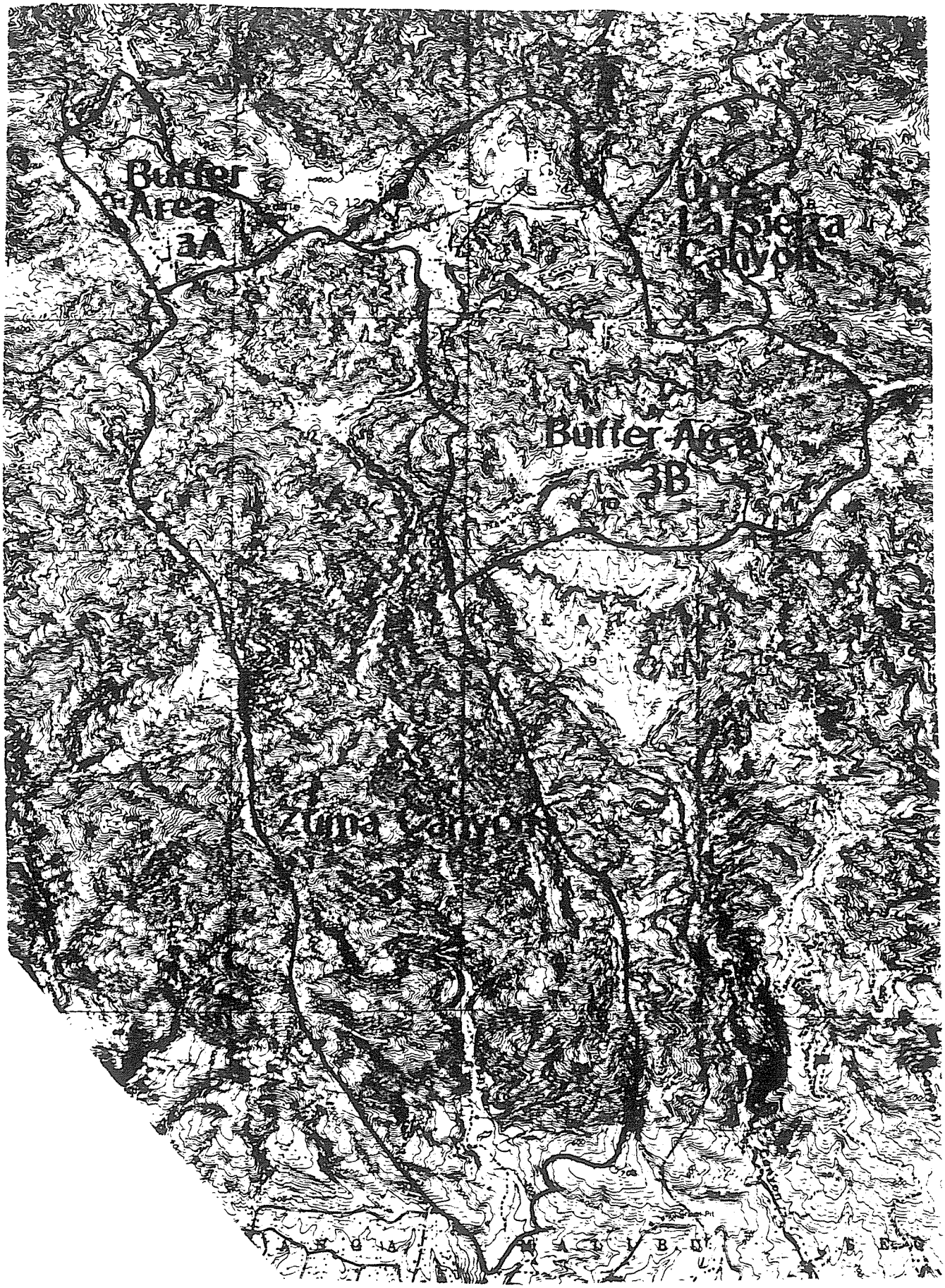
Vegetation

The mapped units of vegetation within this SEA include:

A. Mixture of Chaparral and Coastal Sage Scrub communities dominated by *Ceanothus megacarpus*, *Eriogonium fasciculatum*, *Adenostoma fasciculatum*, and *Artemesia californica*

B. Riparian bottom dominated by *Platanus racemosa*, *Quercus agrifolia*, and *Salix* spp.

Figure Five. USGS topographic map of the Zuma Canyon SEA (Point Dume Quadrangle).



C. Developed areas along roads and a few small areas at the north end of the SEA

D. Riparian areas dominated by Platanus racemosa, Quercus agrifolia, and Umbellularia californica in upper canyons

E. Extensive patches of Quercus agrifolia Woodlands adjacent to creeks in the north and several small such areas in the south SEA

F. Large Grasslands at south tip of the SEA dominated by introduced species.

Other notable plants include:

Lyons' Pentachaeta (Pentachaeta lyonii), Native Deergrass (Muhlenbergia), and Needlegrass (Stipa) in grassy areas; Arizona Ash (Fraxinus velutina), Red Shank (Adenostoma sparsifolium) in the upper water shed; Fremont Cottonwood (Populus fremontii) and Black Cottonwood, (Populus trichocarpa), in the canyon bottoms.

Rare, Endangered, and Threatened Species

The Zuma Canyon SEA possesses a population of the Santa Susana Tarweed (Hemizonia minthornii), an officially listed State Rare species (Section 670.2, Title 14, California Administrative Code) that has been nominated for listing as a Federally Endangered species, (Federal Register 42(242): 82480-82569). This small shrub, a member of the Sunflower family (Asteraceae), grows on sandstone outcrops on dry chaparral slopes. It is scattered through the Simi Hills and the Castro and Calabasas Peak areas in the Santa Monica Mountains. The population occurs near Kanan-Dume Road and Mulholland Highway on the hills west of Calimegos Camp (Township 1 South, Range 10 West Section 12).

The central, sheer cliffs of Zuma Canyon SEA possess a historic nest site of the Peregrine Falcon (Falco peregrinus), a State and Federally listed Endangered species. Although this species was extirpated from the Santa Monica Mountains after the turn of the century, a recent (July 1982) reintroduction of a pair of Peregrine Falcons into a nearby historic nest site in Ventura County by the U.S. Fish and Wildlife Service Endangered Species Recovery Program, may lead to re-utilization of the Historic site in the Zuma Canyon SEA. Peregrine Falcons normally nest on ledges of

high cliffs or rocky outcrops. A number of such sites are available along the cliffs of central Zuma Canyon.

Ecological Significance of the Zuma Canyon SEA

Upper Zuma Canyon SEA possesses a population of the Santa Susana Tarweed, an officially Endangered Plant species. This Endangered Plant was discovered subsequent to Zuma Canyon designation as an SEA in 1976.

Zuma Canyon possesses a significant riparian woodland throughout much of its length, an uncommon resource in Los Angeles County. The riparian vegetation includes several uncommon plants and animals including Black Cottonwoods (Populus trichocarpa) and Pacific Pond Turtles (Clemmys marmorata), which utilize the numerous pools that have developed along its water course. The perennial nature of this stream is augmented by discharge of effluent from a small sewage treatment plant at the head of the SEA on Ensinal Road. This plant services about 300 residents.

Zuma Canyon SEA also possesses some grasslands with populations of native grass species such as Stipa+ and Muhlenbergia.

Lower Zuma Canyon appears to have the upper remnants of a Western Sycamore Woodland that was centered in the developed area to the south of the SEA boundary. Such Western Sycamore Woodlands are designated as Special Communities by the California Natural Diversity Data Base.

The high cliffs in central Zuma Canyon provide uncommonly suitable habitat for raptor nesting. As noted earlier Peregrine Falcons are known to have nested in these cliffs early in the country.

Because of its relatively undeveloped condition, Zuma Canyon has a rich diversity of wildlife. Mountain Lion (Felis concolor) continue to be reported occasionally. Deer (Odocoileus hemionus) are seen frequently depending upon their population cycles that evidently are partly correlated with buring cycles. Bobcats (Lynx rufus) appear to have healthy populations. Golden Eagles utilize the area for foraging. The specialized characteristics of Zuma Canyon that attract these species are its undeveloped condition, excellent riparian bottom, and healthy Chaparral/Coastal Scrub vegetation.

The upper reaches of Zuma Canyon support a population of Red Shank (Adenostoma sparsifolium), a disjunct species found in limited areas of the Santa Monica Mountains.

Zuma Canyon possesses extensive stands of Chaparral and Coastal Sage Scrub communities as well as extensive patches of Coast Live Oak Woodlands. These habitats are largely undisturbed and are only part of a diverse set of biotic communities found in Zuma Canyon. The canyon appears to support a large proportion of native animal species including the most sensitive, such as Mountain Lions and Golden Eagles.

Present Impacts upon Ecological Resources in the Zume Canyon SEA

The upper watershed of Zuma Canyon is presently supporting a small amount of residential development. Although this likely has caused a small amount of downstream sedimentation, no specific negative results were observed.

A small sewage treatment plant has been built at the northernmost part of the SEA on Encinal Road. Effluent from this plant is released into Zuma Canyon and sprayed on hillsides nearby. This artificial enhancement of the stream flow in Zuma Canyon is partly responsible for its downstream perennial water supply which has some positive impacts. A number of pools exist, some with Pacific Pond Turtles. (The stream becomes subterranean by the time it reaches the canyon mouth.)

The Los Angeles County Fire Department has cut a very large fire break on the west ridge of Zuma Canyon. Ruderial plants, such as introduced mustards and grasses, occupy these fire breaks/motor ways. Several offroad motor bikes were observed using these fire breaks (west ridge) for steep hill climbing.

Large Sycamore Woodlands persist at the canyon's mouth on the alluvial benches above streams along with other riparian shrubs. However, extensive grazing by cattle and horses at the southern tip of Zuma Canyon SEA has completely eliminated much of the natural vegetation on the valley floor.

Orchard trees have been planted just outside the southeastern tip of the SEA. Some grading has also occurred near the orchard.

Several fenced yards appear to be within the SEA boundaries at the southernmost tip of the SEA.

Other than the south tip as noted, the area appears in a most natural state. Between the northern and southern ends

of the SEA only one area (the highest ridge point on the west divide) has been developed. The small ranch which occupies the site is reported to have been there for over 20 years.

UPPER LA SIERRA CANYON SIGNIFICANT ECOLOGICAL AREA (#4)

Quadrangle

Point Dume 7 1/2'

Township 1 South, Range 18 West parts of Section 7, 8, 17, and 18

Total Area: 175 acres

Vegetation

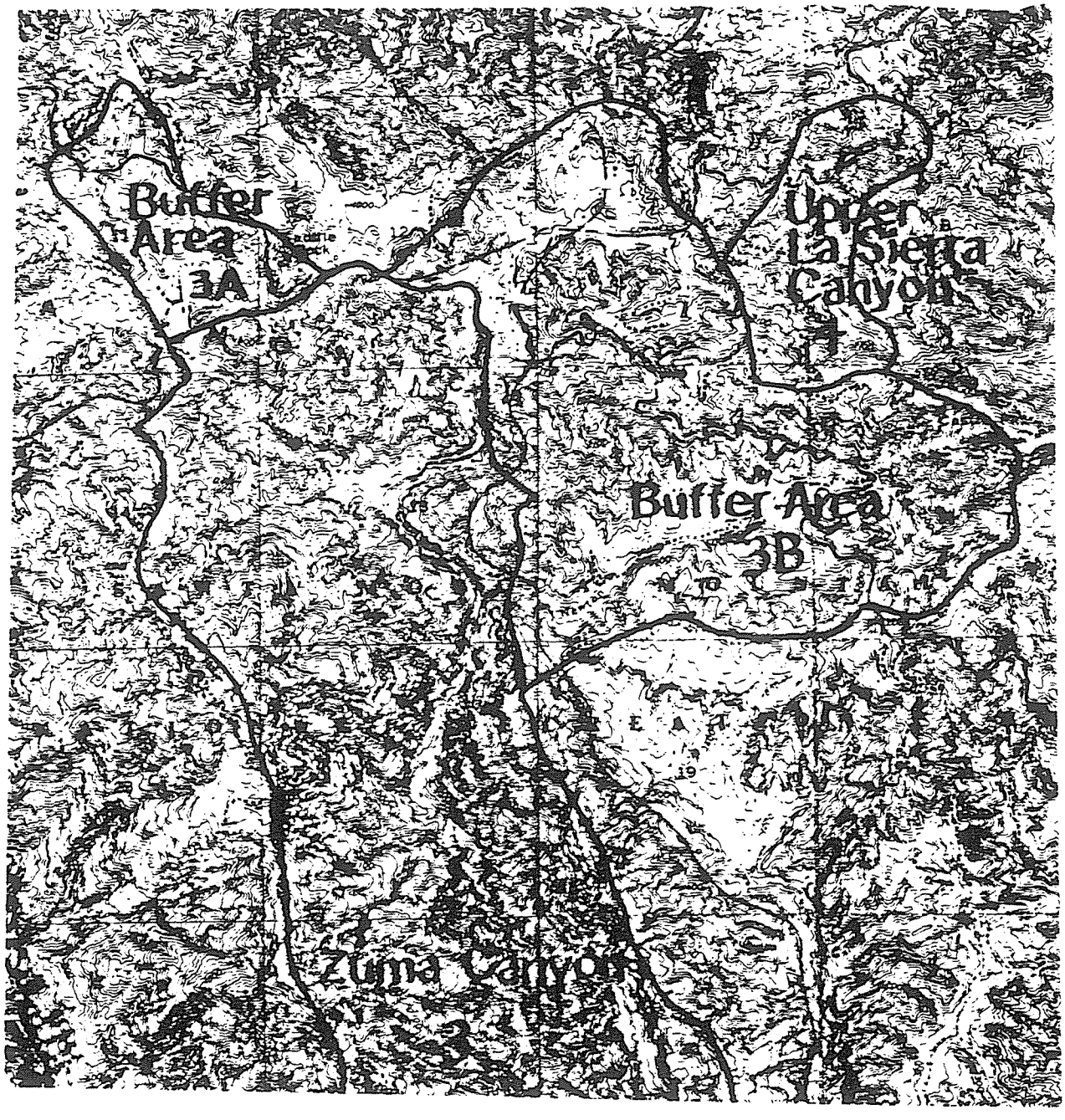
The mapped units of vegetation within this SEA include:

A. Central Riparian area dominated by Coast Live Oaks (Quercus agrifolia), California Bay-Laurel (Umbellularia californica), and Western Sycamore (Platanus racemosa)

B. Chaparral areas dominated by species of California Lilacs (Ceanothus spp.), with patches dominated by Chamise (Adenostoma fasciculatum)

C. Extensive woodlands dominated by California Live Oaks (Quercus agrifolia), and California Bay-Laurel (Umbellalaria californica)

Figure Six. USGS topographic map of the Upper La Sierra SEA (Point Dume Quadrangle).



