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draft natural resource management plan environmental assessment

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SANTA MONICA MOUNTAINS



NATIONAL RECREATION AREA / CALIFORNIA

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SANTA MONICA MOUNTAINS NRA

DRAFT
NATURAL RESOURCE
MANAGEMENT PLAN/
ENVIRONMENTAL
ASSESSMENT


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EXECUTIVE SUMMARY

EXECUTIVE SUMMARY

The Draft Natural Resource Management Plan (DNRMP) describes the resources of the Santa Monica Mountains, threats to these resources, and resource management actions required to comply with PL 95-625 and applicable resource and environmental laws, regulations and Executive Orders.

The Santa Monica Mountains and adjacent seashore exhibit a characteristic Mediterranean-type ecosystem. The climate, physiography, soils, vegetation and wildlife combine to form a unique unit of the National Park System. The relatively unimpacted natural environment, coupled with its close proximity to the Los Angeles Metropolitan complex, increases the significance of the Santa Monica Mountains National Recreation Area.

The DNRMP presents a five-year resource management program which emphasizes the acquisition and computer storage of basic resource data which are largely scattered or non-existent at this time. The need for comprehensive resource data is acute because no agency or organization has produced overall natural resource and land use information for the Santa Monica Mountains. These data are required for effective resource management decisions and actions by all agencies and individuals within the recreation area.

The five-year program also emphasizes cooperative resource management. A predicted 32% of the land within the recreation area will remain in private ownership along with approximateley 28% managed by state and local public agencies after the National Park Service acquires fee and easement interest on the remaining 40% of land inside the boundary. The National Park Service is the only agency with a mandate for resource stewardship within the entire recreation area; state and local agencies are limited to their jurisdictional boundaries within the area. Because natural resource dynamics occur irrespective of ownership boundaries, a cooperative resource management outreach program is proposed.

To initiate the natural resource management program, fourteen specific high priority projects are presented. The project statements address resource problems, alternative actions and their impacts, recommended courses of action, personnel requirements and funding. The projects include: Natural Resource Information System, Water Resource Examinations, Water Quality Monitoring, Re-establishment of the Valley Oak Savannah Complex, Air Quality Monitoring, Monitoring Fuel characteristics of Vegetation, cliff nesting raptor Survey, Acid Deposition, Predator studies, Coastal Resource Examinations, Bird Population Dynamics and Habitat Utilization, Anadromous Fisheries, Cooperative Resource Management Program and Endangered Plant Survey. Operating budget estimates are $513,100 for FY-1 and $2,629,100 for a five-year program. Personnel requirements are approximately 22 work years of which four work years presently exist.

An environmental impact assessment is included in the DNRMP which presents impacts and mitigations, consultation and coordination, and impact categories associated with adopting the natural resource management plan.

Finally the DNRMP contains a selected bibliography relevant to the natural resources of the Santa Monica Mountains. Appendices to the plan present provisional lists of rare and endangered fauna, Federally and state listed endangered flora, locally uncommon flora, wildlife, and native and non-native flora; a copy of Public Law 95-625 is included.

Introduction

The Natural Resource Management Plan (NRMP) is a comprehensive statement that addresses the natural resource issues of the Santa Monica Mountains National Recreation Area. The NRMP documents the current status of the natural resources and threats to these resources, and presents resource management programs and projects. The plan addresses those actions which must be pursued by the National Park Service to preserve and perpetuate the natural resources of the Santa Monica Mountains.

The NRMP will be revised and updated annually so it retains its flexibility and addresses future resource management needs within the Santa Monica Mountains.

RELATIONSHIP OF NRMP TO THE GENERAL MANAGEMENT PLAN

The overall character of the Santa Monica Mountains is determined by the actions of many government agencies and landowners. The cooperative effort of Federal, State and local agencies and private individuals is necessary to perpetuate the health and continuity of the natural and cultural resource base. The role of the National Park Service in executing resource management programs in the National Recreation Area is based on:

1. Direct management actions on lands purchased in fee;
2. Deed and covenant monitoring and professional advice on Service acquired conservation easements;
3. Cooperative and advisory activities on lands within the recreation area owned by others.

Resource Management Objectives

The Congressional Mandate expressed in the enabling legislation which established the Santa Monica Mountains National Recreation Area, Public Law 95-625, and the Management Policies for the National Park Service (1978), provided the basis for the resource management objectives to:

- Protect, preserve and maintain natural processes and cultural values.
- Monitor natural systems to evaluate trends in ecosystem dynamics and impacts.
- Restore and maintain natural terrestrial, aquatic, coastal and atmospheric ecosystems that have been impaired by the activities of man and his technology.
- Conduct research to gather and analyze information necessary to manage, restore, and maintain natural processes and cultural values.
- Protect threatened or endangered plant and animal species and habitats critical to the maintenance of their populations, and reintroduce those species presently eliminated where possible.
- Protect and manage designated significant ecological areas.
- Restore land surfaces disturbed by human activities to more natural appearances, recognizing that cultural remains must be preserved.
- Limit unnatural sources of air, water, noise and visual pollution to the greatest possible degree.
- Monitor encroachments by exotic flora and fauna into natural ecosystems and execute programs for their removal where feasible.
- Encourage and participate in the preservation of the cultural history of the Santa Monica Mountains.
- Pursue cooperative cultural resource stewardship programs and projects throughout the recreation area.
- Develop, promote and participate in cooperative resource management programs with local, state and other federal agencies and private landowners to achieve the resource policies enumerated in Public Law 95-625.

Resource Management and Land Management Concepts

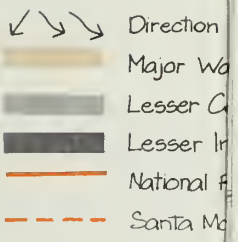
Diverse and conflicting land uses and resource relationships occur within the 225,000 acres of the Santa Monica Mountains Zone. Resource management actions necessary to effectively comprehend these relationships will be utilized on three geographic planning units:

1. Watersheds
2. Land Classifications
3. Land Ownership Tracts

Combined overlays of these units will facilitate organization of the description of resource needs and the roles of agencies, organizations and individuals in executing natural resource programs and projects.

To effectively manage and monitor the natural resources of the Santa Monica Mountains, resource management activities will be based on watershed concepts (Figure 1). Cooperative resource management activities between the National Park Service, other agencies, landowners, and homeowners will attempt to manage the relationships between human activities and environmental dynamics.

The land management concept for the National Recreation Area directly relates to the resources protection program through appropriate land classification and ownership projections. The National Park Service has an unusual opportunity to pursue a land management scheme within the Santa Monica Mountains that differs from traditional federal fee acquisition and control. New concepts are being employed that will allow compatible land uses to coexist within the National Recreation Area boundary while ensuring overall preservation and management for public use.



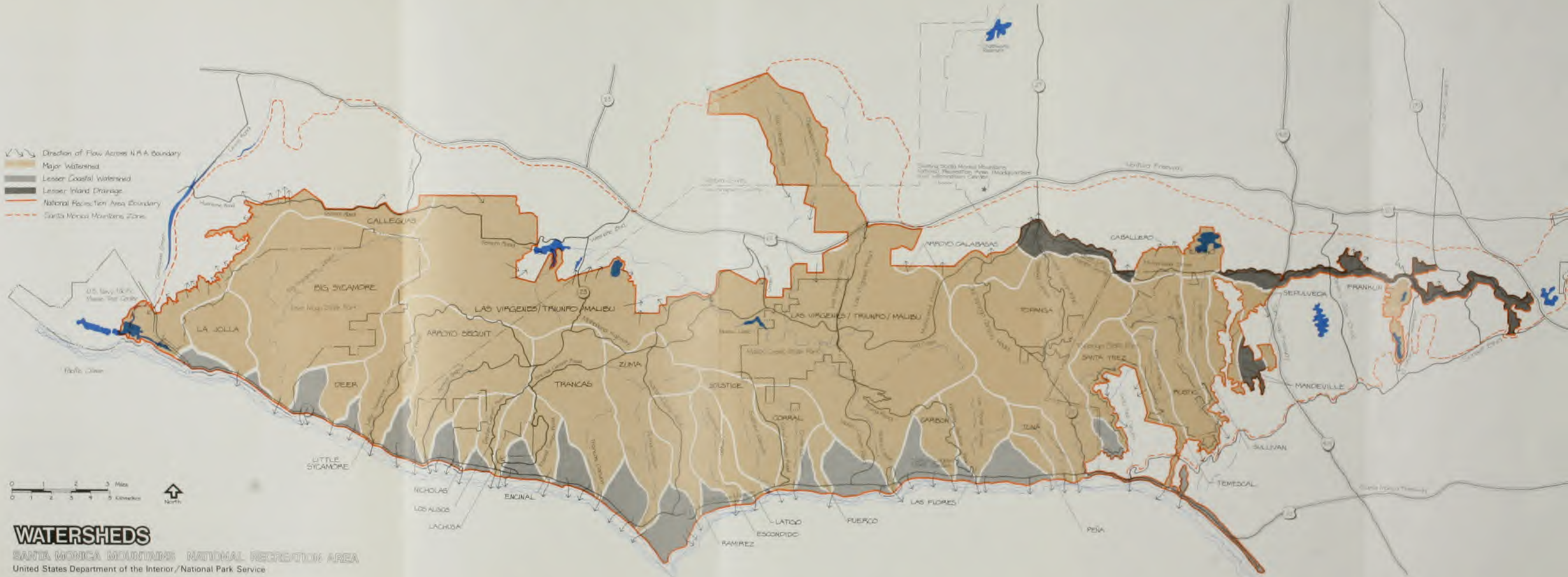




WATER

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WATERSHEDS

SANTA MONICA MOUNTAINS NATIONAL RECREATION AREA

United States Department of the Interior / National Park Service

Natural Resource Issues and Concerns

There are several significant natural resource issues and concerns which must be addressed by the National Park Service in order to maintain and preserve the resources of the Santa Monica Mountains. The critical threats which are currently impacting the natural resources of the mountains include:

1. Urban Encroachment and Land Development. The major threat to the integrity of natural and cultural resources stems from the rapid, and sometimes insensitive urban encroachments within the mountains and along the coast. The result is a rapid change in species diversity and abundance through alteration of wildlife habitat and native vegetation, air and water quality deterioration, loss of cultural diversity, and irretrievable loss of cultural remains.

   Urbanization has both direct impacts through the commitment of lands to development and indirect impacts as more lands are required to provide residential services such as sewage treatment and solid waste disposal. Sewage treatment plants and landfills are located in the National Recreation Area. One landfill has accepted hazardous wastes in the past.

2. Air Pollution. Another threat stems from automobile exhaust and some industrial pollutants, including a threat in the form of acid deposition. Acid deposition is particularly insidious because it infiltrates almost any environment or organism. Scenic and public health values in the mountains are also diminished because of automobile exhaust.

3. Man-Caused Fires and Fire Suppression and Prevention Activities.

   A large percentage of wildfires in the Santa Monica Mountains result from human activity. Homes are often burned in conflagrations, threats to residences in the area are extremely high, and natural resources can be damaged by intense, fast-burning fires that result from unnatural fuel buildup. Watersheds that have been burned experience flooding and landsliding during the winter rains imposing additional threats to homes and buildings.

   Fireroad and firebreak construction present a threat to the ecological integrity of chaparral, riparian, and coastal sage ecosystems, as ground cover is removed and erosion potential increases.

4. Water Quality. Sewage disposal, wastewater treatment, and water quality management are important issues in the Santa Monica Mountains.

5. Coastal Concerns. The National Recreation Area boundary extends to the mean high tide line of the Pacific Ocean. The state of California owns the coastal resources below this tide line, and they are administered by the California Lands Commission. The state of California and the county of Los Angeles operate the public beaches. In addition, all offshore waters between Latigo Point and Mugu Lagoon have been designated as an Area of Special Biological Significance by the California State Water Resources Control Board.

   While the National Park Service does not have jurisdiction in areas below mean high tide line, the habitat and scenic, educational, and recreational values of these coastal areas are of recognized importance.

6. Scenic Quality Protection. Any threats to visual and scenic qualities are important resource issues that relate to every aspect of the management of the National Recreation Area.

7. Mineral Resources Development. In most cases, when lands are included in the National Park System, they are closed to mineral entry. All lands in the National Recreation Area that are acquired by the Park Service will be closed to mineral entry from time of purchase (assuming mineral rights are also purchased). However, private mineral rights within the boundary may be exercised at any time by the mineral owner.

NATURAL RESOURCE MANAGEMENT PROGRAM

The Natural Resource Management Program presents specific programs and projects for resource management in the national recreation area. This program describes management strategies, establishes priorities, and outlines research and management projects relating to resource issues and concerns. The program will be assessed and revised annually as projects are executed and new information becomes available.

A non-prioritizeed outline of the overall resource management program follows:

Geologic Resources

Compile and map information on geologic resources including geologic formations and history, hazard areas, and areas of geological significance

Vegetation Resources

Inventory and map vegetation resources through remote sensing techniques

Identify special vegetation areas such as riparian habitats and critical habitats for endangered species

Investigate chaparral fire dynamics through a comprehensive analysis of past studies in similar areas; aspects of fire management to be investigated include fuel loading, impacts on slope stability and runoff, use of prescribed burning to reduce fuel load and manipulate wildlife habitat, and impacts of fire on vegetation communities, on the population dynamics of individual plant and animal species, and on cultural resources

Compile information on the management and control of exotic vegetation

Compile information and initiate experimental programs on the management of native trees, including oak and sycamore

Examine the effects of firebreak maintenance on riparian zones

Determine the impacts of visitor use on vegetation to aid in determining carrying capacities

Air Resources

Establish a historic and contemporary air resource data base

Develop and maintain an air quality monitoring program in cooperation with county, state, and federal agencies

Determine and monitor sensitivity of recreation area resources to air pollutants and the potential for impact on those resources and to visual and aesthetic values

Determine the levels of acid deposition and its impacts on biota, water quality, soil, and archeological resources

Investigate the effects of chaparral fire on air quality

Monitor the effects of increases in visitor use on air quality

Water Resources

Establish stream monitoring programs for areas of special resource concern; possible factors to be investigated include runoff characteristics, water quality, historic hydrologic data base, and climatological data

Determine the impact of individual septic systems on natural resources and the impact on the recreational potential of the area

Determine the impacts of sewage effluent on native biota and health, both inland and along the coast

Monitor the effects of visitor use on water quality

Investigate soil permeability and its effects on runoff and percolation

Investigate the impact of a landfill operations on public recreation

Classify the water resources as to present and proposed uses and recreational potential

Determine extent of water quality degradation associated with urban development

Wildlife Resources

Inventory the wildlife of the National Recreation Area (including mammals, birds, reptiles, amphibians, and native fish) by determining the species present, establishing and maintaining a wildlife monitoring program, and identifying critical and threatened species

Conduct studies that include impacts of urban development on wildlife populations and biogeography, classification of wildlife habitats, determination of endangered species habitats, determination of the relationship between recreational use and wildlife needs, and identification and analysis of wildlife corridors

Conduct studies on certain species or groups with specific management needs, including raptors, mountain lion, mule deer, coyote, feral animals, reptiles, and amphibians

Coastal Resources

Cooperate with other interested agencies to inventory coastal resources documenting aquatic habitats and their flora and fauna

Analyze biogeography of rocky tide pools

Establish the relationship between coastal resources and recreational/commercial impacts

Develop a habitat management plan for coastal and aquatic species

Conduct coastal wetland studies to determine the feasibility for wetland and estuarine reclamation and restoration

Determine impact of dredge material on sandy beach biota

Analyze upland uses and their effects on coastal lagoons and nearshore resources (including water quality impacts from effluent, pesticides, sedimentation from increased development, and visitor use)

Evaluate productivity of wetlands and coastal waters

Analyze population dynamics of intertidal, sandy beach, bay and lagoon, kelp bed, and other nearshore populations

Inventory and analyze population dynamics of whales, marine mammals and shorebirds

Monitor potential effects of oil resource development on productivity of coastal resources and recreational uses

Resource Information System

Develop a system to organize, retrieve, and analyze mapped information using an automated processing system that will serve as a management and planning tool and will include natural and cultural resource, economic, land use, social, statistical, and ownership information

Cooperative Resource Management

Institute a land management outreach program to actively promote cooperative resource management schemes with private landowners and other land management and land regulatory agencies in the recreation area.







Natural Resource Description

CLIMATE

The Santa Monica Mountains are located between the longitudes W118° 16' and W119° 05' and latitudes N34° 00' and N34° 15'. The climate of the mountains is typical of those associated with the semi-arid subtropical regions of the world.

According to the Koppen climatic classification scheme, the Santa Monica Mountains are situated in the Mediterranean Climate group, a climate characterized by mild wet winters, and hot dry summers. The classification was based upon the response of vegetation associations to climatic variance. The boundaries of each climate group were delineated at the interface of major changes in vegetation. These significant vegetative patterns were defined empirically (based on observation or experience) accounting for mean monthly temperature and precipitation differences.

Mediterranean type climates and ecosystems occur in the midlatitudes of the world (Figure 2). Usually, a Mediterranean climate is present on the western margins of continents. They are found only in the United States, the Mediterranean Sea, Central Chile, Southern/Southwestern Australia and in South Africa.

The general characteristics of a Mediterranean type climatic regime are reflected in the Koppen classification designation. The classification is labeled "Csa" where:

C = the coldest month has temperatures above 26.5° F and never exceeds 64.4° F.

s = Rainfall is three times greater during the winter compared with summer months.

a = (A subtype Mediterranean Unit) hot summers with the highest temperature in the hottest month above 71.6° F.

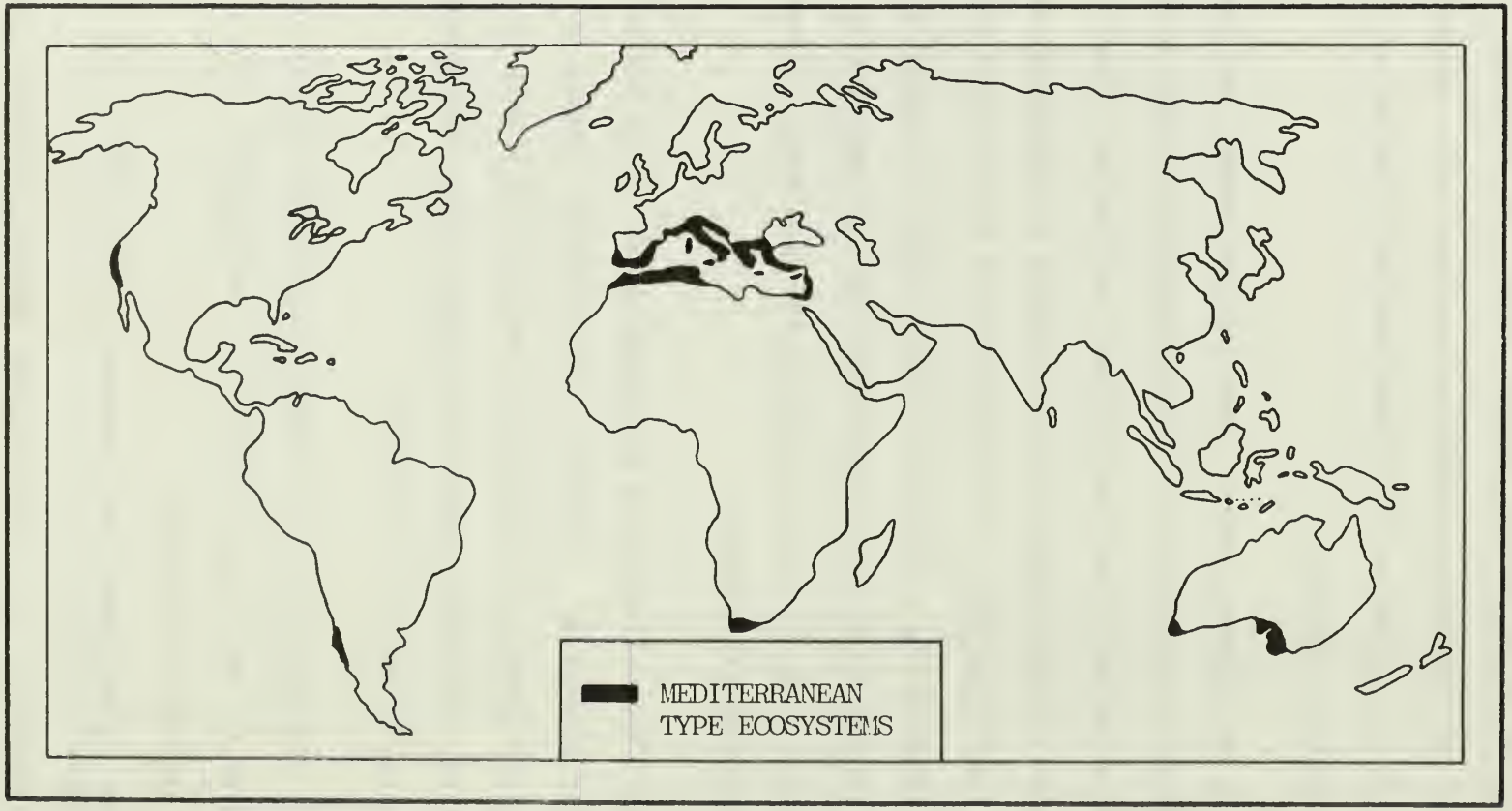


FIGURE 2 : EXTENT OF WORLD MEDITERRANEAN TYPE ECOSYSTEM

The climatic regime of the Mediterranean ecosystem is an intermediary between Koppen's arid climates on the equatorial side and the humid climates on the poleward side. The Mediterranean climate reflects intermediate conditions between these two classifications and the dominating influence is dependent upon the seasonal latitudinal shift of the major air circulation systems on a global basis. These shifts are in response to the elevation of the noon sun above the zenith and associated earth/sun relationships throughout the year which determine solar radiation inputs.

Near the equator, during the summer months descending air flow from the jet stream, situated in the mid-latitudes, directly interacts with high pressure cells at the earth's surface which migrate over the Mediterranean climatic region (Van Riper, 1971). Because of the summer earth/sun relationships for the midlatitudes (poleward migration northward of direct solar rays), the high pressure cells are aloft and a slow cooling of the air (low lapse rates) occurs several thousand feet above the earth's surface. These lower than normal cooling rates cause a rapid adiabatic cooling (those changes in temperature that do not involve the addition or withdrawl of heat) of the rising surface air thereby approximating the ambient temperatures above the surface and deterring the formation of precipitation.

Rain cannot occur in a Mediterranean climate until:

1. an increase occurs in the cooling rate of the air mass as it rises from lower to higher atmospheric elevations which approximates the normal cooling trends averaging 3.54°F per 1000 feet of vertical rise (in effect, increasing the lapse rate)

2. upper air subsidence discontinues.

Horizontal airflows also influence the slower rate of air cooling aloft experienced in the Mediterranean climate of southern California. The horizontal airflow is a direct result of the poleward migration of tropical thunderstorms. These air currents range in elevation from 10,000 to 20,000 feet (above the surface) and offset the influence of thermal updrafts thereby preventing precipitation from occurring.

With the equatorial shift of direct solar radiation during the fall equinox, subsidence of air begins to occur and the lapse rates (rate of air mass cooling aloft) become irregular. When the lapse rates have increased and subsidence has discontinued or weakened, the rain will fall if a frontal system invades the area. The generation of rain storms for southern California increases throughout the winter solstice and the months of December and January are typically the wettest (Figure 3).

The amount and spatial distribution of rainfall within southern California is influenced by the Santa Monica Mountains (Figure 4). The proximity of the mountains to the Pacific Ocean, combined with their steep physical relief, causes micro-climatic changes within the mountain zone and adjacent vicinities. Precipitation is greater in the mountains, ranging from 18 to 26 inches per year (mean annual precipitation for Los Angeles is 14.87 inches per year), temperatures are cooler and air patterns are altered. Land and sea originating wind patterns are a common occurrence within the canyons of the Santa Monica Mountains and coastal fog is a frequent invader deep within the mountain canyons.



FIGURE 3: MEAN MONTHLY PRECIPITATION, TOPANGA CANYON FOR A PERIOD OF 15 YEARS, DEPICTING SEASONALITY IN THE RAINFALL RECEIVED IN A MEDITERRANEAN TYPE ECOSYSTEM.

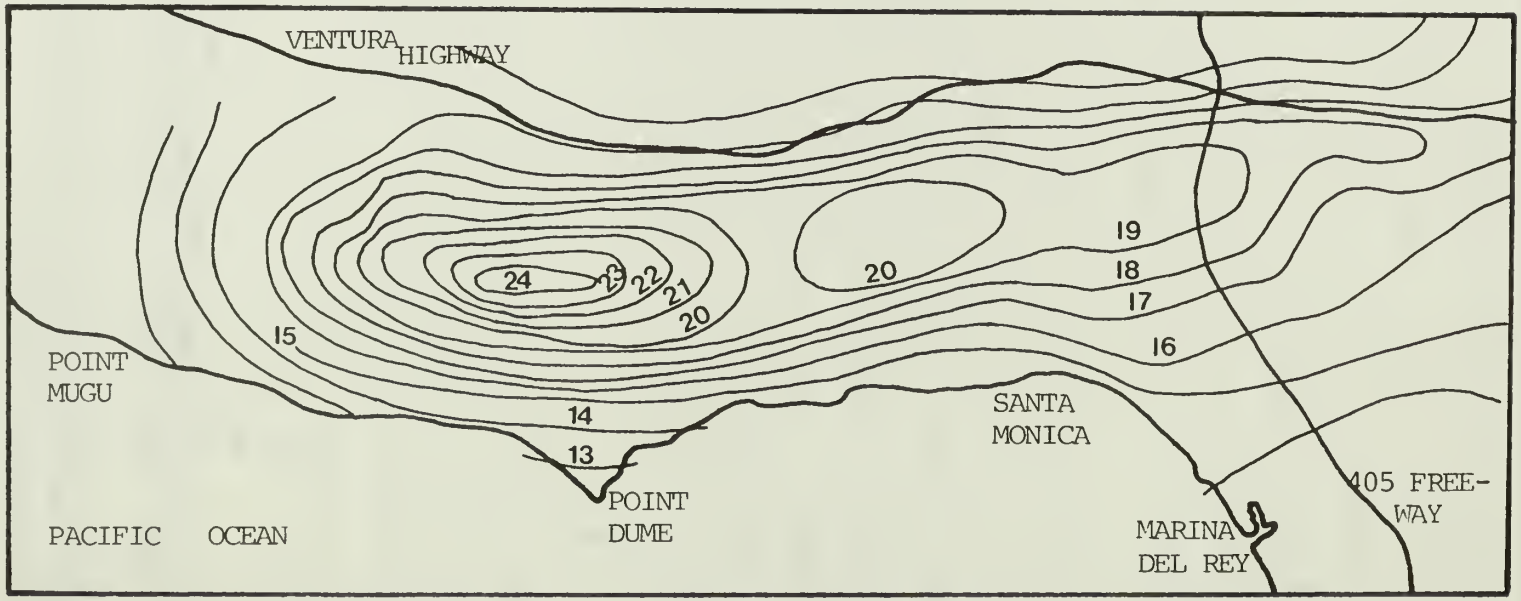


FIGURE 4: RAINFALL ISOHEYTS, SANTA MONICA MOUNTAINS AND VICINITY (Environmental Protection Agency, 1977). (Contours at one inch intervals)

AIR QUALITY

The Los Angeles metropolitan complex since the 1940's has experienced the poorest air quality of any urban center in the United States. National and California air quality standards for major pollutants are regularly exceeded. The Santa Monica Mountains, situated between the highly developed Los Angeles Basin/San Fernando Valley to the east and the Oxnard Plain to the west, function as an airshed for southern California. The significance of the mountains toward providing an airshed for southern California was recognized by Congress in the enabling legislation for the National Recreation Area. The Congressional Mandate (Public Law 95-625) specified that "the Secretary (Interior) shall manage the Recreation Area in a manner which will preserve and enhance...its public value as an airshed for southern California metropolitan area."

The quality of the air resources in the Santa Monica Mountains and vicinity experiences spatial and temporal variabilities. The spatial concentrations of the atmospheric pollutants is directly related to the: 1) climatological conditions, 2) distance from the coast, 3) physiography, and 4) amount of pollutants emitted into the atmosphere. Air quality trends throughout southern California indicate that the coastal areas experience better air quality than the inland interior basins. The Santa Monica Mountains reflect these trends because of their lack of development, proximity to the ocean and the effects that atmospheric air circulation patterns have had upon air mixing and the dilution of constituents in the air column.

Wind speeds in southern California throughout the year are relatively low. During the past 20 years the average wind speed was 6 miles per hour (EPA, 1977). The greatest wind speeds are experienced during the summer months. The daytime air flow during the summer is primarily from the west, southwest, south, and southeast and these winds come from the ocean and travel landward (Figure 5). This is a result of differential heating between land and sea masses. At night, these air flow patterns reverse, are of less magnitude and are from the land to ocean in a northeasterly direction. Conversely, during the winter months the wind direction has a dominant northeasterly trend as a result of frequent Santa Ana conditions and storm systems which move through the area (Figure 6). The winter wind speeds are of less intensity than the summer wind velocities. Even though these two conditions (Santa Anas and winter storm systems) dominate, an oceanic wind flow onto land does occur but the intensity of these winds is reduced due to the lesser differential land/ocean heating as a result of decreased solar radiation inputs. The winter nights experience wind flows from land to ocean and in the canyons of the Santa Monica Mountains there is a pronounced down slope/canyon airflow.

Atmospheric circulatory patterns are essential for air mixing which reduces the emitted pollutant concentrations through dilution. However, other climatological and physiographical conditions exist within southern California which favor the development of temperature inversions, which reduces the ability for vertical air mixing. These inversions are at a particularly low elevation thus trapping emitted pollutants close to the ground. The inversions result from: 1) advection of cool air which is influenced by cold offshore waters, 2) lower lapse rates

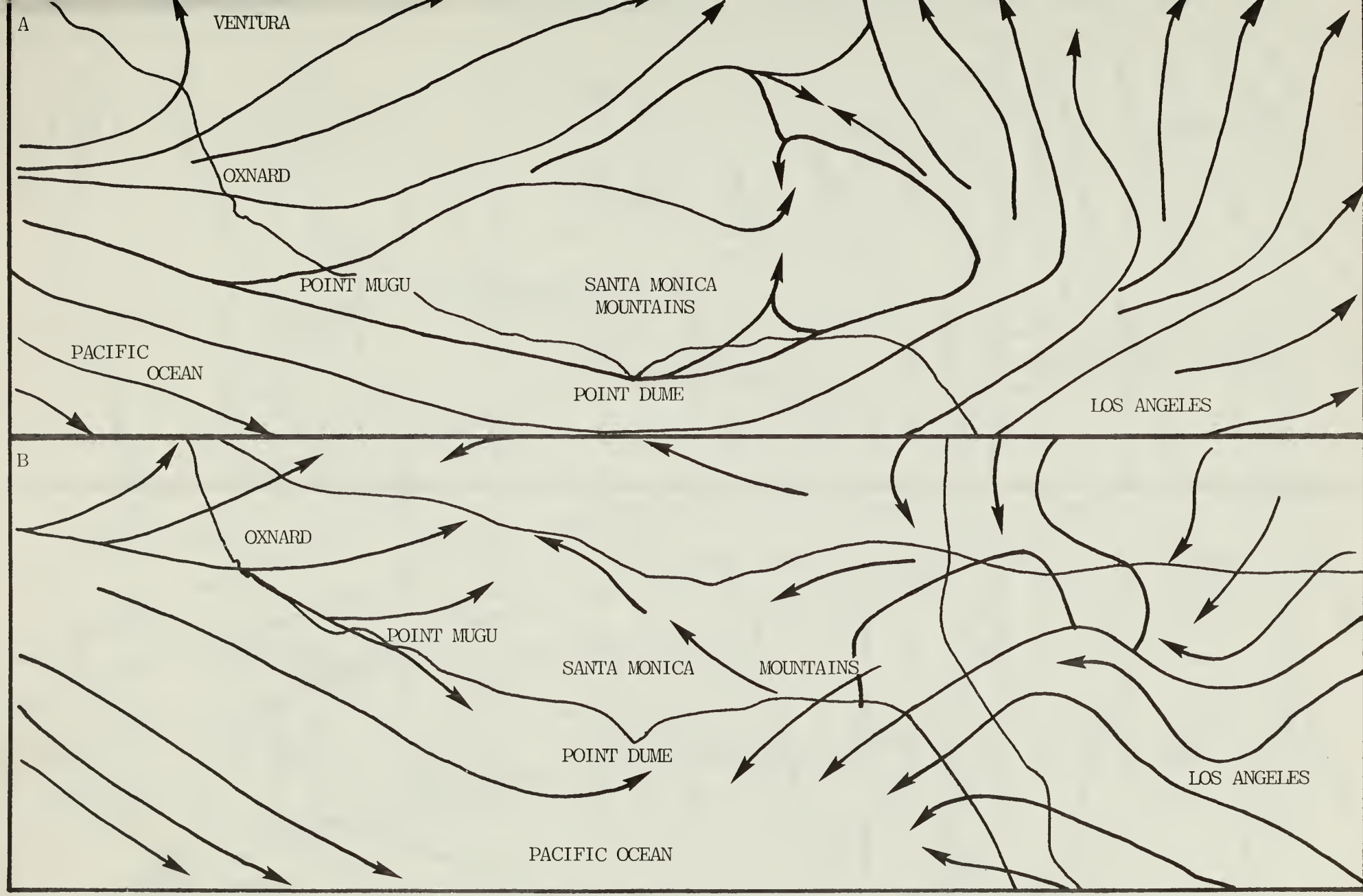


FIGURE 5: DIURNAL SUMMER WIND PATTERNS, SANTA MONICA MOUNTAINS (A=Daytime wind patterns, B=nightime wind patterns) (Environmental Protection Agency, 1977).

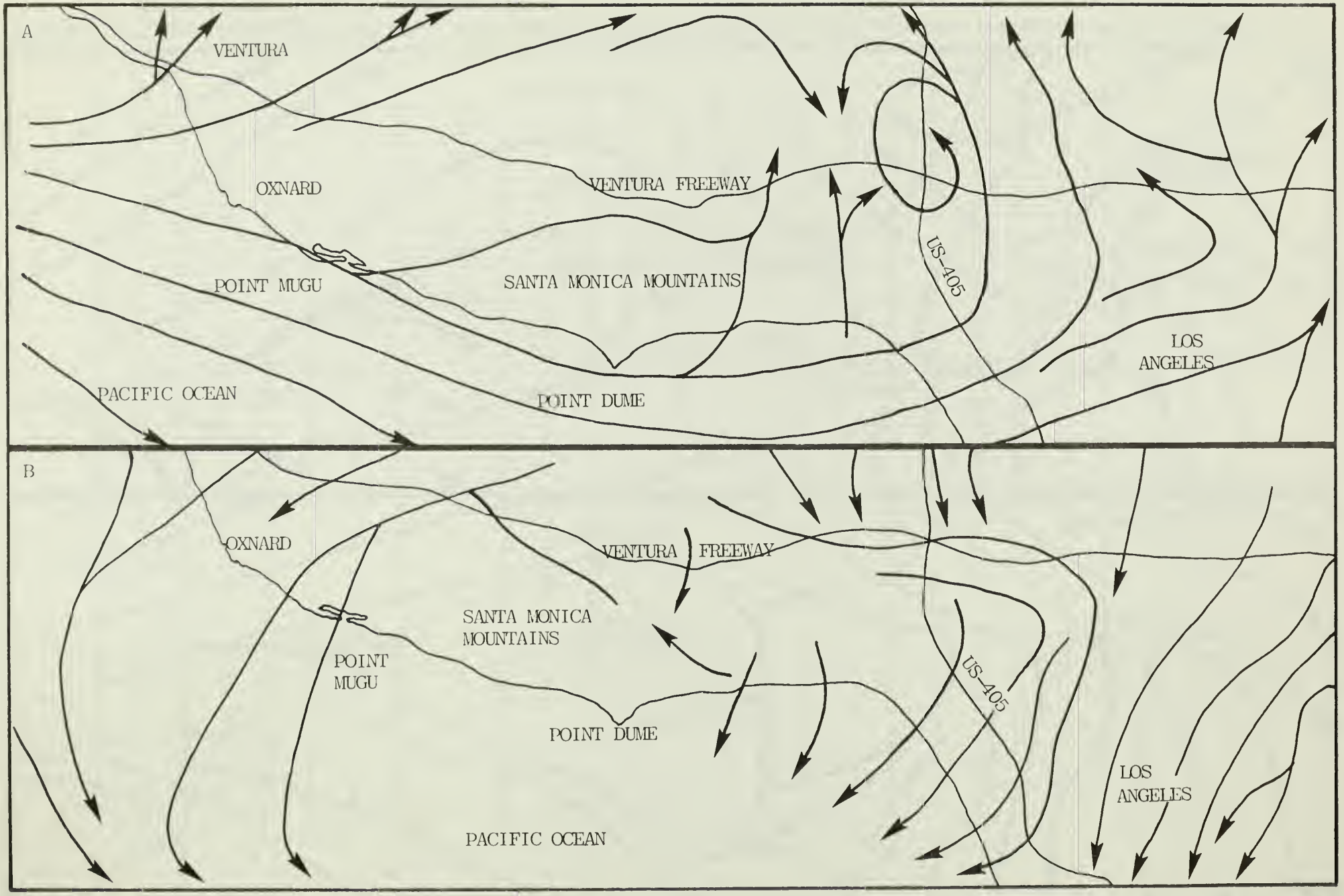


FIGURE 6: DIURNAL WINTER WIND PATTERNS, SANTA MONICA MOUNTAINS (A= DAYTIME WIND PATTERNS, B= NIGHTIME WIND PATTERNS) (Environmental Protection Agency, 1977).

associated with subtropical high pressure cells within the midlatitudes, and 3) physical barriers (Van Riper, 1971).

The inversion base height (depth of vertical atmospheric mixing) for southern California is very low (Figure 7). During the early morning hours the maximum inversion base height is at 2,500 feet elevation (above mean sea level) on the average of 257 days each year (South Coast Air Quality Management District, 1980). The inversions are much lower and of greater intensity during the winter months. At this time, inversion layers are at or near the surface in the early morning hours and throughout the night. Inversion conditions exist 66 percent of the time in the winter but are weaker and vertical air mixing frequently extends to the 4,000 feet elevation (South Coast Air Quality Management District, 1980). Weakened inversion layers are a result of less solar radiation (direct sun light) throughout the winter months. Inversions dissipate during the winter afternoon when the direct solar radiation reaches a peak, thereby heating the ground surface and creating convective air currents.

During the summer months the inversion levels are higher but they are also of greater intensity and more persistent. The morning base for an inversion layer is at 1,400 feet above the surface, however, air mixing improves only to 2,800 feet by the afternoon. (South Coast Air Quality Management District, 1980). Persistent summer inversion layers, combined with the greater direct solar radiation, increase the photochemical reactions producing higher ozone levels affecting the overall air quality throughout the region.

In the Santa Monica Mountains, inversion levels could be lower than in the Los Angeles basin or surrounding coastal plain areas (EPA, 1977).

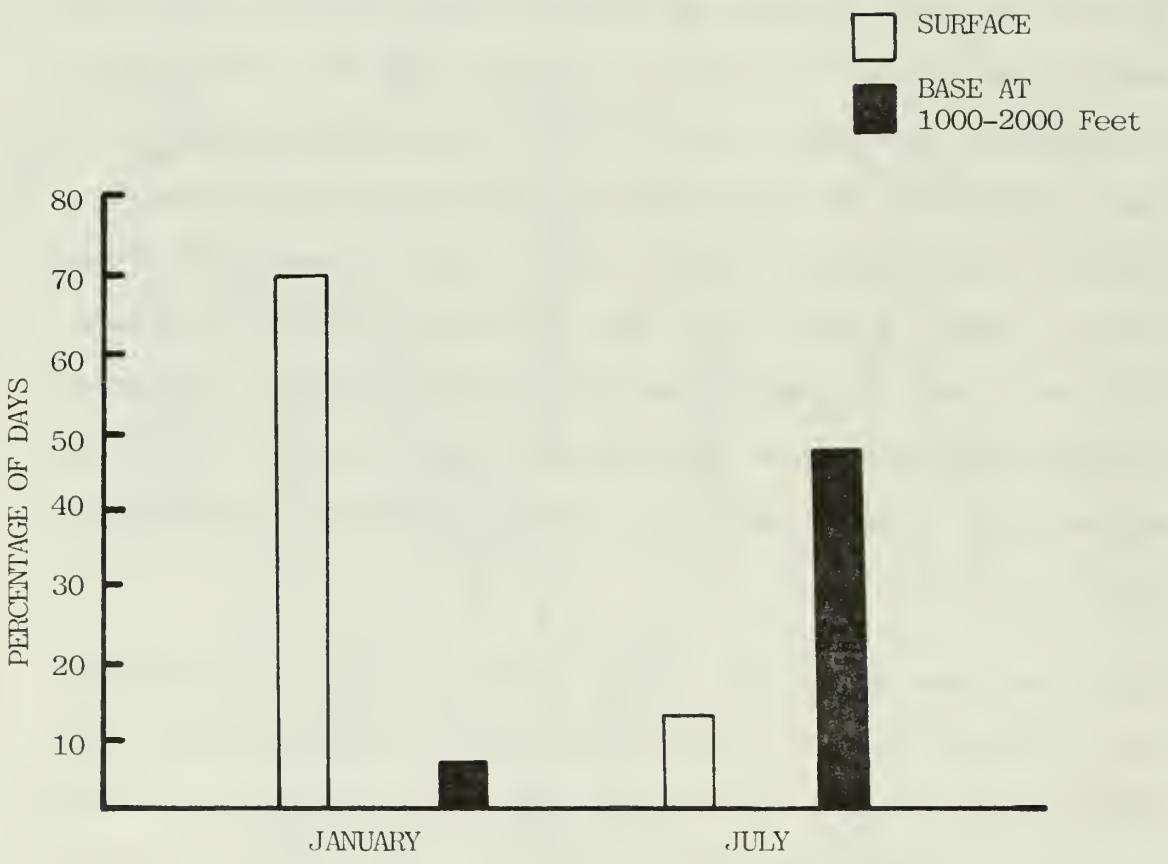


FIGURE 7: PERCENTAGE OF DAYS WITH MORNING INVERSIONS OF SPECIFIED TYPE, LOS ANGELES INTERNATIONAL AIRPORT, 1950-1974 (R.W. Keith, South Coast Air Quality Management District, 1980).

This is a result of a thinner afternoon marine air layer in response to the air flow characteristics. The marine air layer is reduced in the afternoon because air is being furnished from the coast to the inland areas at a faster rate than it is replaced from the ocean. The net result is the convergence of marine air layers to lower elevations in the Santa Monica Mountains, thereby creating lower inversion levels.

In addition to inversions, the air quality in the Santa Monica Mountains is impacted by diurnal air exchanges between inland areas and the ocean. During the day, sea breezes push old pollutants from the mountains and into the inland areas. These pollutants, transported landward, increase pollutant levels in the inland areas. Conversely, at night, a reversed land/sea breeze develops and atmospheric pollutants are transported from the inland regions into the mountain and coastal areas. These pollutants have the capacity to degrade air quality and visibility within the mountains and coastal areas.