Other notable plants include:

The Santa Monica Mountain Live-forever (Dudleya cymosa marcescens), Giant Chain Fern (Woodwardin fimbriata), Humbolt Lily (Lilium humboltii), Creek Dogwood (Cornus glabrata), Black Cottonwood (Populus trichocarpa), Bigleaf Maple (Acer macrophyllum)

Rare, Endangered, and Threatened Species

The upper La Sierra Canyon SEA possesses a population of the endemic Santa Monica Mountains Live-forever (Dudleya cymosa ssp. marcescens), a State listed Rare species (Section 670.2 Title 14, California Administrative code) nominated for Federal listing as Endangered. Except for one population in Ventura County, all known populations of this species are restricted ot the Santa Monica Mountains of Los Angeles County.

The population within the SEA occurs just WSW of Seminole Hot Springs, north of Mulholland Highway (Township 1 South, Range 18 West section 8) in a canyon bottom with year round water. Fewer than 50 individuals exist in this population on north-facing sheer rock surfaces elevated

above the direct influence of water, but still low enough to be in the cold air drainage of the canyon bottom. They grow in association with a Club Moss (Selaginella bigelovii) in filtered light in an area of about 12 square yards. Within the Santa Monica Mountains, three other populations are known, one within the Malibu State Park.

Ecological Significance of the Upper La Sierra SEA

The Upper La Sierra Canyon supports a small population of the endemic Santa Monica Mountains Live-forever (Dudleya cymosa ssp. marcescens), a State listed Endangered species, which has been nominated for Federal listing as Endangered.

A stand of Creek Dogwood (Cornus glabrata) is found at this site and in Malibu State Park and is a regionally uncommon species. These trees require shaded canyons to persist and would be sensitive to removal of overstory vegetation as well as to impacts of riparian species in general, primarily sedimentation and changes in water runoff rates. The distribution of these trees in pockets throughout California suggest that they may be relics of Pleistocene

This SEA contains a rich Riparian Woodland as well as extensive Coast Live Oak Woodlands, both uncommon communities

in Los Angeles county. The Riparian Woodland is especially notable for uncommon plants including Creek Dogwood, Black Cottonwood, and Big Leaf Maple. Such woodlands are subject to destruction by subdivision, channelization, weed encroachment, fire, watershed damage, water diversion, offroad vehicle and stream pollution.These communities are frequently capable of self-restoration after flood and fire.

The Creek Dogwood is disjunct in its distribution. As noted earlier is uncommon in southern California.

Notable taxa within the riparian vegetation of Upper La Sierra Canyon are located in a small, privately-owned canyon and are not easily disturbed. Occasional brush fires have likely harmed this begetation, but riparian woodlands are generally capable of self-restoration.

Present Impacts upon Ecological Resources in the Upper La Sierra Canyon SEA

Fire breaks along the ridges of the Upper La Sierra Canyon drainage divide are extensive, causing some erosion.

Rubbish has been dumped for some time into a small canyon near where Dudleya cymosa marcescens grows.

Houses are scattered along Cornell Road and along a dirt road in the southcentral portion of the area.

MALIBU CANYON AND LAGOON SIGNIFICANT ECOLOGICAL AREA (#5)

Quadrangle

Malibu Beach 7 1/2'

Township 1 South, Range 18 West parts of Section 18, 19, 20, 29, 30, 31, and some unsurveyed sections;

Range 18 West parts of Section 12, 13, 14, 24, 25

Total Area: ± 3,638 acres

Vegetation

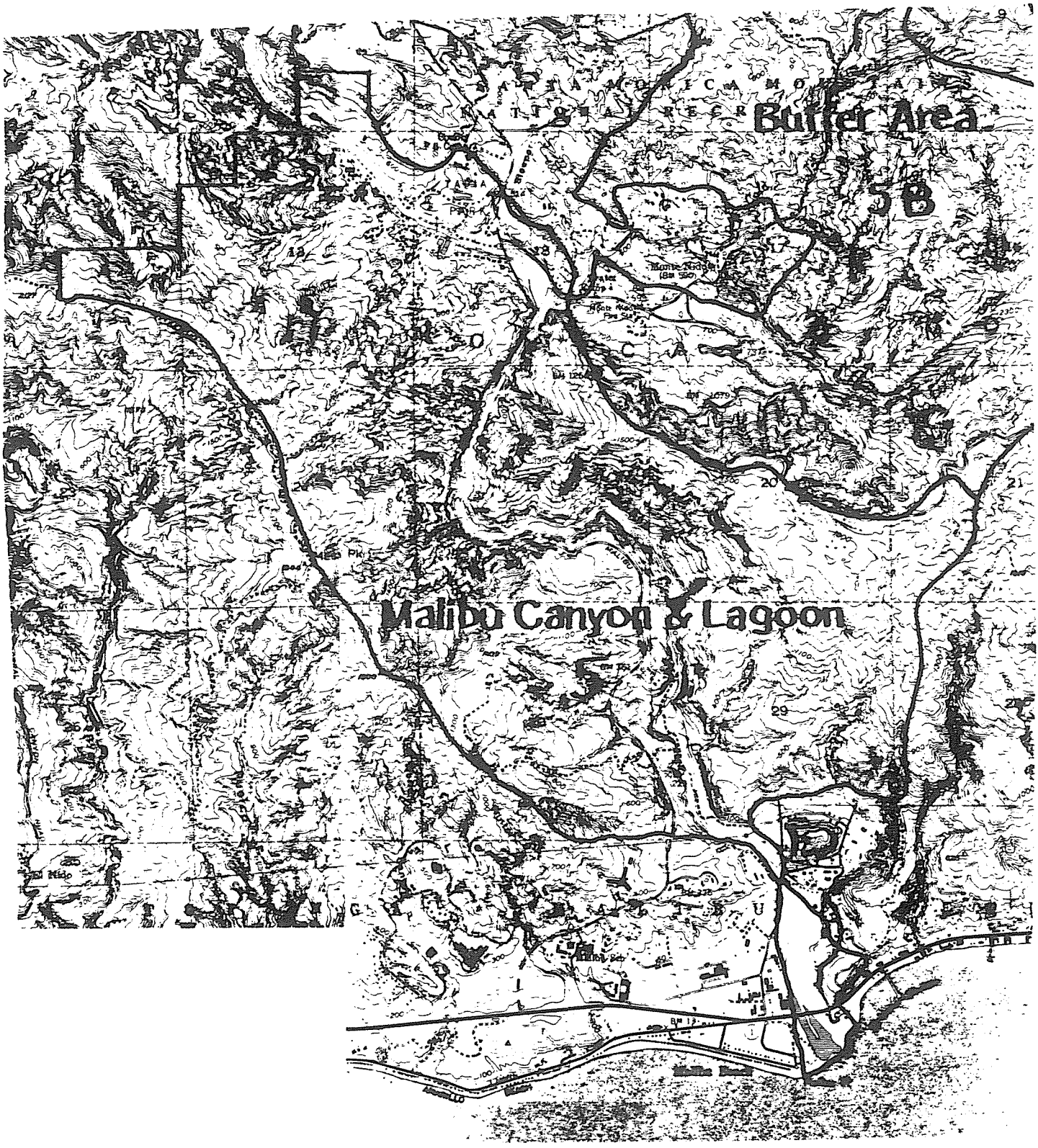
The mapped units of vegetation within this SEA include:

A. California Sage Brush (Artemesia) dominated communities in the southern part of the SEA

B. California-Lilac (Ceanothus) and Chamise (Adenostoma) dominated communities is the northern part of the SEA

C. Extensive riparian areas dominated by Coast Live Oak (Quercus agrifolia) and Western Sycamore (Platanus racemosa) in wetter creek bottoms and by Blue Elderberry (Umbellularia californica) in drier, upper lateral canyons

Figure Seven. USGS topographic map of the Malibu Canyon and Lagoon SEA (Malibu Beach Quadrangle).



D. Developed areas in the central canyon and at the Salvation Army Camp near Tapia Park

E. Cultivated (orchard) near the lower southwest edge of the SEA

F. Large patches of Grasslands in the southeast, centraleast, and northern parts of the SEA

G. Large stands of Quercus agrifolia/Umbellularia californica dominated Woodlands

H. Several large bare rock outcrops

Other notable terrestrial plants include:

Moderately developed stands of White Alder (Alnus rhombifolia) and Big Leaf Maple (Acer macrophyllum) in a side canyon near Tapia Park; Giant Chain Fern (Woodwardia fimbriata) in the canyon south of Tapia Park; Valley Oak (Quercus lobata) near Tapia Park--the southern limit of the species; Wild Grape (Vitis girdiana)--an indicator of good riparian habitat; Black Cottonwood (Populus trichocarpa); Leather-leaf Ash (Fraxinus velutina)

Other notable plants of Malibu Lagoon include:

Open Water species: Lemna sp., Enteromorpha sp., and Spirogyra sp.

Coastal Salt Marsh: Salicornia virginica and S. subterminalis, Atriplex sp., Distichlis spicata, and Suaeda californica

Upstream Riparian areas: Salix sp., Baccharis glutinosa

Rare, Endangered, and Threatened Species

The Malibu Canyon and Lagoon SEA possesses a population oof the endemic Santa Monica Mountains Live-forever (Dudleya cymosa ssp. marcescens), a State listed Rare species (Section 670.2, Title 14, California Administrative Code) nominated for Federal listing as Endangered. Except for one population in Ventura County, all known populations of this species are restricted to the Santa Monica Mountains of Los Angeles County.

The population within the SEA is found on Conejo volcanic rock outcrops along the shaded stream banks of the Salvation Army Camp grounds (Township 1 South, Range 18 West

Section 13). Fewer than 50 individuals live in an area of about 12 square yards. Within the Santa Monica Mountains, three other populations are known, one within the Upper La Sierra SEA and two within Malibu State Park.

The Malibu Lagoon is utilized to a limited extent by several populations of State and Federally listed bird species.

Brown Pelicans (Pelecanus occidentalis) are common residents of off-shore Los Angeles County throughout the year, but are rarely found on the open Lagoon of Malibu Canyon. This species is listed by both State and Federal agencies as Endangered.

Individuals of four species, (the Bald Eagle (Haliaeetus leucocephalus), Peregrine Falcon (Falco peregrinus), Clapper Rail (Rallus longirostris), Least Tern (Sterna albifrons) all listed as Endangered by both State and Federal agencies have each been reported as rare transients to Malibu Lagoon. Within historic time Bald Eagle and Peregrine Falcon nested in nearby sites in the Santa Monica Mountains (Peregrine Falcons within Zuma Canyon Sea and near Hepatic Gulch and Cold Creek SEAs, and Bald Eagles somewhere near the mouth of Malibu Creek). The Peregrine Falcon has been reintroduced (July 1982) into the western Santa Monica Mountains. Coastal

lagoons, as well as riparian areas in the upper parts of Malibu Lagoon, are important habitats of Peregrine Falcons year round. They feed on shorebirds, pigeons and song birds, which they catch in flight.

Belding's Savannah Sparrow (Passerculus sandwichensis beldingi), a State listed Endangered species that is endemic (restricted) to southern California salt marshes, is reported to have once nested at Malibu Lagoon but in the past decade appears to have been completely extirpated with the Salicornia Marsh.

Ecological Significance of the Malibu Canyon and Lagoon SEA

Malibu Lagoon is an example of an important resource that has nearly been lost in California. It is the only one of its kind in Los Angeles County. The brackish lagoon supports open water flora and fauna, including those species listed under vegetation. In addition, the lagoon and the immediate surrounding area support populations of at least eighteen native fish, seven introduced fish species, Pacific Pond Turtles, Bull Frogs, and a great variety of invertebrate species among others. Malibu Lagoon is an exceptionally important resting site for migrating water fowl. Over 262 species of birds are reported to have used the lagoon and its surrounding area.

A Coastal Salt Marsh was once well developed west of the present lagoon. Remnants of this Salicornia salt marsh still exist around the edges of the lagoon. As noted, Belding's Savannah Sparrow (Passerculus sandwichensis beldingi), a State-listed Endangered species, once utilized the marsh but is now extirpated (pers. comm. Kimbell Garrett, July, 1982).

The perennial stream of Malibu Canyon is an uncommon resource of Los Angeles county. Several notable Riparian tree species are found in this canyon. Black Cottonwoods and Leather-leaf Ash found here are both limited in their distribution in Los Angeles county. The Mountain Lion, an uncommon species, utilizes Malibu Canyon. Golden Eagles nest in the central canyon. These uncommon raptors require about 20 square miles of hunting territory. Wild Grape (Vitis girdiana) is found in only a few riparian areas in Los Angeles County, including Malibu Canyon.

A few large patches of grassland in the Malibu SEA are an uncommon resource in Los Angeles County. These occur in the upper reaches of the ridges in the northern, centraleastern and southeastern part of the SEA.

Malibu Lagoon is notable for bird populations utilizing its water, marshy edges, and strand for feeding and resting,

especially during migrations of species using the Pacific Flyway. Several marine and estuarine fish species also utilize the lagoon intermittently during juvenile or breeding stages. A great number of invertebrate fauna also utilize the lagoon for reproductive and maintenance activities.

Malibu Creek also serves as resting and feeding sites for numerous migratory birds such as great Blue Herons. A number of raptors utilize the canyon for nesting and foraging. The large trees in the riparian bottoms are essential elements in the lives of many bird species.

Because Malibu Creek is an antecedent stream, it bisects the Santa Monica Mountain range, allowing coastal and interior climates and taxa to intermix in unique combinations. For example, the southermost individuals of the Valley Oak (Quercus lobata) are found near Tapia Park in Malibu Canyon.

These large oaks probably have moved toward the coast to the point where they reached the spring-summer fog line. Other interior species show similar distributions, allowing an interesting mix between coastal and interior forms.

Silver Salmon (Oncorhynchus kisutch) and Steelhead (Salmo gairdnerii) move up Malibu Creek to spawn in winter. Juveniles live in the creek all year. The trout migrate as

far up as Malibu Reservoir where they are stopped by the dam. Other species, such as Green Sunfish and Bluegills are year round residents in the creek.

The Chaparral and Coastal Sage Scrub communities in the upper flanks of this SEA are largely undisturbed. These wild areas support a rich fauna of native species and are isolated due to lack of accessible roads, although several fire motorways have been cut in several places. Access into the lateral, upper watershed is well protected by fencing and gates along Malibu Canyon Road and elsewhere.

Present Impacts upon Ecological Resources in the Malibu Canyon and Lagoon SEA

Malibu Canyon and Lagoon SEA is the most impacted of all the SEAs. But, it is also in many ways the most diverse and attractive. It contains nearly all the elements that bring people to the mountains and to the beaches. The watershed is huge, including 120 square miles of drainage from Malibu Canyon, Las Virgenes Canyon, Triunfo Canyon, Lindero Canyon, Russell Valley, and Sherwood Valley. Part of this drainage is in Ventura County. The watersheds of the other SEAs are more appropriately measured in acres.

Naturally, a great amount of siltation occurs annually in such a large watershed: Malibu Reservoir is entirely silted to the top of the dam. However, much of the Malibu Creek bottom is very rocky due to the large amount of scouring during winter rains. Nevertheless, the perennial riparian vegetation remains in good condition, partly because of the numerous side canyons which, in many cases, are notable themselves. Some of these, for example, contain perennial springs and unique tree species (i.e., Leather-leaf Ash).

Several impacts upon ecological resources of Malibu Creek and Lagoon result from the Tapia Wastewater Reclamation Plant in the upper parts of the SEA. Presently, the plant is using spray irrigation underground seepage pits to disperse its effluent. A tertiary treatment facility is now being constructed. When finished, tertiary treated water will be released into Malibu Creek. Eutrophication of the streams and lagoon can result from even small amounts of additional organic materials being added to the Creek. Such an effect will be beneficial to a large number of floral and faunal populations but may be detrimental to others. Other impacts related to toxic compounds, temperature, and oxygen levels in the lagoon may result from the Tapia facility.

Horses are sometimes ridden in the Lagoon and onto the Coastal Sage Strand and pets (dogs, cats) have been observed chasing shore birds that nest in the mud flats.

This SEA includes activities such as orchard farming, ground clearing, irrigation, firebreak clearing and maintenance, and paving of roads.

An analysis of the entire 120 m2 of drainage into Malibu Creek is outside the scope of this study.

HEPATIC GULCH SIGNIFICANT ECOLOGICAL AREA (#7)

Quadrangle

Malibu Beach 7 1/2'

Township 1 South, Range 18 West Section 15

Total area: 18 acres

Vegetation

The mapped units of vegetation within this SEA include:

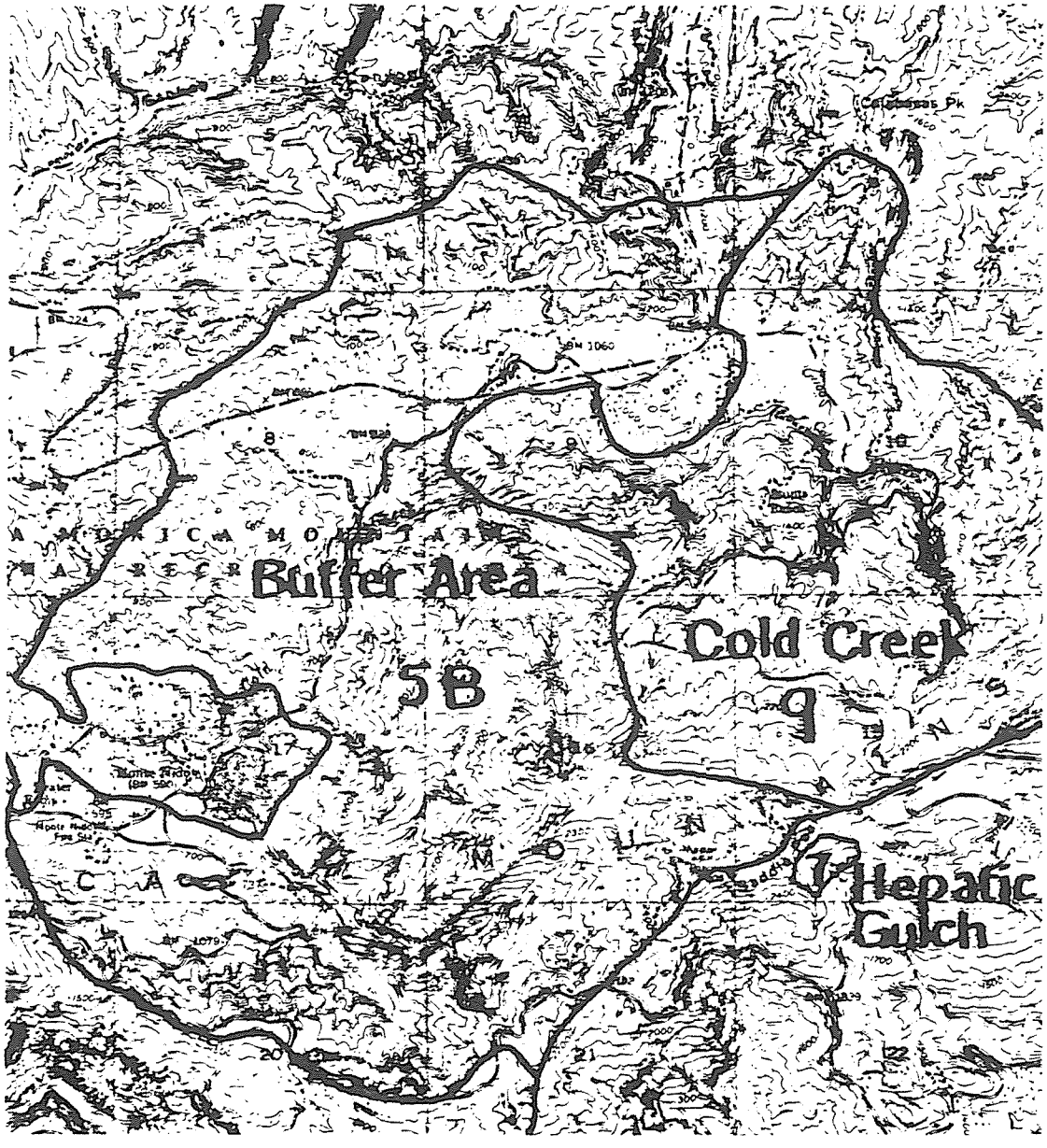
A. Chaparral communities dominated in areas by Bigpod Ceanothus (Ceanothus megacarpus) and by Chamise (Adenostoma fasciculatum) and Black Sage (Salvia mellifera) in other areas

B. Coastal Sage Scrub communities on the edges of the SEA dominated by California Buckwheat (Eriogonum fasciculatum) and Laurel Sumac (Rhus laurina)

Other notable plants include:

Desert Buckwheat (Eriogonum wrightii spp. membranaceum), Scrub Oak (Quercus dumosa), Manzanita (Arctostaphylos ssp.), Whipples' Yucca

Figure Eight. USGS topographic map of the Hepatic Gulch SEA (Malibu Beach Quadrangle).



(Yucca whipplei), Mariposa Lilies (Calochortus spp.), Live-forever (Dudleya sp.), Little Club Moss (Selaginella bigelovii).

Rare, Endangered, and Threatened Species

No State or Federally listed rare, endangered, or threatened species of plant or animal is known to occur within the boundaries of the Hepatic Gulch SEA.

Of historic interest is the Peregrine Falcon (Falco peregrinus) aerie (nest) known to exist in the west, upper drainage of Las Flores Canyon (Section 22), within a mile or less to the south of the Hepatic Gulch SEA.

Ecological Significance of the Hepatic Gulch SEA

This steep hillside supports an unusual blend of dry-adapted (xerophytic) Chaparral species in close proximity to more taxonomically primitive, water-adapted (hydrophytic) species (cryptogams). High rainfall in this coastal area (near Saddle Peak) produces a small seasonal wash in which at least six genera and nine species of liverworts and hornworts exist during winter and early spring months. The area is

underlain by sandstone. The developing soil is generally 0 to 10 inches thick with variable textures and consistencies. Over twenty-five percent of the slope is rock outcrops. Constant downward slippage of the developing soil produces micro-climates suitable for ferns and mosses in the shadows of dry-adapted plants such as Yucca.

Hepatic Gulch and a few nearby hillsides do represent a vegetative association that is unusual and may be one of a kind in Los Angeles county.

The unusual nature of this vegetative community provides scientists with an interesting example (or laboratory) of complex, community interactions through time and space. This particular community interaction is a function of local and regional tectonics, substratum, climate, and genetic diversity and plasticity of the evolving community taxa. The unique situation in Hepatic Gulch SEA is greatly dependent upon the maintenance of the very steep mountain upland with rapid runoff. Any changes in slope aspect and degree would likely eliminate these characteristics.

The unique community in this SEA indicates little evidence of recent disturbances. An abandoned Nike Missile Site (now National Park Service property) was developed

several decades ago on the ridge above Hepatic Gulch. To a limited degree, the abandoned missile site may have contributed to erosion into the drainage channel where the unique plant community persists. But, due to the rocky nature of the "soil", microslumping probably minimizes or eliminates sedimentation of the eroded material. The large surface area on the ridge top above Hepatic Gulch (at the missile site) is paved and this may generate relatively rapid runoff over Hepatic Gulch affecting the survival of the delicate liverworts and hornworts in the SEA.

Present Impacts upon Ecological Resources in the Hepatic Gulch SEA

A dirt road was present before 1950, but has now been largely obscured through natural ecological succession. Any erosion caused by this road appears to have been very minimal.

A number of houses and a large water reservoir (tank) and pipeline are located on the ridges in the vicinity adjacent to Hepatic Gulch.