Combined with these meteorological and physical conditions is the incidence of solar radiation and its reaction with emissions from mobile sources forming serious air quality problems. The late spring, early fall and summer months experience the worst air quality throughout the year when the greatest solar radiation is received (Figure 8). A photochemical reaction occurs between reactive hydrocarbons (RHC), nitrogen oxides (NO_x) and ultraviolet radiation. Compounds combine to form ozone (O_3) and peroxyacetyl nitrate (EPA, 1977). This can be expressed as:

$$\text{Ultaviolet light} + \text{RHC} + NO_x \longrightarrow O_3 + \text{Petroxyacetyl nitrate.}$$

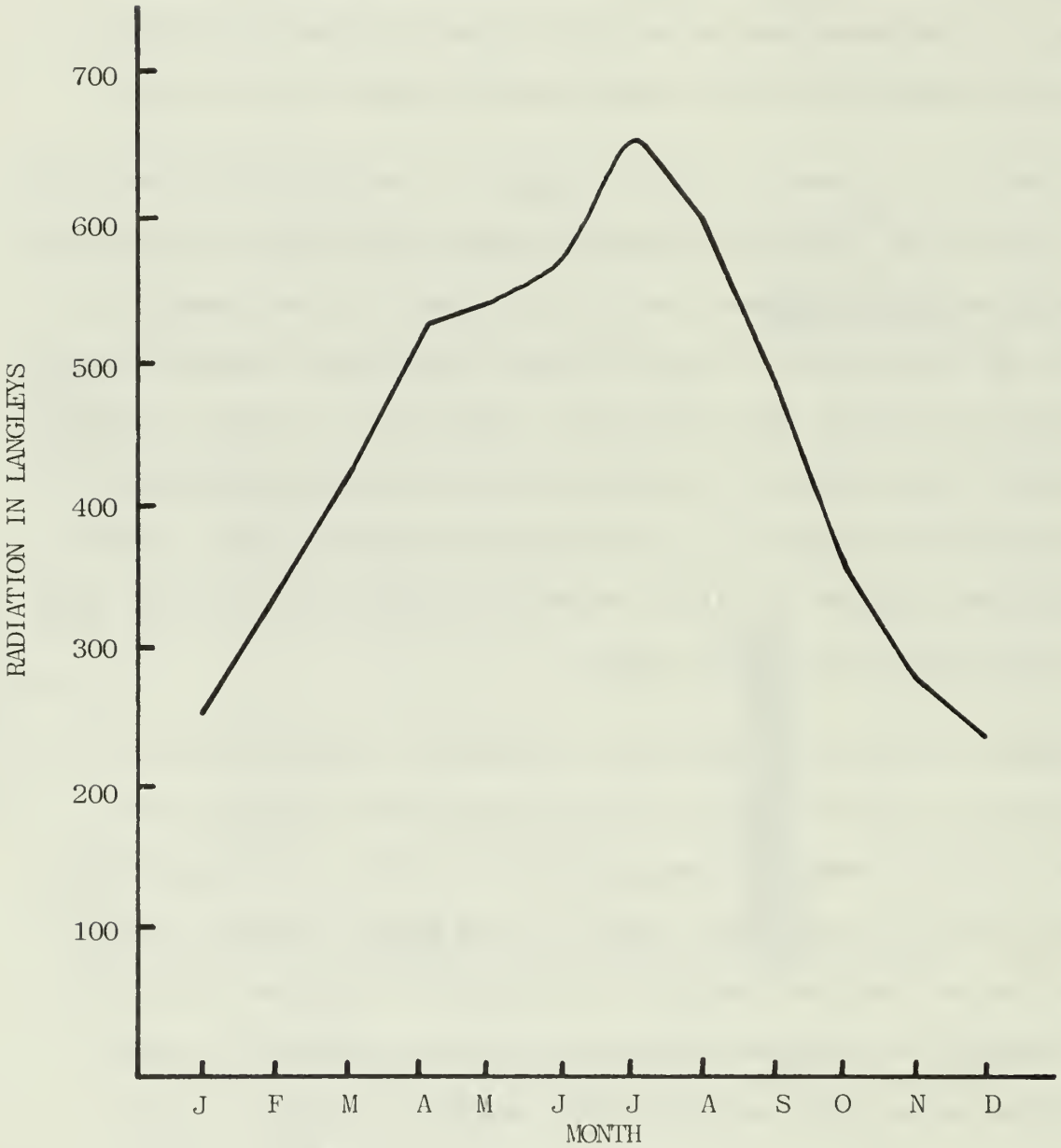


FIGURE 8: MONTHLY AVERAGE SOLAR RADIATION FOR LOS ANGELES, CALIFORNIA (ONE LANGLEY = ONE CALORIE PER SQUARE CENTIMETER) (R.W. KEITH, SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT, 1980).

Ozone is the principal oxidant from photochemical smog which attacks organic materials including unburned hydrocarbons. The result is the production of greater amounts of ozone (O_3) as well as various other oxidation products. Some of these products cause the familiar eye irritation associated with smog, produce odors and impact plant communities.

PHYSIOGRAPHY

The Santa Monica Mountains are one of several mountain ranges comprising the east-west trending Tranverse Mountain Province of southern California. This group of mountains extends 325 miles in length from Point Arguello (western extension) to Joshua Tree National Monument situated at the easternmost extent of the province (Figure 9). The width of the transverse range province varies from a minimum of 40 miles near the western end to a maximum of 60 miles near the Ventura/ Los Angeles County line.

The Transverse Ranges are characterized by numerous faults, folds, downwarps and complex geologic structure (Figure 10). Much of the area's general landforms can be directly attributed to the effects of plate tectonics upon the strata. The interaction of the continental North America Plate with the westward Pacific Plate and the associated earth movements are responsible for the stratigraphic complexity. The contact of these two large plates is expressed on the earth's surface as the San Andreas Fault and it delineates the northern boundary of the Transverse Range Province.

The Santa Monica Mountains are the southernmost mountain chain within the Transverse Range Province. They extend from Point Mugu in Ventura County to Griffith Park in Los Angeles (Figure 11). The mountains are 46 miles in length and incorporate coastal, valley and mountainous landforms. The mountains average 7.5 miles in width and have a mean elevation of 1,000 feet above mean sea level. The highest point within the Santa Monica Mountains is Sandstone Peak (3,111 feet msl) and the minimum elevation is at sea level along the Pacific Ocean.

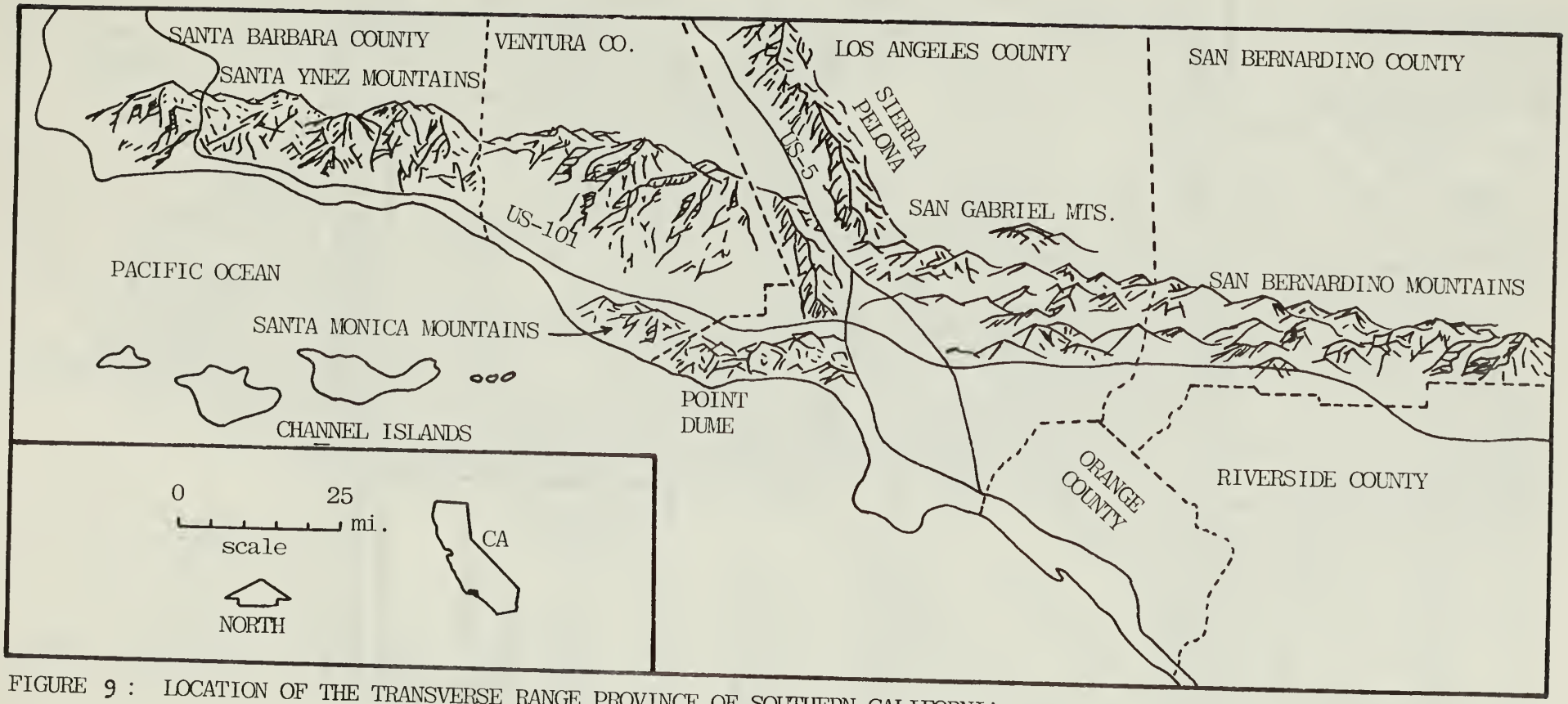


FIGURE 9 : LOCATION OF THE TRANSVERSE RANGE PROVINCE OF SOUTHERN CALIFORNIA

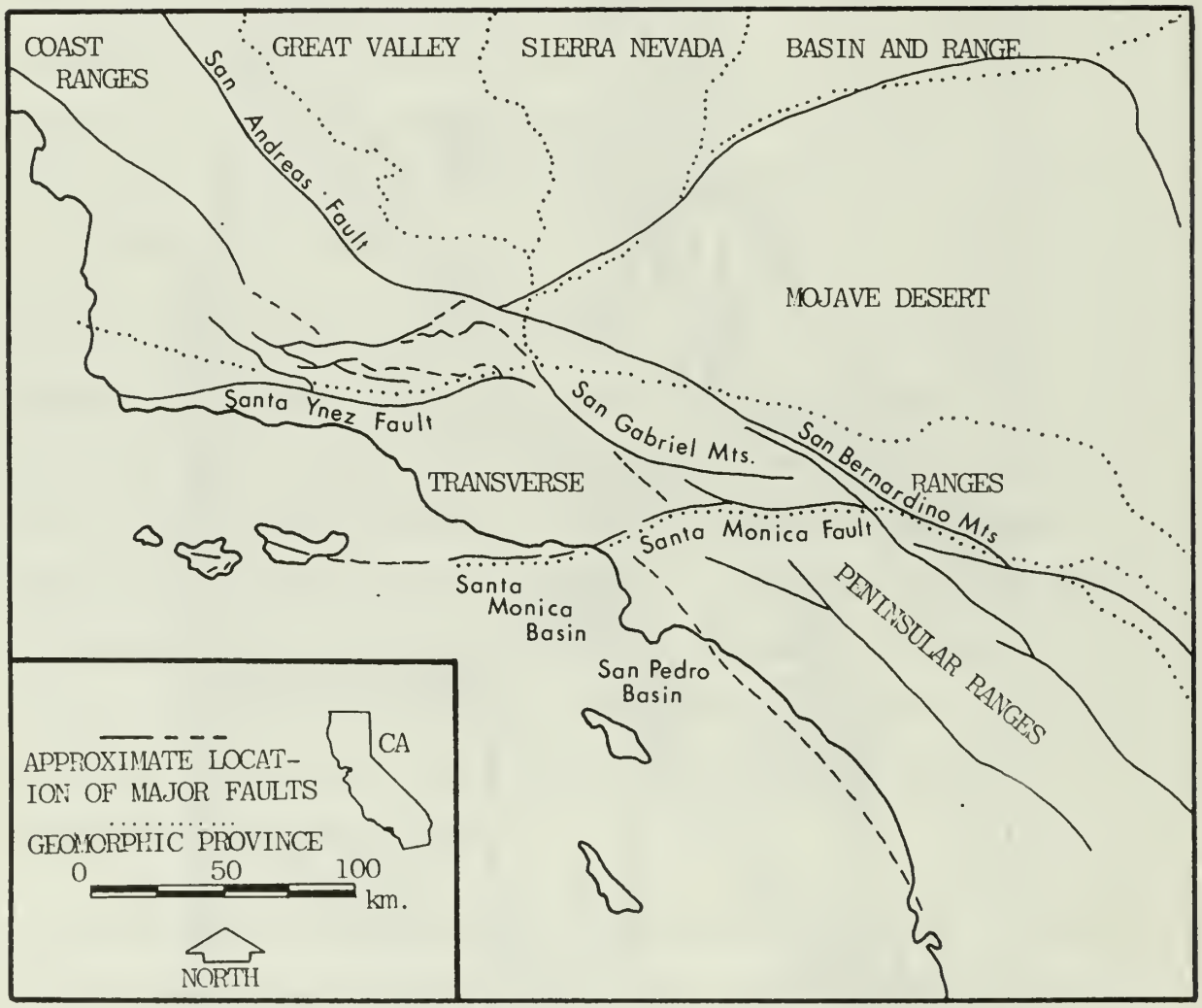


FIGURE 10: RELATION OF SANTA MONICA AND SAN PEDRO BASINS TO MAJOR PHYSIOGRAPHIC PROVINCES, SOUTHERN CALIFORNIA (U.S. GEOLOGICAL SURVEY).

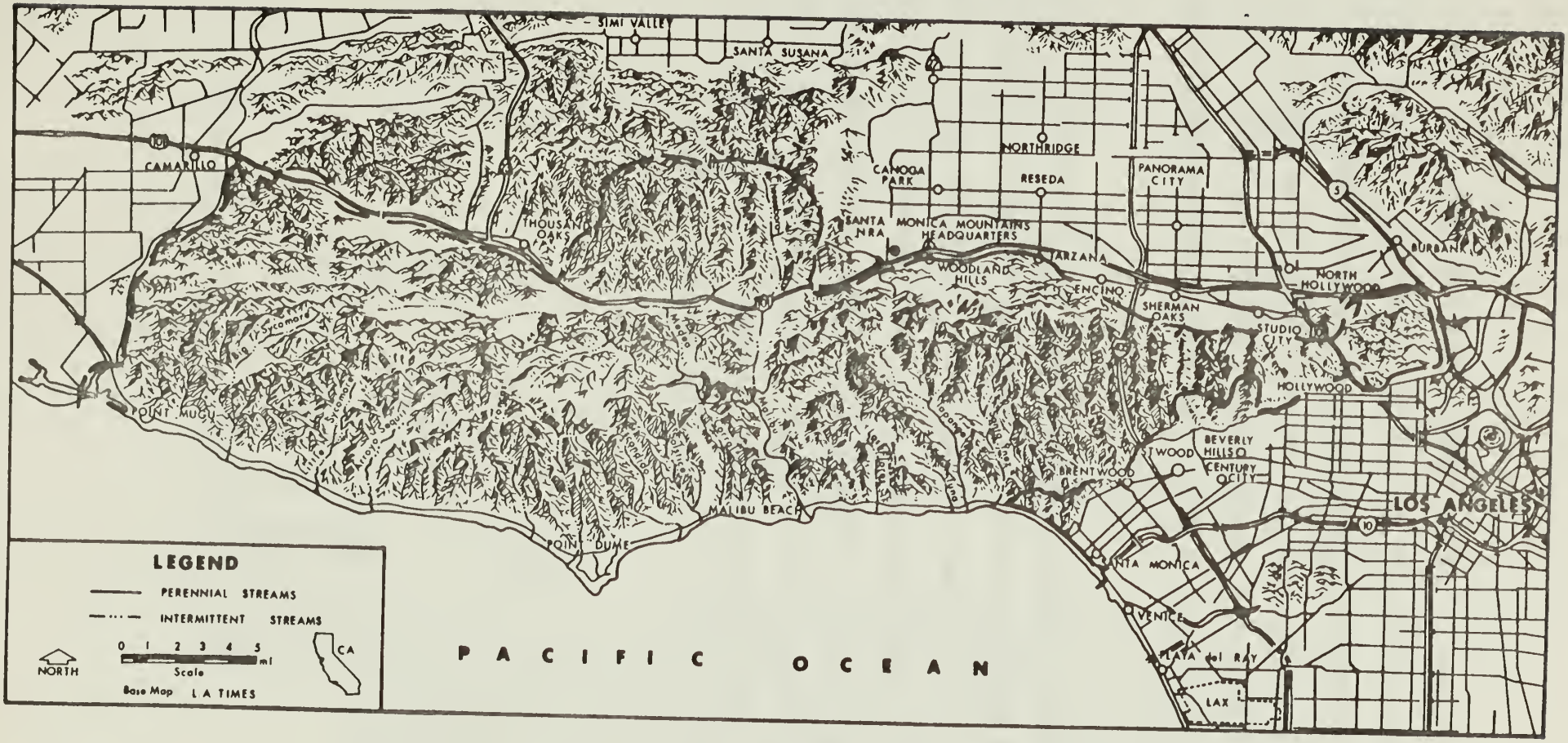


FIGURE 12: MAP OF THE SANTA MONICA MTS.

The physiography of the Santa Monica Mountains reflects a large flat depositional plain which was uplifted (Figure 12). The mountains are a large symmetrical anticline with the steepest plunge situated in the Griffith Park vicinity. The westward dip of the uplifted strata, from Griffith Park to Boney Mountain, is gentle and has been heavily disected by rejuvenated streams that have eroded southern trending canyons.

The mountains topography has been highly incised by stream (intermittent and perennial) erosion and the mountains contain extremely steep, rugged landforms. Some streams, such as Topanga and Malibu, are antecedent and have continued downcutting their channels as uplift occurs. Malibu Canyon is the largest drainage system within the Santa Monica Mountains and it is one of the most sinuous canyons in the mountain chain. Most of the canyons are classified as in their "youthful" stage according to the Davis system of landform classification.

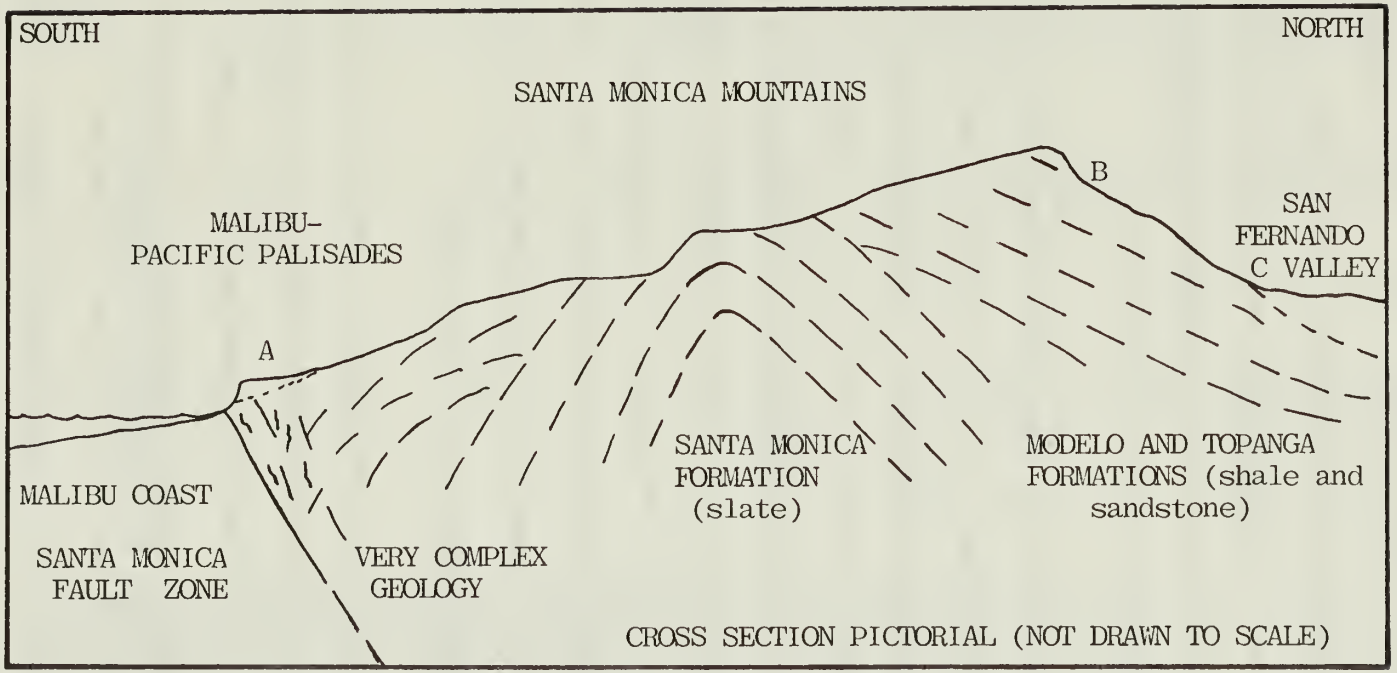


FIGURE 12: GEOLOGIC CROSS SECTION OF THE SANTA MONICA MOUNTAINS (A: wave erosion, sloughing, debris slides, bedrock landslides common for 1.5 miles inland, associated with complex fracturing of the stratigraphy due to the Malibu Coast-Santa Monica fault zone; B: Modelo Formation bedding planes experience block glides; C: block and debris slumps occur in steep areas) (Harold Weber, California Division of Mines and Geology, 1981).

GEOLOGY

The Santa Monica Mountains incorporate the greatest geological diversity of all major mountain provinces within the Transverse Range Province. The lithology of the mountains is a complex assemblage of marine and non-marine deposition. The characteristics of the mountains topographical relief result from differential erosion and plate tectonics (i.e., uplifting, folding and faulting).

The oldest rocks within the Santa Monica Mountains are the Santa Monica Slates of the Mid-Jurassic Period in geologic time (Table 1). The slates were originally deposited in a marine environment forming black shales and greywacke which accumulated up to 7,000 feet in thickness. These deposits were subsequently metamorphosed by granitic intrusions during the late Cretaceous forming black slates, phyllite and spotted slate which are typical of this formation. These associated granitic intrusives, which are primarily quartz and diorite, are of the same Mesozoic event that produced the massive granitic batholiths in the Sierra Nevada (Norris and Webb, 1978).

Subsequent to the granitic intrusions of the Santa Monica Slates, uplifting of the southern California coastal area occurred during the Cretaceous. This uplifted region was eventually eroded and a transgressive sea began to deposit conglomerates, sandstone and shale. Sedimentary deposits during this period include the Trabuco and Tuna Canyon Formations. The Trabuco Formation is thin and consists primarily of conglomerates. The Tuna Canyon Formation, deposited during the upper Cretaceous, represents both marine and non-marine depositional environments and includes deposits of turbidites (marine sandstone),

TABLE 1: GENERALIZED STRATIGRAPHY: SANTA MONICA MOUNTAIN ZONE

		EPOCH	FORMATIONS	THICKNESS (FEET)	GEOLOGIC DESCRIPTION	ROCK TYPES
CENOZOIC	QUATERNARY	RECENT	ALLUVIUM	0-100	DEPOSITS IN VALLEYS AND STREAMS (ACTIVE AND/OR FLOOD PLAIN DEPOSITS)	UNCONSOLIDATED SAND, GRAVEL, SILT
			LANDSLIDE		MASS WASTING (SLIDES, SLUMPS, FALLS OR FLOWS)	DEBRIS FROM SOURCE ROCK (PRESENT OR SURFACIAL, SCAR MATERIALS)
		PLEISTOCENE	TERRACE DEPOSITS	0-300	STREAM DEPOSITS, GRAVELS PRIMARILY IN VALLEYS NEAR COAST, MARINE AND NON-MARINE DEPOSITS	GRAVELS AND SAND
	TERTIARY	PLIOCENE	PICO Fm.	1000	MARINE	SHALES, SANDSTONES, GREY CLAY
		MIOCENE	UPPER MODELO Fm.	4500	MARINE	MARINE DIATOMITE, SHALE, SANDSTONE
			LOWER MODELO Fm.		MARINE	SHALE, CHERT, BASAL CONGLOMERATE, INTRUSIVES
			INTRUSIVES		INTRUSIVES	BASALTIC ANDESITIC DIKES, SILLS AND IRREGULAR BODIES
			CALABASAS Fm.		MARINE	SANDSTONE (PROXIMAL TURBIDITES, INTRA-BEDDED SILTSTONE, SILTY-SHALE
			CONEJO VOLCANICS		DEPOSITED IN MARINE ENVIRONMENT	BASALTIC AND ANDESITIC BRECCIA FLOWS, PILLOW LAVAS, AQUAGENE TUFF, MUD-FLO BRECCIA, VOLCANIC SANDSTONE AND DARK GREY SILTSTONE
			TOPANGA FORMATION	3000	MARINE AND NON-MARINE ENVIRONMENT	MARINE SANDSTONE, SHALE, CONGLOMERATE SILTSTONE
			Cold Creek Member		MARINE	SANDSTONE, SILTSTONE, PEBBLY-SANDSTONE, ABUNDANT MOLLUSCAN FAUNA
			Fernwood Member		NON-MARINE	SANDSTONE, PEBBLY SANDSTONE WITH MINOR TUFF AND LIMESTONE. CALCAREOUS SANDSTONE, SHALLOW BRACKISH WATER GASTROPOD Melongena sp. WEST OF MALIBU CANYON.
			Saddle Peak Member		MARINE	SANDSTONE, PEBBLY SAND-STONE, SILTSTONE, PEBBLECOBBLE CONGLOMER-ATE, ABUNDANT MOLLUSCAN FOSSILS, MOST COMMON COMMON Vertipecten nevadana.
			VAQUEROS Fm.		MARINE AND NON-MARINE	SANDSTONE, MUDSTONE, MOLLUSCAN FAUNA (GASTROPOD Turritella inezana).
		OLIGOCENE EOCENE	SESPE Fm.	3500	NON-MARINE	MULTICOLORED SANDSTONE SILTSTONE, SHALE, CONGLOMERATE
		PALEOCENE	COLD CANYON Fm.	8500	MARINE	MARINE SHALE, CONGLOM-ERATE, SANDSTONE, SILTSTONE, MULLUSCAN FAUNA (GASTROPOD Turitella Pachecoensis).
MESOZOIC	CRETACEOUS		TUNA CANYON Fm.		MARINE FORMATION WITH NON-MARINE BASE	MARINE SANDSTONE (TURBIDITES) SLATE, SILTSTONE, CONGLOMERATE, FORMMINIFERS, MOLLUSCS, Campanian and AMMONITE Metaplacenticeras sp.
			TRABUCO Fm.	0-thin	SEDIMENTARY DEPOSITION	CONGLOMERATE
			GRANITIC INTRUSIVES		INTRUSIVES	MOSTLY QUARTZ DIORITE
			SANTA MONICA SLATES	7000	SEDIMENTARY DEPOSITION	BLACK SHALE, GREYWACKE, METAMORPHOSED TO SLATE, PHYLLITE, SPOTTED SLATE.

slate, siltstone and conglomerates. It is also fossilferous, containing foraminifers, mollusks and ammonites.

The Cenozoic Era of geologic time was the most significant time period for the development of the Santa Monica Mountains. Uplifting of the land, erosion of the elevated formations and transgressive seas were the predominant geologic events during the Paleocene. The Cold Canyon (Martinez) Formation represents a period of extensive deposition composed of marine shale, conglomerate, sandstone and siltstone. The sediments accumulated to a maximum thickness of 8,500 feet. Some fossils, characterized by the gastropod Turrilala pacheconensis, are present in the Cold Canyon Formation.

From the late Eocene to early Miocene, a non-marine flood plain deposit of up to 3,500 feet in thickness was formed. The characteristic outcropping is the Sespi Formation, which is extensive and distinctive because of its red-bed sediments. The Sespi Formation consists mainly of sandstones, siltstones, shale and conglomerates. The flood plain condition continued until the upper Oligocene when the seas transgressed over the site of the present Santa Monica Mountains.

During the Oligocene, there were two basic changes in the earth's crustal behavior as a direct result of plate tectonics (Vedder and Howell, 1980). According to their research, these geologic events include:

1) A change in plate movement from convergent to right lateral shear between North American and Pacific Plates, and which caused

2) A change in the topography of Southern California from a plain/shelf depositional landform to one of ridges and basins which is present today.

The Miocene Epoch was the central period for rock formation within the Santa Monica Mountains. The lower Miocene sedimentary deposits include the Vaqueros Formation comprised of marine and non-marine sandstone and mudstone. The Vaqueros Formation underlies the Topanga Formation including the Cold Creek, Fernwood and Saddle Peak Members. The Topanga Formation is a product of both marine and non-marine sediment accumulation/deposition. Intrusive and, subsequent to these processes, extrusive igneous activity occurred during the mid-Miocene within the Santa Monica Mountains. The intrusives were primarily black basalt, forming sills of diabase within the Topanga sandstone. The extensive intrusive/extrusive Conejo volcanic activity can be directly attributed to the movement of the North American and Pacific Basin Crustal Plates, in accordance with plate tectonic theories.

The plate tectonic impact on the landform development in the Santa Monica Mountains accelerated during the Miocene and younger epochs. Paleomagnetic data obtained through field investigations have documented a clockwise rotation in the Transverse Range Province by 120 degrees, with 75 to 90 degrees rotation occurring in the Santa Monica Mountains (Crouch, 1978).

The development of the California continental borderland was associated with a large strike-slip fault which enabled the northward migration of the continental margin. The movement was along a ridge-trench transform fault which trended in a northwestern direction. The formation of

the Conejo Volcanics within Santa Monica Mountains was associated with this occurrence. As the northern migration of the continental margin progressed, basin formation resulted from complex deformation.

The rifting of the area caused a collision to occur with the east/west trending trench which was in the vicinity of the now present Coastal Ranges. Resistance at the strike-slip fault and a right lateral shear stress between the Continental and Pacific Plates forced the present area of the Western Transverse Ranges to initiate a clockwise rotational movement. The rotation "... may have been enhanced by the displacement of Peninsular Ranges and inner borderland complexes due to mid Miocene extension in the southern basin range province" (Crouch 1978).

During the late Miocene, transgression of the ocean and land subsidence occurred simultaneously. Deep oceanic waters occupied a vast extent of the Ventura and Los Angeles vicinity. This occurrence represented some of the greatest encroachment of the sea in the area and some of the deepest basin development within the borderland complex (Vedder and Howell, 1980). During this period of time, 4,500 feet of marine diatomite, shale, sandstone, chert and basal conglomerate were deposited forming the Modelo Formation.

Thick accumulation of shales, sandstones and clays continued during the Pliocene Epoch. The Pico Formation, the representative Formation, occurs up to 1,000 feet in thickness. It was estimated by Vedder and Howell (1980) that the sea which was present in southern California was nearly 4,900 feet deep near Ventura and up to 8,200 feet deep in the southeastern Los Angeles area.

The Pliocene topography contained uplifted highland areas to the north and east. These higher locations were actively being eroded while submerged basins were being uplifted and deformed as sedimentation continued. Of particular interest was the structural deformation in the Santa Monica Mountains. During this epoch, the mountains were a chain of islands within this Pliocene sea (Vedder and Howell, 1980).

The primary influences upon the geomorphology of the Santa Monica Mountains during the Pleistocene and more recent geologic periods included crustal deformation, eustatic changes in sea level and erosional processes. Fluvial deposits including gravels and sands accumulated in the valleys near the coast. Both marine and non-marine depositional processes were active. Uplifting of the land (one inch per 1,000 years at Point Dume) is also apparent, as wave cut benches can be found along the Pacific Coast Highway. These marine terraces are active sites for mass wasting processes. Large landslides and slumps, combined with differential erosion of the present landforms, have produced one of the greater erosional regimes experienced on a global basis. Finally, the uplifting of the Santa Monica Mountains continues today as evidenced through the numerous earthquakes which are experienced throughout the region. These present occurrences are a direct result of compressional plate tectonics.

SOILS

The Santa Monica Mountains contain a broad spectrum of soils which reflect and are products of its complex geology and diverse topography. These soil types, due to their varied composition, structure and behavior, present an array of characteristics which include shallow depths, poor drainage, excessive runoff, severe erosion susceptibility, and fertility, alkalinity or salinity limitations. The Santa Monica Mountains are dominated by five major soil associations which include (Figure 13):

1. Calleguas-Arnold
2. Gaviota-Millsholm
3. Hambright-Gilroy
4. San Andreas-San Benito
5. Rock land-Rough broken land association

Calleguas-Arnold

Soils of the Calleguas-Arnold association occur in the Santa Monica Mountains on steep (30 to 50 percent) slopes between elevations of 50 and 2,500 feet. The Calleguas soils comprise approximately 50 percent of the association. They are characteristically infertile, well drained soils with moderate subsoil permeability. These shaly, clay loam soils are predominately calcareous and contain a high percentage by volume of shale fragments.

The somewhat more excessively drained, infertile Arnold soils have high subsoil permeability and approximate 35 percent of the association. Textures may be slightly to moderately acidic loamy sand with weakly consolidated sandstone substratum. The remaining 15 percent of this association is an equal mixture of the Castaic, Gaviota and Saugus soil types.

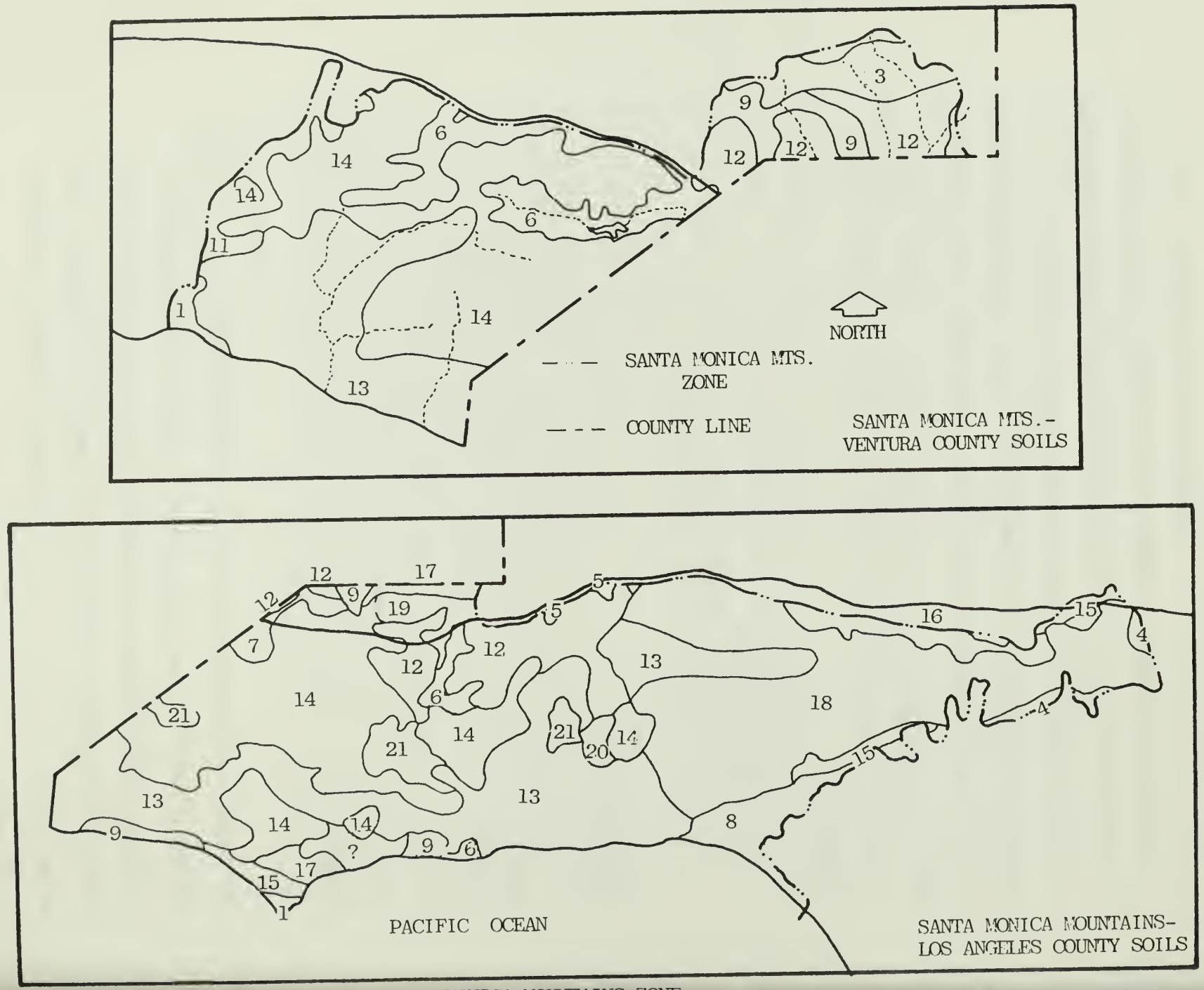


FIGURE 13: GENERAL SOILS MAP: SANTA MONICA MOUNTAINS ZONE

SANTA MONICA MOUNTAINS SOIL ASSOCIATION KEY

Soils of the Alluvial Fans, Plains and Terraces

GROUP I:

1. Riverwash, Sandy Alluvial Land, Coastal Beaches Association: 0-5 percent slopes
2. Tujunga, Soboba Association: 0-5 percent slopes
3. Sedimentary Rock Land, Gaviota Association: 15-75 percent slopes
4. Hanford Association: 2-5 percent slopes
5. Yolo Association
6. Mocho-Sorrento Association: 2-9 percent slopes
7. Cropley Association
8. Pleasanton-Ojai Association: 2-9 percent slopes
9. Perkins-Rincon Association: 0-15 percent slopes
10. Pico-Metz-Anacapa Association: 0-9 percent slopes
11. Camarillo-Hueneme-Pacheco Association: 0-2 percent slopes

Soils of the Uplands

GROUP II:

12. Calleguas-Arnold Association: 30-50 percent slopes (eroded)
13. Gaviota-Millsholm Association: 30-50 percent slopes
14. Hambright-Gilroy Association: 15-50 percent slopes (eroded)
15. Diablo-Altamont Association: 2-9 percent slopes
16. Altamont-Diablo Association: 9-50 percent slopes (eroded)
17. Altamont-Diablo Association: 30-50 percent slopes (eroded)
18. San Andreas-San Benito Association: 30-75 percent slopes (eroded)
19. Balcom-Castaic-Saugus Association: 15-30 percent slopes
20. Balcom-Castaic-Saugus Association: 30-50 percent slopes (eroded)

Miscellaneous Land Types

GROUP III:

21. Rock Land-Rough Broken Land Association

Gaviota-Millsholm Association

The Gaviota-Millsholm association occurs on steep to very steep slopes between elevations of 100 and 3,500 feet. These soils are well drained loams and clay loams that have a loam and clay subsoil and are underlain by shallow to deep sandstone and shale. Rock outcroppings cover between 2 to 10 percent of the surface of both the Gaviota and Millsholm soils, which make up about 50 and 40 percent of the association respectively. In addition, the association contains about 5 percent Rock Land and 5 percent dense loam soil with relatively impermeable clay subsoil resting on hard fractured shales.

Hambright-Gilroy Association

The Hambright-Gilroy association occurs on steep to very steep slopes of basic igneous rock. These moderately fertile soils are well drained clay loams which are shallow to moderately deep resting on decomposing and fractured basalt. The surface and subsurface horizons contain low to moderate percent gravel by volume. These soils are also charactrized by moderate fertility and rock outcroppings. Gilroy soils make up approximately 15 percent, Rock Land 10 percent, and Hambright soils 75 percent of the association with up to 10 percent composed of rock outcrops.

San Andreas-San Benito Association

The San Andreas-San Benito association occurs on steep slopes between elevations of 100 and 1,500 feet. The well drained San Andreas soils, which make up 50 percent of the association, have moderate subsoil permeability and are moderately fertile. They are is neutral to moderately acid fine sandy loam underlain by medium grained sandstone.

The highly fertile San Benito soils, which comprise 30 percent of the association, are well drained with moderately slow subsoil permeability. These soils are characterized by clay loam surface layers and moderately alkaline and calcareous clay loam subsoils with a calcareous sandy shale parent material.

Rock Land-Rough Broken Land Association

The Rock Land-Rough Broken Land association occurs on steep slopes small hills, and terraces. Rock Land which comprises approximately 75 percent of the association, is dominated by shallow soils and granitic, volcanic or sandstone outcrops covering from 50 to 90 percent of the area. Rough Broken Land, which makes up about 15 percent of the association, is characterized by areas of uplifted soft sediments cut by intermittent streams.

WATER

The natural resources of the Santa Monica Mountains are dependent upon freshwater contributions for ecosystem stability and maintenance. The only natural source of freshwater within the mountains is derived from rainfall events which occur between the months of November and May. Following sufficient precipitation inputs, the groundwater resources are recharged and surface flow develops.

The basis for analyzing the water resources for the Santa Monica Mountains is the hydrologic cycle. The cycle accounts for the water inputs and outputs of the system as well as storage coefficients. These components assist with the overall understanding of how the water system functions and are of significance toward formulating resource management policy toward maintaining ecosystem stability. The hydrologic budget for the Santa Monica Mountains can be equated as:

$$SMMHB = [R + I] - [R + S + E + T]$$

Where:

Inputs R = Rainfall

I = Imported Domestic Water Supplies

Outputs R = Surface Runoff

S = Seepage of Groundwater

E = Evaporation

T = Transpiration

SMMHB = Santa Monica Mountains Hydrologic Budget

Percipitation is the driving mechanism for the hydrologic cycle. Within the Santa Monica Mountains 18 to 26 inches of precipitation are normally input into the ecosystem each year. The variance in rainfall throughout the mountains is directly related to the distance from and the elevation above the Pacific Ocean.

The other contributor of fresh water into the Santa Monica hydrologic budget is water imported for domestic utilization. Eventually, these imported water supplies enter the hydrologic cycle as discharge in the form of sewage effluent and/or urban runoff. These additional water supplies have altered the water budget and changed the ecology of some drainage systems in the mountains. Of paramount concern is the transformation of intermittent streams into perennial streams, the increase of discharge rates, degradation of water quality, and an increase in flood frequencies.

The outputs of the hydrologic cycle which balance the water budget, offsetting the natural inputs, include surface runoff, evapotranspiration, seepage of groundwater supplies and groundwater recharge. Under natural conditions, an equilibrium develops whereby hydrologic inputs equalize the hydrologic outputs. However, in the case of the Santa Monica Mountains, this balance has been disequalized through water importation and the associated discharge of these water supplies into the natural system.

VEGETATION

The Santa Monica Mountains contain vegetation communities representative of Mediterranean-type Ecosystems (Figure 14). Variations in physical relief and climate from the coast area to the crestline of the mountains, have influenced the development of these communities. They have been classified as:

1. Coastal
    a. Coastal Salt Marsh
    b. Coastal Strand
2. Coastal Sage Scrub
3. Chaparral
    a. South Slope
    b. North Slope
4. Southern Oak Woodland
5. Valley Oak Savannah
6. Valley Grassland
    a. Annual
    b. Perennial
7. Riparian

1. COASTAL

The Coastal community occurs at the land/sea interface and it is directly influenced by salt water, freshwater or a combination of both.

a. Coastal Salt Marsh:

The coastal salt marsh vegetation occurs in areas influenced by oceanic salt water and by freshwater from inland sources.

VEGETATION COMMUNITY TYPE

1. COASTAL VEGETATION
   a. COASTAL SALT MARSH
   b. COASTAL STRAND
2. COASTAL SAGE SCRUB
3. CHAPARRAL
   a. SOUTH SLOPE CHAPARRAL
   b. NORTH SLOPE CHAPARRAL
4. SOUTHERN OAK WOODLAND
5. VALLEY OAK SAVANNAH
6. VALLEY GRASSLAND
7. RIPARIAN WOODLAND

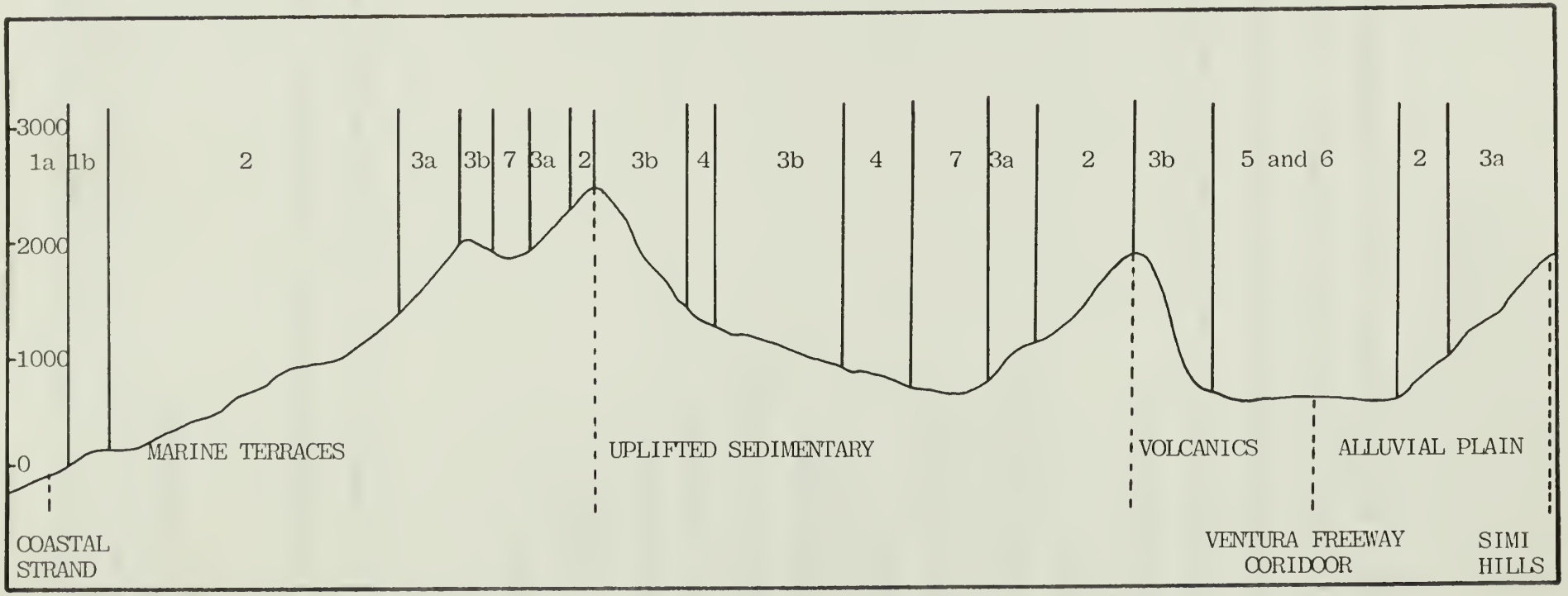


FIGURE 14: GEOGRAPHIC CROSS SECTION OF VEGETATION COMMUNITIES IN THE SANTA MONICA MOUNTAINS

1. COASTAL VEGETATION:

a. COASTAL SALT MARSH

Cuscuta salina	Dodder
Distichlis spicata	Salt Grass
Salicornia spp.	Pickleweed
Sueda californica	Sea Blite

b. COASTAL STRAND

Abronia maritima	Sand Verbena
Ambrosia chamissonis	Silver Beachweed
Atriplex spp.	Saltbush
Calystegia soldanella	Beach Morning Glory
Camissonia cheiranthifolia	Beach Primrose
Mesembryanthemum spp.	Ice Plant

2. COASTAL SAGE SCRUB:

Artemesia californica	Coast Sagebrush
Eriogonum fasciculatum	California Buckwheat
Salvia leucophylla	Purple Sage
Salvia mellifera	Black Sage
Rhus laurina	Laurel Sumac
Rhus integrifolia	Lemonade Berry

3. CHAPARRAL:

a. SOUTH SLOPE CHAPARRAL

Adenostoma fasciculatum	Chamise
Ceanothus crassifolius	Hoary Leaf Ceanothus
Ceanothus cuneatus	Buck Bush
Ceanothus megacarpus	Big Pod Ceanothus
Rhus laurina	Laurel Sumac
Salvia mellifera	Black Sage

b. NORTH SLOPE CHAPARRAL

Adenostoma fasciculatum	Chamise
Arctostaphylous glandulosa	Eastwood Manzanita
Ceanothus oliganthus	Hairy Ceanothus

3 b. NORTH SLOPE CHAPARRAL (CONT):

Ceanothus spinosus	Red Heart Ceanothus
Cercocarpus betuloidies	Mountain Mahogany
Heteromeles arbutifolia	Toyon
Quercus dumosa	Scrub Oak

4. SOUTHERN OAK WOODLAND:

Prunus ilicifolia	Hollyleaf Cherry
Quercus agrifolia	Coast Live Oak
Rhamnus californica	California Coffeeberry

5. VALLEY OAK SAVANNAH:

Quercus agrifolia	Coast Live Oak
Quercus lobata	Valley Oak
Stipa pulcha	Purple Needle Grass

6. VALLEY GRASSLAND:

a. ANNUAL

Bromus mollis	Soft Chess
Bromus diandrus	Ripgut
Erodium cicutarium	Filaree

b. PERENNIAL

Aristida spp.	Three-awn
Stipa spp.	Needle Grass

7. RIPARIAN WOODLAND:

Acer macrophyllum	Big-leaf Maple
Platanus racemosa	Western Sycamore
Quercus agrifolia	Coast Live Oak
Salix lasiolepsis	Arroyo Willow
Sambucus mexicana	Mexican Elderberry
Umbellularia californica	California Bay

This vegetation community prefers areas which lack intense wave action and have sediments available. The soil where coastal salt marsh species grow contains a high percentage of salt and has oxygen deficiencies. The plant species associated with this community can tolerate a high concentration of salt and are referred to as halophytes. Halophytes are low, perennial herbs which have fleshy stems and leaves. Most species have small, inconspicuous flowers and they may reproduce vegetatively. The plants are frequently rhizomatous and the predominant species include: salt grass (Distichlis spicata), pickleweed (Salicornia spp.), sea blite (Sueda californica) and dodder (Cuscuta salina).

High biotic productivity characterizes the coastal salt marsh community. The plant cover provides habitat for large numbers of resident and migratory birds and is a nursery area for fish. Only 8,500 acres (approximate) of coastal wetlands remain in southern California out of an original 26,000 acres which occurred from Santa Barbara to the Mexican Border. This represents a reduction in spatial extent of the coastal wetland community by 67 percent. The two largest salt marshes within the Santa Monica Mountains are Point Mugu, containing 1,400 acres of coastal wetlands, and Malibu Lagoon with 10 acres of salt marsh. Point Mugu, protected within Point Mugu Naval Base, has been altered by recent abnormal amounts of sedimentation. Malibu Lagoon has also been altered and reduced in size primarily from the placement of the Pacific Coast Highway bridge. The lagoon (Malibu) is under the jurisdiction of the

California Department of Parks and Recreation and it will be restored as a functioning wetland.

b. Coastal Strand:

The coastal strand vegetation community occurs on the sandy beaches and coastal sand dunes above the high tide zone and is best developed from Point Dume westward. The environmental conditions are extreme with frequent strong winds, salt spray, fog, intense solar radiation, and drought conditions (during the summer). The sand contains a high degree of salt, is infertile and unstable. The plants of this plant community are commonly succulent with prostrate, creeping stems. Dune stabilization occurs through the spreading of the plants by runners to form plant colonies (rhizomes). The coastal strand contains many species of rhizomatous plants including: sand verbena (Abronia maritima), silver beachweed (Ambrosia chamissonis), saltbush (Atriplex spp.), beach primrose (Camissonia chairanthifolia), ice plant (Mesembryanthemum spp.), and beach morning glory (Calystegia soldanella).

2. COASTAL SAGE SCRUB

Coastal sage scrub is another dominant vegetation community within the Santa Monica Mountains. This community is described as open, partially woody shrubs (Munz, 1978). Coastal sage scrub is refered to as "soft chaparral" due to the flexibility of the leaves and stems.

Coastal sage scrub communities dominate the lower south facing coastal slopes of the Santa Monica Mountains and the steep south

facing exposures in the interior valleys. These sites are usually too steep to maintain soil moisture during the late summer and early autumn. Plant species in this community occupy sandy soils and slopes with a high percentage of gravels. These soil conditions are low in fertility and subject to rapid erosion.

The coastal sage scrub plays an important role in the slope stabilization process. The plant species in this community are quick to invade disturbed soil sites. The plants produce numerous shallow roots, growing just below the soil surface. The roots have the ability to produce new shoots asexually and in effect assist with stabilizing the erosional tendencies of the southern exposed slopes. The plants also have the capability to reproduce from seeds, especially following wildfire disturbances.

The leaves of the coastal sage scrub are small and drought deciduous. During the hot, dry summer months, as a moisture conserving strategy, the larger leaves of the plants are dropped and the plant relies on the smaller leaves to continue photosynthetic processes. In addition, these smaller leaves expose less leaf surface thereby reducing the transpiration moisture losses of the plant during the summer months. This adaptive drought-deciduous characteristic is described as "seasonal dimorphism" and it is particularly apparent in the Salvia (sage) genus of the coastal sage scrub community (Westman, 1980).

There are three coastal sage scrub associations found in the Santa Monica Mountains (Thorn, 1976). The sea bluff succulent association

is located on the crests or precipitous faces of the ocean bluffs. The plants associated with this category are subjected to lower than average temperatures, fog and salt spray due to their proximity to the ocean. The shrubs and succulent herbs associated with the sea bluffs include: sea dahlia (Coreopsis gigantea), lemonade berry (Rhus integrifolia), live forever (Dudleya caesprtosum) and seacliff buckwheat (Eriogonum parvifolium).

The second coastal sage scrub association is maritime sage scrub. The plants within this group are located on the slopes and hilltops along the coast. The more frequent plant species include: coast sagebrush (Artemesia californica), laurel sumac (Rhus laurina), lemonade berry (Rhus integrifolia), purple sage (Salvia leucophylla) and ashyleaf buckwheat (Eriogonum cinereum).

Inland sage scrub is the third association found in the Santa Monica Mountains. The environmental conditions favored by the plant species associated with this group include the hotter and drier sites. These climatic conditions occur at the higher elevations in the Santa Monica Mountains and away from the coast. The species associated with this category are often located below the chaparral community on actively eroding and unstable slopes. Representative species include: coast sagebrush (Artemesia californica), California buckwheat (Eriogonum fasciculatum), golden yarrow (Eriophyllum confertifolium), purple sage (Salvia leucophylla), and laurel sumac (Rhus laurina).

3. CHAPARRAL

Chaparral, the most extensive vegetation community in the Santa

Monica Mountains, is composed of dense evergreen shrubs in a single-layer canopy. There is little understory vegetation. The plants are dormant during the late summer/early autumn. The dominant species in chaparral include: chamise (Adenostoma fasiculatum, buck brush (Ceanothus spp.), and scrub oak (Auercus dumosa).

Chaparral is characterized by its broad-leaved sclerophytic plants. The leaves are small, thick, leathery, waxy and/or fuzzy which function to retard transpiration losses of plant moisture.

Chaparral occurs on steep, rocky slopes which have poor, thin soils and are low in essential nutrients. Nutrient recycling by fungi and bacteria is a slow process in the chaparral community due to low soil moisture. The older chaparral communities, especially those over 20 years, contain a high percentage of dead material because of the low rate of decomposition.

Due to environmental conditions, chaparral has evolved unique physiological mechanisms and morphological adaptations. These environmental conditions include intense fires, heavy spring rains, dry summers and allopathic substances exuded by some plants to retard the establishment of other plant species. These environmental conditions encouraged development of plant species with:

1. Extensive root structures
2. Tuber or seed reproductive processes
3. Moisture conserving leaf coverings
4. Seasonal leaf size variability
5. An ability to utilize free nitrogen from the atmosphere

Fire is the major decomposing agent of chaparral. The frequency of fire in chaparral is once every 10 to 40 years. Plant communities

which evolve in an environment of frequent fire, such as chaparral, develop characteristics which make the species inherently more flammable (Mutch, 1970). Chaparral communities exhibit conditions which include a high content of volatile oils in plant tissues, large percentage of dead biomass and the dependency on fire for nutrient cycling (Debano and Conrad, 1977). The structural arrangement of biomass in the chaparral community creates a continuity of vegetation fuels which promotes the horizontal spread of fire (Philpot, 1978).

Following a fire, some plant species in the chaparral resprout from lignotubers or root burls. Other species produce seeds at an early age which are viable for many years and sprout only after a fire occurs. During the first growing season, subsequent to a fire, herbaceous growth dominates. The chaparral community experiences a temporary increase in species diversity, sprouting from seeds and bulbs during this period of time. Eventually, chaparral replaces itself (autosuccession) in 10 to 15 years after a fire.

There are two community types within the chaparral, the south slope chaparral and the north slope chaparral. The occurrence and frequency of these associations are directly related to the slope aspect (southerly or northerly exposures).

a. The south slope chaparral includes mixtures of ceanothus chaparral, chamise chaparral and some disjunct populations of red shanks chaparral. Ceanothus chaparral is dominated by bigpod ceanothus (Ceanothus megacarpus). This species consti-

tutes over 50 percent of the vegetation cover on many slopes in the Santa Monica Mountains. The bigpod ceanothus prefers undisturbed, dry sites and reproduces by seed following a fire. Chamise chaparral also occupies dry sites, on the south facing slopes away from the coast. Chamise (Adenostoma fasciculatum) and black sage (Salvia mellifera) are the primary plant species within this group. However, the disjunct red shanks chaparral grows on both south and north facing slopes within the mountains.

b. The north slope mixed chaparral commonly grows on moist, northerly facing slopes in the Santa Monica Mountains. This association is also referred to as mixed chaparral, with scrub oak (Quercus dumosa) one of the dominant species. North slope mixed chaparral also contains a wide variety of woody vines and large shrubs, including greenbark ceanothus (Ceanothus spinosus), mountain mahogany (Cercocarpus betuloides), toyon (Heteromeles arbutifolia), hollyleaf redberry (Rhamnus ilicifolia), sugarbush (Rhus ovata), poison oak (Toxicodendron diversilobum) and manzanita (Arctostaphylos spp.).

4. SOUTHERN OAK WOODLAND

The southern oak woodland occurs as islands within the chaparral, preferring areas with deep, moist soil, usually in the canyon bottoms and on the north facing slopes of the mountains. Moisture is held within the leaf litter which decays to form a rich topsoil. Species common to this community include the coast live oak (Quercus agrifola), toyon (Heteromeles arbutifolia), giant wildrye (Elymus

condensatus) and poison oak (Toxicodendron diversilobum).

Coast live oaks (Quercus agrifolia) provide shade for the grasses and widely spaced shrubs of the understory. Coast live oaks resprout freely from the tree's trunk and branches as they have thick bark which protects them from fire. However, intense fire associated with the fuel loading within the neighboring chaparral can kill coast live oaks.

5. VALLEY OAK SAVANNA

Valley oak savannas forms open, grassy communities with widely separated, deciduous valley oak trees (Quercus lobata). Valley oaks prefer flat alluvial valley bottoms associated with grassland species. Formerly, these grassland species consisted of native perennial bunchgrasses (Stipa spp.) interspersed with native annual grasses. Present grasslands consist mainly of introduced Mediterranean annuals which have out-competed and replaced the native grasses. Some of these annual Mediterranean grassland species are soft chess (Bromus mollis), rip gut (Bromus diandrus) and filaree (Erodium botrys).

Valley oaks are adapted to low soil moisture. They have tap roots which extend 30 to 60 feet in depth and are capable of intercepting ground water during the dry season (Rundel, 1979).

Valley oak savannas provide important wildlife habitat including nesting sites for hawks and owls, hollows for smaller mammals, escape and thermal cover for mammals, and browse for deer. At least 37 species (22 percent) of California's terrestrial mammals

are known to utilize acorns as a food source and the valley oak is considered to be the most important oak species for mammals in California (Barrett, 1979).

6. VALLEY GRASSLAND

a. Annual:

Consists largely of introduced Mediterranean annuals which out-competed and largely replaced the native perennial grassland. Mediterranean grassland species have evolved through 8,000 years of man's activities (grazing, cultivation, roads). During the spring many colorful native wildflowers bloom and during the summer the annual grasses die, turning brown.

b. Perennial:

Perennial bunch grasses were the original grassland cover type before they were replaced by cultivation, grazing and urban development. The perennial grassland supports abundant wildflowers during the spring and they maintain their green appearance throughout the summer drought. The exact species composition is unknown. A good assemblage of native bunch grasses can be found in La Jolla Valley Grassland Preserve in Point Mugu State Park.

7. RIPARIAN

The greatest species diversity of all the plant communities within the Santa Monica Mountains occurs in riparian communities. Both flora and fauna abound due to the availability of perennial water and the high content of soil nutrients. The plants associated with this community have leaves which are soft and flexible. Ri-

parian species are predominately deciduous and contain abundant leaf litter. The community structure and species diversity creates essential wildlife habitat.

Riparian communities are fragile and their range has been vastly reduced. It is estimated that less than 10 percent of the original 200,000 acres of riparian communities remain in California (California Riparian Ecosystem Conference, 1981). Many riparian communities have been modified for flood control purposes or agriculture. In the Santa Monica Mountains, riparian communities are also threatened by the impacts of urbanization. The impacts associated with these developments include:

1. Removal of riparian communities for housing development
2. Alteration of water quality and quantity within the riparian area
3. Introduction of exotic grasses for soil stabilization
4. Reduction of ground water supplies to the moisture dependent riparian vegetation

There are two distinct types of riparian communities in the Santa Monica Mountains: 1) the woodland riparian, and 2) the willow riparian. The woodland riparian community has a definite "forest type" structure with an overstory consisting primarily of trees such as sycamore (Platanus racemosa), coast live oak (Quercus agrifolia), California bay laurel (Umbellaria californica), and big leaf maple (Acer macrophyllum).

Understory development in the woodland riparian community is extensive due to increased shading produced by the canopy. The subcanopy (understory) is comprised of shrub species, herbs, ferns

and mosses.

The moist streambanks of the riparian woodland are often covered with ferns, flowers and herbs which survive the hot, dry summers in the cool shade of the tree canopy and availability of perennial water. Typical plants include maidenhair ferns (Adiantum capillus-veneris), giant chain ferns (Woodwardia fimbrata) humbolt lillies (Lilum humboldtii var. ocellatum) and stream orchis (Epipactus gigantea).

Willow riparian communities occupy the alluvial areas of the larger canyons. These communities are comprised primarily of willows (Salix spp.), with occasional live oaks (Quercus agrifolia), cottonwoods (Populus fremontii) and sycamores (Platanus racemosa). Because the flat alluvial washes experience frequent flooding, species diversity is low and willows dominate.

ENDANGERED PLANTS

Four species exist in the Santa Monica Mountains that are proposed for federal listing and one species is listed as endangered. The endangered species occurs on the Point Mugu Naval Base. One of the candidate species has a population in Malibu Creek State Park.

- The endangered species Cordylanthus maritimus ssp. Maritimus, (Salt Marsh Bird's Beak) occurs on the Point Mugu Naval Base and exists there in a protected status.

- Two of the three known populations of the candidate species Pentachaeta lyonii (Lyon's Pentachaeta) occur on: 1) public lands, 2) Rocky Oaks, a unit of Santa Monica Mountains National Recreation

Area, and 3) Stunt Ranch, state property managed by the Santa Monica Mountains Conservancy.

- Two populations of the candidate species Hemizonia minthornii (Santa Susana Tarweed) are found just east of the units Castro Crest and Cheeseboro Canyon. The habitat where the known populations occur extends into federal lands and this species is to be expected there.

- Malibu Creek State Park contains populations of another candidate species, Dudleya cymosa ssp. Marcescans (Santa Monica Mountains Live-forevesr). There are two other known populations neither of which occur on public lands. This is a Santa Monica Mountains endemic.

- Eriogonum crocatum (Conejo Buckwheat), another candidate species and Santa Monica Mountains endemic, occurs at the west end of the range and only one of the populations are found within the Santa Monica Mountains zone.

SPECIAL PLANT COMMUNITIES

The Nature Conservancy initiated a project to identify critical habitats on a nationwide scale. The cooperative project between the Nature Conservancy, the California Department of Fish and Game, and the California Native Plant Society developed the California Natural Diversity Data Base for "Special Plant Communities of California" (Holstein, 1981). Those units identified (the first five listed are the most significant) within the mountains for special consideration in a resource management program include:

1. Mainland Giant Coreopsis Scrub: where Coreopsis gigantea is dominant or co-dominant.

2. Native Grassland: a remnant community dominated by native bunch grasses (usually Stipa spp.)
3. Rare Plant Enclaves: sites containing sensitive species (rare or endangered).
4. Southern Coastal Chaparral and Sage Scrub: border line case within the Santa Monica Mountains.
5. Southern Coastal Salt Marsh: dominated by Salicornia spp.
6. Disjunct Communities: those which are far disjunct from their main range such as Adenostoma sparsifolium.
7. Freshwater Marsh: emergent vegetation in shallow, standing freshwater, exclusive of artificial impoundments.
8. Southern California Walnut Communities: where Juglans californica is dominant or co-dominant but provides less than 50 percent absolute canopy cover.
9. Sycamore Woodlands: Platanus racemosa is the principal tree of these riparian communities.
10. Valley Oak Savanna: alluvial bottom lands where Quercus lobata is the sole dominant tree but provides less than 50 percent absolute canopy cover.

LOS ANGELES COUNTY SIGNIFICANT ECOLOGICAL AREAS (SEA)

Fourteen of the sixty-two SEA'S in Los Angeles County are found in the Santa Monica Mountains (England and Nelson, 1976). This type of designation does not exist for the Ventura County portion of the mountains, but five areas of special concern were identified during the initial planning process for the National Recreation Area.

LOS ANGELES SIGNIFICANT ECOLOGICAL AREAS IN THE SANTA MONICA MOUNTAINS

1. Malibu Coastline: This area represents essentially a native rocky and sandy shoreline as a remnant.

2. Point Dume: This area contains Coreopsis gigantea and Dudleya caespitosa at the southern limit of their range.

3. Zuma Canyon: The upper watershed contains Pentachaeta lyonii, a sensitive species, and an extensive riparian community.

4. Upper La Sierra Canyon: Diverse canyon flora including the endemic Dudleya cymosa var. marcesens and Cornus glabrata (restricted to this location in the Santa Monica Mountains).

5. Malibu Canyon and Lagoon: The riparian community has an unusual variety of tree species, including Populus tricocarpa and Fraxinus velutina var. coriacea. The only lagoon in Los Angeles County is found here and contains indicator species Salicornis spp.

6. Las Virgenes: A desert element is represented by Juniperus californicus and Haplopappus linearifolius. The southern limit of an interior coast range species is also found here, Calochortus venustus. Another of the Dudleya cymosa complex occurs here which is in need of study.

7. Hepatic Gulch: A small pocket with a high diversity of liverworts and hornworts along with a desert species of buckwheat (Eriogonum wrightii spp. membranaceum).

8. Malibu Creek State Park Buffer: The buffer fuctions as protection of the watershed in the most sensitive area in the state park.

9. Cold Creek: The area contains one of the most diverse botanical areas in the mountains includes native grasses (Stipa pulchra) and sensitive species such as Pentachaeta lyonii.

10. Tuna Canyon: The canyon contains pristine riparian vegetation.

11. Temescal-Rustic-Sullivan Canyons: Large contiguous watersheds are contained within the area.

12. Griffith Park: The park is a true island of native vegetation where the principals of island biogeography will be most apparent.

13. Encino Reservoir: The area contains some of the best undisturbed stands of chaparral, coastal sage scrub and riparian vegetation on the inland side of the Santa Monica Mountains.

VENTURA COUNTY, AREAS OF SPECIAL CONCERN

1. Mugu Lagoon: U. S. Navy Base, containing endangered Cordylanthus maritimus var. Maritimus.

2. La Jolla Valley: In Point Mugu State Park contains most substantial acreage of native grassland in the mountains.

3. Big Sycamore Canyon: In Point Mugu State Park containing sycamore woodland.

4. Deer Creek Canyon: Almost pure stands of coastal sage and pristine riparian area.

5. Boney Mountain: Highest point in the range rising abruptly from the Oxnard Plains, which was recently classified as a state wilderness area.

6. Palo Comado Canyon: One of the last examples of the classic California landscapes, a type of oak savanna.

WILDLIFE

Wildlife is an integral part of the diversity of natural resources within the Mediterranean-type Ecosystem of the Santa Monica Mountains. These wildlife populations are unique in respect to their existence in proximity to one of the most urbanized areas of the world. Some areas in the mountains and along the seashore have been severely impacted by urban development. In spite of this development, viable wildlife populations within the mountains are maintained through: 1) preservation of lands by state and local government and private groups; 2) difficult accessibility of some portions of the mountains; and 3) the high bioproductivity associated with a Mediterranean-type Ecosystem.

The Santa Monica Mountains support a very abundant and diverse wildlife network that is dependent upon the cyclic natural events inherent to the chaparral environment. The upper levels of the wildlife food chain are represented by several predatory species which utilize the entire spectrum of habitats within the mountains. These predatory species are currently being threatened due to the loss of suitable habitat.

Wildlife populations in the Santa Monica Mountains are becoming restricted to biogeographic islands, habitats surrounded by freeways and residential developments. Maintenance of normal wildlife populations within the carrying capacity of the ecosystem becomes more tenuous and complex within the constraints of expanding urban development. The quality of wildlife habitat is directly related to the diversity and characteristics of vegetation communities (Table 3). Vegetation provides areas of forage, protection, and locations for nesting and dwelling for wildlife.

TABLE 3: VEGETATION COVER AND WILDLIFE HABITAT

1. RIPARIAN

Occurs in the riparian woodlands vegetation community; high bioproductivity; year round moisture available which attracts wildlife species; a multilayered stratification of vegetation exists providing a broad spectrum of niches for fauna to inhabit (nesting, foraging and protection); canopy provides habitat for birds, small mammals and insects; sub-canopy furnishes forage for small birds and protective cover for larger mammals; the herbaceous ground cover provides forage opportunities for the entire spectrum of wildlife species (aquatic life forms, insects, reptiles, amphibians and mammals).

2. GRASSLAND

Occurs in the valley oak savanna vegetation community; high primary biological productivity; provides forage for herbivores; small mammals depend on grassland for primary habitat; availability of seeds (especially acorns) and herbaceous shoots attracts wildlife species; abundant small mammal populations (rabbits, ground squirrels, gophers, meadow voles) exist which furnish primary food source for raptors and mammals (bobcats, grey fox, coyotes, long-tailed weasels).

3. CHAPARRAL

Occurs in both the south slope chaparral and north slope mixed chaparral vegetation communites; provides cover for large mammals; produces seeds for birds and small mammals; serves as major component of mule deer diet; habitat potential directly related to age structure of the chaparral, old growth stands (exceeding 15 years), low in nutritional value for deer browse (due to the large percentage of dead biomass); conversely, young chaparral stands (less than 15 years) provide resprouting vegetation and new herbaceous growth producing excellent browse high in nutrition for a wide range of wildlife species; during winter rainy season the vegetation species "greenup," thus increasing nutritional qualities for deer and other species.

HERBIVORES

The species composition of herbivores in the Santa Monica Mountains ranges from large browsers (deer) to numerous species of rodents and two lagomorphs.

The largest in size are California mule deer (Odocoileus hemionus californicus). Chaparral vegetation provides the major component of the mule deer's diet. The deer population is directly dependent on the condition of the vegetation. The most important limiters for the mule deer population within the mountains include summer drought, predation, impact by man (i.e, road kills and hunting), disease and over utilization of range. Of all of these conditions, summer drought is the most important because it directly affects the nutritional qualities of the browse due to the desiccation of plant tissues.

Mule deer forage on new shoots of chamise (Adenostoma fasiculatum), buckbrush (Ceanothus spp.) and scrub oak (Quercus dumosa) during the spring when the vegetation is green and contains a high nutritional value. Towards the end of summer and into the autumn, as the vegetation dries out, mule deer feed more upon the fruits produced by woody vegetation species. These fruits include acorns from oak trees (Quercus spp.) and berries from toyon (Heteromeles arbutifolia). Mule deer also supplement their diets with fungi, mushrooms, and mistletoe when supplies are available (Biswell, 1959). During the winter, deer browse on herbaceous vegetation.

Rodents comprise the greatest species diversity and abundance of herbivores in the Santa Monica Mountains. Common species include

ground squirrel (Citellus beecheyi), eastern fox squirrel (Sciurus niger rufiventer), pocket gopher (Thomomys bottae), deer mouse (Peromyscus maniculatus), pacific kangaroo rat (Dipodomys agilis), pocket mouse (Perognathus californicus), and dusky-footed woodrat (Neotoma fuscipes).

Rodents gnaw on roots, bark, nuts and stems of plants. Their primary foods include fruits, berries, seeds, nuts and acorns. Frequently, rodents store their food sources underground, enabling oak trees to sprout from the acorns which were stored by the animals. The rodent population is an important strand in the food chain providing the predators (mountains lion, coyote, bobcat, fox, raptor, snake, and raccoon) with an important food source.

Lagomorphs are represented by two species: the desert cottontail (Sylvilagus bachmani cinerescens) and the bush rabbit (Sylvilagus bachmani cinerescens). Both species forage on grasses, clover, fruit and the bark of trees and shrubs. They live mostly in thick shrubby areas which provide shelter from predators. Rabbits are also frequent residents of meadows and grasslands utilizing hollows and burrows excavated by other mammals for shelter. In addition, they are an important food source for larger carnivores, raptors, and snakes.

PREDATORS

The primary predator mammal species inhabiting the Santa Monica Mountains include mountain lion (Felis concolor), bobcat (Lynx rufus), badger (Taxidea taxus), grey fox (Urocyon cinereoargenteus), ringtailed cat (Bassariscus astutus), coyote (Canis latrans), longtailed

weasel (Mustela frenata) and raccoon (Procyon lotor psora). Due to the reclusive, nocturnal habits of most predator species combined with insufficient wildlife data for the mountains, reliable population estimates are not available. However, sightings are frequent for most of the species which reside within the mountains. The least frequently observed species are the ring-tailed cat, the long-tailed weasel and the badger.

The presence of mountain lion in the Santa Monica Mountains is significant in relation to the urbanized Los Angeles area. Current population estimates range from 8 to 15 individuals based on local observations, area population estimation, and home range studies done by the California Deartment of Fish and Game. During 1981, nine mountain lion sightings were reported within the Santa Monica Mountains (Wildlife Observation System, National Park Service). Several sightings were within residential areas of the wildland/urban interface.

Intermediately sized predators (bobcat, coyote, striped skunk, raccoon, and grey fox) reside mostly in shallow burrows in brushy areas, natural crevices in rock outcroppings, and in small caves. Their diets consist mainly of rodents, rabbits, birds, and some species feed upon small and/or weak mule deer. They also eat berries, cactus fruits and tubers.

The species diversity and abundance of raptors (birds of prey) is reflective of the general high quality of wildlife habitat in the Santa Monica Mountains, despite the intrusion of urban development. The mountains, canyons, and valleys provide a wide range of nesting

and feeding opportunities. The cliff faces in the rock outcroppings, with deep holes worn in them by erosional processes, provide ideal nesting sites for golden eagles, prairie falcons, burrowing owls, and turkey vultures. The oak woodlands containing thick dense canopies are the preferred nesting sites of Cooper's hawks, red-shouldered hawks, white-tailed kites, kestrels, and various species of owls. The riparian canyon bottoms, lined with tall sycamore trees, provide excellent nesting sites for red-tailed hawks, red-shouldered hawks and owls. Many of the owls in the Santa Monica Mountains prefer burrows for nesting sites in exposed outcroppings of soft shale.

During 1981, the National Park Service initiated a raptor nesting site survey program in the Santa Monica Mountains. This survey incorporated historical nesting site data, data from local researchers and current observations of nesting site activity by National Park Service personnel. The survey identified thirteen different species of raptors actively nesting in the Santa Monica Mountains. The species observed included: red-tailed hawk (Buteo jamaicensis), red-shouldered hawk (Buteo lineatus), Cooper's hawk (Accipiler cooperii), prairie falcon (Falco mexicanus), American kestrel (Falco sparverilus), white-tailed kite (Elanus leuairus), barn owl (Tyto alba), horned owl (Bubo virginianus), screech owl (Otus asio), burrowing owl (Speotylo cunicularia), long-earned owl (Asio otus) and turkey vulture (Chathartes aura). In Cheeseboro Canyon, the nesting densities of red-tailed hawk exceeded those reported anywhere else in the United States, including the Birds of Prey Sanctuary in Idaho (Knight, 1981).

MIGRATORY BIRDS

The Santa Monica Mountains also provide resting and feeding areas for migratory birds along the Pacific Flyway (Appendix D). The coastal estuaries and other aquatic habitats of the Santa Monica Mountains are important nonurbanized areas along the Pacific Flyway between the Baja Peninsula and the Coast Range of California.

Over 262 species of birds have been recorded in the vicinity of Malibu Lagoon (Kiff, 1979). The lagoon is important as a wintering locality and migratory stopover for numerous avian migratory species, such as sandpipers, plovers, gulls, and terns. More than 50 species of birds are known or presumed to nest within the vicinity of the lagoon (Kiff, 1979).

AMPHIBIANS

Thirteen species of newts, salamanders, toads, and frogs reside within the Santa Monica Mountains (Appendix D). These amphibians are dependent upon aquatic habitats for survival. Amphibians respire through their skin as well as lungs and, therefore, must keep their skin moist in order to breathe. Amphibians lay their eggs, hatch, and spend their larval stages of development (as well as a good portion of their adult life) immersed in water. Due to these environmental requirements for maintenance of physiological processes, riparian and aquatic habitats are of critical importance to amphibians. The creation of artificial lakes in the Santa Monicas dramatically increased the habitats available to amphibians, although their natural habitats are streams, shady canyon bottoms, and ephemeral pools. Amphibians spend most of their

time under rotting logs, piles of decaying organic matter, under rocks, in animal burrows underground and other moist areas.

REPTILES

The reptilian fauna of the Santa Monica Mountains include seven species of lizards, seventeen species of snakes and one species of turtle (Appendix D). Reptiles have important physical advantages over amphibians which make them more adaptable to a wider variety of environments. Their skin is thick, scaly and covered by a tough fibrous protein containing sulfur (keratin). These keratinized skin covers prevent water loss and protect them from the harsh rays of the sun in the chaparral environment. Better developed lungs allow reptiles to efficiently respire when a moist environment is not present. More importantly, reptiles evolved an amniotic egg which allows them to lay their eggs outside of an aqueous medium. The evolutionary processes have enabled reptiles to survive in most habitats within the Santa Monica Mountains and, more significantly, in habitats without water.

Most reptiles in the Santa Monica Mountains prefer the cool moist climate of the riparian zones even though they have the ability to survive in drier locations. Reptilian thermoregulation is controlled by the ambient temperature of the surrounding environment. In the hot dry summer months, a cool moist environmment is required to keep their bodies from overheating. The western pond turtle (Clemmys marmorata) lives in streams, ponds and brackish waters with dense aquatic vegetation. The red-sided garter snake (Thamnophis girtalis) and the two-striped garter snake (Thamnophis couchi) are. like most garter snakes,

semiaquatic and live close to water. Unlike the amphibians, the reptiles become less active in the cooler wet season.

The most commonly observed reptiles within the Santa Monica Mountains are the lizards. They prefer dry sunny places and are frequently observed on rocks, fences, and branches. Lizards, which are highly adaptable, are found in all habitats within the mountains. Their diets consist primarily of insects, while they themselves are an integral part of many predator diets. The most unique lizard of the Santa Monica Mountains is the silvery legless lizard (Aniella pulchra), and it can be found burrowing in soft sand or leaf litter. Although it appears to be a snake, internal remnant limbs exist under its smooth silvery skin.

There are many species of snakes which reside within the Santa Monica Mountains. One of the most notable non-venomous snakes is the California mountain kingsnake (Lampropeltis zonata), which has black, orange and white bands alternating around its body. This snake is a relict species representative of fauna present during the Pleistocene glacial period, having survived in the cool moist environments of riparian zones. Another non-venomous snake within the mountains is the mountain kingsnake (Lampropeltis zonata pulchra). Its diet consists of lizards, other snakes, nesting birds and small mammals. Unfortunately, its coloration is often confused with the poisonous coral snake (not a resident of the Santa Monica Mountains) and it is unjustly killed. In addition, the coloration of the mountain kingsnake makes it a prize item for pet collectors. These pressures on the mountain kingsnake, as well as a diminishing habitat, have caused

it to be considered endangered by many herpetologists.

There are three species of poisonous snakes in the Santa Monica Mountains. The San Diego night snake (Hypsiglena torquata) and the lyre snake (Trimorphodon vandenburghi) have mildly toxic saliva but are not considered dangerous. The western rattlesnake (Cortalus viridus) is dangerously toxic but rarely fatal. Even though venomous snakes pose a threat to residents and visitors, they do play a vital role in the wildlife ecosystems of the Santa Monica Mountains in helping to control rodent populations.

COASTAL

The Santa Monica Mountains National Recreation Area includes 46 miles of coastline along the southern California coast. Included in the area's coastal zone are a variety of upland habitats, coastal bluffs, sand dunes, wetlands, open coast sandy and rocky beaches, a barrier beach at Mugu Lagoon that is unique in southern California, and the termini of numerous mountain drainages, most of which are intermittent. The nearshore habitats are diverse in structure, communities and species composition, and include several kinds of rock reefs, open coast and protected kelp communities, submarine canyons, and subtidal sand flats. In its Santa Monica Mountains study in the seventies, the former Bureau of Outdoor Recreation described a portion of the coast that has since been designated an Area of Special Biological Significance (ASBS) by the California State Water Quality Control Board:

> "The 27-mile stretch of coastline, from the mouth of Ramirez Creek at Paradise Cove to the westernmost boundary of Point Mugu Pacific Missile Test Range, contains a varied and extremely rich marine and littoral biota, submarine canyons off Point Dume and the mouth of Mugu Lagoon, undisturbed sandy beaches, kelp beds and rock shores. It is the most outstanding inshore marine area left between Santa Barbara and San Clemente."

A relatively undisturbed section of coast, the Santa Monica Mountains shoreline also receives some of the most intense recreational use in the United States. In 1980, visitation to the beaches reached 27.5 million. It is the most visited coastal unit in the National Park System.

The legislation establishing the National Recreation Area recognized the national significance of the coastline. Protection of coastal uplands and beaches was seen as one of the critical purposes of the park. The boundary line follows the mean high tide line from the western arm of Mugu Lagoon south to the Santa Monica Pier. Nearshore areas are included in this discussion because they are an important part of the entire recreational and ecological resource.

The coastal orientation of the Santa Monica Mountains as a range makes it truly representative of the Mediterranean biome. The climatic patterns and the relatively wide temperature fluctuations of the interior are tempered by oceanic influences. Cool westerly marine air masses and summer coastal fog move onshore up the slopes and the coastal canyons. They keep the air relatively humid, decrease summer temperatures and help to elevate the winter temperatures, while serving to minimize temperature flux. The amount of fog and moisture varies with aspect and elevation, thus leading to the formation of a variety of microclimates.

The vegetation communities along the Santa Monica Mountains coastal uplands reflect the variations in moisture and exposure. Major communities include: marine aquatic, rocky coastal, coastal salt marsh, coastal strand, southern coastal sage scrub, chaparral, riparian and freshwater aquatic communities.

The shore and nearshore areas of the coastal zone are relatively undisturbed and contain unique communities. The sand beaches, interspersed with rock outcroppings, vary widely in type and exposure. They trend in an east-west direction with some exposed to direct oceanic

influences while others are protected by kelp beds that dissipate wave energy.

The northwestern coastal area of the Santa Monica Mountains National Recreation Area reflects the influences of depositional alluvial processes. The coastal zone is on the outer periphery of the Oxnard Plain and contains Mugu Lagoon, the most viable wetland area remaining on the southern California coast. The lagoon contains a variety of habitats, including saltmarsh, tidal creeks and tidal flats. Unlike an estuary, most of the species found within Mugu Lagoon are stenohaline, or true marine, organisms. Their populations do not withstand freshwater inundations. Sedimentation and increased freshwater flows caused by upstream urbanization are posing a variety of threats to the lagoon habitat.

To the east of Point Mugu, the nearshore area rises abrupty from the ocean and does not contain rock reefs. The Malibu Bluffs form a portion of this coastal section. The bluffs are a complex area that contain siliceous shales which were formed in a deep oceanic environment. Within this section of coastline is situated Malibu Lagoon. Once an extensive wetland area, the lagoon has been impacted by upstream urbanization and reduced by fill for mosquito control. Restoration plans for a portion of the lagoon are currently being considered by the State of California.

Both Malibu and Mugu Lagoons are significant nesting and feeding areas for migratory birds following the Pacific Flyway (from Alaska to South America). The abundance of avifauna species utilizing this flyway are

documented annually by the Audubon Society during their Christmas counts. The number of species recorded during these counts are among the 10 highest in the nation. In addition, over 40 species of rare birds have been sighted between Mugu Lagoon and Malibu Lagoon. Finally, of the 801 species of birds listed for protection under the Migratory Bird Treaty Act of 1974, 348 species, or 43 percent, have been sighted in the Santa Monica Mountains and coastal zone (Garrett and Jones, 1981).