COLD CREEK SIGNIFICANT ECOLOGICAL AREA (#9)

Quadrangle

Malibu Beach 7 1/2

Township 1 South, Range 17 West parts of Section 3, 4, 9, 10, 11, 14, 15, and 16

Total Area: 1517 acres

The mapped units within this SEA include:

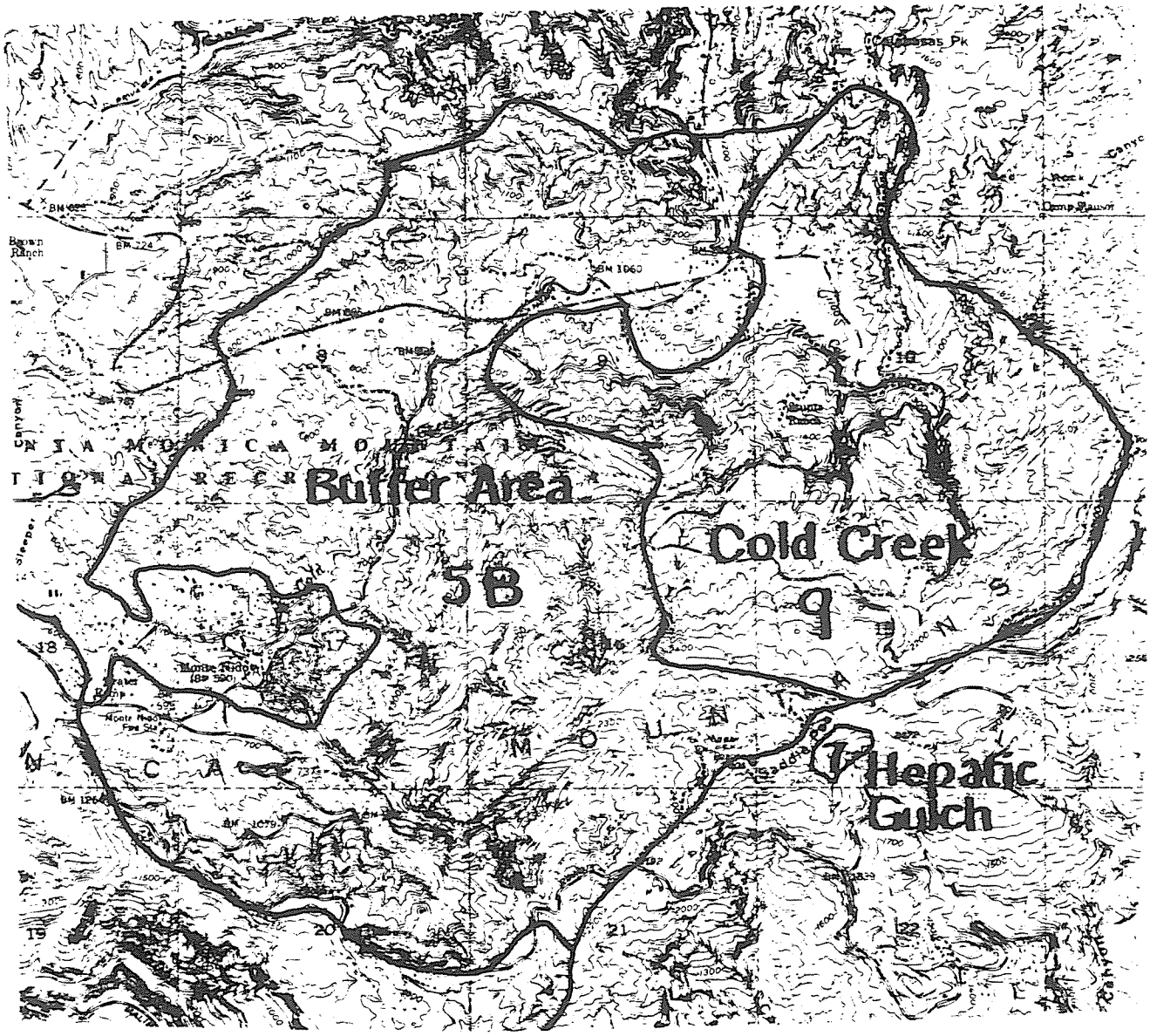
A. Chaparral communities dominated primarily by Ceanothus (*Ceanothus* spp.), patches of Chamise (*Adenostoma fasciculatum*) and California Sage Brush (*Artemesia californica*)

B. Riparian creek bottom (Cold Creek) dominated by *Quercus agrifolia*, *Umbellularia californica*, and *Platanus racemosa*

C. Large patches of grasslands

D. Large *Quercus agrifolia* dominated woodlands adjacent to canyon bottoms

Figure Nine. USGS topographic map of the Cold Creek SEA (Malibu Beach Quadrangle).



3 E. A small number of Developed areas on the lower reaches of Stunt Road

F. "Bare" Rock outcrops near Calabasas Peak

Other notable plants include:

Humboldt Lily (Lilium humboltii), Big-leaf Maple (Acer macrophyllum), Stream Orchis (Epipachis gigantea), Red Shank (Adenostoma sparsifolium), Flowering Ash, (Fraxinus dipetala), Lyons' Pentachaeta (Pentachaeta lyonii), Island Mountain Mahogany (Cercocarpus betaloides var. blancheae), Chaparral Whitethorn (Ceanothus leucodermis), Interior Live Oak (Quercus wislizenii var. frutuscens), a large number of non-vascular plants such as mosses and fungi.

Rare, Endangered, and threatened Species

The Cold Creek Sea possesses a population of the Santa Susana Tarweed (Hemizonia minthornii), a State-listed Rare species (Section 670.2, Title 14, California Administrative Code) nominated for Federal listing as Endangered (Federal Register 45(242): 82480-82569). This small shrub grows on

exposed uplifted sandstone beds along the Calabasas Motorway in the northeasternmost part of the SEA (Township 1 South, Range 17 West Section 3) near Calabasas Peak. Up to probably 1000 individuals occur on dry west-facing surfaces over an area less than two and one-half acres in association with California Buckwheat (Eriogonum fasciculatum) and California Fuchsia (Zauschneria cana).

The Cold Creek SEA possesses a population of the endemic Lyon's Pentachaeta (Pentachaeta lyonii), a species that has been nominated for Federal listing as Endangered. Except for one population in Ventura County, all known populations of this species are restricted to the Santa Monica Mountains of Los Angeles County. The population in the Cold Creek SEA occurs in pockets of grasslands on an old prehistoric landslide. The species was originally known from Catalina Island and coastal Los Angeles County but has now apparently become more restricted in distribution.

Of historic interest is one Peregrine Falcon (Falco peregrinus) aerie (nest) known to exist in the west, upper drainage of Las Flores Canyon (Section 22), within a mile or less to the south of the Cold Creek SEA.

Another historic Peregrine Falcon (Falco peregrinus) aerie is known to have existed in the vicinity of Calabasas Peak on the northeastern edge of the SEA.

Ecological Significance of the Cold Creek SEA

Cold Creek is one of the best perennial streams in the Santa Monica Mountains, an increasingly uncommon resource in southern California. The steep stream is fed by several year round springs and seepage areas and has uncommonly interesting and healthy riparian communities. Plant species include the Big-leaf Maple (Acer macrophyllum), Humboldt Lily (Lilium humboltii), and Stream Orchis (Epipachis gigantea).

The Cold Creek watershed is the last remaining watershed in the Santa Monica Mountains know to still contain representatives of Stoneflies (Plecoptera). These are aquatic insects that are very sensitive to increased siltation and to run off of petroleum - derived compounds from asphalt or other sources.

Beside the more common animals, other more sensitive animal species likely to utilize Cold Creek riparian and stream side woodlands include the Bobcat (Lynx rufus), Mountain Lion (Felis concolor), White-tailed Kite (Elanus leucurus), Long-eared Owl (Asio otus), Ringtail (Bassariscus

astutus), Long-tailed Weasel (Mustela frenata), and Two-striped Garter Snake (Thamnophis couchi), to name a few. The American Dipper (Cinclus mexicanus) is an uncommon and very local resident bird that utilizes the permanent stream in Cold Creek.

This Riparian Woodland is fragile and susceptible to watershed damage (vegetation removal and grading), water diversion, and stream pollution. When other impacts do not complicate recovery, Riparian Woodlands are generally capable of self-restoration after floods and fires.

Other species in this SEA that have restricted distributions in Los Angeles County include Red Shank (Adenostoma sparsifolium) and flowering Ash (Fraxinus dipetala). Both of these species are unusual stands of common plant communities outside of Los Angeles County.

This SEA also has remnant pockets of native grassland, another increasingly uncommon resource in southern California. These grassland pockets support a population of Lyons' Pentachaeta (Pentachaeta lyonii), a Federally nominated species for listing as Endangered. A population of native Needlegrasses (Stipa), now relatively uncommon in southern California, also occur in these grasslands. Grasslands are most susceptible to subdivision and weed encroachment, especially by introduced exotic taxa.

Several species of plants found in the Cold Creek SEA are notable disjunct populations. Red Shank (Adenostoma sparsifolium), Chaparral Whitethorn (Ceanothus leucodermis), and Island Mountain Mahogany (Cercocarpus betuloides var. blancheae) are three such species. The distribution of Red Shank is generally centered in the San Jacinto and Santa Rosa Mountains in Riverside County. Both the Island Mountain Mahogany and Chaparral Whitethorn are perhaps relic populations of more moderate climates in the past. They survive only at higher elevations where the Santa Monica Mountains exhibit insular-like climate.

Another plant species found probably at its extreme distribution in the Cold Creek SEA is the Interior Live Oak (Quercus wislizenii). As far as known, it occurs only in a few small stands at the southern parts of the SEA among other chaparral elements.

The Cold Creek SEA contains generally undisturbed, native plant communities with some naturalized vegatation in a few graded and disturbed areas and along Stunt Road. Large areas of undisturbed examples of several kinds of dense Chaparral and of rich Riparian Woodlands are found within this SEA. Moderately-large patches of grassland with a mixture of both native and introduced grasses are found here.

Near Calabasas Peak, rock outcrops support a characteristic flora, including the Santa Susana Tarweed (Hemizonia minthornii).

Much of this SEA is owned by public agencies (Santa Monica Mountains Nature Conservancy, State of California, and National Park Service) and seems relatively well protected from outside impacts. Chaparral is a durable vegetation but is subject to severe fire damage when extreme fire protection prevents natural burning cycles from occasionally reducing fire loads: Intense fires can kill or damage even fire-adapted species.

Present Impacts upon Ecological Resources in the Cold Creek SEA

In general, the central core of this SEA is compatibly utilized with its special resources. Some residential development has occurred in the uppermost and lowermost parts of the drainage basin. Homes in the uppermost part, contribute to the accumulative impacts to local land forms (through grading and erosion), stream pollution (through applying chemical pesticides and herbicides, through septic tank seepage), and to biotic communities (through vegetation removal) within the SEA.

TUNA CANYON SIGNIFICANT ECOLOGICAL AREA (#10)

Quadrangle

Topanga 7 1/2'

Township 1 South, Range 16 West parts of Section 19, 24, 25, 29, 30, 31, 36, and parts of some unsurveyed sections

Total Area: 1,488 acres

Vegetation

The mapped units of vegetation within this SEA include:

A. Coastal Sage Scrub communities dominated by California Sage Brush (Artemesia californica) near the coast and on the upper ridges in the central part of the SEA large patches of Laurel Sumac (Rhus laurina) dominated communities

B. Chaparral communities dominated by California Lilacs (Ceanothus spp.) in some areas and by Chamise (Adenostoma fasciculatum) in other areas

Figure Ten. USGS topographic map of the Tuna Canyon SEA (Topanga Quadrangle).

C. Extensive Riparian areas dominated by Western Sycamore (Platanus racemosa) and Coast Live Oak (Quercus agrifolia) in the lower canyons and by California Bay-Laurel (Umbellularia californica) in the upper lateral canyons

D. Several large Bare areas from grading for housing developments and from offroad vehicle traffic

E. Extensive Coast Live Oak (Quercus agrifolia) Woodlands in the southcentral and northwestern parts of the SEA

Other notable plants include:

White Alders (Alnus rhombifolia) occur in the lower half of Tuna Canyon. Many of these were evidently killed in a fire in 1973. Alders are strictly riparian trees associated with perennial water flow. Black Cottonwood (Populus trichocarpa) has been reported in Tuna Canyon. A population of Giant Chain Fern (Woodwardia fimbriata) is found in the understory of the southcentral canyon.

Rare, Endangered, and Threatened Species

No State of Federally listed rare, endangered, or threatened species of plant or animal is know to occur within the boundaries of the Tuna Canyon SEA.

Ecological Significance of the Tuna Canyon SEA

Tuna and Pena Canyons support extensive riparian areas dominated by Western Sycamores and Coast Live Oaks in their main canyon bottoms. Lateral canyons are drier, and dominated by California Bay-Laurel. Such riparian areas are uncommon in Los Angeles County. The stream in central Tuna Canyon is perennial and supports White Alders and Black Cottonwood. The Alders are strong indicators of perennial water flow. The understory of this riparian corridor supports a variety of shrubs, and herbs, including large specimens of the Giant Chain Fern (Woodwardin fimbriata)

The Tuna Canyon SEA also support extensive Live Oak Woodlands in its southcentral and northwest parts. Such woodlands are increasingly uncommon in Los Angeles County.