The nearshore marine biota exhibit habitat diversity and complexities influenced by the current patterns of the southern California Bight. The subtidal areas along the Santa Monica Mountains coast are considered to be among the most diverse in California. Rock reefs of varying origins, identical to those of the adjacent land masses, combined with interspersed bedrock and boulder fields, harbor large numbers of marine species. The species composition and abundance are distinct for each reef block.

Several ecological associations of significance are found on the rock reefs. Surf grass (Phyllospadix torreyi) communities occur at shallow depths in the ocean. Generally, this is an area of high surf, and the grass functions to dissipate wave energy and avert erosion. The grass is long-lived and reproduces very slowly. A number of different organisms are intimately associated with the surf grass community. The surf grass serves as a nesting site for small fishes and the puerulus larvae of the spiny lobster (Planulirus interruptus) utilize the grass as a nursery during the summer months.

The rock reefs also provide substrate for beds of giant kelp (Macrocystis pyrifera). The kelp plants function as oceanic forests, provid-

ing habitat for a wide variety of other algaes, invertebrates and fishes. Popular nearshore fishes incude the Garibaldi (Hypsypops rubicund), California's state fish, and sheepshead (Pimelometopon pulchrum). Sheepshead are considered to be important predators of the red sea urchin (Strongylocentrotus franciscanus).

Because of the biological richness and accessibility of the area, and relative absence of large sharks, it is also one of the most popular diving areas along the Pacific Coast.

Marine biota of the Santa Monica Mountains coast is abundant, reflecting habitat diversity, current complexities and land mass orientation that create zones of transition between northern and southern species and a mixing of water masses. When the Santa Ana winds develop, coastal upwelling occurs causing water to be pushed away from the shore and replaced by deeper, colder waters rich in nutrients. These nutrients attract fishes and the abundance of species reflect the availability of the food supply.

Despite proximity to one of the world's most populated urban centers, the coastal resources of the Santa Monica Mountains retain a large measure of their ecological integrity. In addition to the ecosystem dynamics previously discussed, other noteworthy coastal resource values include:

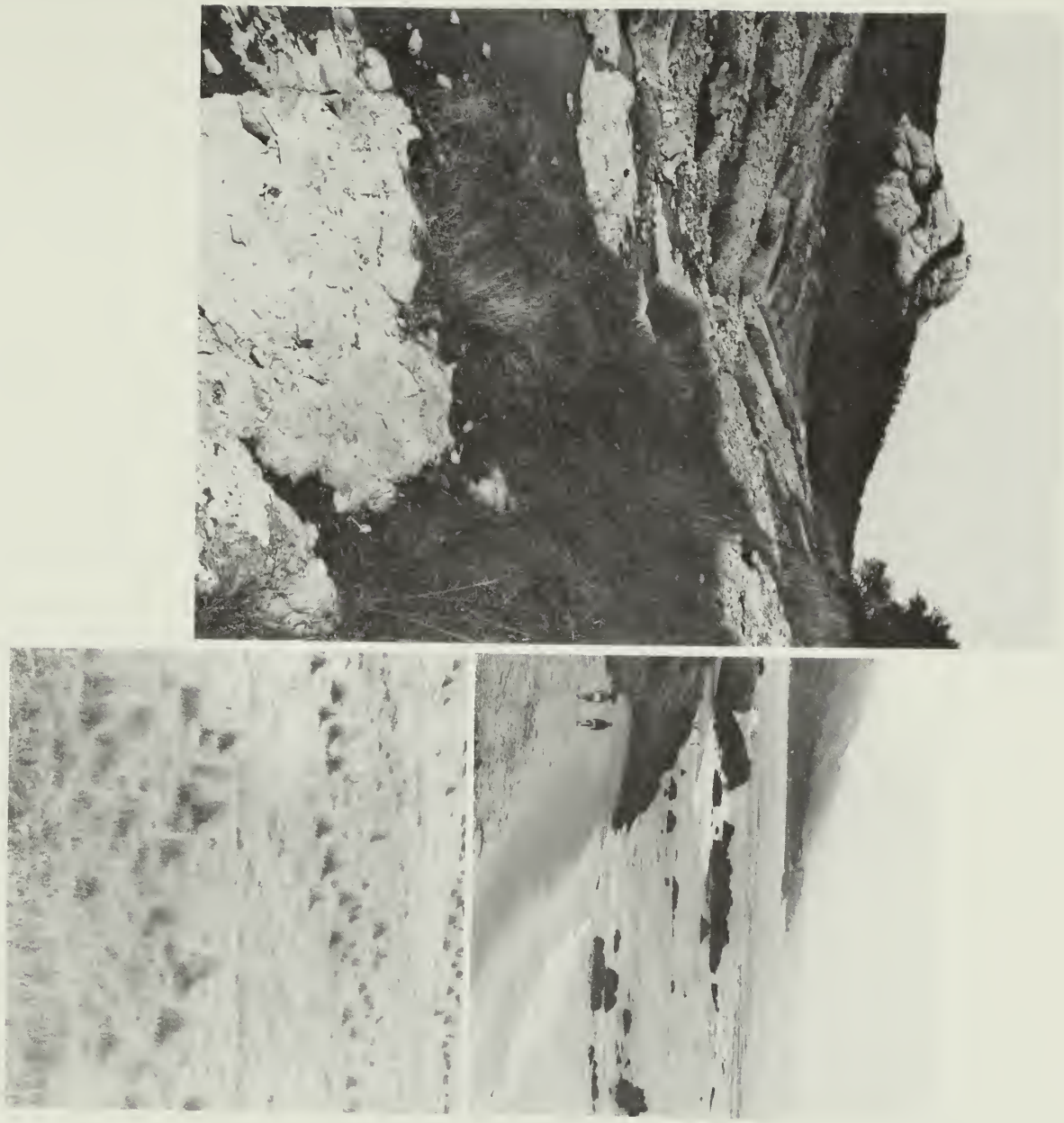
1. Grey whales (Eschrichticus robustus) migrate near the coastal area.

2. Mugu Lagoon supports a resident breeding population of harbor seals (Phoca vitulina).

3. Anadromous steelhead rainbow trout (Salmo gardnerii gardnerii) have been known to spawn in at least two, and possibly more, of the creeks flowing out of the Santa Monica Mountains into the Pacific Ocean.

4. Arroyo Sequit, located between Malibu and Mugu Lagoons, was utilized as a non-polluted comparison site to the 1969 Santa Barbara oil spill.

The coast of the Santa Monica Mountains presents the National Park Service and other involved jurisdictions with a paradox being one of the most popular recreational resources in the country with unique natural resources that still retain a large measure of their ecological integrity. On the average, each American spends ten days per year in some form of coastal recreation (Cables and Tanacredi, 1981). The opportunities to gain insight into the interactions of humans with the coast, and to take creative initiative toward solving resource problems is challenging.



Natural Resource Management Program

INTRODUCTION

The preservation and perpetuation of the natural resources in the Santa Monica Mountains depends on a definitive ecosystem management program. The Natural Resource Management Program specifies the course of action to be pursued by the National Park Service in order for this mission to be accomplished as mandated in Public Law 95-625 which established the National Recreation Area. There are two elements of this approach which must be addressed so that the scope of the resource management thrust can be identified and specific resource management programs applied. Five Year Natural Resource Programs discuss each major natural resource program (water, vegetation, wildlife, air, coastal and an integrated natural resource information system), identifies areas of resource concern, provides timelines for program execution and specifies personnel/budgetary requirements. Natural Resource Project Statements identify specific activities which are needed to solve resource problems or montitor resource conditions.



five-year program

Natural Resource Information System

The need for storing, updating, and accessing natural resources data in a timely fashion has become increasingly critical for park managers and their staffs. The current internal and external threats to the ecological integrity of each park unit requires comprehensive and accurate resource information in order to assess and mitigate these impacts. Natural Resource Information Systems (NRIS) can provide a mechanism for data storage, retrieval and statistical manipulation to generate appropriate products from which park management can best make decisions regarding resource preservation and perpetuation. This capability is of extreme significance in a complex, dynamically changing ecosystem such as that which exists within the Santa Monica Mountains.

Natural resource information systems are utilized to collate and organize data providing timely, cost effective and objective information for direct application to management programs. They are tools that supplement traditional means of securing information. The theory behind the NRIS enables numerous scenarios to be examined regarding the possible effects of alternative decisions before a final course of action is accepted. The NRIS allows for simultaneous statistical manipulation of several data bases which reduces the difficult task demanded of park staffs to assimilate such vast quantities of data while generating usable graphic or tabular data products in a relatively short time frame.

The ability to retrieve resource data and to develop products integrating several data bases is of paramount importance in taking management actions for the Santa Monica Mountains. The rate of urban encroachment upon the mountains and the destruction of prime wildlife habitat,

vegetative communities and deterioration of water quality and quantity has necessitated the need for comprehensive resource data/land use information in a timely manner. The NRIS for the Santa Monica Mountains would assist with the development of a greater environmental awareness of the diverse natural resources in the National Recreation Area while analyzing the ramifications of development actions upon these resources.

The NRIS to be developed for the Santa Monica Mountains will be an automated system (Figure 15). The system will utilize a minicomputer for the storage, retrieval and statistical manipulation of data. The minicomputer will generate theoretical and actual outputs of resource/land classification data and resource maps for resource management and planning functions. The organization of a NRIS of this caliber includes both input (resource data) and outputs (generated products) through the employment of a central processing unit (CPU). The products derived will be utilized for general purpose, data base management, retrieval of resource information, analysis of resource data and map generation of resource information.

The acquisition of natural resource data and base maps is of paramount importance for the development of an NRIS suitable for application to the Santa Monica Mountains National Recreation Area. This includes information pertaining to wildlife species, vegetation communities, water quality and quantity, recreation/visitation use, land classification, trails, access roads, jurisdiction, watersheds, climate and fire history.

The Natural Resource Information System for the Santa Monica Mountains will be a cooperative effort between the Santa Monica Mountains Nation-

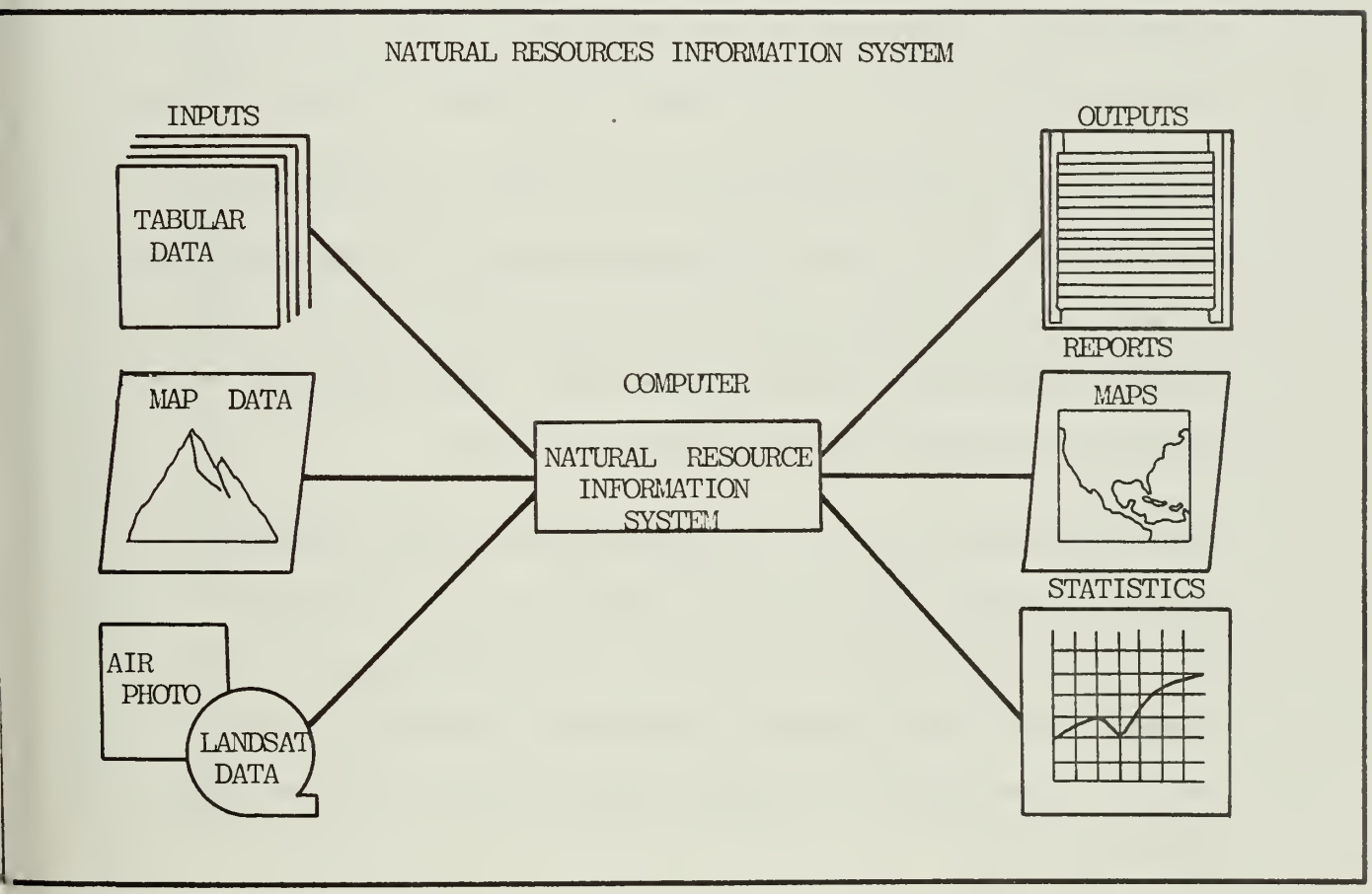


FIGURE 15: ORGANIZATION OF A TYPICAL AUTOMATED INFORMATION SYSTEM FOR NATURAL RESOURCES DATA (REMOTE SENSING AND DATA PROCESSING DIVISION, DENVER SERVICE CENTER, NATIONAL PARK SERVICE).

Recreation Area and the Remote Sensing and Science Sections, NPS, Denver Service Center (DSC). The park staff will provide the technical expertise for resource information and the development of the NRIS will be completed by the DSC. The Remote Sensing Section will be responsible for the aerial photo/remote sensing portions of the NRIS. This includes the generation of vegetation/land classification maps. The Science Section will be responsible for the digitizing of this resource information and initial entry of these data for automated computer storage.

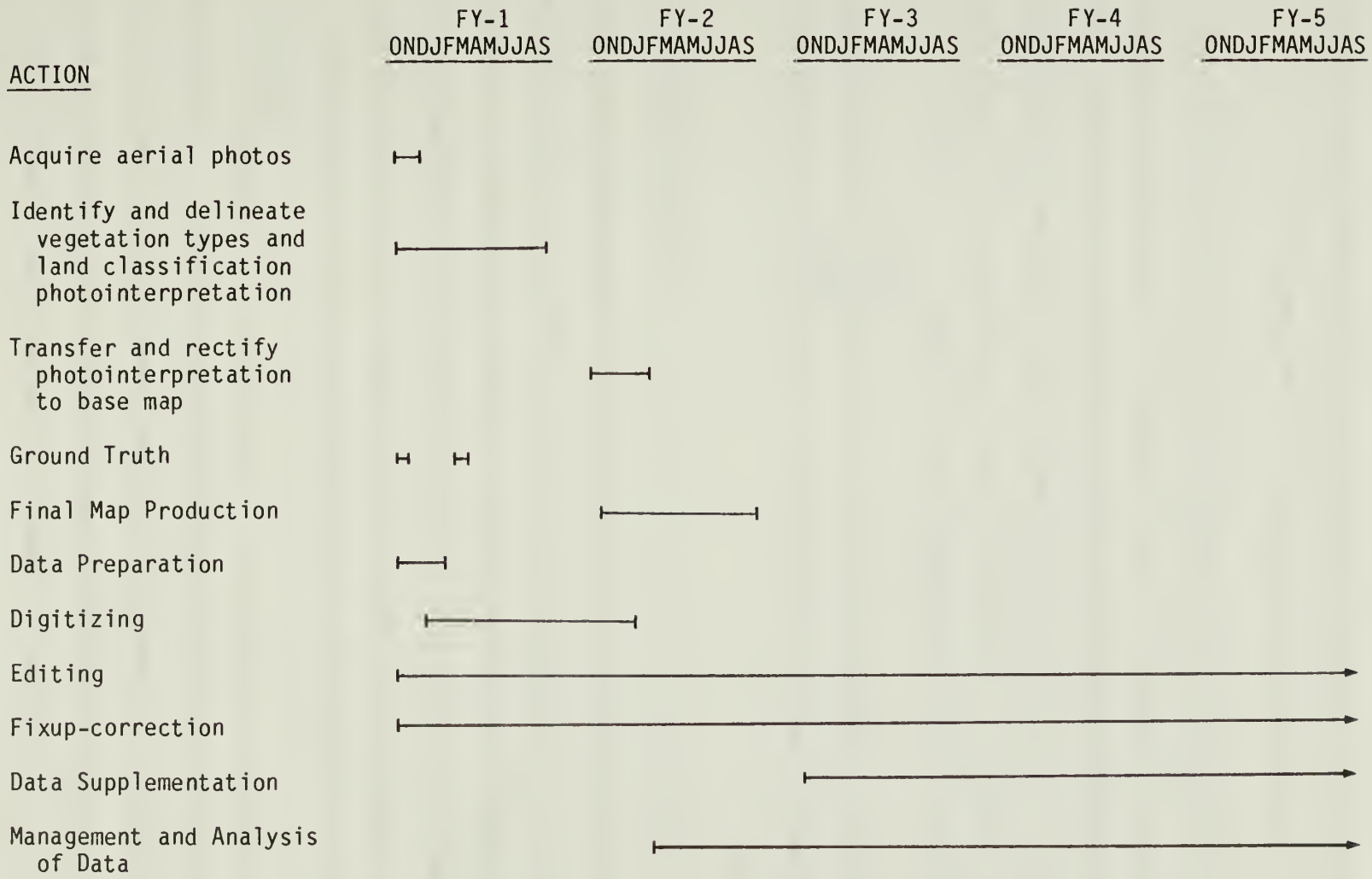
Color infrared aerial photographs for the initial photointerpretation procedure have been acquired. The photographs are of high resolution and will provide detailed resource information for accurate and comprehensive vegetation/land classification maps. These photographs were taken in April 1980 and are at a scale of 1:12,000.

The photointerpretation of the vegetation/land-use will commence during the first month of FY-1 funding (Table 4). The initial thrust will include the assemblage of existing aerial photographs, ground truthing study areas for pattern recognition, and interpretation of the aerial photographs. The photo interpretation will be completed by the end of FY-1.

Once the vegetation/land classification maps are generated, the transfer and rectification of these map products will be accomplished during the first four months of the second fiscal year of funding (FY-2). The result will be true-to-scale resource/land-use maps for the Santa Monica Mountains.

The automated data management aspect of the NRIS will also be implemented at the onset of this program. The first three months of the

TABLE 4: NATURAL RESOURCE INFORMATION SYSTEM PROGRAM TIME LINE



first fiscal year (FY-1) will involve resource data preparation. This includes the acquisition of data for data base establishment and map scale manipulation for data entry into the computer file.

Once this phase has been completed then the digitizing of resource/land-use information will begin for the NRIS (digitizing is primarily the process employed to convert vegetation/land-use information into digital formats which are then entered into local electronic storage). This procedure will start during the fourth month of FY-1 and continue through the first three months of FY-2 funding.

These two coordinated NRIS functions will produce a completely automated resource/land use data management program for the Santa Monica Mountains.

The remaining three fiscal years (FY-3, FY-4, and FY-5) of the five year project include accuracy assessment and system application. Data editing and fix-up/correction will be implemented during the first two years and continue throughout the remainder of the project. The remainder of the ongoing specified tasks include data supplementation and the management and analysis of data. These continuous activities will maintain the integrity, accuracy and completeness of the data files.

The personnel requirement for the development and implementation of the NRIS for the Santa Monica Mountains will be minimal. Since the DSC will develop the program all personnel commitments for the initial stages will be provided through their group and funded through project funding. The personnel commitment from the Santa Monica Mountains National Recreation Area will involve consultations with the DSC from the resource management staff. Eventually, once the system is developed

and operational, a technician will oversee the operation of the system. However, at this time the target date for this employee is unforseen and not programmed within the first five year program.

The overall five year budget for the program includes the following fiscal year expenditures. DSC funding (FY-1 and FY-2 for development stages) and yearly costs for updating and maintaining the NRIS once completed (FY-3, FY-4 and FY-5) are included.

BUDGET ESTIMATES

FY-1	$ 61,900
FY-2	41,900
FY-3	27,400
FY-4	30,000
FY-5	33,100

Water Resource Program

The Santa Monica Mountains contain diverse natural resources which are dependent upon fresh water contributions for ecosystem stability and maintenance. The surface and ground water resources are naturally derived from hydrologic inputs furnished through seasonal precipitation contributions. The rainfall occurs during the months of November through May when the mountains receive between 18 and 26 inches of precipitation.

Freshwater contributions derived from rainfall serve to recharge ground water resources and provide input toward surface flow. Most of the streams in the Santa Monica Mountains are intermittent, discharging surface waters only after sufficient rainfall contributions have occurred. A limited number of major streams (of which Malibu Creek is the most significant) are perennial and discharge surface waters directly

into the Pacific Ocean throughout the year.

The Santa Monica Mountains have become an attractive area for residential and commercial development. The primary impact has resulted in the removal of woodlands, destruction of wildlife corridors and habitat, and the alteration of the natural hydrologic regime.

The impact of residential and commercial development upon the water quality and quantity within the mountains is a primary concern. These developments require water supplies necessary for the daily life functions of the residents. The seasonality of rainfall inputs and the low amount of precipitation which occurs throughout the region has necessitated importation of municipal water supplies. The additional water brought into the region alters the hydrologic budget of the Santa Monica Mountains.

Most of the water utilized by mountain residents eventually enters into the hydrologic cycle. Urban runoff from streets and sewers and from the watering of lawns has increased stream discharges within the Santa Monica Mountains. These additional hydrological inputs have altered the hydrologic budget, causing some intermittent streams to become perennial. The discharge rates have also been increased, effecting historic discharge characteristics and increasing flood stages and the frequency of floods within the mountains.

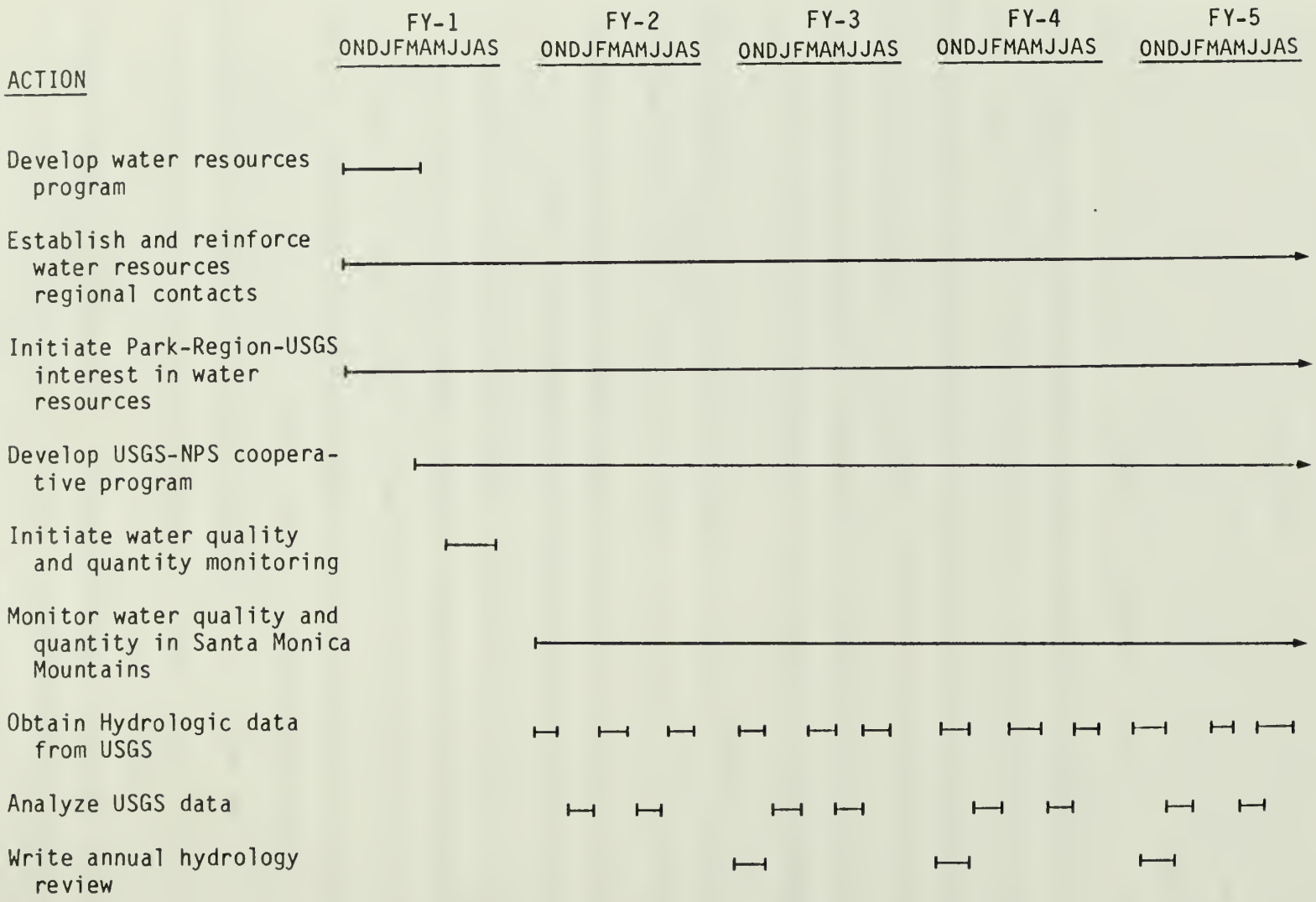
Urban runoff from the residential and commercial developments has also impacted the quality of waters flowing within the Santa Monica Mountains. The water flowing over the pavement and fertilized landscapes has increased the total load of organic, inorganic, trace metals, and pesticide constituents within the water column.

The United States Geological Survey (USGS) has completed water quality analyses from urban runoff for some watersheds in southern California. They determined that specific conductance and total residue concentrations, lead concentrations, pesticides, organics and inorganics all increased significantly within developed areas as a result of water interacting with man introduced elements. The same factors must exist in the residential and commercially developed areas in the Santa Monica Mountains and will have an adverse impact on the natural resources of the mountains. It is imperative that the National Park Service implement monitoring programs to assess the alterations to the water quantity and quality within the Santa Monica Mountains in order to formulate sound management decisions to preserve the natural setting of this area.

The National Park Service in cooperation with the United States Geological Survey will implement a comprehensive water resource monitoring program for the Santa Monica Mountains (Table 5). Presently, limited data have been collected by the USGS, Ventura County and Los Angeles County. An extensive hydrologic monitoring network will be developed to incorporate the watersheds currently being monitored (Calleguas Creek, Malibu Creek and Topanga Canyon) with other areas in the mountains that will provide sufficient data to enable a complete assessment of the water resources for the Santa Monica Mountains. The Santa Monica Water Resources Program will include two projects during the next five years: Water Resource Examinations and Water Quality Monitoring.

The Water Resource Examinations project will document the water quantity of the Santa Monica Mountains. The project will be a cooperative long-range ongoing program between the National Park Service and the USGS. The hydrologic parameters of stage and discharge will be monitored.

TABLE 5: WATER RESOURCE PROGAM TIME LINES



Contemporary hydrologic data will be acquired through the installation of water gauging stations at hydrologically significant locations and from those gauging stations currently operated by Los Angeles County, Ventura County, and USGS. This hydrologic network will provide representative data sets for each watershed unit as identified in the General Management Plan and provide data suitable for application to the overall resource management programs. Additionally, historic water resources data will be acquired. These data will be of paramount importance in formulating trend analyses and to serve as a reference for hydrologic events that occurred in the past within the Santa Monica Mountains. Data will be initially formatted in hard copy, and it is anticipated that automated computer formats will be applied in the future.

The Water Quality Monitoring Project will include analyses of organics, inorganics, trace metals, pesticides, pH, dissolved oxygen, and specific conductance. This project will also be in cooperation with the U. S. Geological Survey. The program will establish a water quality monitoring network throughout the Santa Monica Mountains inclusive of all watershed management units. Samples will be collected from ground water, perennial and intermittent streams, springs, impoundments, leaching and landfill sites. Both surface and ground water samples will be analyzed seasonally throughout the wet and dry seasons. The samples will be analyzed by the USGS Water Quality Laboratory.

The overall Santa Monica Mountains Water Resource Program (Water Quality and Water Quantity) will be initiated during the first fiscal year. The program will be strengthened by establishing and reinforcing water resource contacts with the National Park Service Regional Water

Resource Specialist, the U. S. Geological Survey, and other federal, state, and county personnel. The first year will focus on these activities and upon a definitive plan to specify program goals, objectives and requirements. Throughout the first fiscal year a cooperative relationship will be established with the U. S. Geological Survey. This cooperative relationship will be continuous throughout the five year program as specified in each of the project statements.

Prior to the onset of the rainy season (November), the USGS will begin to monitor both water quality and quantity within the Santa Monica Mountains and will insure that sample sites fulfill the requirements of the program. Shortly after the samples have been collected during either November or early December of the first year (FY-1), the National Park Service will acquire these data, verify their accuracy, and begin analyses of the hydrologic components of the Santa Monica Mountains. This review process will be initiated late in the first year (FY-1) and carry into the early quarter of the second year (FY-2).

During the second (FY-2), third (FY-3), fourth (FY-4), and fifth (FY-5) years, these ongoing water resource projects will follow similar routines. The cooperative efforts will continue. The USGS will collect the water samples for water quality analysis at least twice each year, and perhaps as frequently as once a month at some locations. Stream discharge values will be generated for daily intervals. At six to eight week intervals, the National Park Service will receive the field data collected by the USGS from the latest monitoring activities. The National Park Service will analyze these data for accuracy assessment and preliminary resource evaluation. Near the end of each fiscal year the NPS will publish an annual review of these hydrologic data

and formulate analyses in regard to the status of the water resources in the Santa Monica Mountains. In addition, these hydrologic data will be incorporated within the annual USGS Water Resource Data for California publication.

The personnel requirements for these two projects include one technician, with 173 work days each year on the Water Quality project and 87 work days on the Water Resource Examination project. The technician will assist with field operations, sample collection and analyses, data storage, and assist in the analytical interpretation of data.

The estimated funds needed for these projects are:

WATER QUANTITY

FY-1	$ 14,600
FY-2	16,100
FY-3	17,800
FY-4	19,600
FY-5	21,600

WATER QUALITY

FY-1	$ 27,700
FY-2	30,500
FY-3	33,600
FY-4	37,000
FY-5	40,700

Air Resource Program

The Los Angeles Basin has experienced serious air quality problems since 1940. The poor air quality can be attributed to the fact that 10.5 million people reside within the Basin without an alternative transportation system coupled with a climatic regime that produces frequent conditions favorable to the development of temperature inversions. At times, Los Angeles has the poorest air quality of any metropolitan

area within the United States. Ambient air quality standards for both national and state levels are frequently exceeded for the major pollutants. Mobile sources generate most of the pollutants within the air column. During 1979, over 88 percent of the non-reactive air pollutants were emitted by these mobile sources (South Coast Air Quality Management District, 1980).

The ambient air quality within the Santa Monica Mountains is superior to that which is experienced within the Los Angeles Basin, San Fernando Valley and/or the Oxnard plain. Offshore sea breezes, lack of significant development and the relative absence of major cross mountain transportation corridors can be directly attributed to the improved air quality experienced within the mountains. However, even though the air is of better quality compared with the surrounding vicinity, the mountains' air quality, has definitely been affected by the high levels of pollutants emitted within the region.

The degradation of air quality has impacted the natural resource values of the mountains and the recreation activities of park visitors. Frequent smog events obscure scenic vistas, thereby reducing the overall park experience. In the future, continued air quality degradation within the mountains could affect the recreators' health during severe smog seiges.

The natural resources of the Santa Monicas have also been impacted by the region's poor air quality. The Mediterranean-type vegetation community could experience growth suppression, dwarfing, stress similar to that of nitrogen deficiency and early maturation because of the degradation of the air quality within the mountains (National Park Service). In addition, wildlife could also be affected by air related

problems. This includes wildlife species which have been federally listed and formally proposed as threatened and endangered species (Appendix A). In addition, the aquatic wildlife could have additional stresses placed upon their environments as a direct result of acid deposition into streams and estuaries.

The natural resources projects for the Santa Monica Mountains air quality program will be primarily concerned with the establishment and maintenance of historic/contemporary data bases, suitable monitoring programs and data analyses. It is anticipated that both programs will be continuous, long-term projects. They will generate information essential for preserving air resources in the Santa Monica Mountains. The two natural resource projects for the Santa Monica Mountains air resource program include studies for Air Quality Monitoring and Acid Deposition.

Of paramount importance to the initiation and development of an effective air resource program is the establishment of cooperative relationships with both the National Park Service Western Regional Office, the State Air Resources Board (ARB), the South Coast Air Resource Board and the South Central Coast Air Resource Board. The establishment of good cooperative relations with these groups will be a primary goal and objective (Table 6). Likewise, cooperation will be sought for the Acid Deposition Program at state and federal levels.

In the process of establishing these cooperative efforts the National Park Service will acquire historic air quality data for the mountains. These data will be obtained within the first three months of the first fiscal year of funding (FY-1). Historic data will be acquired for non-reactive/reactive emissions, nitrogen oxides, sulphur oxides,

TABLE 6: AMBIENT AIR QUALITY AND ACID DEPOSITION PROGRAMS - SANTA MONICA MOUNTAINS NRA

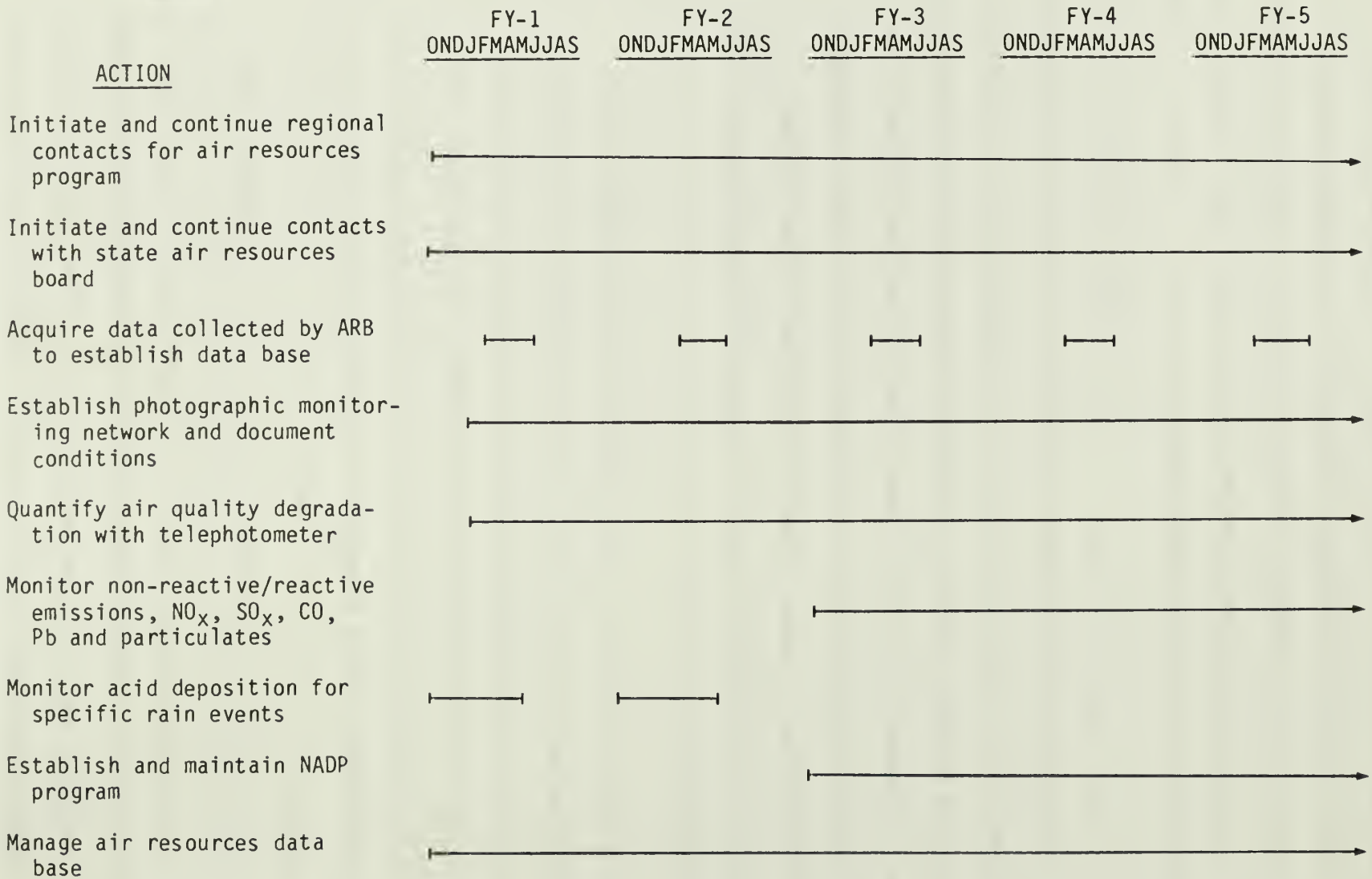


TABLE 6 (Con't.): AMBIENT AIR QUALITY AND ACID DEPOSITION PROGRAMS: SANTA MONICA MOUNTAINS NRA

ACTION	FY-1 ONDJFMAMJJAS	FY-2 ONDJFMAMJJAS	FY-3 ONDJFMAMJJAS	FY-4 ONDJFMAMJJAS	FY-5 ONDJFMAMJJAS
Analyze data collected for ambient and acid rain programs					
Write technical report and forward recommendations to superintendent regarding air quality of the Santa Monica Mountains					

particulates, carbon monoxide and lead. The acid deposition program will obtain data for both wet and dry deposition. Once the historic data bases have been acquired, both natural resource projects will continuously update and maintain these data on a continuous basis during FY-2, FY-3, FY-4 and FY-5.

During the early part of the first fiscal year (FY-1) for the Air Quality project, photographic monitoring sites will be established. These locations will be chosen for their ability to record the visual air quality experienced within the Santa Monica Mountains. Photographs will be taken on a regular and frequent basis during all years of project funding (FY-1 through FY-5). Quantitative data will be obtained from the surrounding basins for those dates the photographs were taken. Visual impacts of air pollution will then be correlated with specific pollutant levels.

During the first fiscal year (FY-1) of the air quality project, a telephotometer will be utilized to quantify light scatter associated with air pollution. Monitoring sites will be selected and the monitoring program will continue for the next five years (FY-1, FY-2, FY-3, FY-4, and FY-5).

Eventually, the level of sophistication of air emission monitoring within the Santa Monica Mountains by the National Park Service will increase substantially. Midway through the third year of funding, it is anticipated that through cooperative efforts between the National Park Service, the ARB and the Air Quality Boards, monitoring instruments will be installed to determine levels of non-reactive/reactive emissions, NO_x, SO_x, particulates, CO and Pb. This portion of the air quality project will then become a long-termed monitoring program

by the National Park Service. The monitoring and analysis of these data will continue through fiscal years four and five and beyond.

The acid deposition project is largely dependent upon the establishment of permanent National Atmospheric Deposition Program (NADP) monitoring devices in the Santa Monica Mountains. Attempts to acquire these instruments will begin during the first year of funding and it is anticipated that they will be installed by the third year of funding (if not earlier). Once these stations are established, data will be collected during the remaining fiscal years (FY-4 and FY-5). In the interim period, the National Park Service will identify the magnitude of acid rain deposition through the monitoring of specific rainfall events to determine acidic compositions of these storms. This procedure will occur between the months of November and May, which is the rainy season in southern California, during each of the five fiscal years. These tests will terminate once permanent monitoring stations have been established.

Air quality data will be analyzed to document pollutant levels. These data will be stored on hard copy for future reference and eventually automatic storage/retrieval of these data utilizing computer processing will be employed. It is anticipated that these data will also be furnished to the State Air Resources Board and the air quality districts for their information and application to the improvement of the air quality.

During the initial three months of FY-2, FY-3, FY-4 and FY-5, these data obtained by the two air resource projects will be published in National Park Service technical reports. The reports will include a data summary and reference maps. The technical reports will make

recommendations to park management regarding the air quality monitored within the Santa Monica Mountains, to formulate trend analyses of air quality degradation, and to assist in defining the best approach toward improving the overall air quality of the mountains.

The personnel required for these two projects includes the assistance of one technician. The time allotment for the technician includes 130 work days spent working with the Air Quality Monitoring Program and 130 work days employed by the Acid Deposition Program. The technician will be expected to maintain monitoring stations, collect data, and provide technical assistance with data interpretation, data base management and preparation of written reports.

The estimated funding for these projects is:

AIR QUALITY MONITORING

FY-1	$ 16,000
FY-2	13,200
FY-3	14,600
FY-4	16,000
FY-5	17,600

ACID DEPOSITION

FY-1	$ 28,500
FY-2	13,700
FY-3	15,100
FY-4	16,600
FY-5	18,300

Vegetation Resource Program

Vegetation management is a critical element in managing the ecosystem in the Santa Monica Mountains. Most ecosystem dynamics in the mountains are related directly to the condition and extent of the vegetation cover. Fire intensity is determined by the age of the chaparral

community. Watershed integrity is maintained by the stabilizing root systems of vegetation which inhibit erosion and direct runoff. Finally, wildlife is directly affected by the age of the vegetation community and the nutritional qualities it contains.

The Mediterranean-type ecosystem in the Santa Monica Mountains has produced unique vegetation types specifically adapted to surviving the characteristic environmental stresses. These adaptations predispose chaparral to vegetation management techniques to attain a variety of objectives. Vegetation management programs undertaken in the Santa Monica Mountains will fall into five general categories:

1. Endangered Species Management
2. Vegetation Rehabilitation/Watershed Stabilization
3. Exotic Species Control
4. Wildlife Habitat Improvement
5. Fire Fuels Management

Any of these vegetative management programs will benefit other facets of the resource management program. For example, fire fuels management programs will also function to improve wildlife habitat, and vegetation rehabilitation efforts will help stabilize watershed integrity in certain areas. Such integrated approaches for management programs are cost effective and will help attain a compatibility with the ecosystem dynamics of the Santa Monica Mountains for the benefit of residents, park visitors and natural processes.

The initial objectives of the vegetation management program will be to inventory, map, and catalog plant communties, rare, threatened, or endangered plant locations and critical habitat; develop fire history maps and fuel loading information; and identify sites in need of rehabilitation. Such information is critical in the formulation of

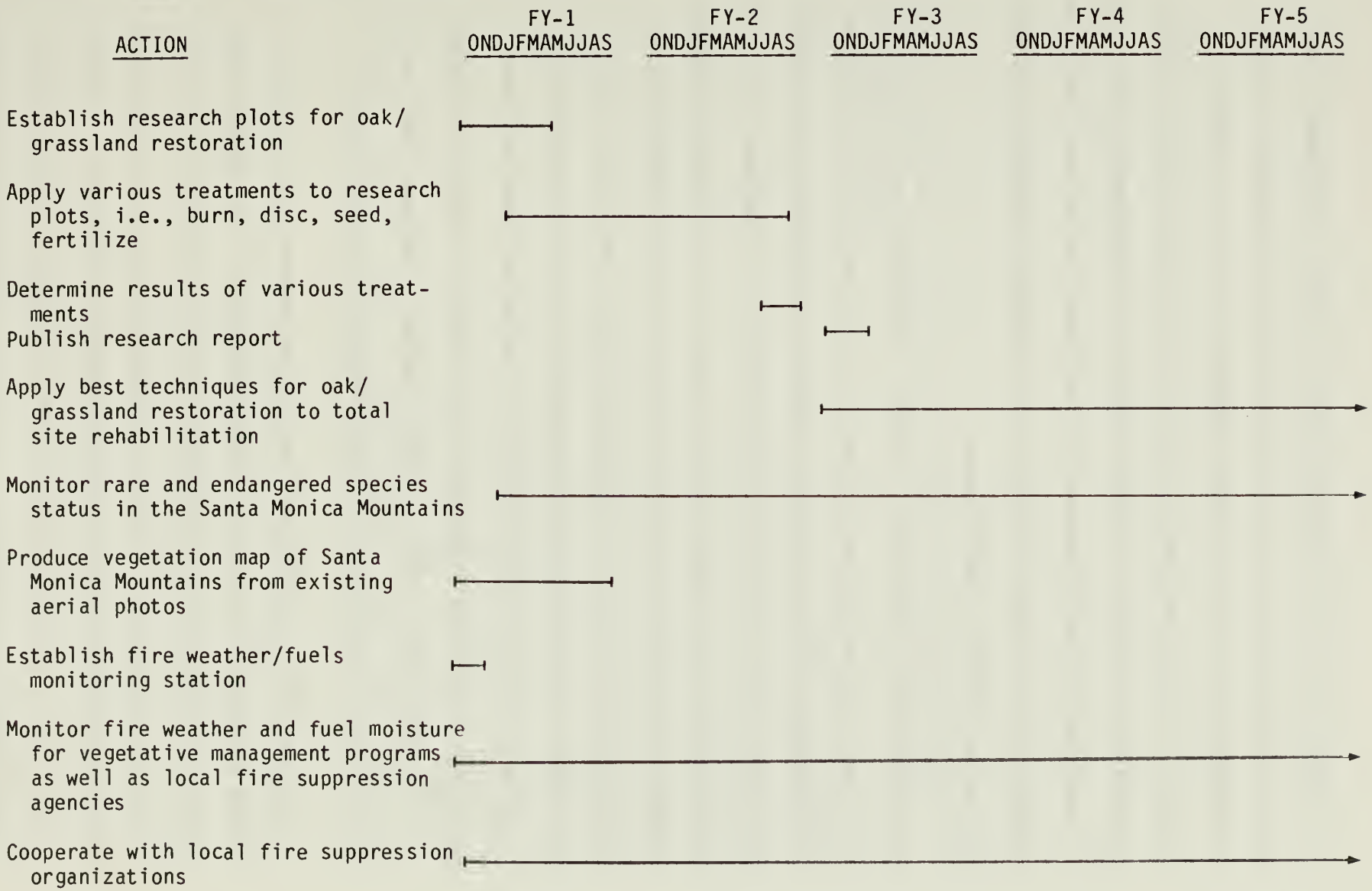
strategies for other management programs. For example, vegetation maps and inventories are the key toward identifying wildlife habitat; fuels and fire history information can provide the basis for fire suppression strategies.

Infrared aerial photographs (scale 1:12,000) taken of the Santa Monica Mountains during the spring of 1980 contain the base data. These photographs clearly depict plant communties and will be utilized to produce a vegetation map of the major plant associations. This map will be the basis for fuel management strategies and delineation of primary wildlife habitat.

Endangered, rare and threatened species, and attendant habitat data will be collected, recorded and mapped as part of the vegetation management programs. Sensitive species on National Park Service lands that are threatened by visitor use impacts will be protected. Efforts will be made to cultivate populations of endangered species for possible reintroduction on suitable sites. Projects will be undertaken to expand suitable habitat for endangered species through site treatments. All proposed projects will be studied by appropriate environmental review personnel to assure that these proposed projects do not impact endangered flora or critical habitat.

During the first fiscal year, lands owned by the National Park Service requiring habitat rehabilitation will be identified and restoration strategies and priorities will be prepared (Table 7). The initial thrust for the rehabilitation effort will be the valley oak (Quercus lobata) savanna restoration at Paramount Ranch. The valley oak and native grasslands have been designated as plant communities of special concern by the California Natural Diversity Data Base Survey. Because

TABLE 7: VEGETATIVE MANAGEMENT PROGRAM TIME LINE



of threats to its critical habitat from residential development, the valley oak has potential to be locally listed as a threatened species. If the valley oaks and associated grasslands are not protected, this "classic" Californian vegetative type, and productive biological community will soon disappear. Active research and management programs will be instituted to develop appropriate techniques for the continued maintenance of the valley oak savannah. The techniques developed will be applied to suitable sites elsewhere.

The National Park Service will initiate a cooperative research and experiment program with the California State University at Los Angeles to restore the valley oak savanna community on a portion of the ranch during the first fiscal year of funding (FY-1). In addition, the project will protect against further impacts to the existing oaks and provide interpretive information to the park visitor on the role of the National Park Service in preserving natural communities. The oak/savanna restoration project at Paramount Ranch will continue for a second fiscal year of funding (FY-2). During the remaining years (FY-3, FY-4 and FY-5) the National Park Service will continue restoration efforts at other critical sites situated on National Park Service lands based on priorities established during the previous years.

During the first fiscal year of funding and continuing as a long-ranged program (FY-2, FY-3, FY-4, FY-5 and beyond), the National Park Service will establish a fire-weather/fuels monitoring station in the Santa Monica Mountains. The data generated will enable fire managers to develop fire suppression and fuel management strategies. The techniques that will be utilized by the fire management project include: 1) monitoring of site specific fire weather and fuel moisture, 2) in-

tegration of weather stations in the Santa Monica Mountains into the National Fire Danger Rating System (NFDRS) and, 3) installation of a computer terminal to access the Administrative Forest Fire Information and Retrieval Management System (AFFIRMS). The system will integrate daily fire weather and fuel moisture information from the Santa Monica Mountains into computer simulations of site-specific fire behavior characteristics. This information will be furnished on a daily basis to all fire management agencies in the Santa Monica Mountains as a National Park Service contribution to existing fire prevention and suppression programs.

Studies will be undertaken to address the impacts of firebreak construction. For a number of years firebreaks have been maintained through bulldozing operations. In some cases firebreaks have not been strategically located to stop the spread of fire. In addition, firebreaks are constructed without adequate water control structures (water bars and culverts) to prevent erosion and the consequent sediment input into sensitive riparian habitats. Projects will be initiated to construct water control structures on fireroads and fuelbreaks to mitigate erosion. The firebreaks will be revegetated with native chaparral species to restore the disturbed vegetation community.

The personnel requirements for these two projects include three technicians for the fuels monitoring project and two technicians for the rehabilitation project. The time allotment for these technicians includes 260 work days per technician for the fuels project and 130 work days each for the two technicians working on the rehabilitation project. During the first fiscal year of funding and continuing as a long-ranged program (FY-2, FY-3, FY-4, FY-5 and beyond), the National Park

Service will establish a fire weather/fuels monitoring station in the Santa Monica Mountains. The data generated will enable fire managers to develop fire suppression and fuel management strategies. The tech- The technicians will be responsible for data collection and monitoring station maintenance, and will provide technical assistance to the professional staff.

The estimated funding needs are:

VEGETATIVE REHABILITATION

FY-1	$ 32,500
FY-2	21,400
FY-3	23,600
FY-4	26,000
FY-5	28,600

FUELS MANAGEMENT

FY-1	$ 30,000
FY-2	33,000
FY-3	36,300
FY-4	39,900
FY-5	43,900

Wildlife Resource Program

The faunal populations of the Santa Monica Mountains are as diverse as the landscape they inhabit. Despite the intrusion of urban development into some of the finest habitats in the Santa Monica Mountains, many species usually associated with more pristine environments still maintain populations within the wildland/urban interface. Many of the large predators, such as the mountain lion, various raptors, and a few other species could face localized extinction within several years due to destruction of habitat. Initial wildlife management programs will focus on identifying habitats critical to the survival of these species

for protection, as well as determining home range, population densities and species behavioral dynamics within the ecosystem.

One of the most important concepts for managing wildlife populations in the Santa Monica Mountains is the principle of maintaining open spaces between areas of urban development for purposes of wildlife movement. These "wildlife corridors" are essential for stabilization of wildlife population dynamics within the carrying capacity of a specific habitat for a specific species. Without natural corridors for movement, certain populations of wildlife will become isolated within principal feeding areas, resulting in over utilization of that habitat by a particular species. In a natural ecosystem, when the carrying capacity of a habitat is overextended by the number of individuals utilizing it, intra-specific competition will result in either emigration of individuals until the carrying capacity is reached, or population decline due to death by starvation, disease, or both.

The opposite of this situation is also true. When a wildlife population drops below the carrying capacity of the environment due to predation, disease or some other limiting factor, it becomes essential that other individuals of the species migrate into the area to breed with the existing population and replenish its numbers. Therefore, one of the primary tasks of the wildlife management program for the Santa Monica Mountains will be to identify essential wildlife habitats and corridors and make recommendations to local land management agencies and private landowners for protection of wildlife habitat to prevent localized extinction.

Managing wildlife in the Santa Monica Mountains presents some very complex problems, including land ownership patterns, destruction of

habitat, and conflicting attitudes about wildlife. These problems can begin to be resolved through a sound wildlife research and monitoring program. All wildlife management activity undertaken by the National Park Service will be in cooperation and consultation with the California Department of Fish and Game, California Department of Parks and Recreation and other state and local agencies involved in the Santa Monica Mountains.

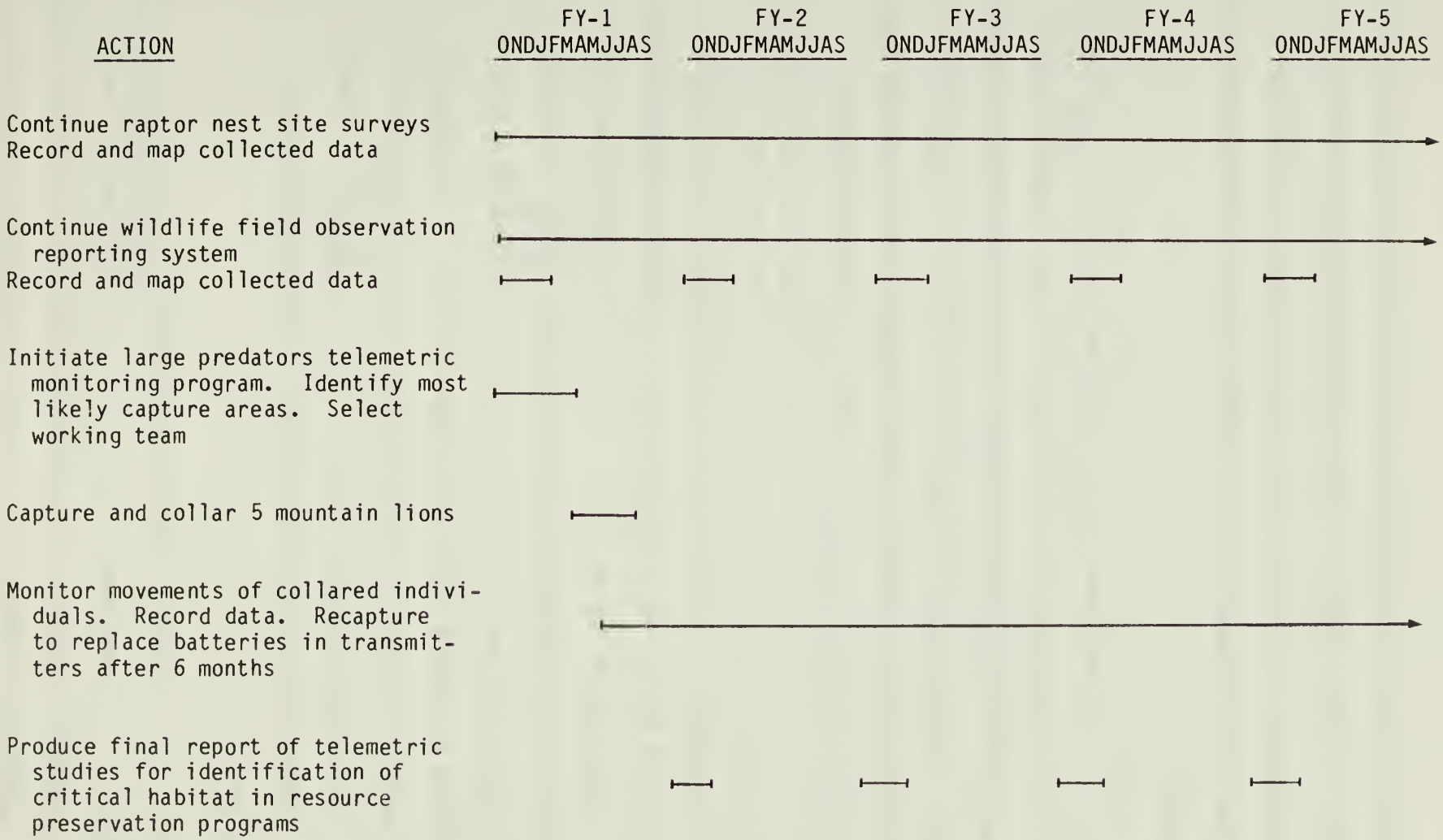
The initial activity of the wildlife program will be to obtain baseline data for wildlife species in the Santa Monica Mountains. For most species, existing data is insufficient for an effective wildlife management program. Greater data are required for species inventories, population estimations, primary habitat identification and to determine the behavioral dynamics of individual species within the ecosystem.

These data will be of paramount importance toward providing critical information and recommendations to other park programs, other agencies, and landwoners to insure the preservation of critical wildlife habitat.

During the first year of the wildlife management program (FY-1) baseline data on the wildlife of the Santa Monica Mountains will be obtained (Table 8). Literature will be searched to determine the extent of current research on the wildlife species that reside in the Santa Monica Mountains. Some data has been acquired but the activity needs to be greatly expanded. These efforts will be continuous throughout the five year wildlife management program and beyond (FY-1, FY-2, FY-3, FY-4, FY-5,....).

A manual system for recording and mapping wildlife observations has been established by the National Park Service to ascertain general habitat locations for individual species. These wildlife observations

TABLE 8: WILDLIFE MANAGEMENT PROGRAM TIME LINE



are obtained from staff personnel, individuals from other agencies, and members of the community. This observation program will be an ongoing project (FY-2, FY-3, FY-4, FY-5 and beyond), and the data collected will supplement future wildlife research in the Santa Monica Mountains.

Studies of large predators will be instituted during the first fiscal year (FY-1) to determine critical habitat for these important members of the wildlife community. The program will be long-ranged, transcending the five year program. Data will be sought on the population status of predators, their home ranges, primary hunting grounds, prey utilization, and denning areas within the Santa Monica Mountains.

Predatory birds (raptors) are an equally important component of the wildlife community. Nesting site surveys conducted by the National Park Service during 1981 determined that 14 species of raptors reside within the Santa Monica Mountains. These data are incomplete and reflect only those areas which were accessible by foot or vehicle. During the second year of funding (FY-2), a helicopter will be utilized to more accurately survey the extent of raptors in the mountains. This method of survey will provide greater range coverage with a minimal disturbance to nesting raptors. Aerial surveys will continue during the remaining three fiscal years of project funding (FY-3, FY-4, and FY-5).

Future wildlife management program considerations include the incorporation of fire management strategies into wildlife habitat enhancement programs. Research has demonstrated that fire can improve wildlife habitat by promoting young herbaceous vegetation that is very high in nutritional quality (Urness, 1979). Chaparral, in particular,

becomes very low in nutritional value for wildlife as it ages. Much of the biomass in an older stand of chaparral is dead material. Fire exclusion policies in the Santa Monica Mountains have created areas that are low in productivity potential for wildlife by excluding all fire from decadent chaparral communities. It is anticipated that proposed fuel management strategies for fire control would improve wildlife habitat in the Santa Monica Mountains.

The personnel required for these projects includes one technician, 260 work days for the Cliff Nesting Raptor Survey and two technicians, 260 man days each, for the Predator Study. These technicians will assist with field monitoring and data collection, and will provide assistance to the professional staff.

The estimated funding needs are:

CLIFF NESTING RAPTOR STUDY

FY-1	$ 25,000
FY-2	27,500
FY-3	30,300
FY-4	33,300
FY-5	36,600

PREDATOR STUDY

FY-1	$ 44,800
FY-2	25,100
FY-3	27,700
FY-4	30,500
FY-5	33,500

Coastal Resource Program

The National Park Service will initiate and conduct a comprehensive coastal ecosystem program for the Santa Monica Mountains National Recreation Area. Presently, only limited coastal resources data have

been collected by any of the agencies with jurisdiction in the mountains. An understanding of the relationships between coastal processes and biota and upland activities will be essential for an assessment of the impacts recreation and other human activities have on these resources.

The program will initially consist of three natural resource projects: the first, Coastal Resources Examinations, will involve a survey of existing information and research on Santa Monica Mountains coastal resources. Unique biota and ecological processes need to be identified and protection strategies, if necessary, implemented. Significant localities and species to be monitored for degradation, pollution effects, and population flux also must be identified. Because of the complexities of the resources and the number of agencies with jurisdiction in the Santa Monica Mountains coast, as well as the extensive cooperative nature of the National Recreation Area, a survey of how the resources are divided institutionally will also be necessary. An important component of this survey will be an examination of oil spill and hazardous waste contingency plans among the agencies and companies.

Research actions will include investigation into the relationship between surf grass and the larvae of the spiny lobster, and the impacts of recreation on this relationship, and the degree to which other larvae, particularly of economically important species of fishes, may be affected by pollutants, stream alterations or sedimentation.

The second project will be a series of studies on the population dynamics and habitat requirements of steelhead trout in the coastal streams of the Santa Monica Mountains. There will be a series of seasonal investigations to qualify and quantify trout spawning. Fish will be

tagged and stream returns monitored. Stream quality, rainfall and water flow will be correlated with critical life cycle points to evaluate system functions. Habitat recovery and population enhancement will be assessed and implemented if feasible.

The third project will consist of a cooperative avifauna dynamics and habitat study. A series of studies will be implemented cooperatively with the National Audubon Society, the U. S. Fish and Wildlife Service, the California Department of Fish and Game, and the Point Reyes Bird Observatory. Historic and contemporary data will be acquired and analyzed for population trends, habitat utilization, and establishment of a bird observation route and species list. A series of undisturbed sites will be compared with appropriate disturbed sites for avifaunal composition and changes.

The Coastal Resource Program will be initiated during the first year (FY-1) (Table 9). The primary focus will be to establish cooperative relationships that are essential to coastal ecosystem management, and to establish the informational foundations upon which each project will be developed. Resource goals, objectives and requirements will be more precisely defined during the first year. Historic data will be obtained and preliminary assessments of potential habitat enhancement projects, such as marsh and lagoon recovery, will be made. Monitoring sites for a long-term study will be chosen. Other agencies, including California Department of Fish and Game, U. S. Fish and Wildlife Service, and the Southern California Coastal Water Resources Project will be consulted during all phases. All data collection and studies will be coordinated with the National Park Service water resource programs to assess possible correlations.

TABLE 9: COASTAL RESOURCES EXAMINATIONS - FIVE YEAR TIME LINE

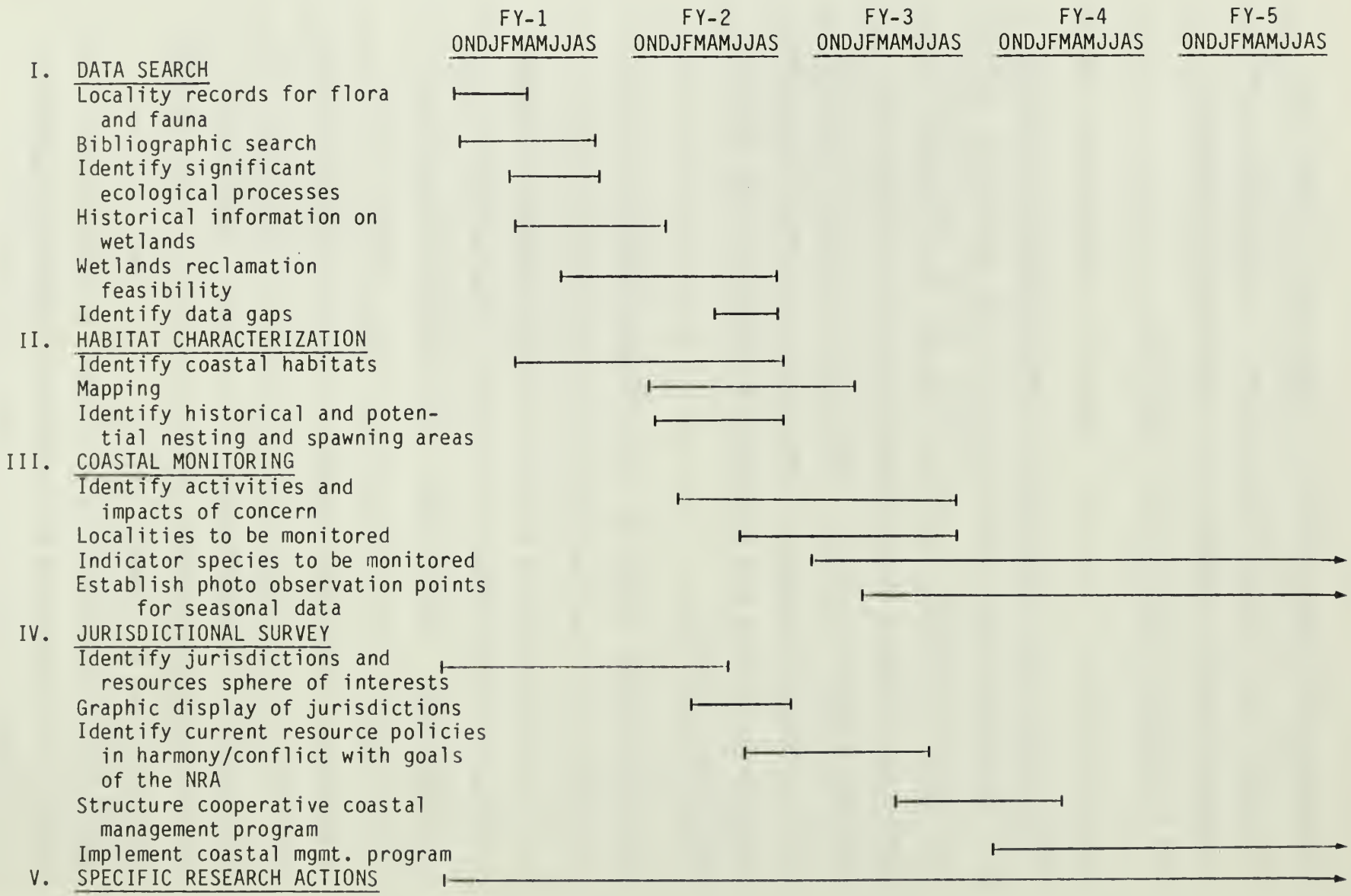


TABLE 9 (cont d): ANADROMOUS FISHERIES RESOURCES PROGRAM AND HABITAT ENHANCEMENT STUDIES - FIVE YEAR TIME LINE

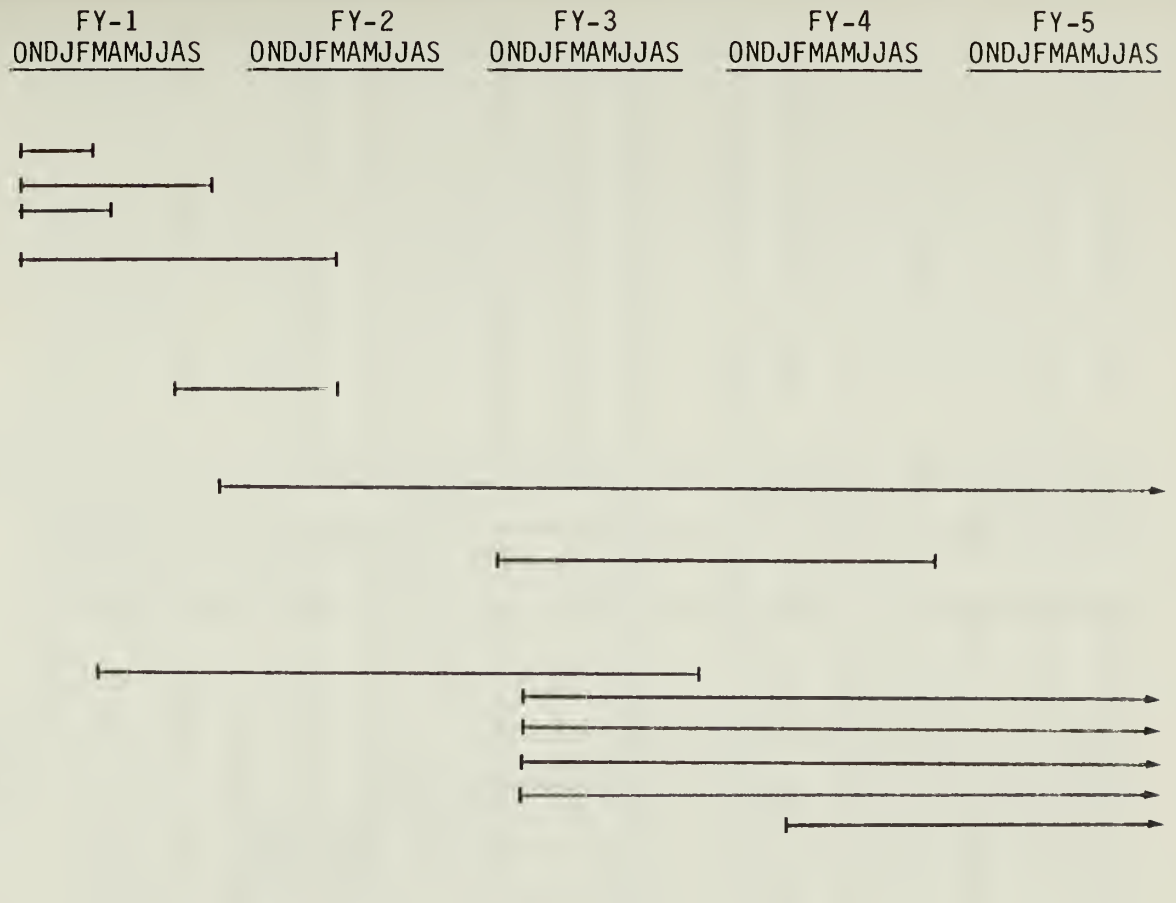
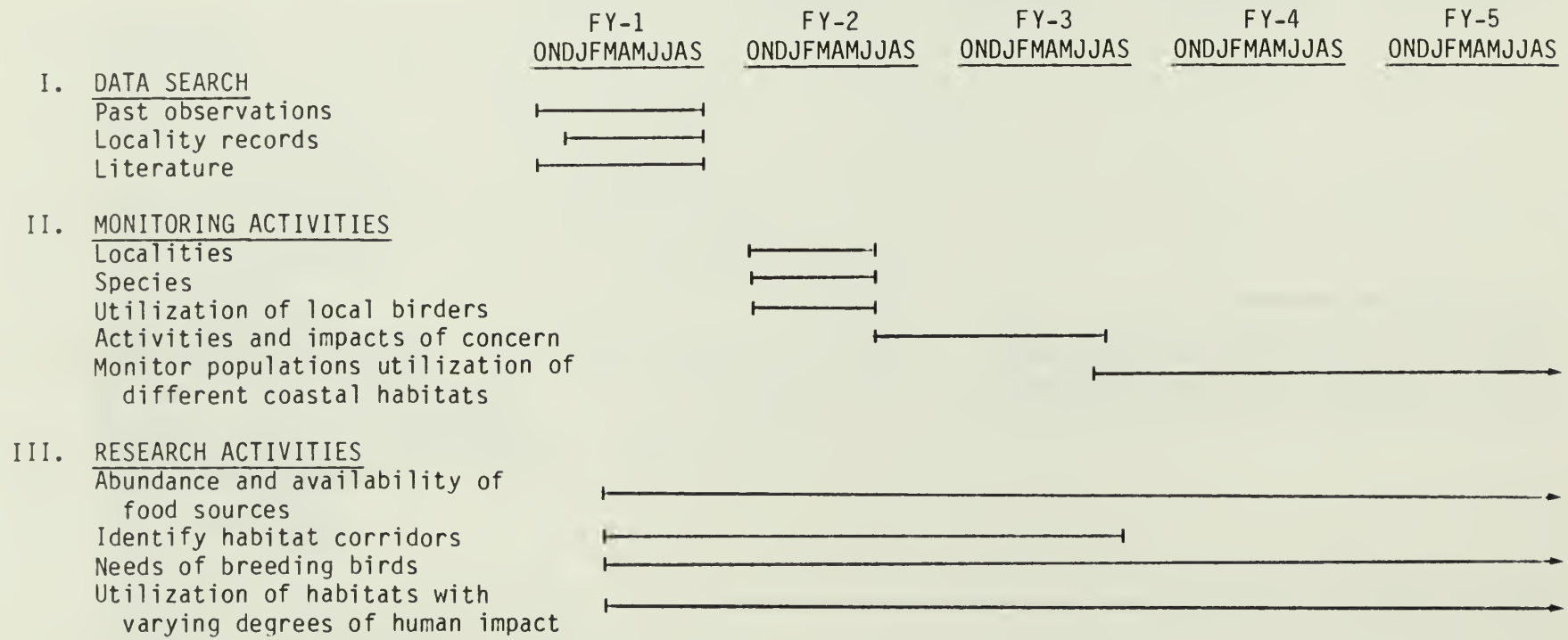


TABLE 9 (Cont'd.): BIRD POPULATIONS OF THE SANTA MONICA MOUNTAINS COAST - DYNAMICS AND HABITAT UTILIZATION STUDIES



During subsequent years (FY 2-5), studies, sampling and field work will proceed on annual cycles and will be analyzed for seasonal variations and correlations with human impacts. At the end of each fiscal year, the National Park Service will publish a report of findings and trends, make appropriate management recommendations, and identify further research needs. Significant findings will also be documented and submitted to professional journals as appropriate.

Personnel requirements for the three projects include two technicians for the Anadromous Fisheries Project; one technician for the Bird Populations, Dynamics and Habitat Utilization Project; and two technicians for the Coastal Resource Examinations Project. Each of these technicians will be employed for 260 work days each fiscal year. In addition, a graduate student research assistant will be sought for the Bird Populations, Dynamics and Habitat Utilization Project and the Coastal Resource Examinations Project. These technicians will obtain historic data, assist with field work, conduct portions of these projects and assist with the analyses of data.

The estimated funding needs are:

ANADROMOUS FISHERIES RESOURCES

FY-1	$ 42,200
FY-2	46,400
FY-3	51,000
FY-4	56,100
FY-5	61,700

BIRD POPULATIONS OF THE SANTA MONICA MOUNTAINS COAST DYNAMICS AND HABITAT VITALIZATION

FY-1	$ 35,700
FY-2	37,100
FY-3	40,800
FY-4	44,900
FY-5	49,400

COASTAL RESOURCE EXAMINATIONS

FY-1	$43,600
FY-2	40,600
FY-3	44,700
FY-4	49,200
FY-5	54,100

Cooperative Resource Management Program

A cooperative resource management program is required to effectively implement many of the programs described above. While the National Park Service (NPS) has direct authority to manage resources on NPS lands, all other lands in the recreation area will require landowner cooperation to maintain the health and viability of natural resources. Landowner needs and ecosystem needs must be integrated into effective land use and resource management activities.

This will be a land management outreach program for residents and landowners within the recreation area. The activites will meet the objectives for the recreation area of cooperating with residents in determining land management practices on non-federal lands which are compatible with the purposes of the area. A NPS interdisciplinary team will negotiate with and assist individuals, community organizations and other agencies to develop and execute projects in: wildlife habitat enhancement, fire and flood prevention, compatible landscape and architectural design, matching grant programs, cultural and historical resource protection, protection of private property rights, wild habitat management, agricultural and scenic easement management, zoning recommendations, endangered and threatened species management, water quality management, protection of coastal resources, etc.

The purposes of such a program would be to:

1. Bring an awareness of the purposes and objectives of the recreation area to residents and landowners.

2. Explain NPS management policies, cooperative intents, acquisition procedures and viable options.

3. Learn from residents their specific concerns about the recreation area and their intentions for use of their lands.

4. Identify ways in which individuals and agencies can work together for mutual benefit.

5. Advise and assist residents in techniques and practices to enhance meeting the objectives of the recreation area, while carrying out their planned uses for their properties.

Beginning with FY-1, a team leader (new position) will be given authority to organize an interdisciplinary team of specialists and technicians. The team will set specific program goals during the first year that will include such activities as gathering homeowner and landowner data, and establishing contacts with homeowner groups, land management agencies, regulatory agencies, matching grant agencies, etc.

During FY-2, opportunities for demonstration and pilot programs should be pursued to test proposed projects and methods. At the same time, contact with homeowners would continue and possibly expand.

In FY-3, programs would be evaluated and revised as necessary, while continuing pilot projects and outreach programs. By FY-4 and FY-5,

the team should have gained enough experience from the previous years to fully implement the outreach program.

The personnel requirements would include:

Outreach Team Leader (new position)
Realty Specialists (existing)
Grants Specialist (new position)
Landscape Architect (new position)
Cultural Resource Specialist (new position)
Forester (existing)
Biologist (new position)
Graphics Technician (new position)
Resource Management Technician (new position)

The estimated funding needs are:

COOPERATIVE RESOURCE MANAGEMENT PROGRAM

FY-1	$ 100,100
FY-2	109,800
FY-3	120,600
FY-4	135,500
FY-5	151,600













project statement

NATURAL RESOURCE PROJECTS

PROJECT NUMBER	PARK PRIORITY	PROJECT TITLE	STATUS	PAGE
RM-1	1	Natural Resource Information System	Proposed	131
RM-2	2	Water Resource Examinations	Initiated	140
RM-3	3	Water Quality Monitoring	Initiated	148
RM-4	5	Re-establish Valley Oak Savanna Complex	Initiated	157
RM-5	7	Air Quality Monitoring	Proposed	163
RM-6	4	Monitor Fuel Characteristics of Vegetation	Proposed	174
RM-7	6	Cliff Nesting Raptor Survey	Initiated	181
RM-8	8	Acid Deposition Program	Proposed	187
RM-9	9	Predator Studies	Proposed	196
RM-10	10	Coastal Resource Examinations	Proposed	202
RM-11	12	Bird Populations	Proposed	210
RM-12	11	Anadromous Fisheries	Proposed	217
RM-13	13	Cooperative Resource Management Program	Proposed	222
RM-14	14	Endangered Plant Studies	Proposed	229

I. SAMO, RM-1, NATURAL RESOURCE INFORMATION SYSTEM

II. STATEMENT OF THE PROBLEM

The diversity of natural resources in the Santa Monica Mountains is one of the primary reasons that the National Recreation Area was established. The mountains and adjacent coast contain significant scenic, natural and cultural features, the values of which are amplified because of their proximity to the urban complexes in Los Angeles and Ventura Counties. The mountains offer unique opportunities to fulfill a portion of the recreational needs of the region's 10.5 million residents while sustaining a significant ecosystem.

A comprehensive, centralized natural resource information system (NRIS) is presently non-existent. Data bases for natural resources of the Santa Monica Mountains are sketchy and scattered. Data have been collected by various federal, state, county and local agencies for application to their particular concerns. The need for automated storage, maintenance and retrieval of natural resource and land use data has become increasingly critical for sound land management decisions.

In addition to satisfying the mandates of Public Law (95-625) requirements for natural resources preservation, a NRIS is needed to asssure compliance with the following federal laws and executive orders for projects within the Santa Monica Mountain Zone:

- National Park Service Organic Act of 1916
- National Environmental Policy Act of 1969 (NEPA)
- National Historic Preservation Act of 1966
- Executive Order 11593, Protection and Enhancement of the Cultural Environment
- National Trails System Act
- Land and Water Conservation Fund Act
- Endangered Species Act of 1973
- Coastal Zone Management Act of 1972
- Executive Order 11988 of May 24, 1977, Floodplain Management
- Executive Order 11990 of May 24, 1977, Protection of Wetlands
- Clean Air Act of 1963 and Amendments
- Wildlife Coordination Act

III. ALTERNATIVE ACTIONS AND PROBABLE IMPACTS

A. Continue Present Status

Presently, natural resource data have been collected by various federal, state, county and local agencies. However, these data files are disjunct and are maintained by the agencies collecting these data for their individual program requirements. The National Park Service, in order to integrate these data sets for planning and management decisions has had to continuously obtain, assemble, integrate and digest these data from each particular agency where that data is filed. This alternative, therefore, is costly and inefficient.

B. No Action

This alternative would eliminate all interest and involvement for natural resource data systems by the National Park Service. This alternative is unacceptable because the National Park Service would not have sufficient data to make management decisions to fulfill the Congressional mandate (Public

Law 95-625) to preserve the natural and cultural resources of the Santa Monica Mountains.

C. Develop a Natural Resource Information System

The National Park Service would develop a natural resource information system for the Santa Monica Mountains.

This alternative would provide for the acquisition, storage and retrieval of natural resource and land use data for the 225,000 acre Santa Monica Mountain Zone. This approach would enable application of multivariant resource information to all facets of park operations for the National Recreation Area, and the data would be available for use by other agencies and individuals.

The centralization of these data in an automated computer format would enable the integration of various data sets for the generation of natural resource and land use planning maps and statistical manipulation of data bases for trend analysis. The NRIS would provide current, accurate and comprehensive natural resource information for the Santa Monica Mountains.

IV. RECOMMENDED COURSE OF ACTION

A. Develop a Natural Resource Information System

During the first fiscal year, land use and land cover interpretations would be made from existing contemporary aerial color infrared photographs. The map scale would be 1:12.000 with a minimum mapping unit of five acres except for certain special categories and lineal features (e.g., roads, trails,

streams). In addition, individual home sites in the mountains would be located on the map as point sources. The land cover and land use mapping would delineate seven categories for inclusion into the NRIS. These categories include:

Category I: Urban and Built-Up

- Residential
- Commercial, Services and Institutional
- Industrial
- Transportation
- Open and Other Urban and Built-Up Land

Category II: Agricultural Land

- Cropland and Pasture
- Orchards, Bush Fruits, Vineyards, and Ornamental Horticulture
- Confined Feeding Operations
- Other Agriculture Land

Category III: Rangelands (Grasslands and Shrub Lands)

- Grassland
- Chaparral (soft and hard)
- Woodland

Category IV: Water

Category V: Wetlands

Category VI: Barren

- Beaches
- Exposed Rocks
- Quarries
- Transitional Barren Areas

Category VII: Exotic

The process involved with this stage of NRIS development includes:

1) Photointerpretation

   Identification and delineation of cover types based on color, intensity, texture, and other attributes of the imagery

2) Transfer

   Transfer and rectification of the photointerpreted cover-type polygons to a controlled/stable map base

3) Ground Truthing

   Field work to aid in the photointerpretation and to assess the accuracy of the final map product

4) Final Map Production

   Inking of a final mylar reproducible map for use in visual displays and analyses.

The data depicted on the final mylar maps would then be computerized for automated retrieval and analysis. The point source data from field monitoring stations would also be entered along with the following maps for the Santa Monica Mountains:

(1) prescriptive zoning
(2) land resources/ownership
(3) activity
(4) trails and camps
(5) transportation

(6) recreation use

(7) jurisdiction

(8) watershed units

The computer applications would involve:

1. Data Preparation
2. Digitizing
3. Editing
4. Final Compilation
5. Management and Analysis of Data

The Natural Resource Information System developed for the Santa Monica Mountains would include functions for:

1. General Purpose - System costs, determination of UTM coordinates, subject identification, detailed map summaries

2. Data Base Management - Creation of data files, deactivation of out-of-date maps. listing of map files, conversion of polygon maps into cell maps specified by the user, activation of all or a specified subset of any master file or workfile map, creation of a spatial subset of maps in the master file for a user specified study area

3. Spatial Retrieval - Activation of maps of specified units and all data for specified units within a user specified distance from a given reference point on the map

4. Analysis of Data - Determination of aerial extent and percentage of subject cover in a map; delineation of user specified buffer zones around a specified point, line or polygon on a map; combination of cell maps to generate composite maps; measurement of distances; determination

of subject frequency and percentage on a map; map transformation; determination of intersection/union between specified map units; production of a two-way frequency table for the contents of any two cell maps; production of summary statistics for mapped units and generation of histograms of these subjects

5. Display - Magnification or enlargement of user-specified map elements, generation of contour maps and theme maps, plotting lines on a map, displaying maps, plotting and shading maps, plotting point maps, production of 3-D block diagrams, conversion of polygon maps to vector maps

The NRIS would be applied to natural resources planning and management decisions in the Santa Monica Mountains. Some of the potential applications include:

1. Easy conversion of vegetation types into fuel models and when combined with slope, aspect, transportation, land use and other variables, these data could be used in aiding development of operational plans for fire management, fire fighting, fire break location or planning prescribed burns.

2. The location of individual homes and other land uses to aid in identifying development in the mountain areas and in predicting impacts of proposed future development and/or formulation of alternative strategies for resource protection.

3. Assist with identification of areas for recreational potential and aid in prioritizing access and scenic vistas to better meet visitor services and access/transportation requirements.

4. Assist the development of planning alternatives and associated impact documentation in the ongoing development concept plans for National Park Service lands.

5. Assistance in park planning operations for immediate identification of significant areas for land acquisition program.

6. Identification of potential hazard areas with respect to home sites. This includes unstable slope conditions, earthquake hazards, flood areas, leaching field/septic system failures, safety and threats from fire, including hazardous brush accumulation.

7. Determination and mapping of transportation routes for mountain residents to escape from life and property threatening fires and providing this information on a timely basis.

8. Natural resource information base maps for vegetation, wildlife, water, coastal and air quality.

9. Provide significant information to park managers for immediate management decisions based on current data.

10. Development of resource inventories for endangered and

threatened species residing within the mountains and plotting of these sites for identification of "sensitive" areas to be considered in park management plans.

11. Development of scenarios for development plans based on specified natural resources inputs for park management decisions.