The Riparian and Live Oak Woodlands of Tuna Canyon SEA are particularly important habitat for a number of animals. A variety of small amphibians, reptiles, and mammals utilize the moist stream banks and litter scattered on the canyon bottoms. Other small animals utilize drier areas higher up slope. Larger wildlife species, including Mountain Lions, Mule Deer, and a variety of raptorial birds utilize these habitats regularly. Some species, such as Cooper's Hawk, forage in riparian habitat. Red-shouldered Hawks generally confine themselves entirely to Oak Woodland-Riparian Woodland habitat. Other species utilize the trees as perching and nesting sites. The SEA is an important wintering and resting ground for many migratory birds utilizing the Pacific Flyway.

Present Impacts upon Ecological Resources in the Tuna Canyon SEA

Tuna and Pena Canyons have been relatively undisturbed by human activities generally because of the steep canyon walls and the lack of roads. The Chaparral and Coastal Sage Scrub communities are in good condition as are the Riparian and Oak Woodlands. For this reason, the Tuna Canyon SEA serves to preserve the diversity and integrity of these biological communities within Los Angeles County.

Pena Canyon indicates very little disturbance from human activities. A small portion of the uppermost reaches of the canyon, however, are crisscrossed with trails created by offroad vehicles. The extend of this area (shown in the vegetation map as Bare) covers several acres. However, only a surprisingly small amount of gully-producing erosion has resulted from this use. The perimeter of the area appears to have been extensively graded as a fire break in past years.

Tuna Canyon indicates considerably more human impact on its ecological resources. A large area in the northwestern SEA has been heavily graded denuding almost all of the native vegetation (see the vegetation map). Other smaller areas near the northern boundaries of the SEA have also been similarly denuded. These areas have increased siltation into the riparian bottom of the SEA, but surprisingly, large scale erosion is not apparent. The large denuded area is crisscrossed with grazing paths.

Dumping of rubbish in Tuna Canyon has occurred throughout the drainage creating the possibility of stream pollution.

A substantial concrete bridge/culvert has been constructed across Tuna Canyon where the road crosses. This

bridge does not appear to restrict riparian flow in the canyon bottom but has become an attractive site for picnicking. A small trail leads up stream from this point. A wide area adjacent to the bridge also has served as a dumping site for rubbish.

The extension of this SEA eastward from Tuna Canyon does not appear to be in accord with the criteria originally established.

PALO COMADO CANYON SIGNIFICANT ECOLOGICAL AREA (#12)

Quadrangle

Calabasas 7 1/2'

Township 1 north,Range 17 West parts of Section 18, 19, 20, 21, 22, 27, 28, 29, and 30;

Range 18 West parts of Section 13, 24 and several unsurveyed sections

Total Area: 2,760 acres

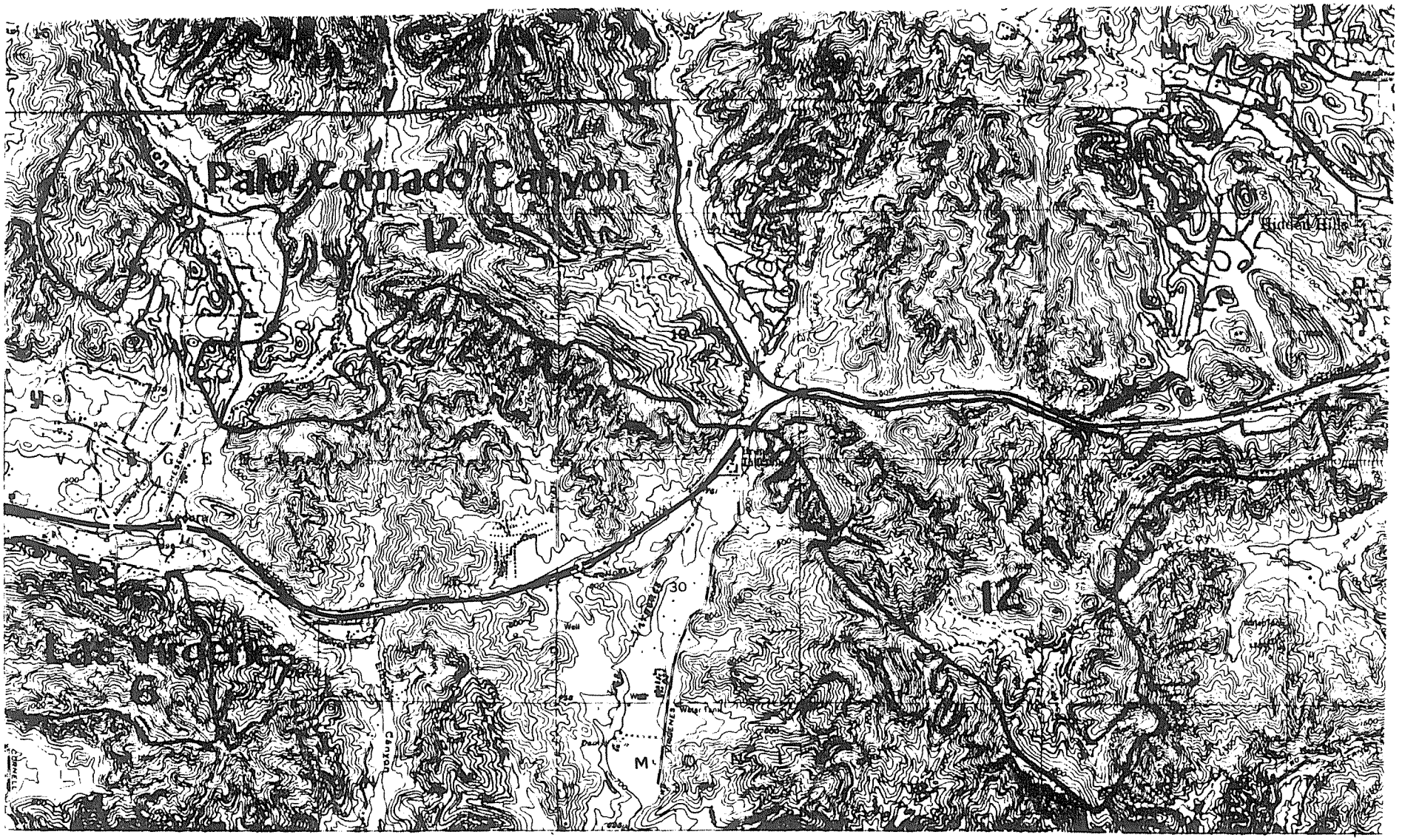
Vegetation

The mapped units of vegetation within this SEA (north of the freeway) include:

A. Extensive Grassland community

B. Patches of Bush Mallow (Malacothamnus fasciculatus), and Artemesia californica dominated communities and some Eriogonum fasciculatum and some Salvia leucophylla dominated areas

Figure Eleven. USGS topographic map of the Palo Comado SEA (Calabasas Quadrangle).



C. Large patches of Quercus lobata/Quercus agrifolia Woodlands and Quercus agrifolia/Juglans californica Woodlands

D. Numerous isolated Quercus lobata

The mapped units of vegetation within this SEA (south of the freeway) included:

A. A large Grassland with patches of Quercus agrifolia/Juglans californica Woodlands and Juglans californica Woodlands

B. Large Bare/grassy area - appears to have been graded for development at some time past.

C. Riparian patches with Quercus agrifolia

D. Large Quercus agrifolia/Juglans californica Woodlands

E. Areas of Artemesia californica dominated communities

F. Large orchard area

Other notable plants include:

A number of introduced annual grasses (such as Festuca and Avena), occupy much of the grasslands in this SEA. Over the last few hundred years, these have largely displaced native perennial Bunchgrasses throughout California.

Rare, Endangered, and Threatened Species

No State or Federally listed rare, endangered, or threatened species of plant or animal is known to occur within the boundaries of the Palo Comado Canyon SEA.

Ecological Significance of the Palo Comado SEA

Several plant communities found in this SEA are uncommon resources within California. Southern California walnut communities, in which Juglans californica is dominant or co-dominant, are scattered throughout both the north and south units of this SEA. On the site in general, these woodlands are situated where they are subject to subdivision and modification for recreational areas. This has caused the

relatively rapid decline of this and Oak Woodland communities in Los Angeles County.

Another uncommon resource in this SEA is the Valley Oak Savannah (Quercus lobata) found on alluvial bottom lands and moist hills in both units of this SEA. Valley Oaks require deep fertile soils with a shallow water table. The stands in the south unit are not as extensive and the individuals are not as large as those in the north. Nonetheless, the Valley Oaks found in the Palo Comado SEA are significant for their generally natural concentrations and health. Many are perhaps three to four hundred years old.

The ecological significance of these oaks is additionally increased because a large concentration of raptorial birds regularly nest in these and associated trees in both the north and south units of the SEA. An unusually large number of nests of Red-tailed Hawks, Red-shouldered Hawks, Kestrels, Horned Owls, Cooper's Hawks, White-tailed Kites, Burrowing Owls, and Long-eared Owls are found in the trees of Palo Comado and Cheeseboro Canyon of the SEA (or on its borders just inside Ventura County). Additionally, Golden Eagles utilize the grasslands of Palo Comado SEA for hunting as do most of the raptors just mentioned. California Condors have been sighted on occasion over the area.

The high concentration of breeding raptors in this SEA probably reflects the general reduction in other such alternative nesting areas throughout Los Angeles County.

The Palo Comado SEA possesses large populations of Beechey Ground Squirrels (Citellus beecheyi), and Bush Rabbits (Sylvilagus bachmani). These typically open-grassland mammals are important food items in the diets of many of the raptors nesting in the SEA and adjacent territories. Some birds, such as the White-tailed Kite, require grasslands for hunting.

The grasslands do not extend well above (north) of the Palo Comado/Los Angeles County line. Instead, except for a band along the county borders, the terrain in Ventura County is covered with Coastal Sage Scrubs and/or Chaparral. The distribution of the grasslands coincide with an Upper Miocene sandstone and the scrub community in Ventura county with an Upper Cretaceous shale. The grasslands are restricted to an area that begins near the southern edge of the Palo Comado SEA and passes just to the north of the northern SEA boundary. In general, the bulk of these grasslands fall within Los Angeles County alone.

The Palo Comado SEA derives much of its significance from the grassland nature of its Savanna. The woodland resources (uncommon in themselves) and the grassland resources (both alone and as an understory in the Savanna) each are ecologically significant. The taxa now comprising the grassland flora of Palo Comado SEA are largely European introduced species. But this does not detract from the fact that grassland communities are increasingly diminished in Los Angeles County. The productivity and species diversity of the present annual grassland communities perhaps may be as great or greater than were the productivity and diversity of native perennial greasslands. In any case, if adequate grassslands are to be saved, in recognition of their important ecological significance to wildlife, those in the Palo Comado SEA are among the best examples in Los Angeles County.

Present Impacts Upon Ecological Resources in the Palo Comado Canyon SEA

Much of the grasslands in the north unit of the Palo Comado SEA is being grazed by cattle. Many of the Valley native oaks in the Palo Comado SEA are several hundred years old and will eventually die. Recruitment of young Valley Oak saplings does not now appear to be occurring. Evidently, the

new shoots are removed by grazing. Additionally, cattle trails have initiated erosion in a few areas of the SEA.

The southern boundary of the Palo Comado SEA partly wraps around a very large landfill/dump site developed in Section 24 just below the SEA. The landfill and SEA borders coincide on the western edge of the landfill.

LAS VIRGENES SIGNIFICANT ECOLOGICAL AREA (#6)

Quadrangles

Thousand Oaks 7 1/2'

Calabasas 7 1/2'

Township 1 North, Range 18 West part of Section 35 and several unsurveyed sections

Total Area: 434 acres

Vegetation

The mapped units of vegetation within this SEA include:

A. Coastal Sage community in the central SEA dominated by California Buckwheat (*Eriogonum fasciculatum*)

B. Patches of Chaparral dominated in places by Chamise (*Adenostoma fasciculatum*) and in other places by Wedgeleaf Ceanothus (*Ceanothus cuneatus*)

C. Patches of woodland dominated by Coast Live Oak (*Quercus agrifolia*)

Figure Twelve. USGS topographic map of the Las Virgenes SEA (Calabasas and Thousand Oaks Quadrangles).

D. Areas of grasslands dominated by introduced European species

Other notable plants include:

Several disjunct desert plant species are found here, but nowhere else in the Santa Monica Mountains. These include California Juniper (Juniperus californicus) and Haplopappus linearifolius (Sunflower family).

The Live-forever (Dudleya cymosa) grows generally on north-facing rocky cliffs, but in the Las Virgenes SEA it grows in full sunlight on conglomerate and volcanic rocks. This species is particularly complicated in the Santa Monica Mountains with at least two subspecies having been described. Three species of Mariposa-Lily grow on the ridge of this SEA, including Calochortus clavatus ssp. pallidus, C. catalinae, and C. venustus. The latter species is considered as locally very rare in the Santa Monica Mountains.

Rare, Endangered, and Threatened Species

No State or Federally listed rare, endangered, or threatened species of plant or animal is known to occur within the boundaries of the Las Virgenes SEA.