B. Personnel: Natural Resource Management Specialist

C. Funding

	Year in Program Sequence				
	FY-1	FY-2	FY-3	FY-4	FY-5
Personal Services	-0-	-0-	-0-	-0-	-0-
Other than Personal Services	$ 61,900	41,900	27,400	30,000	33,100
TOTAL	$ 61,900	41,900	27,400	30,000	33,100
Funds Available in Park Base	-0-	-0-	-0-	-0-	-0-
Funds Requested from Region	$ 61,900	41,900	27,400	30,000	33,100

D.

On Form	Date Submitted
10-237	
10-238	
10-250	
10-451	

I. SAMO, RM-2, WATER RESOURCE EXAMINATIONS

II. STATEMENT OF THE PROBLEM

The Santa Monica Mountains National Recreation Area encompasses 150,000 acres of the 225,000-acre Santa Monica Mountain Zone. The natural resources of the Santa Monica Mountains are dependent upon hydrologic inputs for ecosystem stability. These inputs recharge the ground water resources and contribute fresh waters to the stream channels. The stream courses are, in most part, intermittent, supplying surface waters to the larger streams during the rainy season. Perennial streams exist in the major canyons, such as Malibu, Zuma and Topanga and serve as arterials for freshwater discharge into the Pacific Ocean.

Both the biological and hydrological resources of the Santa Monica Mountains are threatened by intensive residential and commercial development. Stream banks and flood plains have become attractive sites for development, at the expense of the riparian vegetation community. Upstream residential development has impacted both the rate and quality of stream discharges. Slope stabilization and stream channelization activities have increased the sediment load and runoff transported by the streams within the mountains. Flow regimes have been impacted and nutrient content of natural water courses have been altered through the discharge of sewage effluent directly into the stream channels. In order to document present and future hydrologic conditions, assess the ramifications of such changes on the Santa Monica Mountains ecosystem and determine

the impact on public recreation, accurate and comprehensive hydrologic records are required.

Presently, minimal hydrologic data and monitoring stations exist within the National Recreation Area. The U. S. Geological Survey has done some monitoring in Topanga and Malibu Canyons. In addition, the Los Angeles County Flood Control District has done limited surface and water quality monitoring. However, these hydrologic monitoring programs are limited in scope and are inadequate for formulating a sound water resource management program for the Santa Monica Mountains (Figure 16).

The National Park Service is required by a congressional mandate (Public Law 95-625) to manage the recreation area in a manner which will preserve and enhance its scenic, natural and cultural resources. Comprehensive and accurate hydrologic records are required in order to document impacts on the hydrologic regime for each watershed unit and to identify point source contributors of pollutants. These data are also required to determine the impact of development and recreation upon the complex ecological balances.

Other applicable Federal laws and executive orders which apply to the Santa Monica Mountains National Recreation Area requiring extensive hydrologic data include:

- National Environmental Policy Act of 1969 (NEPA)
- Endangered Species Act of 1973
- Coastal Zone Management Act of 1972
- Executive Order 11988 of May 24, 1977, Flood Plain Management
- Executive Order 11990 of May 24, 1977, Protection of Wetlands
- Executive Order 11752, Prevention, Control and Abatement of Environmental Pollution at Federal Facilities

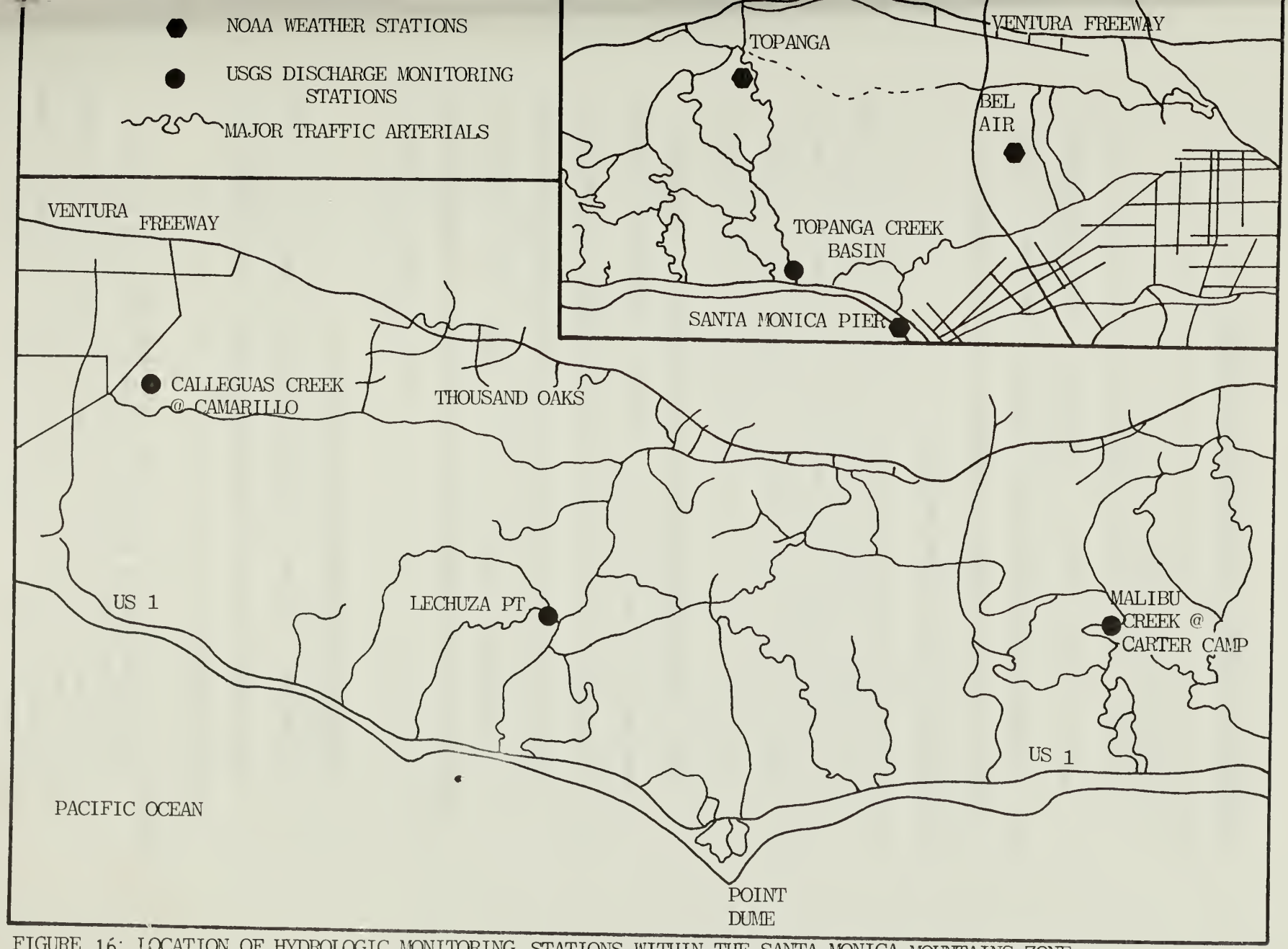


FIGURE 16: LOCATION OF HYDROLOGIC MONITORING STATIONS WITHIN THE SANTA MONICA MOUNTAINS ZONE

III. ALTERNATIVE ACTIONS AND THEIR PROBABLE IMPACTS

A. Continue Present Status

Presently, surface water discharge and water quality measurements are made by the U. S. Geological Survey at downstream locations in Topanga and Malibu Creeks. The State of California monitors these same parameters at a limited number of locations within the mountains.

The National Park Service would generate a historic data base for these discharge and water quality measurements. However, because of the limited nature of the monitoring locations, a complete evaluation regarding the water resources for the Santa Monica Mountains could not be formulated. As greater development occurs within the mountains, degradation of the water quality would continue and the disruption of the hydrologic regime would accelerate. The lack of technical scientific hydrologic data for the watersheds in the Santa Monica Mountains would make the task of preserving and maintaining the ecological integrity of the mountains extremely difficult.

B. Develop Discharge Monitoring Program

The National Park Service would establish a network of stream-gaging stations in all major streams within the Santa Monica Mountain Zone.

This approach would require increased funding and staffing to provide the expertise required of a major hydrology thrust. This would include the acquisition of stream-gauging equipment

requiring frequent servicing and calibration. Therefore, these limitations preclude this option as a viable alternative for the Santa Monica Mountains water resource program.

C. No Action

This alternative would eliminate all interest and activities in water resource management for the Santa Monica Mountains by the National Park Service. The "no action" strategy cannot be considered as an alternative because in doing so the National Park Service would be failing to fulfill the congressional mandate to preserve the natural resources of the Santa Monica Mountains.

D. Cooperative Water Resource Management Program

This strategy involves the establishment of a cooperative program between the National Park Service and the U. S. Geological Survey that would include the establishment of a hydrology network within the Santa Monica Mountains. The monitoring program would include the parameters of stage and discharge.

This alternative would be the best possible choice for an active water resource management program for the Santa Monica Mountains. The cooperative effort would result in the acquisition of accurate and comprehensive hydrologic field data. The NPS would develop monitoring needs and formulate analyses of data for the National Recreation Area and the USGS would provide the technical expertise, equipment and consistency required of an effective long-term water resource program.

IV. RECOMMENDED COURSE OF ACTION

A. Resource Management Actions

Commencing in FY-1, the National Park Service would cooperate with the U. S. Geological Survey for the acquisition of baseline hydrologic data. A hydrologic monitoring network would be developed throughout the Santa Monica Mountains. The hydrologic parameters of stage and discharge would be monitored. This network would provide representative data sets for each watershed unit and provide data suitable for application to the overall resource management program. It is anticipated that data would be provided in both hardcopy and automated data processing formats for application and analysis. These hydrologic data collected would be distributed through the U.S. Geological Survey's Water Resources Data for California and annual analyses of these conditions would be prepared by the National Park Service.

B. Monitoring Actions

Specific monitoring programs include the installation of permanent recording stations for daily water level and discharge measurements. Each recording station would be sited so that data from several locations within a watershed could be analyzed to determine upstream and downstream conditions. This monitoring network would be based upon the watershed unit and would provide data on water level variance throughout a given year.

Discharge measurements would also be made for both upstream and downstream locations within each specific watershed unit. The measurements would be made biweekly. These discharge measurements, when combined with the associated water levels, would establish stage-discharge relationships.

The National Park Service would also establish a climatological monitoring program. The existing NOAA weather stations located at Lechusa Point, Topanga Canyon, Santa Monica, and Bel Air would be included within the monitoring program and available fire station weather data would be obtained and incorporated within the monitoring network. Analyses would determine if existing climatological stations provide sufficient data which reflect climatological inputs and gradients. Additional monitoring devices would be included in the monitoring program in the event gradients cannot be concluded from the existing network.

Annual reports summarizing and analyzing the hydrologic events within the Santa Monica Mountains would be generated. These reports would focus on analyzing hydrologic inputs and outputs and would include all hydrologic data collected within the Santa Monica Mountains.

Stage and discharge data would be analyzed to determine the relationship between these two hydrologic parameters. Stage discharge curves would be generated from correlation coefficients to serve as a predictive tool for water resource management decisions. Significant results would be presented

in tabular and graphical formats. Reports would also include interpretations of these data for definitive management actions and for other natural resource projects.

C. Personnel: Natural Resource Management Specialist and one technician, 87 work days

D. Funding

	Year in Program Sequence				
	FY-1	FY-2	FY-3	FY-4	FY-5
Personal Services	$ 4,100	4,500	5,000	5,500	6,100
Other than Personal Services	10,500	11,600	12,800	14,100	15,500
TOTAL	$ 14,600	16,100	17,800	19,600	21,600
Funds Available in Park Base	-0-	-0-	-0-	-0-	-0-
Funds Requested from Region	$ 14,600	16,100	17,800	19,600	21,600

E.

On Form	Date Submitted
10-237	
10-238	
10-250	
10-451	

I. SAMO, RM-3, WATER QUALITY MONITORING

II. STATEMENT OF THE PROBLEM

The Santa Monica Mountains have historically functioned as a barrier to westward expansion of the Los Angeles urban complex. The mountains have provided a last retreat and sanctuary for wildlife species which are dependent upon the natural ecosystem for their existence.

Increasing residential and commercial development threatens the ecological integrity of the Santa Monica Mountains. Of significance is the quality of both surface and ground water resources. It is these waters that the assemblages of wildlife are dependent upon for their water needs.

Presently, there are three major contributors of water pollutants in the Santa Monica Mountains: 1) sewage plant effluent; 2) septic system failure; and 3) increased urban runoff. All of these sources of pollutants directly influence ecosystem stability in the mountains and the recreation potential for park visitors.

Two major drainage basins within the Santa Monica Mountains have had untreated effluent directly discharged into their stream channels. Violations of discharge permit standards have been documented in Malibu Creek, which has been designated a Significant Ecological Area by Los Angeles County and a special land habitat by the California Coastal Commission. Malibu Creek

empties directly into the Pacific Ocean at Malibu Surfriders State Beach which has an estimated annual visitation of 723,750 visitors. Malibu Lagoon, a major wildlife refuge at the mouth of Malibu Creek, has experienced extremely poor water quality, including high concentrations of chemical and bacterial pollutants. At times, extremely high coliform concentrations monitored within the lagoon's surface waters have forced the closure of the state beach because of health hazards.

Zuma Canyon is another location where raw sewage has been discharged into a major stream. The stream sustains a well defined riparian habitat and abundant wildlife populations which depend upon surface water that is limited during the dry summer months. In addition, Zuma County Beach, situated at the mouth of Zuma Creek, serves as a major recreation area with an annual visitation that exceeds 7,300,000. However, throughout the year, untreated and secondary effluent is discharged into Zuma Creek, which directly impacts the water resource and threatens wildlife and public health.

The water quality of other major streams in the Santa Monica Mountains is being threatened by human activities. Malibu Canyon, Malibu Gorge, Fern and Mendenhall Canyons, Dark Canyon, Liberty Canyon and Cold Creek have been included on the Inventory of California Natural Areas by the State of California. Monitoring programs to assess the chemical and biological pollutants of the streams within these canyons must commence immediately if the National Park Service is to formulate a policy to

best manage and preserve the natural resources of the Santa Monica Mountains while enhancing recreational utilization.

Of critical concern is the development of residential and commercial structures on steep, unstable mountain slopes. Many of the structures under construction utilize septic systems which are a source of chemical and bacterial pollution for ground and surface water. Septic system failure could impact the natural resources within the canyons. In some canyons, such as Zuma, high or perched ground water tables have intercepted waste effluents. Considering future growth trends for the canyon and the high visitation the location receives, this definitely has a high potential as a threat to public health and ecosystem maintenance.

Some of the most pronounced septic system failures within the mountains occur adjacent to the coast. Marine terraces have experienced some of the highest failure rates. The Department of Regional Planning for the County of Los Angeles determined that the water quality does not meet the established standards set by the Regional Water Quality Control Board at Point Dume, the Malibu area and inland along the Pacific Coast Highway.

The poorest water quality along the coast is located in the eastern portion of the National Recreation Area, including the vicinity of Will Rogers State Beach, Topanga State Beach and Malibu Surfrider State Beach. These locations experience a combined annual visitation of almost 12,000,000 visitors. Conversely, the western portion of the National Recreation Area

has less development, better water quality, and fewer visitors each year.

The National Park Service has been mandated by Congress (Public Law 95-625) to preserve the natural and cultural resources of the Santa Monica Mountains. The NPS must establish baseline water quality data through the development of an aggressive and comprehensive water quality monitoring program. The NPS must obtain these data in order to assure that the quality of water is of sufficient purity to prevent ecosystem deterioration and to provide healthful public recreation opportunities.

The National Park Service is also required by the Federal Water Pollution Act Amendments of 1972 (PL 92-506) and the Clean Water Act of 1977 (PL 95-217), to comply with established Federal, State, local and interstate water quality standards. Other acts and laws which require water quality data for National Park Service planning and management within the Santa Monica Mountains NRA include:

- Organic Act 1916
- NEPA 1969
- Endangered Species Act of 1973
- Coastal Zone Management Act 1972
- Executive Order 11988 of May 24, 1977
- Floodplain Management
- Executive Order 11990 of May 24, 1977, Protection of Wetlands

III. ALTERNATIVE ACTIONS AND THEIR PROBABLE IMPACTS

A. Continue Present Status

Presently, water quality monitoring programs within the Santa Monica Mountains are essentially nonexistent. The Los Angeles Water Control District monitors the water quality of Topanga and Malibu Creeks. No Federal agencies are actively involved in water quality data acquisition within the mountains.

The National Park Service would obtain the historic and contemporary data base for Malibu and Topanga canyons. These data bases are continuous from 1974 to present. However, the National Park Service would not implement monitoring programs within the remaining watershed units. The National Park Service would therefore not have the baseline data necessary to assess the impacts of water quality degradation, would not know the point source contributors of pollutants nor the ramifications of these impacts on ecosystem stability and preservation. These consequences would jeopardize the the effective management of the National Recreation Area and would be in direct conflict with the congressional mandate for NPS stewardship of the Santa Monica Mountains. Therefore, this option of maintaining the status quo is unacceptable as a recommended course of action.

B. Establish an NPS Water Quality Monitoring Program

The National Park Service would implement a comprehensive water quality monitoring program. The data analyses would

include organics, inorganics, trace metals, and pesticides. Continuous monitoring devices would be installed at strategic locations to monitor pH, dissolved oxygen and specific conductance. Data analyses would be conducted under contract with suitable laboratories.

This alternative would require additional staffing and funding. The analysis of water quality samples requires consistency in sample processing. The degree of variance in sampling procedures employed by different contractors, and their degree of sophistication, would not enable a consistent data analysis to be completed for a long-term water quality program.

C. No Action

This alternative would eliminate all interest and monitoring activities for water quality parameters in the Santa Monica Mountains by the National Park Service.

The "no action" strategy cannot be considered as an alternative because in doing so the National Park service would be failing to fulfill the congressional mandate to preserve the natural and cultural resources of the Santa Monica Mountains and provide recreational opportunities in a healthful setting.

D. Cooperative Water Quality Monitoring Program

A cooperative water quality monitoring program would be established between the National Park Service and the U. S. Geological Survey (USGS). The parameters to be analyzed would

include the major anions/cations of the inorganics/organics, trace elements, pesticides, nitrates, and phosphates. Continuous monitoring devices would be installed to monitor dissolved oxygen, temperature, pH, and specific conductance.

This alternative would establish a water monitoring network throughout the Santa Monica Mountains inclusive of all watershed management units. The USGS would monitor the surface and ground water resources based upon the management needs of the National Recreation Area. Monitoring sites would include perennial and intermittent streams, impoundments, leaching and landfill sites, springs, and ground water.

The water samples would be analyzed by the USGS to generate baseline data, monitor water quality trends, and develop a historic/contemporary data base.

IV. RECOMMENDED COURSE OF ACTION

A. Cooperative Water Quality Monitoring Program

A cooperative program between the National Park Service and the U. S. Geological Survey would collect water samples at selected streams, springs, areas of septic influence, dump sites, and impoundments within the Santa Monica Mountains.

These data will be analyzed to determine spatial and temporal concentrations of water constituents. The parameters to be analyzed include nutrients, inorganic and organic ions,

trace metals, nitrates, phosphates, pH, pesticides, dissolved oxygen and specific conductance.

B. Monitoring Actions

The initial water quality monitoring program for the Santa Monica Mountains would concentrate on the acquisition of baseline data. Monitoring stations would be selected within each watershed unit, depending on natural resource requirements and management needs.

Continuous monitoring routines would be established for the perennial streams within the watersheds. Intermittent streams would be sampled during high and low flow regimes. The National Park Service would attempt to incorporate the data from perennial streams into the National Stream Quality Accounting Network (NASQAN) program. Water quality data would also be collected at ecologically significant springs on a seasonal basis four times yearly. The impoundments which impact the recreation area should be monitored twice yearly, during the fall and summer. Ground water samples would be collected once yearly unless significant concentrations of pollutants are found in the water column. Monitoring would also be done at dump sites near the recreation area and near septic tank leaching fields.

Water quality samples would be collected utilizing National Water Quality procedures in cooperation with the USGS and samples analyzed in the USGS National Water Resources Laboratory.

C. Personnel: Natural Resource Management Specialist and one technician, 173 work days

D. Funding

	Year in Program Sequence				
	FY-1	FY-2	FY-3	FY-4	FY-5
Personal Services	$ 8,200	9,000	9,900	10,900	12,000
Other than Personal Services	$ 19,500	21,500	23,700	26,100	28,700
TOTAL	$ 27,700	30,500	33,600	37,000	40,700
Funds Available in Park Base	-0-	-0-	-0-	-0-	-0-
Funds Requested from Region	$ 27,700	30,500	33,600	37,000	40,700

E. On Form — Date Submitted

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I. SAMO, RM-4, RE-ESTABLISH VALLEY SAVANNA COMPLEX

II. STATEMENT OF THE PROBLEM

Before the influx of European culture and land-use practices into southern California, many of the lowland valleys contained native perennial bunchgrasses, interspersed with native annual grasses. With the introduction of domestic cattle from Europe and exotic annual grasses, the decline of the California native grasslands began. The Spanish ranchers, finding vast expanses of bunchgrasses, overgrazed these savannas to the extent that the soils were compacted and the perennial grasses were unable to produce seed for reproduction. Consequently, exotic grasses and weeds that adapted to the intense pressures of grazing in Europe, outcompeted the native grasses. Presently, only a few areas of the Santa Monica Mountains contain significant stands of native grasses.

Growing in association with the native grasses in the rich alluvial soils of the valley bottoms are valley oaks (Quercus lobata). Historically, valley oaks were extensive throughout the Central Valley of California. However, with the widespread development of agricultural practices and the extensive settlement in California during the last century, thousands of valley oaks were removed for utilization or land clearance. Today, only a few significant stands of valley oak trees remain. Unfortunately, these remaining stands of valley oak grow in the most favorable areas for urban

development. Due to these pressures for utilization of its habitat, the valley oak is rapidly becoming a prime candidate for endangered species status.

Paramount Ranch, situated within the National Recreation Area along the floodplain of Medea Creek, contains alluvial soils which support a significant stand of valley oaks. Some of these oaks are the finest specimens in the area. Since the valley oak is rapidly becoming an endangered species, the National Park Service must give them special consideration.

Paramount Ranch is intensively used for several purposes. The ranch was used extensively by the movie industry during the last fifty years, a practice which continues today. The ranch is also the site of the Renaissance Pleasure Faire. During the six weekends of the Faire each spring, over 300,000 people attend the Faire. Over 6,000 vehicles a day are parked at the site. The impact of parking cars on the Ranch has caused extensive soil compaction, eliminated native grasses, prevented regeneration of valley oaks, and weakened existing trees.

In order for the valley oak/grassland vegetation complex on Paramount Ranch to be preserved, the National Park Service must initiate a rehabilitation project on a portion of the site. This project is consistent with the Congressional mandate (Public Law 95-625) to preserve the natural resources of the Santa Monica Mountains. Other Federal laws which are applicable include: The National Environmental Policy Act of 1969, the Organic Act of 1916, the Endangered Species Act of 1973, and Executive Order

11988 of May 24, 1977, Floodplain Management.

III. ALTERNATIVE ACTIONS AND PROBABLE IMPACTS

A. Continue Present Status

Most of Paramount Ranch has been severely impacted by a variety of intensive land uses. This will continue to be the trend unless a portion of the site is designated for perpetuation of natural systems. The site was purchased with the intention of utilizing it for intensive recreation. However, without proper mitigation or rehabilitation, the valley oaks on the ranch could decline in total numbers and the opportunity to regain native grasses lost. In addition, there is a possibility for increased soil erosion and compaction and serious impacts to wildlife populations which utilize the site.

B. No Action

If rehabilitation efforts are not undertaken on the Paramount Ranch, then the National Park Service would lose a significant opportunity to re-establish an endangered vegetative community, the valley oak savanna. The National Park Service would also forfeit the environmental education opportunities that could be afforded by a resource rehabilitation effort as well as the good example it would set for local residents in the Santa Monica Mountains. Eventually, all of the oaks would be extirpated from the site.

C. Re-establish Valley Oak Native Grassland Complex on a Portion of Paramount Ranch

This alternative provides for approximately 18 acres presently utilized for special event parking on Paramount Ranch to be set aside for the purpose of re-establishing the valley oak/savanna. The National Park Service would cooperate with researchers from local universities who have developed expertise in native grasses and California oak restoration.

The initial phase of the project would be experimental in design with the primary goal to determine the best methods for promoting the re-establishment of valley oak/savanna. These methods would then be applied to more extensive valley oak savanna habitats.

IV. RECOMMENDED COURSE OF ACTION

A. Resource Management Actions

The National Park Service would coordinate the valley oak/savanna rehabilitation project at Paramount Ranch, encompassing approximately 18 acres.

B. Treatment Methods

The rehabilitation area would be divided into a number of small experimental plots on which different methods of promoting regeneration of the valley oak savanna would be employed. The plots would be treated with individual techniques or combinations of methods, such as discing and burning, to determine the best approach for regeneration.

The treatment methods include:

1) Discing soil
2) Burning vegetation
3) Burning vegetation and discing soil
4) Discing and introducing native seed
5) Burning, discing and introducing seed
6) Control plot (no treatment)

C. Monitoring Actions

Following treatment of the study plots with the various methodologies described (which, in effect, prepare the site for a favorable environment for the regeneration of the native species), results would be monitored and analyzed. Evaluations of treatment methodologies would include: 1) the amount of regeneration promoted by a specific treatment, 2) the species mix promoted by treatment, and 3) cost effectiveness per unit area for a treatment. Once the various treatments have been evaluated, then the best technique would be applied to the entire rehabilitation area. If successful, these same techniques could be applied eventually to similar areas within the National Recreation Area in need of rehabilitation.

C. Personnel: Forester, one technician, and one part-time graduate student, 260 work days per fiscal year

D. Funding

	Year in Program Sequence				
	FY-1	FY-2	FY-3	FY-4	FY-5
Personal Services	$ 12,300	13,500	14,900	16,400	18,000
Other than Personal Services	$ 20,200	7,900	8,700	9,600	10,600
TOTAL	$ 32,500	21,400	23,600	26,000	28,600
Funds Available in Park Base	-0-	-0-	-0-	-0-	-0-
Funds Requested from Region	$ 32,500	21,400	23,600	26,000	28,600

E. On Form — Date Submitted

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10-451

I. SAMO, RM-5, AIR QUALITY MONITORING

II. STATEMENT OF THE PROBLEM

The Los Angeles metroplitan complex throughout recent time has experienced the poorest air quality of any urban complex in the nation. National and state ambient air quality standards for major pollutants are regularly exceeded. The Santa Monica Mountains, situated between the highly developed San Feranando Valley to the east and the Oxnard Plain to the west, function as an airshed for southern California.

Offshore sea breezes encounter the Santa Monica Mountains and directly influence the air patterns over the region. However, even though the Santa Monica Mountains have better air quality due to the relative lack of development and the mitigating air patterns, air quality in the mountains has been affected by the degraded air in the Los Angeles Basin.

The significance of the Santa Monica Mountains airshed was recognized by Congress in the enabling legislation for the National Recreation Area. Public Law 95-625 specified that "...the Secretary (Interior) shall manage the Recreation Area in a manner which will preserve and enhance its scenic, natural and historic setting, and its public health value as an airshed for the southern California Metropolitan area."

The National Recreation Area is situated within two air basins designated by the California Air Resources Board. These air

pollution control districts monitor the ambient air quality parameters throughout the areas adjacent to the Santa Monica Mountains. The South Central Coast Air Basin has monitoring stations located in Thousand Oaks, Port Hueneme, El Rio, Ventura, and Simi Valley. These stations monitor gaseous or multi-pollutants. These same parameters are monitored by the South Coast Air Basin at the Newhall, Reseda and West Los Angeles locations. There are no air quality monitorng sites within the Santa Monica Mountains (Figure 17).

The data obtained from monitoring programs reflects the severe air quality problems associated with the Los Angeles/Ventura metropolitan area. During 1979 (the latest published data), the Federal National Ambient Air Quality Standards (NAAQS) established by the Environmental Protection Agency (EPA) which were based on U. S. Public Health Service (USPHS) criteria, were periodically exceeded. In addition, the State of California ambient air quality standards were also exceeded during 1979. Specifically, the air basins surrounding the Santa Monica Mountains experienced:

1. First stage ozone (O_z) episodes
2. Second stage (more severe) ozone episodes
3. California twelve-hour standard for carbon monoxide (CO) was exceeded.
4. California one-hour nitrogen dioxide (NO_2) standard was exceeded 73 days (the highest in the state).
5. The national annual mean standard for nitrogen dioxide (NO_2) was exceeded.

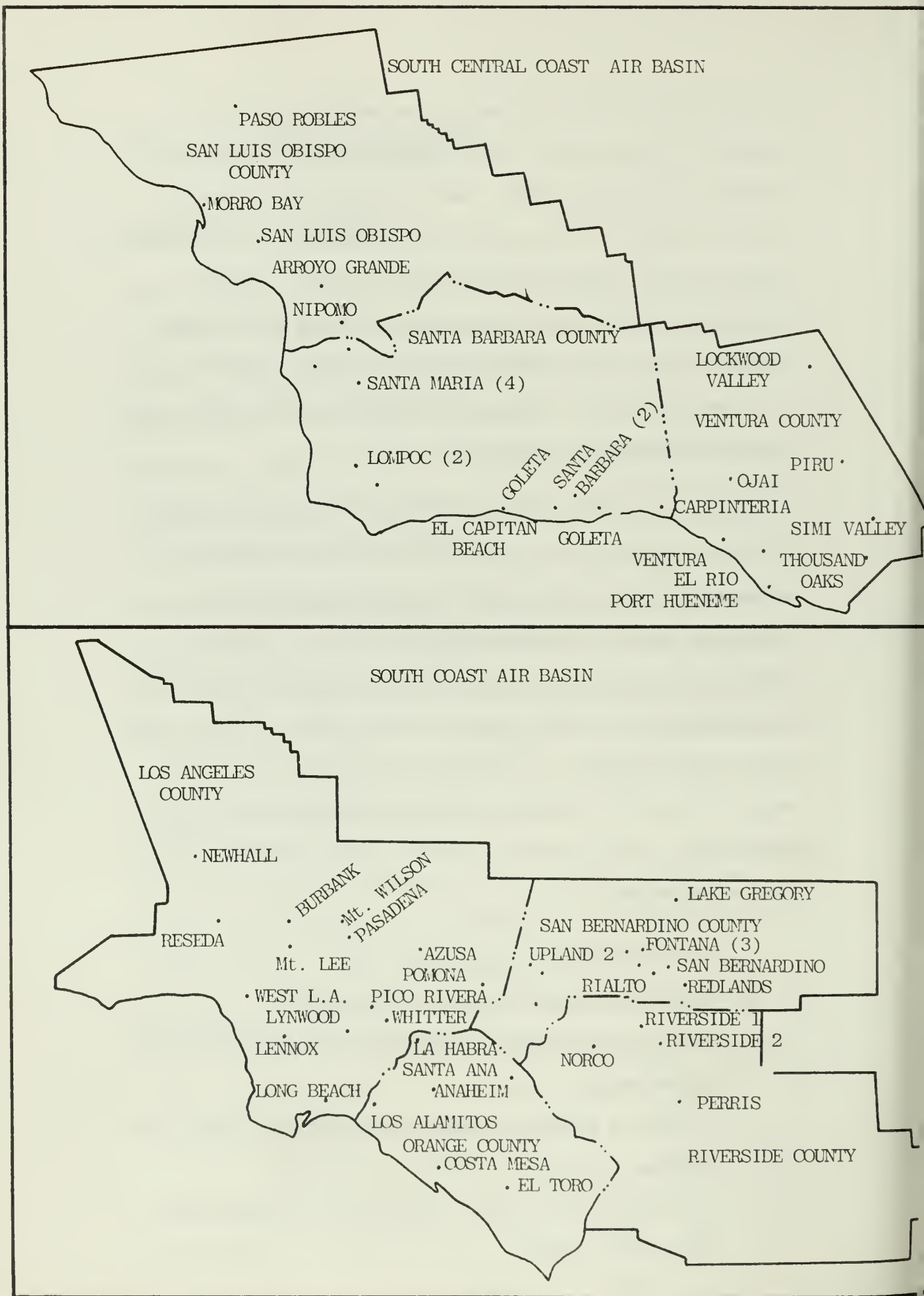


FIGURE 17: AIR QUALITY MONITORING STATIONS WITHIN THE VICINITY OF THE SANTA MONICA MOUNTAINS

6. The California 24-hour standard for sulfur dioxide (SO_2) was exceeded.
7. First stage suspended particulate episodes were reported.
8. Federal and State standards for lead (Pb) were exceeded.
9. Seven sulfate/oxidant episodes were reported.
10. High nitrate leads were reported.
11. Rainfall occurred with a pH of 2.9.

The air quality degradation of the South Coast and South Central Coastal Air Basins is directly attributed to mobile sources of air pollution. The lack of significant transportation alternatives throughout southern California has created a situation where a large number of people are dependent upon a great number of automobiles to serve their transportation requirements for a great number of miles. During 1979, mobile sources of pollutants contributed over 88 percent of the nonreactive pollutants, CO and Pb in both Ventura and Los Angeles counties (Emission Inventory, South Coast Air Quality Management District). In addition, mobile sources were directly responsible for over 57 percent of the reactive pollutants and the NO_x emissions within these two counties.

Studies correlating the cumulative affects of air pollution upon the biota, especially Mediterranean-type vegetation, indicate that some varieties are impacted. The interaction of the low level pollutants with a vegetation community could suppress growth, cause early maturation, increase the incidence of dwarfing or produce symptoms of stress similar to nitrogen deficiency

or a virus infection (USNPS, 1979).

The recreational potential of the Santa Monica Mountains is degraded as air quality decreases. Millions of visitors (27,271,358 recreated at the beaches in the Santa Monica Mountains NRA during 1979) seek the solitude of the mountains and ocean for their recreational needs. At times during 1980, poor air quality impacted the overall enjoyment of these visitors during smog sieges. Many scenic vistas were obscured and blurred due to the ever increasing incidence of extremely poor air quality throughout these episodes. The wildlife resources were also affected, which include a number of federally listed and formally proposed threatened and endangered species as well as critical habitats.

The National Park Service, as a steward of the Santa Monica Mountains, is required by the Clean Air Act (amendments 1977) and Public Law 95-625 to prevent the significant deterioration of air quality for this vital airshed. The National Park Service should also take an active role in attempting to improve the air quality of the Santa Monica Mountains through an aggressive and comprehensive air quality monitoring and data analysis program. Therefore, it is imperative that a base line air quality monitoring program be established to ascertain present air quality parameters within the Santa Monica Mountains and to forecast trends of the ambient air quality which may directly influence the recreational, scenic, vegetative, wildlife and water resources of the mountains.

The data collected would become incorporated within the EPA National Air Sampling Network and would provide information exchange on a local and national basis. The data would also provide a valuable link to the southern California ambient air quality monitoring program to integrate data within the existing state monitoring network. Other applicable federal laws and executive orders pertaining to NPS planning which require air quality data for the Santa Monica Mountains NRA for effective National Park Service management include:

The Organic Act of 1916
National Environmental Policy Act of 1969 (NEPA)
The National Historic Preservation Act of 1966
Executive Order 11593, Protection and Enhancement of the Cultural Environment
Endangered Species Act of 1973
The Coastal Zone Management Act of 1972
The Clean Air Act, 1963

III. ALTERNATIVE ACTIONS

A. Continue Present Status

Presently, air quality monitoring is done by the California State Air Resources Board within the South Central Coast and South Coast Air Basins. These stations monitor the reactive/non-reactive emissions, the nitrogen oxides (NO_x), sulfur oxides (SO_x), particulates, carbon monoxide (CO), and lead (Pb). Monitors are situated near the Santa Monica Mountains

National Recreation Area in Reseda, West Los Angeles, Thousand Oaks, Port Hueneme, and Simi Valley.

The National Park Service would continue data acquisition from the California Air Resources Board to document air quality conditions for the surrounding valleys adjacent to the National Recreation Area. However, data analysis throughout the mountain range would be impossible due to the lack of air quality monitoring devices in this area.

B. No Action

This alternative would divest all interest in the air resources management for the Santa Monica Mountains by the National Park Service.

The "no action" alternative cannot be considered viable because the National Park Service would be in direct conflict with the Congressional mandate (Public Law 95-625) which specifies that the "Secretary (Interior) shall manage the recreation area in a manner which will preserve and enhance its scenic, natural and historic setting and its public health value as an airshed for the Metropolitan Area."

C. Document Visual Air Quality Conditions

The National Park Service would initiate a long-term continuous photographic monitoring program which would document the visual impacts of air pollution in the Santa Monica Mountains.

This approach would enable a qualitative assessment of air quality degradation within the National Recreation Area.

Site selection for documentation would be dependent upon accessibility, significance to management plans and effectiveness toward generating a product depicting overall air quality conditions throughout the year. This approach would be an initial step toward documenting air quality degradations in the Santa Monica Mountains. However, quantitative data could not be obtained, rendering this procedure acceptable but less than ideal for scientific anlaysis and documentation.

D. Quantification of the Visual Impacts

Quantification of the visual impacts from air quality degradation within the Santa Monica Mountains could be documented by controlled field experiments utilizing a telephotometer.

The National Park Service would initiate studies on a frequent and regular basis to quantify the visual impacts on the scenic vistas by the ambient air quality. This approach would assist in developing baseline data within the National Recreation Area and could be readily implemented by staff personnel.

E. Cooperative Air Quality Monitoring Program

The National Park Service would initiate an aggressive and comprehensive cooperative air quality monitoring program with the State of California and other federal agencies to analyze the overall air quality in the Santa Monica Mountains.

This approach would require a memorandum of agreement between

the State and other involved federal agencies and the National Park Service to establish sophisticated monitoring devices throughout the Santa Monica Mountains. This method would include "state-of-the-art" monitoring devices, and analysis would be formulated for the major air constituents. This approach would enable the most significant data to be collected, however, the costs involved would be quite high and the availability of sophisticated instrumentation is limited.

IV. RECOMMENDED COURSE OF ACTION

A. Integrated Alternative Approach

Considering the high costs associated with air quality monitoring and the degree of sophistication required for data analysis, the National Park Service would strive for an effective balance between the proposed alternatives. The thrust would involve a combination of continuing the present status, documenting visual air quality conditions, quantification of the visual impacts, and initiating cooperative relationships which would provide thorough scientific data for the air quality parameters within the National Recreation Area.

This approach would enable documentation of air quality degradation through a long-term program. It would also enable the National Park Service to best work within an economic framework to obtain data in a cost effective manner, while providing data essential for park management.

B. Monitoring Actions

The National Park Service would commence an air quality monitoring program during the first fiscal year of funding. The initial thrust would establish a photographic monitoring network. The photo sites would be at strategic locations to qualitatively document the impacts on scenic vistas by present and future air conditions. The 35mm color oblique photographs would be taken on a regular interval and at the same time each day. Both dates and times would be permanently recorded on each slide for accurate documentation of conditions experienced at the location.

A quantitative approach would also be initiated to monitor air quality parameters. The National Park Service would acquire at least one telephotometer. This instrument would serve to quantify the contrasts wthin a scenic area for air quality analysis. The lack of contrasts documented by repeated monitoring would assist in documenting the particulate problems associated with the ambient air quality experienced in the mountains and surrounding vicinity. Site selection would be in coordination with the photographic analysis monitoring program.

Concurrently, the National Park Service would strive to develop cooperative relationships with the California Air Resources Board, the South Central Coast Air Basin, the South Coast Air Basin, and other Federal agencies to provide interaction between these various groups and the staff at

the Santa Monica Mountains National Recreation Area. The ultimate intent would be to establish sophisticated air quality monitoring devices to generate baseline data within the Santa Monica Mountains. The monitoring routine would include the reactive/non-reactive emissions, nitrogen oxides, sulfur oxides, particulates, carbon monoxide and lead analysis. Instrumentation would be obtained through joint funding, and analysis would provide greater insight into regional air quality degradation.

C. Personnel: Natural Resource Management Specialist and one technician, 130 work days per year

D. Funding

	Year in Program Sequence				
	FY-1	FY-2	FY-3	FY-4	FY-5
Personal Services	$ 6,100	6,700	7,400	8,100	8,900
Other than Personal Services	$ 9,900	6,500	7,200	7,900	8,700
TOTAL	$ 16,000	13,200	14,600	16,000	17,600
Funds Available in Park Base	-0-	-0-	-0-	-0-	-0-
Funds Requested from Region	$ 16,000	13,200	14,600	16,000	17,600

E.

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I. SAMO, RM-6, MONITOR FUEL CHARACTERISTICS OF VEGETATION

II. STATEMENT OF THE PROBLEM

Fire is an integral component in the ecosystem dynamics of the Santa Monica Mountains. Chaparral, the predominant vegetation type, depends on fire to initiate successional cycles, promote regeneration, and maintain the flow of nutrients through the ecosystem.

The release of nutrients caused by wildfire is essential to renew the vigor of the chaparral community. In the absence of fire, chaparral produces high levels of dead biomass below the living upper portions of the plants. This dead biomass limits nutrient flow through the vegetation community because these nutrients are held in the woody portions of the plant. Consequently, nutrient levels in the soil are depleted and the vegetation becomes senescent.

The high ratio of dead to living biomass in the vegetation community, estimated at 15 to 50 tons per acre in old growth chaparral, increases wildfire potential and intensity. In the Santa Monica Mountains, significant stands of chaparral vegetation have reached ages of 30 to 40 years in many areas. These heavy fuel loads, especially during Santa Ana wind conditions, make the task of fire suppression extremely difficult.

Control of wildfires in the chaparral community is a major problem in southern California. While fire is an essential part of

the life history of chaparral ecosystems, the toll in property damage caused by wildfire continues to rise yearly. The desire to live away from the congested cities, and the demand for more pastoral settings as sites for custom-built homes, enhances the use of chaparral covered slopes for housing developments. As the number of houses increases, so do the yearly losses in personal property due to fires and ensuing mudslides or floods.

In order for the National Park Service to make a significant contribution to a fire suppression program, it must develop a fuels management program for the Santa Monica Mountains. This requires the input of precise, site-specific data on the characteristics of fuels in the mountains (i.e., fuel load, species composition, slope, and aspect), as well as an integrated interagency fire weather network to be incorporated within the FIRESCOPE program. The Federal laws, acts and mandates supporting this program include:

Public Law 95-625

Federal Water Pollution Act Amendments of 1972 (PL 92-506)

Clean Water Act of 1977 (PL 95-217)

Organic Act, 1916

NEPA, 1969

Endangered Species Act of 1973

Coastal Zone Management Act, 1972

III. ALTERNATIVE ACTIONS AND PROBABLE IMPACTS

A. Continue Present Status

Currently, fire suppression activities in the Santa Monica Mountains are conducted by local fire agencies which include the Los Angeles City Fire Department, the Los Angeles County Fire Department, the Ventura County Fire Department, and the California Division of Parks and Recreation. The National Park Service is beginning to interact with these agencies. A centralized fire data information center for observations is not available to local fire suppression personnel in the Santa Monica Mountains. Therefore, this alternative is unacceptable because it does not provide representative, site-specific data for a comprehensive fire management program to be developed for the Santa Monica Mountain Zone.

B. No Action

The National Park Service would not actively develop, initiate or cooperate with local and state agencies for a fuels management program. Without an aggressive fuels management and fire control strategy, based upon precise fuels and weather information, wildfires would continue to burn unchecked throughout the Santa Monica Mountains and property losses and the potential threat to life would increase as the area becomes more developed.

C. Cooperative Fire/Fuels Management Programs

The immediate needs for developing a fuels management program for the Santa Monica Mountains require the input of precise site-specific data on the characteristics of fuels in the mountains. In order to accomplish this task, the National Park Service would establish a "Fuels Research and Monitoring Station" in cooperation with the Los Angeles and Ventura County Fire Departments. The purpose of this effort would be to facilitate fire weather and fuel monitoring activities for the Santa Monica Mountains at one central facility, collating the data and furnishing them to local fire agencies. The type of information to be obtained would include daily fire weather reports for the Santa Monica Mountains from the NFDRS, live fuel moisture monitoring, fuel load and fuel type characteristics, site-specific fuel and weather data monitoring for prescribed burning activities and burn prescription recommendations for local land management agencies.

IV. RECOMMENDED COURSE OF ACTION

A. Resource Management Actions

Cooperative Fire Data Information Center:

The National Park Service would operate a Fire/Fuels Monitoring Station in cooperation with the Los Angeles County and Ventura County Fire Departments and the California Department of Parks and Recreation. The facility would be operated at Camp 8 Fire Control Station in the Santa Monica Mountains,

currently owned by the National Park Service, and operated by the Los Angeles County Fire Department. The Los Angeles County Fire Department's Forestry Division also would conduct research activities at the station.

In addition, the National Park Service would develop vegetation maps for the Santa Monica Mountains. The vegetation mapping would be conducted using the 1:12,000-scale aerial stero color infrared photographs of the Santa Monica Mountains, taken during the spring of 1980 by the National Park Service in cooperation with the Los Angeles County Fire Department and the U. S. Forest Service. Through the integration of these vegetation maps and classifications with recent information on the fire history of the Santa Monica Mountains, predictive capabilities for pre-fire planning would be greatly enhanced.

B. Monitoring Actions

1. Fire Weather Monitoring

Accurate fire weather prediction capabilities are the cornerstone for a successful fire management program. Weather is the most important factor in determining fire behavior. Presently, localized fire weather predictive capabilities are minimal. Only one fire weather station in the Santa Monica Mountains reports to the AFFIRMS program. The acreage of the Santa Monica Mountain Zone (225,000 acres) requires at least three additional fire

weather stations be installed at strategic locations for an effective program. These additional stations would be operated and maintained by the National Park Service. Data obtained from these weather stations would be provided to the AFFIRMS System and to agencies and individuals in need of these data. In addition, historic fire weather data would be collected and maintained for future use in fire research for the mountains.

2. Live Fuel Moisture Monitoring

The research effort would also conduct live fuel moisture monitoring activities throughout the year (wet and dry seasons). These data would provide understanding of the relationships between fuel moisture and other environmental conditions for direct application to fire suppression activities.

C. Research Activities

Research activities would include coordinating research projects conducted by the National Park Service and by independent researchers. Studies would be implemented to monitor post-fire vegetative regeneration in terms of changes in both the vegetation communities structure and composition. Soils research would also be conducted to determine the effects of fire on the soil types in the Santa Monica Mountains for wildfires, and soil temperatures would be monitored for prescribed burns.

D. Personnel: Forester and three technicians, 260 work days per year

E. Funding

	Year in Program Sequence				
	FY-1	FY-2	FY-3	FY-4	FY-5
Personal Services	$ 20,000	22,000	24,200	26,600	29,300
Other than Personal Services	10,000	11,000	12,100	13,300	14,600
TOTAL	$ 30,000	33,000	36,300	39,900	43,900
Funds available in Park Base	-0-	-0-	-0-	-0-	-0-
Funds requested from Region	$ 30,000	33,000	36,300	39,900	43,900

F.

On Form	Date Submitted
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I. SAMO, RM-7, CLIFF NESTING RAPTOR SURVEY

II. STATEMENT OF THE PROBLEM

The Santa Monica Mountains maintain a very high density and variety of raptors (birds of prey). These species include: red-tailed hawk, red-shouldered hawk, cooper's hawk, golden eagle, turkey vulture, prairie falcon, American kestrel, white-tailed kite, great horned owl, barn owl, long-earred owl, screech owl, and burrowing owl. Records of historic nesting sites indicate that near the turn of the century the peregrine falcon, bald eagle and California condor also nested in the Santa Monica Mountains.

The remaining raptor populations constitute one of the significant natural resources in the Santa Monica Mountains. Over 50 percent of the top tropic level predator species in the mountains are raptors. They are critically important to the integrity and stability of the ecosystem.

Of primary concern is the relationship between raptors and habitat depletion due to urban enchroachment. Through the removal of habitat, small mammal populations will not be maintained to support present raptor populations. Some of the raptor species have already been extirpated as breeding residents, including the peregrine falcon and condor. Golden eagles are currently being threatened by development projects adjacent to or in the vicinity of nesting sites.

In order to assess the abundance and species composition of raptors in the Santa Monica Mountains, the National Park Service must initiate a raptor nesting survey program. This program would define population trends, the extent of endangered and threatened raptor species and the impacts that urban development has on raptor densities.

The National Park Service was mandated by Public Law 95-625 to manage the National Recreation Area in a manner which will preserve and enhance its scenic, natural and cultural resources. To best manage and preserve the raptors which reside within the Santa Monica Mountains, species diversity and abundance and nesting data must be acquired. Other applicable Federal laws to this research include: the Organic Act of 1916, and the Endangered Species Act of 1973.

III. ALTERNATIVE ACTIONS AND THEIR PROBABLE IMPACTS

A. Continue Present Status

Presently, potential golden eagle, prairie falcon, and peregrine falcon nesting habitat is documented from ground surveys. Aerial infrared photographs and topographical maps are utilized to identify potential cliff nesting habitats.

This survey method would fail to locate all the potential or actual habitat used by the raptors in the Santa Monica Mountains. In addition, species inventories would continue to be fragmented and incomplete due to limited access by ground

surveys. Without this information, preservation of essential raptor nesting habitat would be extremely difficult.

B. No Action

This alternative would preclude all interest and activities in raptor management for the Santa Monica Mountains by the National Park Service.

The "no action" strategy cannot be considered an alternative because in doing so the National Park Service would fail to fulfill the Congressional Mandate to preserve the natural resources of the Santa Monica Mountains.

C. Cooperative Raptor Survey Program

This strategy involves the establishment of a cooperative agreement between the National Park Service and Point Mugu Pacific Missile Test Range to survey the Santa Monica Mountains by helicopter for rare cliff nesting raptors. Under this agreement, the National Park Service would supply the personnel and Point Mugu would supply the helicopter to carry out the survey.

This alternative requires that resource management personnel apply for, and receive, a military clearance from the Defense Department. The time required to apply for this clearance is lengthy and there is no guarantee that it would be granted. Therefore, these limitations render this option unacceptable.

D. National Park Service Raptor Survey Program

This approach would establish an annual helicopter and ground

survey of potential cliff nesting habitats in the Santa Monica Mountains, funded and executed by the National Park Service.

This strategy is the most viable alternative for the preservation of essential raptor habitat by the National Park Service. It would enable a comprehensive raptor nesting survey to be conducted in the Santa Monica Mountains.

IV. RECOMMENDED COURSE OF ACTION

A. Resource Management Raptor Survey

The overall objective of the raptor survey is to provide a comprehensive, integrated, and economical system for surveying, assessing, and monitoring cliff nesting raptors and to provide management recommendations for the preservation of these species and their habitats. The survey would be carried out by helicopter and from ground observation. It would locate breeding pairs of raptors in the mountains and document habitat requirements for these birds.

B. Monitoring Actions

1. Based on survey procedures developed at the Santa Cruz Predatory Bird Research Group, all cliff and rock outcroppings would be surveyed annually by helicopter. The survey would be conducted during the last week in April and would take approximately two days to complete. Raptor nests would be located and ground monitoring

activities would continue for the remainder of the breeding season.

2. Nesting sites would be mapped and nesting densities determined for each of these species.

3. In support of the U. S. Fish and Wildlife Service Endangered Species Recovery Program, peregrine falcon eyries discovered in the mountains would be monitored and management techniques applied to increase the productivity of these eyries.

4. The National Park Service would prepare an annual report assessing the status of raptors in the Santa Monica Mountains. A final report would be generated upon completion of the project.

C. Personnel: Wildlife Biologist and one technician, 260 work days per year

D. Funding

	Year in Program Sequence				
	FY-1	FY-2	FY-3	FY-4	FY-5
Personal Services	$ 12,300	13,500	14,900	16,400	18,000
Other than Personal Services	12,700	14,000	15,400	16,900	18,600
TOTAL	$ 25,000	27,500	30,300	33,300	36,600
Funds available in Park Base	-0-	-0-	-0-	-0-	-0-
Funds requested from Region	$ 25,000	27,500	30,300	33,300	36,600

E.	On Form	Date Submitted
	10-237	
	10-238	
	10-250	
	10-451	

I. SAMO, RM-8, ACID DEPOSITION PROGRAM

II. STATEMENT OF THE PROBLEM

The Santa Monica Mountains contain the most extensive Mediterranean-type Ecosystem within the National Park System. Vegetation communities consisting of mixed chaparral, coastal sage and oak woodlands are the primary cover types. Residing within these various plant communities and depending upon this ecosystem for their existence are numerous wildlife species. These diverse wildlife and vegetative resources could be threatened by continued air quality degradation within the Los Angeles Basin. The combination of extensive mobile pollutants and air circulation patterns contribute to the poor air quality. Included within the overall degradation of air quality in the Santa Monica Mountains is the occurrence of acid deposition.

Acidic compounds occur as both wet and dry deposition. According to Smith (1980), "Acid rain deposition results primarily from the combustion of fossil fuels which release sulfur dioxide (SO_2) and nitrogen dioxides (NO_2) in the form of nitric acid (NO) and nitrogen dioxide (NO_2) to the atmosphere." The combination of these sulfates and nitrates with water molecules in the atmosphere produces acid rain. In California, the nitrate ion is responsible for most acid rain as over 65 percent of the total NO_x is derived from mobile sources (State of California, 1981).

Dry deposition is the other major acidic depositional process. Fine particulates, including sulfate and nitrate ions, settle out of the atmosphere collecting on terrestrial objects. In past studies, little has been determined regarding the impact of this dry component of acid deposition.

The pH levels for acid rainfall fluctuate both spatially and temporally throughout southern California. In a recent study completed by State of California Air Resources Board (1981) acid rain was found to be, under certain atmospheric conditions, as acidic as that found anywhere else in the world. The analysis determined that both the source and receptor for these acid pollutants was in southern California with a dominance in nitric acid in the rainfall.

The acidity of normal "background" precipitation has a pH of 5.6 (neutral pH is 7.0). A State Air Resources Board study (1981) determined that rainfall in southern California had much lower pH (higher acidity) levels than found in unpolluted rainfall (Figure 18). The report concluded that rainfall occurring in the Los Angeles Basin "typically was 10 to 100 times more acidic than unpolluted rain." The lowest mean pH for the Los Angeles area was 4.41 and lowest reading (highest acidity) was 2.89 (vinegar is slightly less acidic with a pH of 3.00).

Increasing acidity in rainfall has been demonstrated to adversely impact natural resources in various parts of the world. Both direct and indirect effects upon vegetative communities have been

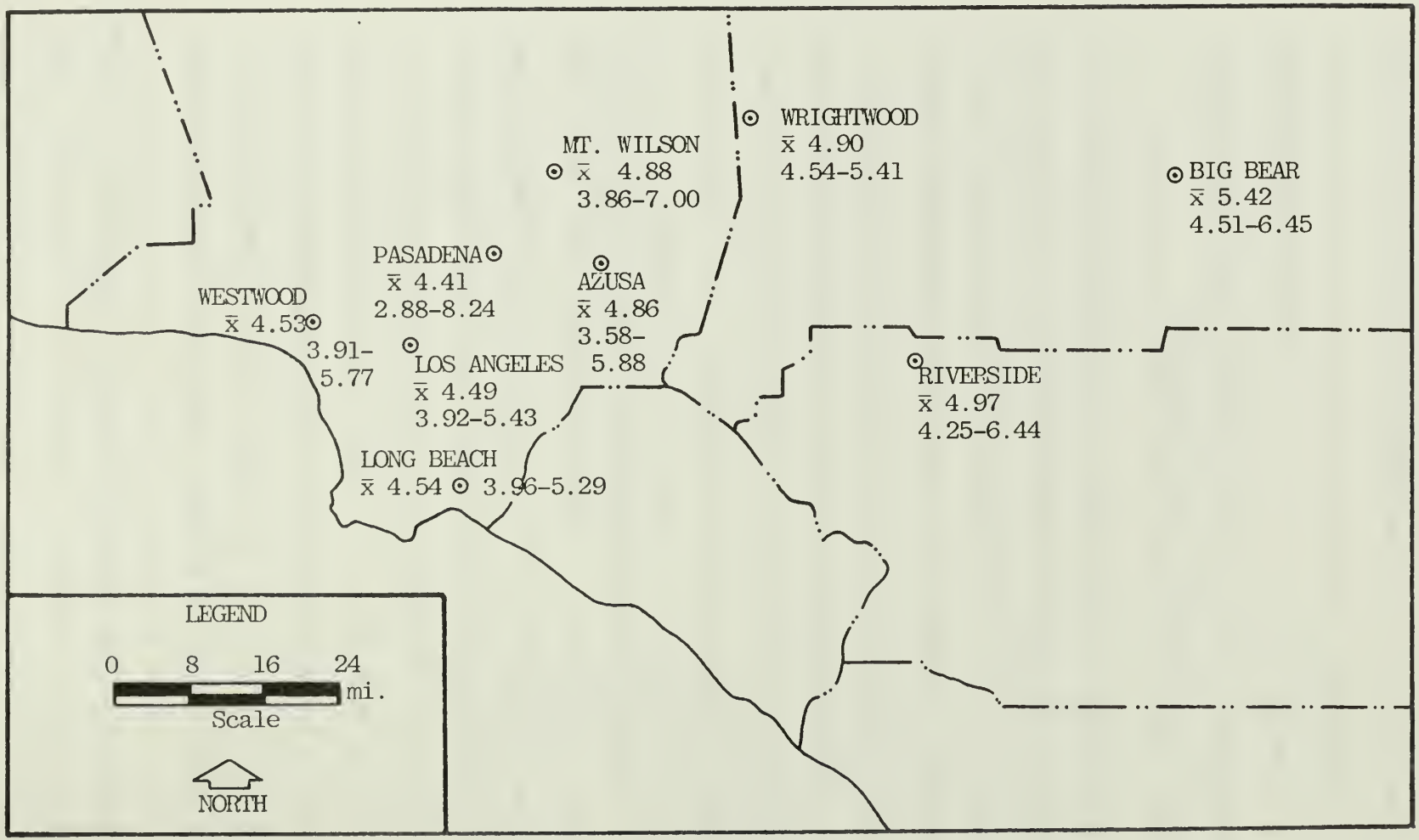


FIGURE 18: MEAN pH and pH RANGE, LOS ANGELES BASIN, FALL 1978 - SPRING, 1979 (State of California, Air Resources Board)

proven for plant receptors and classified as: (1) acute, (2) chronic, and (3) subtle (Tam and Cowling, 1977). Many factors affect the response of the vegetation to acid precipitation inputs. Some of the effects include damage to protective surface structures, disturbance in plant metabolism, altered leaf/root exudation processes and overall plant health (Table 10).

Other effects from both wet and dry acid deposition noted by the California State Air Resources Board include:

1. Acidification of soils

2. Alteration of the solubility, mobility and toxicity of chemical species affecting biological processes

3. Impacts to wildlife populations, water supplies (ground and surface), aquatic, and coastal resources receiving acid deposition

Public Law 95-625 directed that the Santa Monica Mountains be managed in a manner "... which will preserve and enhance its scenic, natural and historic setting, and its public health value as an airshed for the Southern California metropolitan area." The Clean Air Act Amendments also included provisions "to preserve, protect and enhance the air quality in the National Parks."

Other applicable federal laws and executive orders which apply include:

- National Park Service Organic Act of 1916
- The National Environmental Policy Act of 1969 (NEPA)

TABLE 10: Potential Effects of Acid Precipitation on Terrestrial Vegetation

1. Damage to protective surface structures such as cuticle. Damage to surface structures may occur due to accelerated erosion of the cuticular layer that protects most foliar organs.

2. Interference with normal functions of guard cells. Malfunction of guard cells will lead to loss of control of stomata and thus altered rates of transpiration and gas-exchange processes and possible increased susceptibility to penetration by leaf-attacking plant pathogens.

3. Poisoning of plant cells after diffusion of acidic substances through stomata or cuticle. This could lead to development of necrotic or senescent spots on foliar organs including leaves, flowers, twigs, and branches.

4. Disturbance of normal metabolism or growth processes without necrosis of plant cells. Such disturbance may lead to decreased photosynthetic efficiency, altered respiratory patterns and intermediary metabolism, as well as abnormal development or premature senescence of leaves or other organs.

5. Alteration of leaf- and root-exudation processes. Such alterations may lead to changes in populations of leaf-surface and root-surface microorganisms, including nitrogen-fixing organisms.

6. Interference with reproduction processes. Such interference may be achieved by decreasing the viability of pollen, interference with fertilization, decreased fruit or seed production, decreased germinability of seeds, etc.

7. Synergistic interaction with other environmental stress factors. Such reinforcing interactions may occur with gaseous sulfur dioxide, ozone, fluoride, soot particles, and other air pollutants as well as drought, flooding, etc.

INDIRECT EFFECTS

1. Accelerated leaching of substances from foliar organs. Damage to cuticle and surface cells may lead to accelerated leaching of mineral elements and organic substances from leaves, twigs, branches and stems.

2. Increased susceptibility to drought and other environmental stress factors. Erosion of cuticle, interference with normal functioning of guard cells, and direct injury to surface cells may lead to increased evapotranspiration from foliar organs and vulnerability to drought, air pollutants, and other environmental stress factors.

3. Alteration of symbiotic associations. Changes in leaf- and root-exudation processes and accelerated leaching of organic and inorganic substances from plants may affect the formation, development, balance, and function of symbiotic associations, such as mycorrhizae, nitrogen-fixing organisms, lichens, etc.

4. Alteration of host-parasite interactions. Resistance and/or susceptibility to biotic pathogens, parasites, and insects may be altered by subjecting plants to any environmental stress. Acid precipitation may increase the susceptibility of plants to these injurious agents, alter their capacity to tolerate disease or injury, or alter the virulence of pathogens. The effects of acidic precipitation may vary with the following: the nature of the pathogen involved; the species, age and physiological status of the host; and the stage in the disease cycle in which the acidic stress is applied, for example, acidic rain might decrease the infective capacity of bacteria before infection and increase the susceptibility of the host to disease development after infection.

Source: Tamm and Cowling, 1977.

- The National Historic Preservation Act of 1966
- Executive Order 11593, Protection and Enhancement of the Cultural Environment
- Endangered Species Act of 1973
- The Coastal Zone Management Act of 1972

III. ALTERNATIVE ACTIONS

A. Continue Present Status

Presently, limited data are being gathered within the Los Angeles Basin for long term acid depositional analyses. The National Park Service has been in contact with the California Air Resources Board and supports their interest and activities in acid deposition. The role of the National Park Service would be to continue this relationship. However, suitable data would not be collected by the National Park Service which would address the acid deposition impacts in the Santa Monica Mountains for a comprehensive natural resource management program.

B. No Action

The National Park Service would divest all interest in the acid precipitation problem of southern California. The "no action" alternative is not acceptable because the National Park Service, as an agency of the Department of the Interior, has a responsibility to protect and preserve natural re-resources. In addition, the National Park Service would be in direct violation of Public Law 95-625 which defines

the role of the National Park Service in regard to preserving the natural setting of the Santa Monica Mountains.

C. Cooperative Acid Deposition Program

The National Park Service would establish a cooperative research program with the State Air Resources Board, the South Coast Air Basin and the South Coast Central Air Basin, to monitor acid deposition. The State would provide the necessary field equipment for acid deposition collection and the National Park Service would provide the personnel for monitoring and field logistics. The program would be incorporated within the National Atmospheric Deposition Program (NADP).

D. National Park Service Acid Deposition Monitoring

The National Park Service would assume full responsibility and funding for an acid deposition monitoring program. The Service would install, monitor and forward to the NADP field samples (wet and dry) collected at each monitoring station. The data would be analyzed by the NADP. This alternative would be a good choice if funding could be made available for a long-term program.

IV. RECOMMENDED COURSE OF ACTION

A. Establishment of NADP Program

The National Park Service will initiate and establish an acid deposition project to monitor both dry and wet acid deposition. If project funds are not available through National

Park Service channels, then a cooperative agreement with the State should be explored. The equipment would be provided by the National Park Service or the State Air Resources Board and the field logistics and monitoring would be conducted by the National Park Service. The data collected would be incorporated into the NADP and analyses conducted by the central data processing system for this program. The National Park Service would cooperate with the South Central Coastal Air Basin and the South Coast Air Basin Boards to provide recommendations to improve the quality of air resources for the area.

B. Monitoring Actions

At least two acid deposition monitoring stations should be installed in the Santa Monica Mountains. These devices should be situated so that definitive gradients in acid precipitation/deposition could be established between the Channel Islands National National Park monitoring station and the Los Angeles Basin where instruments have been installed. The devices would collect both wet and dry deposition.

A precipitation collector would also be installed at each site to obtain total precipitation at the station. The National Park Service would collect both wet and dry samples on a weekly basis and perform routine quantitative analyses required of NADP field stations. The collected samples would be forwarded to the National Acid Deposition

Laboratory for analysis and these data would then be incorporated within National Data Network for the acid deposition program.

C. Personnel: Natural Resource Management Specialist and one technician, 130 work days

D. Funding

	Year in Program Sequence				
	FY-1	FY-2	FY-3	FY-4	FY-5
Personal Services	$ 6,100	6,700	7,400	8,100	8,900
Other than Personal Services	$ 22,400	7,000	7,700	8,500	9,400
TOTAL	$ 28,500	13,700	15,100	16,600	18,300
Funds Available in Park Base	-0-	-0-	-0-	-0-	-0-
Funds Requested from Region	$ 28,500	13,700	15,100	16,600	18,300

E. On Form — Date Submitted

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I. SAMO, RM-9, PREDATOR STUDIES

II. STATEMENT OF THE PROBLEM

Predators are an essential link in the foodchain of an ecosystem. Presently, as urban development encroaches into the wildlands of the Santa Monica Mountains, essential wildlife habitat is rapidly disappearing. Many habitats are threatened with becoming "island ecosystems" totally cut off from adjacent wildland areas. The "islandization" of faunal communities within the Santa Monica Mountains would prevent the immigration and emigration of wildlife, thereby upsetting the balance of normal population dynamics. The end result would be the probable extinction of several predator species that are currently being threatened in the Santa Monica Mountains.

Considering the proximity of the Santa Monica Mountains to a large urban area, very little is known about the predators that inhabit and enrich the mountains. Research is needed to better understand their roles and habitat needs.

The largest predator which resides within the Santa Monica Mountains and is observed at infrequent intervals is the mountain lion (Felis concolor). It has been estimated that 10-15 lions currently utilize the mountains for their habitat requirements (based on the land area of the mountains and observation reports).

Other predators in the Santa Monica Mountains, such as bobcats, coyotes, weasels, ringtail cats, and grey foxes, as well as

eagles, hawks, and owls face the same pressures exerted by urban development. The dynamic relationships that exist between these predator species and the prey they utilize require a greater understanding if management programs are to be implemented to perpetuate their presence in the Santa Monica Mountains.

Other applicable Federal laws which apply to this program include the Organic Act of 1916, the National Environment Policy Act of 1969, Land Conservation Fund Act of 1964, and the Endangered Species Act of 1973.

III. ALTERNATIVE ACTIONS AND THEIR PROBABLE IMPACTS

A. Continue Present Status

Currently, the National Park Service is maintaining a data base on wildlife observations made by staff personnel, other agencies, and members of the community. These data are recorded and site locations for these species are transferred to topographic maps to delineate essential habitat and to determine the patterns of wildlife movement. These observations provide general information regarding the species which reside within the mountains. However, the sightings reflect the species composition of areas people frequent (roads and trails) and the reports provide little information regarding primary habitat requirements for these species. This alternative would not provide sufficient information for effective management of predator species within the mountains.

B. No Action

Currently, the parameters for survival of predator species in the Santa Monica Mountains are unknown. The status of existing populations of predators is based upon unconfirmed reports by various individuals that frequent the mountains. Some species may already be precariously close to extinction in the Santa Monica Mountains. Without extensive monitoring studies, wildlife habitat management programs would have an insufficient scientific data base. Present survey methods are inadequate to determine the behavior, home range, and status of predators, information that is essential to make recommendations for habitat acquisition and protection. This alternative is not viable if the National Park Service is to fulfill the Congressional mandate to preserve the natural resources of the Santa Monica Mountains.

C. Cooperative Wildlife Management Program

The National Park Service in cooperation with the California Department of Fish and Game and the California Department of Parks and Recreation, would develop interagency wildlife monitoring and management programs. This would involve initially establishing a monitoring program for selected species of large predators in order to identify primary habitats for protection and management. This alternative would provide an opportunity for the National Park Service and the State of California to expand their interagency cooperative

efforts in the Santa Monica Mountains as mandated by the enabling legislation (PL 95-625) for the National Recreation Area. These data collected through this cooperative effort would be analyzed and presented in technical reports which would discuss the behavior, home range, and critical habitat essential to the survival of the large predator species in the Santa Monica Mountains.

IV. RECOMMENDED COURSE OF ACTION

A. Cooperative Wildlife Management Programs

The initial objective of the cooperative wildlife management program would be to identify primary habitat for predators based upon studies of the movements of selected species. The predators to be monitored include mountain lion (*Felis concolor*) and bobcat (*Lynx rufous*). These two species occupy the top of the foodchain and have the greatest habitat requirements. Therefore, these species would provide a good indication of general habitat and range requirements for predator species in the mountains. The project would be conducted with personnel from the National Park Service, California Department of Fish and Game and The California Department of Parks and Recreation.

B. Monitoring Actions

Initially telemetric collars would be attached to mountain lions and bobcats, depending on the availability for capture.

Capture areas would include water holes and grassland/savannas which are primary hunting areas for these animals. A small collar with a lithium powered transmitter would be placed around the animal's neck for monitoring of movements. In addition, physical measurements of the animals would be taken at time of capture, such as weight, age, sex, length, and general condition. Movements of all collared individuals would be monitored regularly, recording point locations on topographic maps. Pertinent information about behavior, weather, and other variables would also be documented.

C. Research Actions

Data on individual species observations would be correlated and analyzed. Maps of individual home range and territories would be assembled to determine the effects and extent of intraspecific competition on behavior. Denning areas would be identified as well as essential wildlife corridors which connect one primary habitat area to another.

Information obtained through this research would be included in technical reports for use in wildlife habitat management. These data would be assembled in text, maps and charts for easy use and would include recommendations for habitat acquisitions and protection.

D. Personnel: Wildlife Biologist and two technicians, 360 work days annually

E. Funding

	Year in Program Sequence				
	FY-1	FY-2	FY-3	FY-4	FY-5
Personal Services	$ 12,300	13,500	14,900	16,400	18,000
Other than Personal Services	32,500	11,600	12,800	14,100	15,500
TOTAL	$ 44,800	25,100	27,700	30,500	33,500
Funds Available in Park Base	-0-	-0-	-0-	-0-	-0-
Funds Requested from Region	$ 44,800	25,100	27,700	30,500	33,500

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I. SAMO, RM-10, COASTAL RESOURCE EXAMINATIONS

II. STATEMENT OF THE PROBLEM

Santa Monica Mountains National Recreation Area contains 46 miles of coastal resources that are among the most ecologically diverse in the nation, and which simultaneously receive the greatest recreational usage of any coastal unit in the National Park system. In 1980 visitation to the beaches numbered 27.5 million.

The onshore and nearshore resources of the Santa Monica Mountains coast have not been sufficiently investigated. Only a few definitive surveys or scientific studies have been done. During the 1969 Santa Barbara oil spill, Arroyo Sequit was chosen as a control site representing an undisturbed area containing little oil or other pollutants, to serve as a comparison to the spill site. Surveys of intertidal algae at several locations have also been conducted along the coast. The research determined that the greatest algal diversity, over 69 species, occurred at Little Sycamore Canyon (Dawson, 1965). The California State Water Resources Control Board determined that the portion of the coast from Mugu Lagoon to Latigo Point is biologically unique and one of the least impacted regions on the southern California margin. In 1979, it was designated an "Area of Special Biological Significance" by the State.

There are numerous coastal resources and ecological relationships that are of economic importance but are poorly understood. Ex-

amples are the relationship between the puerulus larvae of the spiny lobster (Panulirus interruptus) and surf grass (Phyllospadix torreyi), the degree to which the lagoons are used as nursery grounds by juvenile fishes, or how the structure and community dynamics of kelp beds respond to heavy recreational use or upland disturbances.

The relationship between coastal uplands, the beach areas, and nearshore areas is ecologically intimate and complex. Freshwater from the coastal drainages flows directly into the ocean. As upstream development intensifies, there is concommitant removal of native vegetation. The removal of chaparral cover exposes the soil, leading to increased erosion and subsequent sedimentation of stream courses and nearshore areas.

The sedimentation problem is particularly acute in Mugu Lagoon. At the mouth of the Calleguas Creek watershed, the lagoon has been receiving extremely high sediment loads during recent storm events. Some of the sediments are transported out of the lagoon by tidal action and normal water discharge. However, approximately 40 percent of the sediments are being deposited in the central arm of the lagoon and are filling it in. A similar problem exists in Malibu Lagoon. Management decisions regarding the best approach to manage the sedimentation problem are difficult, especially in the absence of definitive resource information.

Documentation of the effects of development, pollution, and varying levels and types of recreational use, and the attendant management decisions that must be made require comprehensive

and current information on the coastal resources themselves. Presently, the National Park Service does not have adequate information to make sound management decisions for the coastal resources.

The National Park Service is mandated (Public Law 95-625) "to preserve and enhance the scenic, natural and historical setting of the Santa Monica Mountains and adjacent coastline area." A comprehensive survey of coastal resources is needed to document the effects of different impacts on the unique biological resources in the coastal zone. The complex relationship between inland activities and coastal resources needs to be fully understood if the Congressional mandate is to be fulfilled.

Other Federal laws and executive orders which the National Park Service must comply with requiring extensive coastal monitoring and data include the National Environmental Policy Act of 1969 (NEPA); Endangered Species Act of 1973; the Coastal Zone Management Act of 1972; Executive Order 11988 of May 24, 1977 (Flood Plain Management); Executive Order 11990 of May 24, 1977 (Protection of Wetlands); and Executive Order 11752 (Prevention, Control and Abatement of Environmental Pollution at Federal Facilities).

III. ALTERNATIVE ACTIONS AND THEIR PROBABLE IMPACTS

A. Continue Present Status

Presently, information and monitoring of coastal resources is limited and is conducted by several agencies. Assessments of actual upland activities on coastal processes are insuffi-

cient to address a comprehensive resource management approach. Due to the inadequate data and understanding of these coastal processes, it would be difficult to preserve and maintain the ecological integrity of the Santa Monica Mountains coastal area.

B. Conduct Comprehensive Coastal Studies

The National Park Service would establish a comprehensive, long-term coastal ecology research program. Coastal resources would be identified, monitoring points to determine the impacts of various human activities would be identified, and populations of significant indicator species observed for signs of damage or poor health.

This alternative requires significant increases in funding and staffing for monitoring to be conducted and the analyses of data to be completed. While the National Recreation Area needs the information, and its research potentials would be of great educational benefit to the more than 125 colleges and universities within the area, this alternative is not feasible at this time because of the limited funds available for a program of this nature.

C. No Action

No action would effectively mean that the National Park Service would be making a host of management decisions in a total void of information about coastal resources. The agency could not have a viable role in managing the coastline.

No action is not a viable alternative because the National Park Service would then fail to fulfill its Congressional mandates for the Santa Monica Mountains and adjacent coastline, as outlined in the enabling legislation. It would also fail to meet other resource objectives prescribed by Federal laws.

D. Cooperative Coastal Resources Management Program

The National Park Service would survey existing information and research activities on coastal resources of the Santa Monica Mountains. Other agencies with direct coastal management responsibilities, including the California Department of Fish and Game, the Southern California Coastal Water Resources Program, the California State Water Quality Control Board, the California Coastal Commission, the California Department of Parks and Recreation, and the Bureau of Land Management, would be contacted for input and resources information. A network for coastal resources could then be established that would lead to cooperative effort including establishment of monitoring stations onshore and nearshore, educational programs, and research activities that are conducted on a comprehensive ecosystem basis.

This alternative is the preferred course of action. A baseline survey of existing records and information, combined with a vigorous cooperative effort, would be the most effective method of dealing with the complexity of the coast in an ecologically comprehensive manner.

IV. RECOMMENDED COURSE OF ACTION

A. Resource Management Actions

1. Survey of Existing Information and Research

During the first fiscal year, an extensive baseline survey of existing coastal resources would be conducted. This includes an assessment of unique biota and ecological processes, location of rare and endangered species, and the identification of localities and species that require monitoring.

Data acquired would provide a baseline against which environmental assessments could be made, and would make it possible to identify necessary cooperative programs and research needs for coastal preservation.

Of particular importance would be the acquisition of historical information about wetlands and the feasibility of reclamation, a documentation of the distribution of coastal flora and fauna, such as the coastal strand of sand dunes, and a survey of academic institutions and researchers.

2. Survey of Jurisdictions and Other Resource Management Policies Affecting the Santa Monica Mountains Coast

Because of the complexities of both the coastal resources and jurisdictions on the coast, and the extensive cooperative nature of the National Recreation Area, it is essential for the National Park Service to know how the re-

sources are divided institutionally. An important part of this project would be an examination of oil spill contingency plans of various agencies and oil companies and a determination of the role, if any, that the National Park Service should play in the event of a spill. Another important component of these studies would be the development of a cooperative network and contingency plan for dealing with beached or stranded coastal animals and other resource problems that may arise.

B. Monitoring Actions

Cooperative coastal monitoring would be required at several points along the coast. Populations of indicator species of organisms would be analyzed periodically to determine coastal resource status. This includes correlations with sedimentation, water quality, or effects of recreational use to determine associated impacts upon the coastal resources. The California State Water Quality Control Board recommended that the following species be monitored: giant kelp (Macrocystis punfera); gray tube worm (Diopatra ornata); surf grass (Phyllospadix torreyi): sand dollar (Dendraster excentricus); halibut (Paralichthys californicus); and the pismo clam (Tirela stultorum). Areas targeted for monitoring would include Nicholas Canyon, Paradise Cove, Zuma Beach and Mugu Barrier Beach. In addition, upland areas would need to be identified for species monitoring and photo observation points chosen for monitoring.

C. Research Actions

Priority research actions would include investigation into the relationship between surf grass, spiny lobster larvae, and recreational use, and the degree to which other larvae, particularly of economically important fish species, may be affected by certain kinds and intensities of recreation use and pollution.

All findings will be published in yearly research summaries.

D. Personnel: Wildlife Biologist and two technicians, 260 work days each year for both technicians

E. Funding

	Year in Program Sequence				
	FY-1	FY-2	FY-3	FY-4	FY-5
Personal Services	$ 24,500	27,000	29,700	32,700	36,000
Other than Personal Services	$ 19,100	13,600	15,000	16,500	18,100
TOTAL	$ 43,600	40,600	44,700	49,200	54,100
Funds Available in Park Base	-0-	-0-	-0-	-0-	-0-
Funds Requested from Region	$ 43,600	40,600	44,700	49,200	54,100

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I. SAMO, RM-11, BIRD POPULATION DYNAMICS AND HABITAT UTILIZATION

II. STATEMENT OF THE PROBLEM

The Santa Monica Mountains coast and nearby upland habitats represent a relatively undisturbed segment of the California coastline. A wide variety of bird species are observed in the coastal area every year as they migrate along the Pacific Flyway. This migratory pathway follows the Pacific Coast from the Arctic to South America.

Coastal wetlands along the migratory route of the Pacific Flyway contain vital habitat for waterfowl and other avian species. These wetlands provide food, resting area, and space for the migratory species, thus serving to minimize the degree of mortality. However, over 91 percent of California's original wetlands have been filled or destroyed, a loss which is acutely experienced in southern California where wetlands were historically rare (Onuf, 1978).

Two significant wetland areas along the flyway, Mugu Lagoon and Malibu Lagoon, are within the boundary of the National Recreation Area. Mugu Lagoon is the most pristine wetland remaining in southern California and approximately 225 species of migratory birds frequent the lagoon proper and the nearby uplands. Malibu Lagoon, impacted by development activities, is utilized by about 262 migratory species, of which 50 are known to be resident breeding birds. Because many of the migratory bird species

cross international boundaries during their yearly odyssey, these two coastal wetland areas are of international significance. Endangered migratory bird species that have been observed at these lagoons include Belding's savanna sparrow (Ammodramus sandwichensis beldingi), the California least tern (Sterna albifrons browni), lightfooted clapper rail (Rallus longirostris levipes), and the brown pelican (Pelacanus occidentalis californicus). In addition, golden eagles (Aquila chrysaetos), a legislatively significant species, are occasionally seen in the coastal zone. Additionally, more than 40 species of rare birds have been sighted with some regularity between Mugu Lagoon and the Malibu Coast.

The National Park Service has been mandated by Congress to manage the Santa Monica Mountains and adjacent coastline in a manner that preserves and enhances scenic, natural and cultural resources (PL 95-625). The Migratory Bird Treaty Act of 1974 listed 801 species of migratory birds to receive some form of protection. Of these, 348 species, or 43 percent, have been sighted in the Santa Monica Mountains.

As development pressures and competing land uses escalate, it will become important to understand which habitats are essential to a continuation of avifauna populations, so that appropriate actions can be taken to avert or mitigate the loss of habitats. The relationship between upland habitats and coastal wetlands is not well-understood, and current research effort is insufficient. Yet, the destruction of wetland habitat, including riparian

habitat, has had an untold effect on the avifauna and other life forms which utilize the coastal area.

Other Federal laws and executive orders relative to migratory birds in the Santa Monica Mountains include the National Environmental Policy Act of 1969 (NEPA); Endangered Species Act 1973; the Coastal Zone Management Act of 1972; Executive Order 11990 of May 24, 1977 (Protection of Wetlands); Executive Order 11988 of May 24, 1977 (Flood Plain Management); Fish and Wildlife Coordination Act of 1958; Fish and Wildlife Conservation Act of 1980; Bald and Golden Eagle Protection Act of 1940; Convention for the Protection of Migratory Birds and Game Mammals, Treaty between the U. S. and Mexico, February 7, 1936; and Convention for the Protection of Migratory Birds and Birds in Danger of Extinction and their Environment, Treaty between the U. S. and Japan, March 4, 1972.

III. ALTERNATIVE ACTIONS AND THEIR PROBABLE IMPACTS

A. Continue Present Status

Avifaunal observation and study of coastal species in the Santa Monica Mountains consists primarily of Audubon Christmas bird counts done once a year in December. There are currently scant efforts to obtain information on habitat utilization or seasonality of species and their abundance. Continuing the present status would mean that information and ecological understanding of the role of the Santa Monica Mountains for avifauna would continue to be limited in scope

and incomplete. Current information would continue to be disjunct and of limited use to management programs.

B. No Action

The no action alternative requires that the National Park Service effectively eliminate interest in the avifauna of the Santa Monica Mountains and knowledge of the ecological role the coastal resources have for the Pacific Flyway along the southern California coast. By adopting a "no action" alternative the National Park Service would fail to execute the Congressional mandate to preserve and enhance the resources of the Santa Monica Mountains. It would also become increasingly difficult to fully assess the impacts of human activities within the park boundary without adequate information.

C. Cooperative Avifauna Dynamics and Habitat Program

The National Park Service would establish a series of cooperative studies with the National Audubon Society, the U. S. Fish and Wildlife Service and the California Department of Fish and Game, the Point Reyes Bird Observatory and local universities. Involvement with various agencies and organizations would enable the appropriate avifaunal data to be acquired at several levels, and a more ecologically complete and habitat-oriented analysis could then be performed. The National Park Service would take the lead in designing a comprehensive avifaunal monitoring and habitat utilization program for long-term ecological research.

IV. RECOMMENDED COURSE OF ACTION

A. Resource Management Actions

The National Park Service would develop an extensive data base consisting of past observations, bird counts, and other existing information. Historical nesting sites for species which may be reintroduced, such as bald eagle or peregrine falcon (Falco peregrinus anatum), would be acquired. Nesting sites of birds currently breeding in the Santa Monica Mountains would be identified. These baseline data would be analyzed and a bird list for the Santa Monica Mountains would be prepared. This would be of particular use to bird-watchers, who constitute a major recreational user group. It would also be important to confirm the presence or absence of legislatively significant species on the coast, including the golden eagle.

B. Monitoring Activities

Observation sites. such as at Point Dume, Malibu Lagoon and Mugu Lagoon would be monitored on a regular basis for avi-faunal utilization. In addition, important habitat sites would be chosen and monitored for loss of vegetation cover, sedimentation, pollution and other forms of disruption.

C. Research Actions

A wide variety of related research actions would be implement-ed. The relationship between abundance and availability of

food sources, such as insects, sand crabs and juvenile fishes, and population dynamics of resident and migratory birds would be established. This would develop into a series of closely related long-term ecological studies.

Another series of research projects are required to arrive at a meaningful understanding of how habitat loss and modifications in the coastal zone effects selected resident and migratory bird species. Undisturbed control sites would be compared with similar sites in varying stages of disturbance and ecological succession. Each would be examined for species composition and distribution, habitat preferences, seasonal utilization and response to disruption.

To effectively execute long-term ecological research projects on avifaunal resources of such international significance, a fully cooperative program would include the National Park Service, U. S. Fish and Wildlife Service, the National Science Foundation, and the local jurisdictions and agencies, and local universities. Expertise, equipment and funding could be shared and coordinated over a long-term period to ensure completeness and continuity of research. Such research would make definitive management actions more plausible and possible.

D. Personnel: Wildlife Biologist and one technician and one graduate student, 260 work days per year

E. Funding

	Year in Program Sequence				
	FY-1	FY-2	FY-3	FY-4	FY-5
Personal Services	$ 24,500	27,000	29,700	32,700	36,000
Other than Personal Services	11,200	10,100	11,100	12,200	13,400
TOTAL	$ 35,700	37,100	40,800	44,900	49,400
Funds Available in Park Base	-0-	-0-	-0-	-0-	-0-
Funds Requested from Region	$ 35,700	37,100	40,800	44,900	49,400

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I. SAMO, RM-12, ANADROMOUS FISHERIES

II. STATEMENT OF THE PROBLEM

Anadromous fishes are those species that spend their adult lives in ocean waters but move into fresh waters to spawn. The young eventually migrate from the stream and into the open ocean. Salmon of the Pacific Northwest are a familiar anadromous fish.