Ecological Significance of the Las Virgenes SEA

The Las Virgenes SEA possesses several populations of unusual flora for the Santa Monica Mountains. Several disjunct species are found growing on the extreme westcentral end of the SEA just above Cornell Road. A stand of California Junipers (*Juniperus californicus*) has persisted here for at least two hundred years (judging from the size of one juniper). About a dozen individuals were known to persist here along with another desert disjunct, *Haplopappus linearifolius*, in association with more coastal forms such as *Yacca whipplei*, *Rhus ovata*, *Eriogonum fasciculatum*, *Artemesia californica*, *Quercus dumosa*, *Malacothamnus fasciculatus*, and *Salvia leucophylla*.

The 1978 Kanan-Dume Fire killed all but one of the

then-known junipers. A fire also passed through the grassland in 1981 but the sole surviving juniper appears healthy and is presently (1982) adding new vegetative leaves. A search for newly sprouting junipers in the adjacent grassland and under shrubs in the area produced no evidence of new individuals. An additional juniper was discovered in July 1982 living among other shrubs on the north-facing slope above Agoura Road on the edge of an area being cleared for development.

The Las Virgenes SEA also possesses a number of Valley Oaks (Quercus lobata) in the deep soils on the north slope of the SEA near the western end. This species is locally uncommon in the Santa Monica Mountains.

The population of Live-forever (Dudleya cymosa) growing in the Las Virgenes SEA is surviving under extreme physical conditions compared with other populations of this species that generally grow in cool shaded canyon bottoms. Those in this SEA are found growing in full sunlight on conglomerate and volcanic rock. Several subspecies of this species have been described, but the taxonomic status of the population in the Las Virgenes SEA needs study.

The Las Virgenes SEA possesses relatively undisturbed areas of Chaparral communities with patches of annual Grasslands and patches of Coast Live Oak Woodland. Perhaps the biotic resource that this SEA best depicts under criterion 2 is a transitional community vegetation.

The Las Virgenes SEA falls in a transitional area that is a mosaic of Chaparral/Coastal Scrub vegetation found on the ridges to the immediate south (across Mulholland Highway) and of grassland vegetation found on the hills to the immediate north (across the Ventura Freeway). The south unit of Palo Comado SEA also possesses this biotic characteristic.)

Present Impacts upon Ecological Resources in the Las Virgenes SEA

The Las Virgenes SEA has several small residential developments that are being developed within its northern borders. Additional vegetation has been cleared for other houses. The present housing developments are occurring adjacent to the significant ecological resources.

A wide fire break has been cleared along the central backbone ridge within the SEA. Offroad vehicles utilize this fire break and a small dirt road leading out of the deleted area around the northeastern peak in the SEA. This usage has caused some erosion. In general, other areas of this SEA are relatively undisturbed.

MALIBU/COLD CREEK BUFFER AREA (5B)

Quadrangle

Malibu Beach 7 1/2'

Township 1 South, Range 17 West pparts of Section 3, 4, 5, 7, 8, 9, 15, 16, 17, 18, 19, 20, and 21

Total Area: 2,984 acres

Vegetation

The mapped units of vegetation within this Buffer include:

A. Complex of chaparral dominated by Adenostoma fasciculatum, Ceanothus megacarpus, and Ceanothus spinosus

B. Coastal Sage Scrub in northern part (north of Monte Nido and above Mulholland Highway), dominated by Artemesia californica and Ceanothus

C. Three large patches of grassland in the central band of the Buffer

D. A number of Bare patches (disturbed)

E. A string of Developed areas (disturbed) in patches along Mulholland Highway and Piuma Road

F. Riparian vegetation in creek bottoms dominated by Quercus agrifolia, Salix spp., Platanus racemosa, and Umbellularia californica

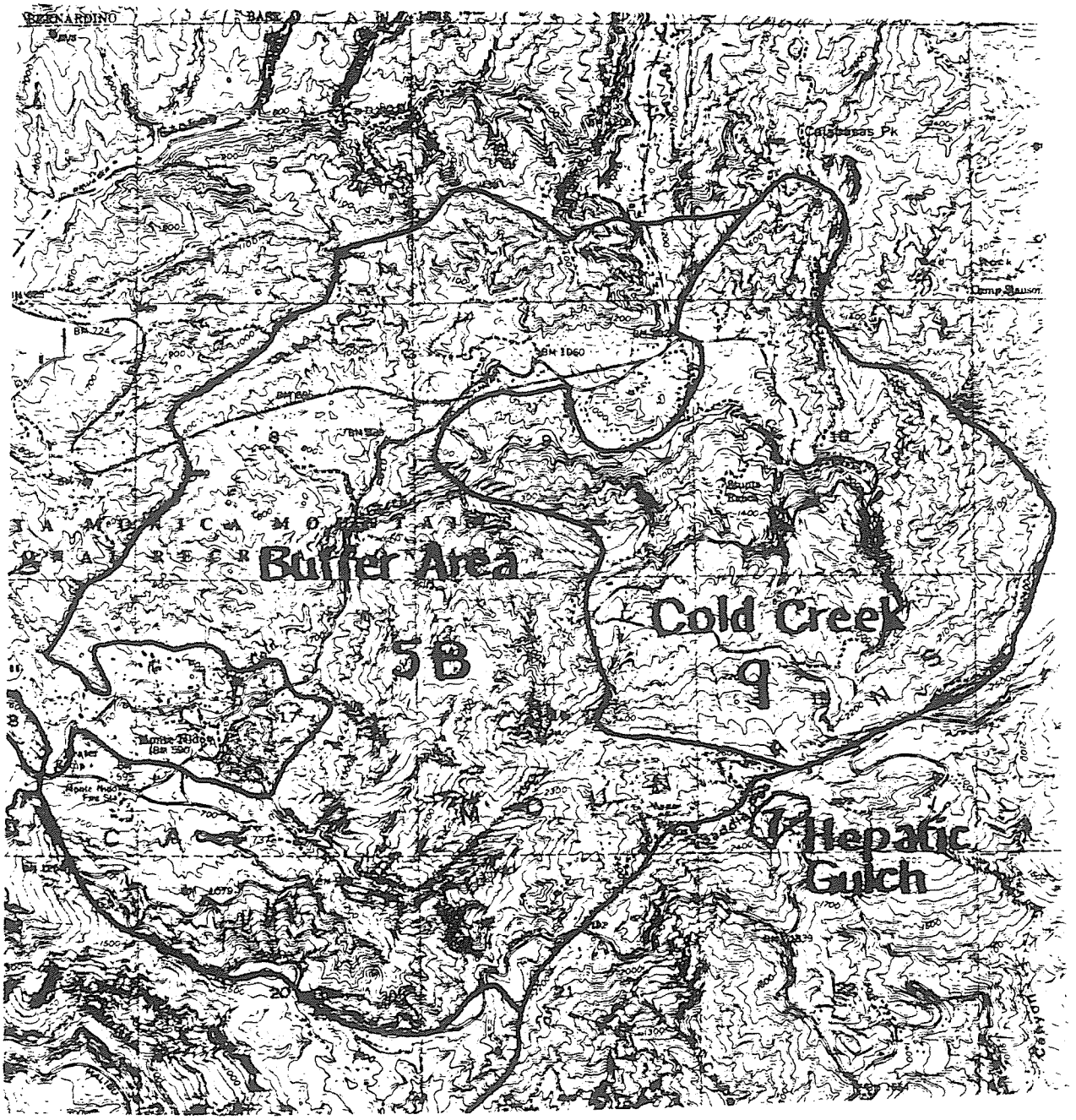
G. Large patches of Quercus agrifolia dominated Woodlands

Rare, Endangered, and Threatened Species

No State or Federally listed rare, endangered, or threatened species of plant or animal is known to occur within the boundaries of the 5B Buffer.

Of historic interest is the Peregrin Falcon (Falco peregrinus) aerie (nest) reported to exist in the west, upper drainage of Las Flores Canyon (Section 22), within a mile or less to the south of the 5B Buffer

Figure Thirteen. USGS topographic map of the B5 Buffer (Malibu Beach Quadrangle).



This SEA Buffer possesses a population of Lyon's Pentachaeta (Pentachaets lyonii), a Federally nominated Endangered species, in grasslands and along dirt roads and openings in chaparral on National Park Service property (Township 1 South, Range 18 West, Northwest 1/4 of Section 7).

Ecological Significance and Present Impacts

The 5B Buffer has some extensive areas of grading and vegetation removal. A moderate number of homes are located along the roads in the area.

Housing build-up appears to be the most significant impact inside the 5B Buffer. This causes erosion and siltation in the Malibu Creek drainage, but probably is of limited significence compared with the impact of the Monte Nido community.

Dark Canyon is a relatively undisturbed, ecologically significant area in this Buffer. It has a perennial stream with a rich riparian area of White Alders (Alnus rhombifolia). Big-leaf Maple (Acer Macraphyllum), and Wild Grape (Vitis girdiana). Mountain Lions (Fellis concolor) have been sighted here.

ZUMA CANYON BUFFER (3A)

Quadrangle

- Township 1 South, Range 19 West parts of Sections 2, 11, and 12

  Total area; 1,809 acres (includes #3B Buffer)

Vegetation

The mapped units of vegetation within the #3A Buffer include:

A. Several large Developed areas by roads

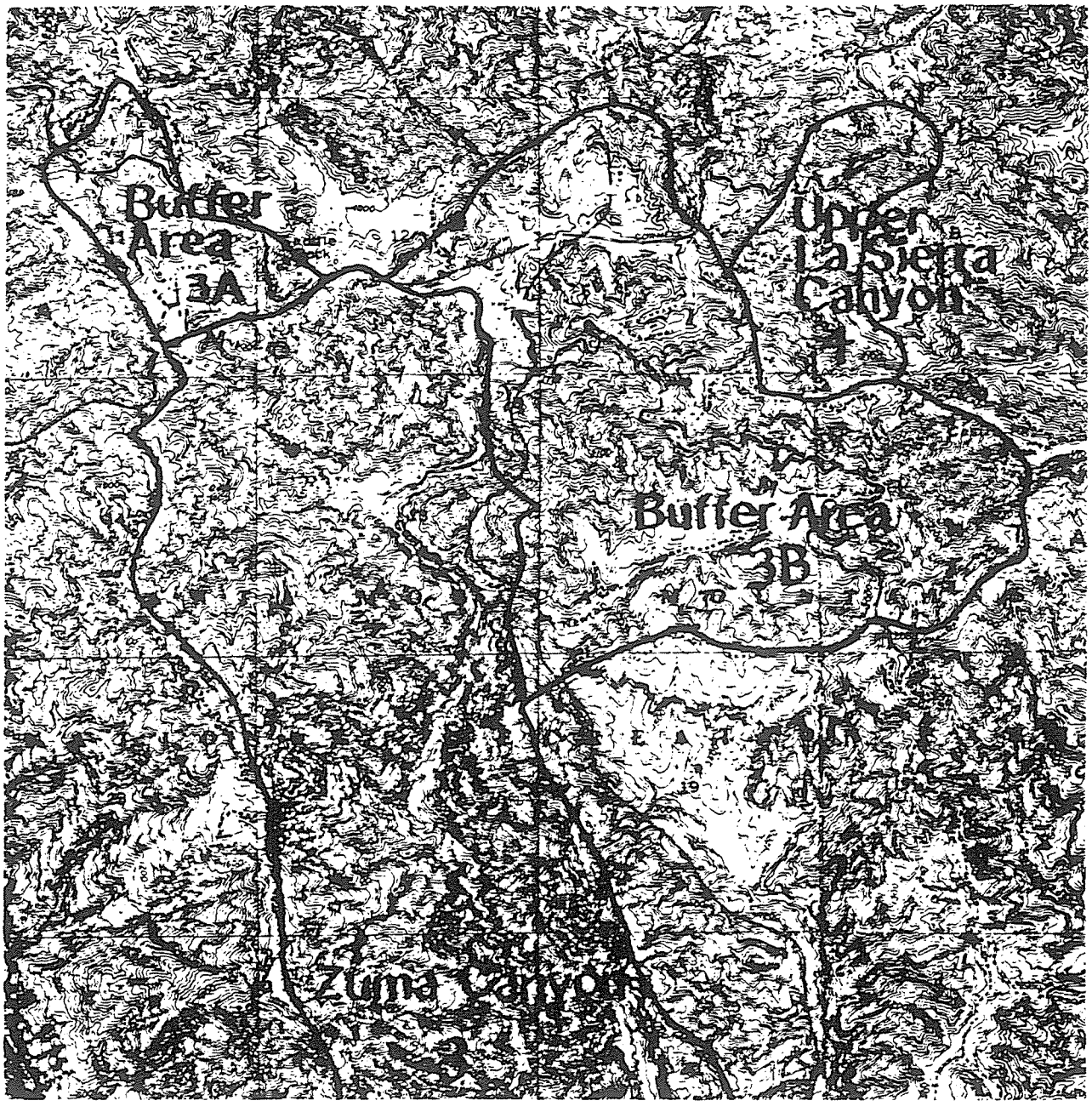
B. Large grasslands - relative to the size of the Buffer

C. Plant communities dominated by Adenostoma fasciculatum and by Ceanothus spp.

Other notable plants include:

Red Shanks (Adenostoms sparsifolium)

Figure Fourteen. USGS topographic map of the 3A Buffer (Point Dume Quadrangle).



Rare, Endangered, and Threatened Species

No State of Federally listed rare, endangered, or threatened species of plant or animal is known to occur within the boundaries of the #3A Buffer SEA.

Ecological Significanceand Present Impacts of Buffer #3A

The general vegetation in this Buffer area is typical for the vicinity and exhibits the same sensitivities and significance as the northern part of the Zuma Canyon SEA. A stand of Red Shanks (Adenostoma sparsifolium) occurs within the Buffer. These plants are part of a disjunct population occurring in the Santa Monica Mountains.

Developments in this Buffer include a few scattered houses along Mulholland Highway, a water reservoir and pipeline, and a county probation camp. A few pads for additional homes exist, but have not been developed. Some grading also has occurred for firebreaks on the drainage divides in the northern part of the Buffer zone.

ZUMA CANYON/UPPER LA SIERRA CANYON BUFFER AREA (#3B)

Quadrangle

Point Dume 7 1/2

Township 1 South, Range 18 West parts of Section 7, 17, 18, and 19,

Range 19 West parts of Section 12, 19, and 24

Total Area: 1,809 acres (includes #3A Buffer)

Vegetation

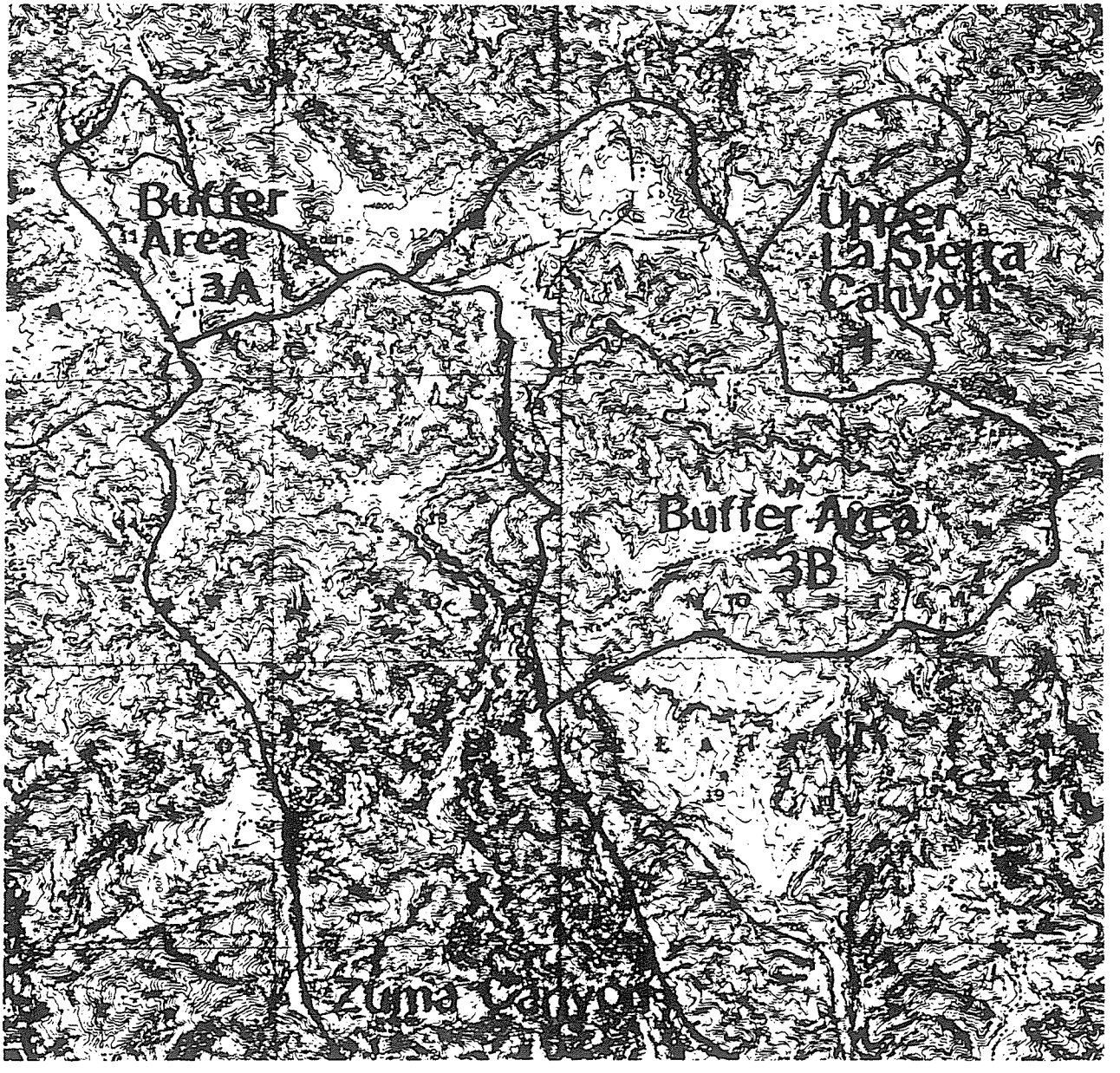
The mapped units of vegetation within the #3B Buffer include:

A. Communities largely dominated by Ceanothus and by Adenostoma fasciculatum with extensive riparian communities dominated by Platanus racemosa and Quercus agrifolia

B. Extensive Quercus agrifolia Woodlands next to Riparian communities and on slopes in the south

C. Large Developed areas in north by roads

Figure Fifteen. USGS topographic map of the 3B Buffer (Point Dume Quadrangle).



D. Large Grassland areas in south and north Buffer

Other notable plants include:

Lyon's Pentachaeta (Pentachaeta lyonii), a Federally nominated Endangered species, occurs in this Buffer around the small lake in the northwest 1/4 of Section 7.

Rare, Endangered, and Threatened Species

No State or Federally listed rare, endangered, or threatened species of plant or animal is known to occur within the boundaries of the #3B Buffer area.

Lyon's Pentachaeta may be added to the list of Federally Endangered species.

Ecological Significance and Present Impacts of the #3B Buffer

The general vegetation in this Buffer area is typical for the vicinity and exhibits the same sensitivity and significance as adjacent areas within the SEAs. This Buffer possesses a population of Lyon's Pentachaeta (Pentachaeta lyonii).

Impacts have occurred in this Buffer that may affect ecological resources within Zuma and Upper La Sierra Canyons. Large fire breaks have been cut along the southern and northeastern borders of the Buffer. These have generated erosion which may have caused significant downstream siltation. An Avocado orchard appears to be under development (June 1982) on the slopes of the Western Newton Canyon; brush removal and grading already have been accomplished. Some development of roads and channelization of the stream bottom appear in the western Newton Canyon.

A number of homes are located along Latigo Canyon Road.

A private wildlife preserve has been established at the west end of Newton Canyon.

It is reported that a large number of deer were killed by automobiles when Kanan-Dume Road was first opened. Happily it appears that deer have subsequently learned to cross this road over the grassy roof of a tunnel that passes through a hillside.

RELATIONSHIP OF ECOLOGICAL FACTORS TO HUMAN DEVELOPMENTS AND ACTIVITIES

In view of the long history of settlement in the area it is not surprising to find that none of the Significant Ecological Areas in the Santa Monica Mountains has escaped the effects of man. On strictly ecological grounds, any human activity within an SEA has some impact. Most--but not all--human impacts are not beneficial to native biological communities. Removal of unusual plants that contribute to the ecological significance of a designated SEA clearly degrade the SEA. Such an action not only eliminates the vegetational element, but also alters the habitat for numerous animals that utilize the plants as food or nesting sites or as a substratum upon which they may spend their entire life (e.g., a number of insect species).

However, some human actions within an SEA may augment the natural ecological resources in the SEA. For example, many highway bridges provide nesting and roosting sites for birds and for bats. Kingfishers, for instance, use the pipeline on the side of the Pacific Coast Highway bridge over Malibu Lagoon as a regular fishing perch. Augmented runoff creates small ponds which may serve as watering places for wildlife.

Although all places within the SEAs are not pristine (e.g., only native species present), it must not be construed that the ecological resources within the SEAs are summarily degraded by all human-caused disturbance. Most of the land within the SEAs is in private ownership (much of the Cold Creek SEA is an exception) and there is no evidence that any of the human development encountered was inhabited after the Los Angeles County Board of Supervisors approved the Los Angeles County General Plan (25 November 1980), at which time the SEAs became official or without appropriate approval subsequent to the designation. In addition, much of the development encountered within the SEAs is very limited in extent and intensity, especially so when compared to similar areas outside the SEAs. Much of the human development was completed long enough ago, that any adverse initial perturbation has now completely disappeared (e.g., direct effects of building a bridge).

To be an important or significant ecological or natural area, an area of land or water does not have to be completely undisturbed--as long as it either retains or reestablishes its natural character and values which provide scientific, recreational, or inspirational benefits (U.S. Department of Interior, Heritage Conservation and Recreation Service definition). In spite of human activities occurring within

the natural areas of the Santa Monica Mountains, significant ecological resources have persisted because many of these actions have been limited in intensity and extent, and because--since adoption of the county ordinances dealing with SEAs--many of the adverse effects, when significant, have been mitigated.

What is not obvious about the resources within each of the SEAs, however, is how much additional human development impact each specific resource can tolerate. Answers to these questions are known only in a general way and require a case-by-case analysis as is called for by current (1982) County procedures. For example, Chaparral is a relatively hardy vegetation. Riparian species, in contrast, are very sensitive to changes in the water table with which their root systems interact. These plants are sensitive to both increases and decreases in water table levels and runoff volumes. Although many are benefited by augmented flow, they are negatively impacted when their root systems are blocked from water and oxygen supplies by siltation. Thus, accumulative upstream impacts must be evaluated, (including those erosion from fire breaks for instance) when new developments are proposed for the SEAs.

The vegetation maps indicate where large areas of development have already occurred within the SEAs. These are areas that, for one reason or another, have been built upon, graded, or cleared of vegetation. The maps also indicate areas that are cultivated, and or dominated by exotics. These disturbed areas comprise a small percentage of each of the SEAs and a somewhat larger percentage of the Buffer Areas.

During the course of this study a number of human-caused activities were observed and others may be inferred. Inferred actions would include, for example, application of fertilizers, insecticides, or herbicides in orchards, although not actually observed during the study. The magnitude and importance of any impacts upon ecological resources caused by these actions within the SEAs varies from beneficial to extremely harmful. In many cases, mitigating measures have eliminated or reduced the impact of these actions upon the ecological resources within the SEAs. Other incidences and kinds of human-caused disturbances certainly may occur within the SEAs, but were not identified during this study.

There follows a brief discussion of the human-caused actions identified during this reconnaissance study which have potential negative impacts upon significant ecological areas. These are classified as (1) Modification of

Biological Regimes (2) Land Transformation and Construction (3) Agricultural Operations (4) Land Alteration (5) Resource Removal/Management (6) Waste Replacement and Treatment and (7) Chemical Treatment.

Modification of Biological Regimes

a. Exotic faunal introductions. These mostly are such species as domestic dogs (Canis familiaris) and cats (Felis domesticus). Red Foxes (Vulpes fulva) have been introduced into the Santa Monica Mountains. One fox pup was observed in Malibu Canyon SEA, but individuals are reported throughout the mountains.

b. Exotic floral introductions. At least 206 species of introduced plants occur throughout the Santa Monica Mountains, many occurring within the SEAs. Some of the most obvious ones are exotic tree species planted for landscaping purposes or exotic ground covers for fire supression purposes. Introduced species of grasses, such as Bromes (Bromus) and Oats (Avena), are ubiquitous along roadsides and other disturbed areas, including fire breaks and fuel breaks. Black Mustard (Brassica nigra) generally occurs in these same areas. In these cases, the exotic plants have almost entirely replaced native species that previously inhabited these places.

c. Modifications of Wildlife Habitat. Wherever vegetation is removed from natural areas, wildlife species are affected, some of which are small, secretive, or nocturnal animals that are rarely observed (e.g., Bats and Kangaroo Rats). This action generally occurs around all dwellings in the SEAs, but the extent of modification varies greatly from unit to unit.

d. Alteration of ground water hydrology. A sandbar barrier is periodically created by wave action at the mouth of Malibu Lagoon, blocking the outflow of fresh water from Malibu Creek. The lagoon water also blocks drainage of water from septic tank drain fields in adjacent areas. The Department of Parks and Recreation, accordingly, periodically breeches the sandbar to drain the lagoon. This management action should be periodically reviewed.

e. Stream control and flow modifications. A large dam, the Malibu Reservoir, was built in central Malibu Canyon several decades ago. The impoundment is now entirely silted to the top of the dam.

f. Canalization of streams. The mouth of Malibu Creek has been canalized where it passes by the developed area north of the Pacific Coast Highway bridge. The Las Virgenes Creek drainage has been canalized

where it passes underneath the Ventura Freeway and Las Virgenes Road. This channel is the only feasible passage for terrestrial wildlife to pass between the two Palo Comado units. The large culverts, however, are blocked by thick stands of Arroyo Willows (Salix).

g. Irrigation. Wherever houses and other buildings occur within the SEAs, lawns are generally planted and irrigated. This may encourage the proliferation of some exotic species.

h. Surfacing and paving. Except for the Hepatic Gulch SEA, roads and/or bridges have been built within each of the SEAs and Buffers. Where houses have been built, driveways, tennis courts, patios, and housing pads have eliminated surface areas into which water would normally percolate during rains, replenishing underground reservoirs of water. These paved areas also increase the rate of water runoff during storms, increasing the rates of erosion, sedimentation, and siltation within the SEAs.

i. Noise and vibration. Noises from automobiles, airplanes, helicopters and from other human activities have some impact upon all the SEAs. Many species of animals are sensitive to even infrequent presence of humans within their habitats.

For example, Mountain Lions (Felis concolor) appears to avoid human areas in general, and are only infrequently observed anywhere. Nesting birds may abandon their nests when disturbed by humans.

j. Burning. Vegetation in the Santa Monica Mountains has been periodically burned from natural causes for millions of years (from lightening-caused fires passing from the interior, for instance) and is generally comprised of species adapted to fire in the way they reproduce after a fire. Indians may have utilized fire sparingly to increase grasslands that would attract additional game. After 1850 (Statehood), individual landowners often set deliberate fires to open up chaparral for access, grazing, ranching, development, and mining. Between 1900 and 1918, many large fires burned throughout the Mountains so that, on the average, any one area (like the SEAs) burned about two times in those 18 years. In 1919, the Los Angeles County Forestry Department began fire suppression management. This allows fuels to build up in chaparral and coastal sage areas so that when fires do finally get started, they are intense. The intensity of these fires often exceeds the ability of some native species to quickly recover.

Thus recent experiments by the Forester and Fire warden with controlled burning indicate a desirable trend. More frequent, less intense fires would more closely approximate natural conditions.

Land Transformation and Construction

a. Industrial sites and buildings. Although no large industrial operations occur within the SEAs, wastewater treatment plants occur within the SEAs, One is located in Malibu Canyon at Tapia Park and another is located at the head of Zuma Canyon below Encinal Canyon Road.

b. Highways and bridges. All SEAs, except Hepatic Gulch, Las Virgenes, and Zuma Canyon, have highways with bridges passing through them. Several small bridges exist in some of the SEAs along minor paved or dirt roads. The major roads provide passage through the mountains for a large number of daily commuters. The construction and utilization of these in SEA's increases pollution and erosion protential.

c. Roads and trails. Unimproved roads are generally found along the edges of the SEAs or along the boundaries where they act as fuel breaks and motorways for fire-fighting equipment. Other small roads provide access for residents and for the servicing of electric line towers. Trails are located in even the remote areas of the SEAs. Some of these are used by horses and by motorbikes. Erosion is a primary impact caused by such trails and roads.

d. Fire and fuel breaks. Most of the SEA boundaries are marked by large fire and fuel breaks that are maintained by the County Fire Department. Many of these are very wide (100 feet or more in some cases) and have grown in with introduced species of grasses and herbs. The effectiveness of such wide fuel breaks in stopping fires is questionable, because the non-native vegetation particularly after they die back in late spring, does not impede fires. Erosion caused by these fire breaks is considerable. Shipley's 1978 study reported that erosion generated within fire breaks over a three month period was equivalent to erosion over 45 years from undisturbed watersheds of equal size.

e. Transmission lines, pipelines, and corridors. All of the SEAs, except Hepatic Gulch, have utility poles and lines passing into them. Malibu Canyon, Zuma Canyon, Tuna Canyon, and Palo Comado SEAs have large high voltage transmission lines passing through. A small amount of vegetation was initially removed below the towers, apparently by mechanical means and, in cases, is kept cleared by chemical treatments. The only major road within Zuma Canyon is one maintained by Southern California Edison Company to service these transmission towers.

f. Barriers. Wherever houses have been built within the SEAs, fences of various kinds have been erected. Fences and gates have been installed across the mouths of several of the canyons at Point Dume to prevent the use of trails passing through these canyons by unauthorized (non-resident) persons. Ranchers have installed fences along numerous property lines where they graze cattle and horses. A number of old, unmaintained fences lines can be found throughout many seemingly undisturbed parts of the SEAs--evidence of ranching operations that have occurred in the Santa Monica Mountains beginning with the advent of European man. Fences may serve to reduce impacts by keeping human

disturbances at low levels, but they may contribute to the death of animals that cannot find passage into safe territory during fires.

g. Channel dredging and straightening. Malibu Creek has been altered a number of times for several reasons. The original lagoon was much more extensive (based upon early 1900 USGS maps), but--it is reported-- was filled in to alleviate mosquito problems and to provide land for development. Presently, the course of the creek at the mouth is restricted to a channel below the bridge. The Los Angeles County Flood Control District is studying the feasibility of enlarging the existing levee along the west side of Malibu Creek.

h. Dams and impoundments. Small ponds are found in various areas of the SEAs and are generally beneficial. These provide additional habitat for wildlife and also serve to trap sediments that might otherwise pass downstream to impact riparian vegetation. Although dams may be helpful in controlling siltation, they do have some negative characteristics. Malibu reservior dam prevents fish, such as Steelhead, from running upstream.

Small treated wastewater holding ponds have been built along the Las Virgenes Water District distribution lines. One such pond is located in the south unit of the Palo Comado SEA.

i. Recreational facilities. Picnic facilities, such as are found at Tapia Park in Malibu Canyon, may compact soil at the bases of large oak trees, decreasing oxygen and water permeability of the soil. Numerous foot paths through the bluffs has accelerated the rate of erosion on these bluffs.

j. Heavy grading operations. Wherever houses, roads, and bridges are built within mountainous parts of the SEAs, cutting and filling are normal activities, without great care in design this can generate additional erosion with subsequent siltation and sedimentation in the drainage areas of the SEAs.

k. Tunnels and underground seepage pits. Roadway tunnels have been cut through Malibu Canyon Road and Kanan-Dume Road. The initial ecological disturbances from the construction of these tunnels is the removal of vegetation and the increase in erosion and siltation that may result downstream. The tunnels on these particular roads have been faced with rock slabs to reduce erosion. The top of

one tunnel on the Kanan-Dume Road serves as a wildlife corridor. The top of this tunnel is a grassy hillside that connects both sides of the roadside. Mule Deer (Odocoileus hemionus), regularly utilize this corridor.

Agricultural Operations

a. Farming. In general, farming within the SEAs studied is limited to gardening and orchards. Impacts from these activities include the removal of natural vegetation and the application of chemical treatments that may be toxic to surrounding plants and wildlife.

b. Cattle grazing and ranching. The Santa Monica Mountains have a long history of cattle grazing. These impacts began with first arrivals of Europeans. Cattle grazing probably was partly responsible for alteration of the species compositions of native grasslands. It also has an important impact upon the Valley Oak (Quercus lobata) Woodlands in the SEAs wherever newly-sprouted acorns grow. The recruitment of new trees to replace senile ones is prevented whenever cattle remove new shoots. Cattle trails also increase erosion and sedimentation in downstream

channels. Fecal materials from cattle can cause considerable eutrophication (enriched nutrient supply which results in increased numbers of plants and animals) of stream and ponds in some cases.

c. Horse corrals. Horses are generally utilized in ranching operations. But many homeowners in the Santa Monica Mountains also maintain horses for riding. Each of the SEAs (except for Hepatic Gulch) and Buffers has incidences where horses are kept or ridden on trails. Corrals, in some cases, are in or adjacent to drainage channels where they pollute the water.

Land Alteration

a. Erosion control and terracing. Generally, erosion control techniques are used in all developed sites within the SEAs. The extent varies with the situation, obviously. Significant, large terraced areas are present in the Palo Comado and Tuna Canyon SEAs. As a result only relatively small amount of gully-producing erosion was noted in these areas.

b. Landscaping. This activity is widespread wherever homes and other buildings are constructed, and also along roadsides New species may be added to the mountain flora by this activity and native vegetation may be removed or reduced.

c. Lagoon dredging. Historic dredging of the Malibu Lagoon no doubt altered ecological resources within the water and on the bottom.

d. Marsh filling and draining. From the turn of the century, the Malibu Lagoon has been filled in various episodes, until today it is much reduced from its original size. The reduction of such habitats throughout California make this remaining lagoon of prime ecological importance. The State Department of Parks and Recreation owns the lagoon and adjacent wetlands and are now in the process of restoring the area.

Resource Renewal/Management

a. Reforestation. Actually a misnomer for the Malibu Area since most of the "reforestation" has occurred in areas--primarily along roads--where trees have not naturally persisted for several thousands of years. The species of trees that are generally planted along roadsides are members of the Pine

Family (Pinus), which do not now naturally persist in the Santa Monica Mountains due to the frequency of fires in the area.

b. Wildlife stocking and management. The National Park Service, California Department of Fish and Game, State Department of Parks and Recreation, and Topanga/Las Virgenes Resource Conservation District all have programs of several kinds in wildlife management in the Santa Monica Mountains. For example, in cooperation with the U.S. Fish and Wildlife Service, a pair of Peregrine Falcons (Falco peregrinus) has now been reintroduced into the Santa Monica Mountains. Several historic Peregrine Falcon nesting sites adjacent to and within the SEAs are likely to be re-utilized if this program is successful. A privately-owned wildlife preserve has been created in the Newton Canyon area of the 3B Buffer.

c. Fertilization application. This generally occurs wherever lawns and fields persist around houses and farmyards. Sludge from the Tapia Wastewater Treatment Plant is sold to local landowners in the Malibu drainage for purposes of soil enrichment. Fertilizers frequently impact native vegetation and soil organisms as well as downstream drainage channels, generally increasing eutrophication.

Waste Replacement and Treatment

a. Landfill. Only minor occurrences of landfill occur within the SEAs. The Calabasas Landfill is a large, mountain-like facility that borders on the Palo Comado SEA. Large landfills of this size contain numerous substances,which--without great care in design and operation--may interact (e.g., ion exchanges and complexing) to produce toxic materials that can eventually make their way into drainage channels.

b. Junk disposal. Scattered dumping of rubbish is found throughout the roadsides of the SEAs. For example, the area where the road crosses Tuna Canyon has several recently-dumped piles of debris. One person was observed dumping trash from his pickup truck into Upper La Sierra Creek near where the Santa Monica Mountain Live-forever (Dudleya cymosa var. marcescens) persists.

c. Waste water discharge into streams. The wastewater treatment plant at the head of Zuma Canyon releases some of its effluent into Zuma Canyon. This waterflow likely contributes to the perennial nature of Zuma Canyon. The Tapia Wastewater Treatment Plant is now being converted to a

tertiary treatment facility. When finished, this plant will release water into Malibu Canyon. The effects of this additional flow will likely be beneficial to some species while detrimental to others.

d. Waste water discharge by spray irrigation. Presently, treated water from the Tapia Wastewater Treatment Plant is sprayed over land owned by the facility and over land in public and private ownership. This water contributes to the underground reserve used by plants for transpiration (evaporation of water from leaf surfaces). Some of this water makes it way into Malibu Canyon. Irrigation of native vegetation over a long time period will probably result in a change of species composition in the irrigated area. Some additional eutrophication of drainage channels may occur. Toxic compounds, such as trace metals, may enter local and downstream ecosystems by spray irrigation.

e. Stabilization and oxidation ponds. The wastewater treatment plants in Malibu and Zuma Canyons have ponds used for settling and oxidation of organic materials. A pair of Mallards was observed using the pond in Zuma Canyon. Other organism, such as numerous species of algae and floating animals, are part of these systems.

7. The County ordinances dealing with SEAs should be periodically reviewed and updated. Consideration should be given to modification of the Ordinance to provide additional protection for the Flora and special habitats within SEAs from clearance activities.

8. Recognizing the practical difficulties of on-going monitoring of all SEAs, an effort should be mobilized to provide public information in a campaign to involve homeowners, homeowner's associations, and developers in recognizing and protecting the resources of the SEAs.

9. The role of the Significant Ecological Areas Technical Advisory Commimttee (SEATAC) is important and (SEATAC) should be supported by the scientific communities. Furthermore, conservationists, individual homeowners and homeowner's associations, and developers should work closely with SEATAC and the Los Angeles County Department of Regional Planning to help assure balanced treatment of the environment.

APPENDIX A

ANNOTATED BIBLIOGRAPHY

The following sources were consulted during this study. They discuss specific guidelines and resource information pertinent to the SEAs included in this study. The original England and Nelson Report (1976) includes 186 sources of information in the Resource Bibliography (Appendix B). Many of these same sources were also consulted during this study but are not re-listed below. The following annotated list includes sources published since 1976 as well as notes about some sources listed by England and Nelson that were especially useful in this report. Not all specific information in these sources could be discussed in either report. Annotations with each of the sources listed below indicate the kinds of information discussed in each source that are relevant to the SEAs in the Santa Monica Mountains.

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