The Santa Monica Mountains currently have the distinction of being the most southerly occurrence of self-sustaining steelhead populations on the Pacific coast. Steelhead rainbow trout (Salmo gairdnerii gairdnerii), a salmon relative, have been sighted spawning in Malibu Creek, Arroyo Sequit and Little Sycamore Canyon. It is likely that they also spawn in some of the other drainages, but additional research is required to verify this occurrence.

The Pacific lamprey (Lampetra tridentata) is another anadromous fish which spawns in the freshwater streams of the Santa Monica Mountains. Adult lamprey migrate from the ocean into a coastal stream where they build a nest in the gravel bottom. The eggs hatch into a larval form known as an ammocete. The ammocetes have been found in the coastal streams of the Santa Monica Mountains. Spawning runs of the Pacific lamprey are rare below Monterey Bay, California.

Some other fishes, such as stickleback and sculpin, are also known to migrate from the streams into the ocean for at least

one portion of their life history stages. However, due to a lack of research and insufficient data available regarding these anadromous fishes in the coastal area of the Santa Monica Mountains it is not known to what extent (if at all) these fishes may be present or where they may spawn. In addition, the overall composition of stream fauna is not known due to the lack of data. Endangered species (e.g., unarmored three-spined stickleback) may also be present.

Anadromous fishes are influenced by subtle changes in a stream's environmental conditions. Temperature, stream gradient, salinity, bottom type and dissolved oxygen are just some of the important factors that influence their distribution. In recent years the intensification of development pressures upstream has impacted flow regime, chemical character of streams, sedimentation, and natural riparian habitat. Some streams, such as Malibu Creek, have man-made obstructions which block upstream fish migration.

The Anadromous Fish Conservation Act of 1974 authorizes the Secretary of Interior to conduct biological surveys to improve stream habitat and spawning conditions for the protection of fishery resources and migration. The Act was passed for the purpose of conserving, enhancing and developing the anadromous fishery resource of the Nation. Title I of the Conservation Programs on Government Lands Act of 15 September 1960 directs the Secretary to plan, develop, maintain and coordinate programs for conservation and rehabilitation of wildlife, fish and game, which shall include habitat improvement projects.

The National Park Service has been mandated by Congress (Public Law 95-625) to manage the Santa Monica Mountains National Recreation Area in a manner that preserves and enhances its scenic, natural and cultural resources. Other Federal laws which the National Park Service must address in order to preserve the anadromous fish species in the Santa Monica Mountains include:

National Environmental Policy Act of 1969
Coastal Zone Management Act of 1972
Wildlife Restoration Act of 1937
Fish and Wildlife Coordination Act of 1958
Clean Water Act
Federal Aid in Wildlife Restoration Act

III. ALTERNATIVE ACTIONS AND THEIR PROBABLE IMPACT

A. Continue Present Status

Presently, the only research being conducted on the distribution of steelhead rainbow trout and their spawning and life cycle activities in streams of the Santa Monica Mountains consists of occasional observations by wardens of the California Department of Fish and Game. There are no tagging studies to determine returns of fish, larval or population measurements, or efforts to document other areas where fish may be spawning. The continued lack of research and knowledge of population ecology would lead to continued demise of the steelhead trout fishery and the loss of a popular recreational resource.

B. Anadromous Fsiheries Program and Habitat Enhancement Studies

The National Park Service would initiate a related series of

studies on the population dynamics and habitat requirements of steelhead rainbow trout in the coastal streams of the Santa Monica Mountains. Of particular importance would be an analysis of the health of the streams and the health of the populations, and management recommendations based on sound ecological analyses.

C. No Action

No action would allow the existing populations of anadromous steelhead rainbow trout to continue to dwindle and possibly become locally extinct. The National Park Service would have insufficient information upon which to base management decisions regarding anadromous fish and their protection. In addition, the National Park Service would fail to fulfill its Congressional mandates as well as resource objectives prescribed by other Federal laws and its own management guidelines. This is not a viable alternative.

IV. RECOMMENDED COURSE OF ACTION

A. Resource Management Actions

Develop a series of seasonal monitoring efforts to qualify and quantify spawning of steelhead rainbow trout and other anadromous fishes in the coastal drainages of the Santa Monica Mountains.

B. Monitoring Actions

Monitoring of stream quality, rainfall, and other environ-

mental conditions would be conducted. Correlations between specific environmental conditions and fish spawning and behavior would be formulated for management actions.

C. Research Actions

Research of specific physiological and ecological requirements of the anadromous fishes would be undertaken. Habitat recovery and population enhancement would be assessed and implemented if feasible.

D. Personnel: Wildlife Biologist and one technician and one graduate student, 260 work days per year

E. Funding

	Year in Program Sequence				
	FY-1	FY-2	FY-3	FY-4	FY-5
Personal Services	$ 24,500	27,000	29,700	32,700	36,000
Other than Personal Services	17,700	19,400	21,300	23,400	25,700
TOTAL	$ 42,200	46,400	51,000	56,100	61,700
Funds Available in Park Base	-0-	-0-	-0-	-0-	-0-
Funds requested from Region	$ 42,200	46,400	51,000	56,100	61,700

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I. SAMO, RM-13, COOPERATIVE RESOURCE MANAGEMENT PROGRAM

II. STATEMENT OF THE PROBLEM

The Santa Monica Mountains National Recreation Area was recognized by Congress as an area of national concern. The subject of national concern is land use practices. The management philosophy of the recreation area is aimed at cooperation of agencies and individuals, particularly residents and landowners, to achieve common goals. This philosophy, combined with the stated intent that all lands within the boundary will not be public lands, dictates a positive and active program commitment to work cooperatively with other landowners.

The overall character of the landscape and the health and viability of natural and cultural resources will, in large measure, be determined by the actions of numerous private landowners, and several land management and regulatory agencies. The National Park Service will have direct resource management authority on lands acquired in fee and, to a lesser extent, on acquired easements. However, this level of authority would be exercised on a predicted 40% of the recreation area. Other public agencies would continue to exercise authority over approximately 28% of the area, leaving about 32% in private ownership.

The essence of the problem for effective resource management in the recreation area is that natural resource dynamics occur irrespective of ownership boundaries. Catastrophic natural

events (fires, floods, landslides) are the most dramatic examples. However, trends in ecosystem health (population trends, air quality, status of endangered and threatened species, invasion of exotics) are no less important, although often more subtle.

Finally, the Santa Monica Mountains National Recreation Area General Management Plan, 1982, contains numerous statements to the effect that the National Park Service will actively pursue cooperative land stewardship and resource management programs.

III. ALTERNATIVE ACTIONS AND THEIR PROBABLE IMPACTS

A. Continue Present Status

The present activities in cooperative resource management are merely responsive in nature. Resource issues on lands outside National Park Service properties are only addressed when the Service is approached by an agency or individual and then usually dealt with in a superficial manner. Under this alternative, the Service would continue to prepare and execute projects only on National Park Service owned lands (including easements) but would not have the capability to actively engage in cooperative projects outside its jurisdiction. Unacceptable impacts to National Park Service lands and recreation opportunities would probably result. In addition, Congressional mandates and General Management Plan objectives would be met only minimally.

B. No Action

Under a no action alternative, the National Park Service would

exercise resource management authority and execute projects only on lands owned in fee or on acquired easement lands. Requests for assistance on resource management issues on all other lands in the area would be denied. No assistance to other agencies or to private landowners would be offered. Such action by the Service would directly conflict with Congressional mandates and stated management objectives for the recreation area. The health and perpetuation of Santa Monica Mountains ecosystems would probably suffer from a lack of coordinated management effort.

C. Cooperative Resource Management Program

Under this alternative, the National Park Service would actively pursue natural resource management activities in cooperation with other land management and land use regulatory agencies and private landowners within the recreation area boundary. Consensus on common management objectives would be sought and projects designed to meet those objectives.

The Natural Resource Management Plan and Program would become the focal point for addressing resource issues and formulating action plans to resolve resource management problems. With this approach, the health and viability of natural resources in the Santa Monica Mountains would be dealt with on the basis of ecosystem management principles and integrate landowner desires and needs with resource requirements. This alternative would also meet Congressional mandates in Public Law 95-625 and the management policies and objectives stated

in the Santa Monica Mountains National Recreation Area General Management Plan, 1982. This alternative will also require an increase in funding and personnel to carry out the program.

IV. RECOMMENDED COURSE OF ACTION

A. Cooperative Resource Management Program

A cooperative natural resource management program is necessary to integrate resource requirements and landowner needs. The National Park Service will assume leadership in pursuing a land management outreach program within the national recreation area. Landowners will be contacted and invited to participate in the formulation of resource management objectives and action plans to meet those objectives. Resource issues to be addressed include, but are not limited to: wildlife habitat enhancement, fire and flood hazard management, compatible landscape and architectural design, resource management grant programs, protection of cultural resources, private property rights, wildland management, monitoring and management of conservation easements, zoning and ordinance revisions, etc.

This program will require the following kinds of information and knowledge:

1. Basic natural resource information and an understanding of the requirements to maintain a healthy and viable ecosystem.

2. Basic cultural resource information and cultural resource preservation techniques and requirements.

3. Knowledge of various kinds of grants available to individuals and agencies to achieve land use and resource enhancement and protection goals, and the ability to assist in securing such grants.

4. The knowledge and application of landscape and design techniques to enhance aesthetic appeal and mitigate potential adverse aesthetic impacts.

5. Knowledge of land acquisition policies, procedures and options.

6. Ordinances, regulations and procedures of local jurisdictions.

7. Management and planning objectives for the recreation area.

8. Land protection techniques and options.

9. Natural hazard management techniques and options.

10. Probable impacts on private landowners that result from visitor use activities on public recreation lands.

B. Personnel

To execute this program, a land management outreach team will have to be organized. The team of specialists and technicians will provide expertise in the areas of knowledge and information listed above. Program goals and evaluation

of program effectiveness will be the responsibility of the Assistant Superintendent, Planning and Resource Management, the Land Resources Officer, and the Chief, Resource Management. Direct supervision of the program will be delegated to the Chief, Resource Management.

The following specialists and technicians will constitute the Outreach Team:

Land Management Specialist, GS-11, full-time permanent (new position). This person will organize and supervise the activites of the outreach team on a full-time basis.

Realty Specialists, full-time permanent (existing positions). They will provide land acquisition data on an as-neeeded basis as a result of their land acquisition duties in the Land Resources Division.

Grants Specialist, GS-9, full-time permanent (new position). This person will assemble information pertinent to the program, explain suitable grants to landowners, and assist in preparing grant applications.

Landscape Architect, GS-9, full-time permanent (new position). This position will be in the Division of Professional Services and will be called upon as needed to consult with landowners on aesthetic issues and concerns, suggest design modifications and objectives, and assist in management of scenic easements.

Cultural Resource Specialist, GS-9, full-time permanent (new position). This person will serve part-time on the team to work with landowners in identifying cultural resource values, and to recommend means to protect resources.

Forester, GS-9, full-time permanent (existing position). The forester will contribute vegetation management expertise on an as-needed basis.

Biologist, GS-9, full-time permanent (new position). The biologist will contribute wildlife management expertise on an as-needed basis.

Graphics Technician, GS-5, less-than-full-time (new position). This position would be a student intern or co-op arrangement to be filled year-round on a rotating basis to provide graphic and cartographic assistance to the team.

Resource Management Technician, GS-5, full-time permanent (new position). This technician would provide support and assistance to other members of the team as required.

C. Funding

	Year in Program Sequence				
	FY-1	FY-2	FY-3	FY-4	FY-5
Personal Services	$ 97,000	106,700	115,000	127,000	140,000
Other than Personal Services	25,500	25,500	28,000	30,900	34,000
TOTAL	$ 122,500	132,200	143,000	157,900	174,000
Funds Available in Park Base	$ 22,400	22,400	22,400	22,400	22,400
Funds requested from Region	$100,100	109,800	120,600	135,500	151,600

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I. SAMO, RM-14, ENDANGERED PLANT SURVEY

II. STATEMENT OF THE PROBLEM

An endangered plant survey will provide information about the distribution and abundance of sensitive species in the National Recreation Area. A complete project statement will be developed at a later date.

III. ALTERNATIVE ACTIONS AND THEIR PROBABLE IMPACTS

An alternative action summary will be developed when the project statement is completed.

IV. RECOMMENDED COURSE OF ACTION

A. Resource Management Actions

The study will locate each population of plants and measure population size. Detailed site maps and habitat descriptions will be prepared for each population. Sources of impact to sites will be determined to prevent losses. Censuses will be conducted each year to ensure protection of the plants. A complete literature file for each species will be developed for management, research, and education purposes. A close liaison will be developed with the California Native Plant Society and the California Department of Fish and Game with its concern for formally State designated sensitive plants.

B. Personnel: Forester and Park Ranger (Visitior Services)

C. Funding

		Year in Program Sequence				
		FY-1	FY-2	FY-3	FY-4	FY-5
Personal Services	$	-0-	-0-	-0-	-0-	-0-
Other than Personal Services		10,000	11,000	12,100	13,300	14,600
TOTAL	$	10,000	11,000	12,100	13,300	14,600
Funds Available in Park Base	$	-0-	-0-	-0-	-0-	-0-
Funds requested from Region	$	10,000	11,000	12,100	13,300	14,600

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NATURAL RESOURCES PERSONNEL PROGRAMMING SHEET

PROJECT NUMBER	PARK PRIORITY	PROJECT TITLE	PERMANENT PERSONNEL	FULL TIME EQUIVALENCE	SEASONAL POSITIONS	FULL TIME EQUIVALENCE
RM-1	1	Natural Resource Information System	Natural Resource Management Specialist	0.15	None	0.0
RM-2	2	Water Resource Examinations	Natural Resource Management Specialist	0.15	1 Technician	0.4
RM-3	3	Water Quality Monitoring	Natural Resource Management Specialist	0.15	1 Technician	0.7
RM-4	5	Re-establish Valley Oak Savanna Complex	Forester	0.25	1 Technician and 1 Graduate Student	1.0
RM-5	7	Air Quality Monitoring	Natural Resource Management Specialist	0.15	1 Technician	0.7
RM-6	4	Monitor Fuel Characteristics of Vegetation	Forester	0.25	3 Technicians	1.0
RM-7	6	Cliff Nesting Raptor Survey	Wildlife Biologist	0.15	1 Technician	1.0
RM-8	8	Acid Deposition Program	Natural Resource Management Specialist	0.15	1 Technician	0.5
RM-9	9	Predator Studies	Wildlife Biologist	0.15	2 Technicians	1.4
RM-10	10	Coastal Resource Examinations	Wildlife Biologist	0.15	2 Technicians	2.0
RM-11	12	Bird Populations	Wildlife Biologist	0.15	1 Technician and 1 Graduate Student	2.0

NATURAL RESOURCES PERSONNEL PROGRAMMING SHEET

PROJECT NUMBER	PARK PRIORITY	PROJECT TITLE	PERMANENT PERSONNEL	FULL TIME EQUIVALENCE	SEASONAL POSITIONS	FULL TIME EQUIVALENCE
RM-12	11	Anadromous Fisheries	Wildlife Biologist	0.15	1 Technician and 1 Graduate Student	2.0
RM-13	13	Cooperative Resource Management Program	Land Management Specialist	0.75	None	0.0
RM-14	14	Endangered Plant Studies	Forester	0.25	None	0.0

NATURAL RESOURCES BUDGET PROGRAMMING SHEET

PROJECT NUMBER	PARK PRIORITY	PROJECT TITLE	FY-1	FY-2	FY-3	FY-4	FY-5	FORM NUMBER	DATE	CONTRACT NUMBER
RM-1	1	Natural Resource Information System	61,900	41,900	27,400	30,000	33,100			
RM-2	2	Water Resource Examinations	14,600	16,100	17,800	19,600	21,600			
RM-3	3	Water Quality Monitoring	27,700	30,500	33,600	37,000	40,700			
RM-4	5	Re-establish Valley Oak Savanna Complex	32,500	21,400	23,600	26,000	28,600			
RM-5	7	Air Quality Monitoring	16,000	13,200	14,600	16,000	17,600			
RM-6	4	Monitor Fuel Characteristics of Vegetation	30,000	33,000	36,300	39,900	43,900			
RM-7	6	Cliff Nesting Raptor Survey	25,500	27,500	30,300	33,300	36,600			
RM-8	8	Acid Deposition Program	28,500	13,700	15,100	16,600	18,300			
RM-9	9	Predator Studies	44,800	25,100	27,700	30,500	33,500			
RM-10	10	Coastal Resource Examinations	43,600	40,600	44,700	49,200	54,100			
RM-11	12	Bird Populations	35,700	37,100	40,800	44,900	49,400			

NATURAL RESOURCES BUDGET PROGRAMMING SHEET

PROJECT NUMBER	PARK PRIORITY	PROJECT TITLE	FY-1	FY-2	FY-3	FY-4	FY-5	FORM NUMBER	DATE	CONTRACT NUMBER
RM-12	11	Anadromous Fisheries	42,200	46,400	51,000	56,100	61,700			
RM-13	13	Cooperative Resource Management Program	122,500	132,200	143,000	157,900	174,000			
RM-14	14	Endangered Plant Studies	10,000	11,000	12,100	13,300	14,600			
		TOTAL BUDGET	535,500	489,700	518,000	570,300	627,700			

Environmental Assessment

ENVIRONMENTAL ASSESSMENT

I. INTRODUCTION

The Draft Natural Resource Management Plan (NRMP) for Santa Monica Mountains National Recreation Area summarizes the ecological resources of the Santa Monica Mountains and adjacent seashore. The area contains prime examples of southern California's varied natural features that represent, within the context of the National Park System Plan (1972), important characteristics of the biogeographical province called the "South Pacific Border Region." Many of the characteristics are not found in other preserves and parks in the same region.

While many portions of the National Recreation Area are relatively "pristine" in ecological integrity, other sections are beginning to experience varying degrees of pressure from urbanization. A spectrum of land uses, from intense visitor use to extensive removal of natural habitat, are represented. Additionally, the area includes varying levels of interest of a multiplicity of jurisdictions. Extensive cooperative efforts between other agencies, jurisdictions, and the National Park Service will be required for effective resource management and enhancement of the unit's diverse natural values.

II. PROJECT PURPOSE AND NEED

The NRMP is based upon current information and cursory surveys of the biological and physical environments. It is proposed as a

guide for resource management actions, and is required by the National Park Service of all its units with natural resources. Overall purposes and management goals are set forth in the park's enabling legislation, Public Law 95-625. The goals of the NRMP have also been formed in response to several other laws, directives and policies that include the following:

Organic Act 1916
Clean Air Act (1977 Amendments)
National Environmental Policy Act of 1969
Endangered Species Act of 1973
Coastal Zone Management Act of 1972
National Historic Preservation Act of 1966
Wildlife Restoration Act of 1937
Fish and Wildlife Coordination Act of 1958
Federal Aid in Wildlife Restoration Act
Fish and Wildlife Conservation Act of 1980
Bald and Golden Eagle Protection Act of 1940
Convention for the Protection of Migratory Birds and Game Mammals (U. S. - Mexico, 7 February 1936)
Migratory Bird Treaty Act of 1974
Anadromous Fishes Conservation Act of 1974
Conservation Programs on Government Lands Act of 15 September 1960 (Title I)
National Trail Systems Act
Clean Water Act
National Park Service Plan of 1972
Land and Water Conservation Fund Act
Executive Order 11593 (Protection and Enhancement of the Cultural Environment)
Executive Order 11988 (Flood Plain Management 27 May 1977)
Executive Order 11990 (Protection of Wetlands 27 May 1977)
Executive Order 11752 (Prevention, Control and Abatement of Pollution at Federal Facilities)

III. PREFERRED ALTERNATIVE: IMPACTS AND MITIGATIONS

The preferred alternative is to adopt the NRMP as proposed and implement the resource management activities as soon as possible.

Within each resource management project, the preferred alternative is to effect as much in the way of cooperative projects as possible.

Several agencies and organizations in southern California already collect data on Santa Monica Mountains resources. The National Park Service will augment and complement these efforts. Extensive cooperation will allow maximum efficiency in resource management and make it possible to acquire essential information within a reasonable time frame. The costs of implementing the projects, both in personnel hours and capital costs, will be minimized for all agencies through cooperation.

Essentially, the projects do not involve significant environmental impacts. All of them propose extensive data gathering so the information for assessing resource degradation is available, and impacts are anticipated and averted. Directions for habitat enhancement and recovery will be guided by the information gleaned during the initial stages of implementation.

Projects with minimal or no impacts include coastal resource examinations, bird populations studies, anadromous fishes studies, air quality monitoring, natural resource information system, water quality monitoring, acid deposition program and water quality monitoring, and re-establishing oak-savanna grassland on negatively impacted areas on National Park Service properties. Other projects may lead to a variety of significant impacts on faunal populations if not conducted correctly. These include the: 1) fuel monitoring program, 2) predator monitoring, 3) raptor studies, and 4) anadromous fish enhancement. Reproductive success, behavioral patterns, and utilization of habitats could be affected. It is anticipated that following the initial data

gathering phases and preparations, additional environmental documentation will be prepared for monitoring phases of each project and will include specific plans for conducting additional research. Other resource management activities may be proposed as information is brought to light.

IV. OTHER ALTERNATIVES CONSIDERED

A. No Action

A "no action" alternative was evaluated for each proposed project and it was determined that the National Park Service would continue to have little or no information upon which to base resource management descisions, or to adequately assess resource status. "No action" would make achievement of the mandates of the enabling legislation impossible, and is therefore unacceptable.

B. Continue Present Status

Continuing present status would be essentially the same as a "no action" alternative. The National Park Service would be required to continue acquiring disjunct and incomplete information generated by other groups and agencies. Additional data would be sought by present staff only as time permits. This is not considered an acceptable alternative.

C. Non-cooperative Alternative

Another alternative was for the National Park Service to undertake its own resources projects in a comprehensive series of studies. This alternative would not be in keeping with the legislative mandate and would preclude maximum agency

and jurisdictional cooperation. It would also be more costly than cooperative programs.

V. CONSULTATION AND COORDINATION

The following organizations were contacted during the development of the Natural Resources Management Plan:

Bureau of Land Management, Outer Continental Shelf Office
California Air Resources Board
California Coastal Commission
California Department of Fish and Game
California Department of Parks and Recreation
California Native Plant Society
California State University, Dominguez Hills
California State University, Fullerton
California State University, Los Angeles
Greater Los Angeles Council of Divers
Los Angeles City Planning
Los Angeles County Fire Department
Los Angeles County Flood Control
Los Angeles County Health Department
Los Angeles County Museum of Natural History
Los Angeles County Planning
National Marine Fisheries Service
National Park Service, Acid Deposition Program Office
National Park Service, Denver Service Center,
Remote Sensing and Science Sections
National Park Service, Western Regional Office
Pierce College
Point Reyes Bird Observatory
Santa Barbara Museum of Natural History
Santa Monica College
Santa Monica Mountains National Recreation Area Advisory Commission
South Coast Air Pollution Control District
Southern California Academy of Sciences
Southern California Coastal Waters Resources Project
Thousand Oaks, City Planning
U. S. Army Corps of Engineers
U. S. Fish and Wildlife Service
U. S. Forest Service, Southwest Forest and Range Experiment Station
U. S. Geological Survey
U. S. Naval Missile Test Center, Point Mugu
University of California, Los Angeles
University of California, Santa Barbara
University of Southern California
Urban Wildlife Management Institute
Ventura County Planning
Western Foundation for Vertebrate Zoology

IMPACT CATEGORIES

PROJECT STATEMENT TITLE: NATURAL RESOURCE INFORMATION SYSTEM

NEED FOR THE PROPOSAL: Establish and develop a natural resource inventory which will enable sound management decisions to be made from comprehensive, accurate and up to date natural resource information utilizing an automated computer format.

ALTERNATIVE ACTIONS / IMPACT CATEGORIES	PROPOSED ACTIONS C. Develop a natural resource information system	NO ACTION B. No action	ALTERNATIVE C. Continue present status	ALTERNATIVE
Resources	A complete understanding of the resource status within the mountains can be formulated. Resource data bases will be established for analyses	Natural resources will continue to be threatened as data will not be available for analyses	Natural resources could not be completely protected as insufficient data analyses would result from incomplete data bases, and limited staff would be available for analysis of these data	
Ecosystem Preservation	Natural resource data would be correlated by statistical analyses and resource maps generated to insure proper consideration is given for resource preservation and protection	Insufficient data will hinder effective resource protection	A comprehensive approach to ecosystem preservation would be impossible due to lack of complete data bases for analysis	

PROJECT STATEMENT TITLE: NATURAL RESOURCE INFORMATION SYSTEM (Continued)

	PROPOSED ACTIONS	NO ACTION	ALTERNATIVE	ALTERNATIVE
Human Activities	National Park Service would have an efficient way of mapping, documenting and updating human activities within the mountains	National Park Service would not have data available for analyses of human impacts on the resources	National Park Service would have limited knowledge of human impacts, but could not insure comprehensive resource protection	
Legislative and Other Legal Mandates	National Park Service will have the best data bases available in order to fulfill Public Law 95-625 and attendant resource laws and policies	National Park Service will have no data available for resource protection and therefore will fail to fulfill Public Law 95-625 to preserve and enhance the natural resources	Limited data will be available for analyses, but a comprehensive approach to resource preservation as mandates by Congress cannot be formulated	

PROJECT STATEMENT TITLE: WATER RESOURCE EXAMINATIONS

NEED FOR THE PROPOSAL: Monitor stream discharges to acquire baseline data to determine hydrologic outputs, develop stage/discharge relationships and determine impacts to the hydrologic flow regime for resource protection and management decisions.

ALTERNATIVE ACTIONS / IMPACT CATEGORIES	PROPOSED ACTIONS	NO ACTION	ALTERNATIVE	ALTERNATIVE
	Cooperative Water Quantity Program	No action	Continue present status	Establish NPS water quantity monitoring program
Resources	Monitoring surface discharges from watersheds will enable comprehensive data to be collected which will enhance resource preservation. Cooperative program will insure acquisition of accurate hydrologic data representative of resource dynamics.	Water discharges would not be monitored, hydrologic outputs not understood, and adequate resource protection impossible.	Limited discharge data on two major watersheds would be obtained. However, ecosystem dynamics regarding hydrologic outputs would not be completely understood due to the limited nature of these data.	Same as the proposed action. However, increased funding and personnel are required to implement this alternative.
Recreation	Stream discharges, including peak flows during flooding would be known and applied to develop recreation plans which would promote public safety and encourage recreation during safe stream conditions.	The NPS could not develop comprehensive recreational plans considering peak stream discharges and public recreation.	Limited data on only two stream courses could be analyzed and discharge relationships formulated. Discharge from remainder of water courses would be unknown, could not be considered in recreation planning.	Same as the proposed action
Legislative Mandate	The NPS would satisfy P. L. 95-625 and other Federal/State laws regarding flood plains and stream courses.	The NPS would not completely satisfy P. L. 95-625 or other Federal /State laws pertaining to flood plains and stream courses.	Same as "No action"	Same as the proposed action

PROJECT STATEMENT TITLE: WATER QUALITY MONITORING

NEED FOR THE PROPOSAL: Establish a water quality monitoring program to assure that the quality of SAMO's waters are of sufficient purity to prevent ecological damage or deterioration of ecosystems, and to promote healthful public recreation sites for park visitors.

ALTERNATIVE ACTIONS / IMPACT CATEGORIES	PROPOSED ACTIONS	NO ACTION	ALTERNATIVE	ALTERNATIVE
	Cooperative water quality monitoring program	No action	Continue present status	Establish NPS water quality monitoring program
Establish Baseline Water Quality Data Base	NPS will obtain water quality data necessary for proper resource preservation and management.	No water quality data or existing data sets will be obtained.	Obtain limited historical data for Malibu, Topanga and Calleguas Creeks; other watersheds will not be analyzed.	Same as the proposed action except funding and staffing requirements must be increased.
Monitor Water Quality Parameters	Monitor major anions/cations of inorganics, organics, trace elements, pesticides, nitrates, phosphates, DO, pH, and specific conductance; analysis of these data to provide management recommendations for ecosystem preservation and recreation.	No analysis or data will be collected for water quality parameters within SAMO.	NPS will obtain the limited data for Malibu, Topanga, and Calleguas Creeks, for management actions and resource protection. Remainder of watershed will not be analyzed.	Same as the proposed action except staffing and personnel requirements will increase.

PROJECT STATEMENT TITLE: WATER QUALITY MONITORING (Continued)

	PROPOSED ACTIONS	NO ACTION	ALTERNATIVE	ALTERNATIVE
Recreation Values	NPS will know water quality parameters for application to recreational opportunities within SAMO.	Lack of data could impact public health values for those visitors who recreate in SAMO's water resources which are polluted.	Limited knowledge regarding the water quality of selected streams would be known for application to formulating recreation opportunities.	Same as the proposed action.
Natural Resource Needs	Enables water pollution trend analysis to be formulated, comparisons can be generated for historic vs. contemporary water quality parameters, and significance of observed concentrations can be made to form management recommendations for natural resource preservation.	Insufficient hydrologic data would hinder effectiveness of NPS to insure resource protection.	Limited resource protection would occur only in areas where data has been collected.	Same as proposed action; however, staffing/budget increases would be required.
Legislative Mandate	NPS fulfills Public Law 95-625.	NPS fails to fulfill Public Law 95-625.	NPS partially satisfies Public Law 95-625.	NPS fulfills Public Law 95-625.

PROJECT STATEMENT TITLE: RE-ESTABLISH VALLEY OAK SAVANNA

NEED FOR THE PROPOSAL: Restore natural vegetation to impacted areas within recently acquired NPS lands to demonstrate NPS resource management policies and maintin aesthetic natural environments.

ALTERNATIVE ACTIONS IMPACT CATEGORIES	PROPOSED ACTIONS Set aside limited areas on NPS lands for native vegetation rehabilitation projects	NO ACTION No action	ALTERNATIVE Continue present status	ALTERNATIVE
Resources	Native grasslands and California valley oaks will be restored to a natural condition and preserved for the future.	Destruction will continue and the valley oak could locally become extinct.	Partial protection of limited areas containing native vegetation will occur.	
Recreation	Restoration of native landscape will enhance the recreation experience for the park visitor.	The park visitor will not gain insight into the valley oak/grassland ecosystem dynamics.	Same as no action.	
Legislative and other Legal Mandates	The NPS will fulfill Public Law 95-625 to preserve and perpetrate the natural resources of the mountains.	The NPS will fail to fulfill the Congressional mandate.	Same as no action.	

PROJECT STATEMENT TITLE: AIR QUALITY MONITORING

NEED FOR THE PROPOSAL: Baseline air quality monitoring program is required to provide data for management actions, to develop plans to prevent the significant deterioration of the air quality within the Santa Monica Mountains, to assist with attempts to improve air quality parameters and provide input for recreation plans for public health values.

ALTERNATIVE ACTIONS / IMPACT CATEGORIES	PROPOSED ACTIONS	NO ACTION	ALTERNATIVE	ALTERNATIVE	ALTERNATIVE	ALTERNATIVE
	Cooperative air quality monitoring program, document visual aspects and begin quantification of air parameters	B. No action	A. Continue present status	C. Document visual air quality conditions	D. Quantify visual impacts	E. Cooperative air quality monitoring program
Establish Baseline Air Quality Data Base	Data will be collected monitoring air quality parameters (reactive and non-reactive); visual impacts and quantification of air quality will begin.	No data will be collected; management recommendations cannot be made based on fact, and SAMO's air quality will continue to degrade.	NPS will analyze data collected by State Air Resources Board, but will lack data pertinent to SAMO.	35mm slides will record visual pollution impact; however, quantification will be impossible for management purposes.	A telephotometer will quantify the light scatter associated with the air pollution in SAMO. Recommendation can be made to management in regard to preserving air quality of SAMO.	Air quality monitoring will document air parameters for reactive and non-reactive pollutants throughout the year at continuous monitoring stations.
Natural Resources	Data base will be established in order to quantify air quality and its impacts on the vegetation, wildlife, water and coastal resources.	No data analysis or collection will occur and SAMO's air quality will continue to degrade.	ARB will monitor air quality parameters outside Santa Monica Mountain Zone but data will not be present to formulate policy nor determine impact on SAMO's natural resources.	Visual air quality degradation will be documented. Impacts on the natural resources cannot be made.	Air quality degradation will be quantified, giving support to natural resources preservation programs; however, specific pollutants cannot be identified.	Specific pollutant levels for SAMO's air parameters will be documented to provide comprehensive data to assess impacts of air pollution in vegetation, wildlife, coastal and water resources.

PROJECT STATEMENT TITLE: AIR QUALITY MONITORING (Continued)

	PROPOSED ACTIONS	NO ACTION	ALTERNATIVE	ALTERNATIVE	ALTERNATIVE	ALTERNATIVE
(Recreation)	Comprehensive Air Quality data will enable recreation plans to be developed which will take air quality parameters into consideration prior to programming activities.	Potential health hazards could exist based on unhealthful air conditions.	Same as no action.	Visual impacts on recreation can be assessed providing information to park planners on areas where air quality is better for scenic visits and recreation potential.	Limited quantification of pollution levels will be of value for developing recreational opportunities.	Air quality parameters will be known within SAMO and can be correlated with those monitored in the L.A. Basin to develop times when recreation should be limited, based on a public health threat.
(Legislative Mandate)	NPS satisfies Public Law 95-625.	NPS fails to satisfy Public Law 95-625.	NPS partially fulfills Public Law 95-625.	NPS partaially satisfies Public Law 95-625.	NPS partially satisfies Public Law 95-625.	NPS satisfies Public Law 95-625.

PROJECT STATEMENT TITLE: FIRE FUEL MONITORING PROGRAM

NEED FOR THE PROPOSAL: The Santa Monica Mountains NRA has the most explosive fire conditions of any NPS unit, interfaced with the most expensive homes in the United States. Innovative fuel management strategies are necessary with good data bases to support local fire suppression agencies.

ALTERNATIVE ACTIONS / IMPACT CATEGORIES	PROPOSED ACTIONS	NO ACTION	ALTERNATIVE	ALTERNATIVE
	Cooperative fuel monitoring program between NPS and L. A. County Fire Department	No action	Continue present status	
Resources	Data will be collected for live fuel moisture and weather to determine site-specific fuel moistures. Vegetation/ fuel type maps will be prepared.	Data will not be collected for live fuel moisture and weather, and maps will not be prepared.	Limited data will be collected and partial vegetation maps will be prepared.	
Recreation	Data will enable more precise determination of park closures due to fire danger to visitors.	Potential threat to life of park visitors if no action is pursued.	Recreation opportunity for public may be decreased due to restrictive fire management policies.	
Legislative and Other Legal Mandates	Will enable resource management to prepare more comprehensive data base for resource preservation in accordance with Public Law 95-625.	National Park Service fails to fulfill Congressional mandate.	National Park Service partially fulfills Congressional mandate.	

PROJECT STATEMENT TITLE: CLIFF NESTING RAPTOR SURVEY

NEED FOR THE PROPOSAL: Develop a comprehensive program for surveying, assessing and monitoring cliff nesting raptors and provide management recommendations to insure species preservation.

ALTERNATIVE ACTIONS / IMPACT CATEGORIES	PROPOSED ACTIONS	NO ACTION	ALTERNATIVE	ALTERNATIVE
	NPS Raptor Survey		Continue present status	Cooperative Raptor Survey Program
Resources	Monitoring activities by helicopter would briefly disturb nesting birds; however, impact would be minimal as determined by NPS research.	Management decisions would be based on insufficient knowledge.	Only species located in accessible areas would be monitored.	
Recreation	Park visitors would have greater awareness of raptor population through interpretive programs utilizing this data.	There would be no benefit to the visiting public or environmental education programs.	Limited information could be furnished to benefit visitor enjoyment/environmental education.	Same as proposed action.
Legislative Mandates	NPS would partially satisfy P. L. 95-625 to preserve the natural resources of the Santa Monica Mountains.	NPS would not completely satisfy P. L. 95-625.	NPS would not completely satisfy P. L. 95-625.	Same as proposed action.

PROJECT STATEMENT TITLE: ACID DEPOSITION PROGRAM

NEED FOR THE PROPOSAL: To determine and monitor acid deposition within the Santa Monica Mountains, to preserve, protect, and enhance air quality for the Santa Monica Mountains, make recommendations to the State Air Resources Board toward air quality improvements, and to determine impacts of acid deposition on a Mediterranean-type ecosystem.

ALTERNATIVE ACTIONS / IMPACT CATEGORIES	PROPOSED ACTIONS C. Cooperative Acid Deposition Program	NO ACTION B. No action	ALTERNATIVE A. Continue present status	ALTERNATIVE D. NPS establish acid deposition program
Establish Monitoring Program	Baseline data would be obtained to determine extent of acid deposition in the Santa Monica Mountains, and concentrations of these acid depositions.	No data would be collected and NPS would not have sufficient data available to manage and preserve the natural resources of the mountains.	Same as the no action alternative.	Same as the cooperative acid deposition program except funding and staffing would need to be increased.
Impact on the Natural Resources	Monitoring stations will enable acid deposition levels to be determined and will enable NPS to analyze impacts of acid deposition to a Mediterranean-type ecosystem. Fish could eventually be killed by high acidic rain concentrations and vegetation killed or impacted.	No research could be completed to determine the impact of acid deposition on a Mediterranean-type ecosystem, thereby limiting effectiveness of management of the natural resources.	Same as the "no action" alternative as baseline acid deposition data are non-existent.	Same as Alternative C, except funding and staffing would need to be increased.

PROJECT STATEMENT TITLE: ACID DEPOSITION PROGRAM (Continued)

	PROPOSED ACTIONS	NO ACTION	ALTERNATIVE	ALTERNATIVE
Public Recreation	Data would provide insight into the acid deposition problem of the Santa Monica Mountains, and visitors could be informed of this threat to natural resources.	The NPS would not seek public involvement or education in regard to the acid deposition problem in SAMO.	Same as the "no action" alternative.	Same as the proposed action alternative.
Legislative Mandate	The NPS would satisfy Public Law 95-625.	The NPS would not completely fulfill Public Law 95-625.	The NPS would not completely fulfill Public Law 95-625.	The NPS would satisfy Public Law 95-625.

PROJECT STATEMENT TITLE: PREDATOR MONITORING PROGRAM

NEED FOR THE PROPOSAL: Faunal populations and habitat in the Santa Monica Mountains are being destroyed by rapid urban development. Unless critical wildlife habitat is identified and protected, many species of ecosystem importance will become locally extinct.

ALTERNATIVE ACTIONS / IMPACT CATEGORIES	PROPOSED ACTIONS	NO ACTION	ALTERNATIVE	ALTERNATIVE
	Cooperative predator monitoring program between National Park Service and California Fish and Game	No action	Continue present status	
Resources	Wildlife populations will be monitored and data obtained to document habitat requirements.	Wildlife populations will not be monitored and data not obtained for habitat analyses.	Limited wildlife population movements and habitat requirements can be determined from observations in heavily visited areas.	
Recreation	Data obtained could be disseminated by the staff to enhance recreational opportunities for park visitors.	There would be no benefit to the visiting public.	Park visitors would have limited information furnished to them by the NPS regarding wildlife populations and habitat.	
Human Activities	Data obtained will be of paramount importance in developing a wildlife management program to insure minimal disturbance to these populations by human activities in the mountains.	Wildlife management programs would not be developed and human activities could impact wildlife populations.	Limited wildlife management schemes could be developed from limited data sources, but activities within the mountains could disrupt populations.	

PROJECT STATEMENT TITLE: PREDATOR MONITORING PROGRAM (Continued)

	PROPOSED ACTIONS	NO ACTION	ALTERNATIVE	ALTERNATIVE
Legislative and Other Legal Mandates	Data collected will enable the National Park Service to fulfill Public Law 95-625 and attendant resource laws and policies.	National Park Service will fail to fulfill the Congressional mandate to preserve the natural resources of the mountains.	National Park Service will partially fulfill the mandates of Public Law 95-625 and other federal laws and regulations.	

PROJECT STATEMENT TITLE: COASTAL RESOURCE EXAMINATIONS

NEED FOR THE PROPOSAL: Although the NRA fronts 46 miles of the Pacific Ocean which encompasses approximately three-fourths of the area within the legislative coastal zone, only cursory information is available for coastal resources of the Santa Monica Mountains. The coast is one of the most diverse in the NPS system. Fundamental data is required for application to management actions, to fulfill legal mandates, and to assess the magnitude of impacts from varying human activities, such as development and intense recreation.

ALTERNATIVE ACTIONS / IMPACT CATEGORIES	PROPOSED ACTIONS	NO ACTION	ALTERNATIVE	ALTERNATIVE
	Cooperative coastal resource examinations, identification of species and locales for monitoring, and fundamental documentation of resources	No actions	Continue present status	Comprehensive coastal studies
Resources	Resources will be as fully identified as feasible, important fundamental data generated, and vulnerable processes identified.	No data will be gathered on coastal resources and potentially critical resources could be lost.	Same as no action	Resources would be identified and data generated over a longer period. Staff costs would escalate because specialists would be necessary.
Ecosystem Resource Management	Will bring together all jurisdictions to facilitate resource management on an ecosystem basis.	Coastal resources will continue to be managed on a jurisdictionally fragmented basis.	Same as no action	Ecosystem management would take longer to accomplish and would incur greater staff costs to NPS. Interagency linkages will not be as strong.

PROJECT STATEMENT TITLE: COASTAL RESOURCES EXAMINATIONS (Continued)

	PROPOSED ACTIONS	NO ACTION	ALTERNATIVE	ALTERNATIVE
Recreation	A satisfactory data base will enhance recreation by circuiting severe resource problems and identifying areas into which recreation can be expanded.	No resource data will be available to adequately evaluate the impacts of various kinds of recreation which may lead to degradation of resource-based recreation.	Same as no action	A comprehensive data base would be available and some recreation could be monitored, depending on availability of staff and additional funds for contracts.
Other Human Activities	Will allow for identification of significant ecological processes and adequate assessment of the impacts of human activities, including development, watershed disruption, etc. Identification can be made in a timely manner and significant resources protected.	An array of human activity will continue to cause primary and secondary impacts on resources that are not well understood, such as Mugu and Malibu Lagoons.	Same as no action	Impacts and appropriate data would be gathered by NPS, but increased funding would be required and interagency cooperation would not be particularly utilized.
Legislative and Other Legal Mandates	NPS will fulfill mandates in Public Law 95-625 and attendant resource laws and policies.	NPS will fail to fulfill the mandates of Public Law 95-625 and attendant resource laws and policies.	Same as no action	NPS will fulfill mandates of Public Law 95-625 and other appropriate resource laws.

PROJECT STATEMENT TITLE: BIRD POPULATIONS OF THE SANTA MONICA MOUNTAINS COAST: DYNAMICS AND HABITAT UTILIZATION STUDIES PROGRAM

NEED FOR THE PROPOSAL: The Santa Monica Mountains coast and a wide variety of nearby upland habitats support a large number of Pacific Flyway migrants and resident breeding birds. Of the 801 migratory species listed for protection in the Migratory Bird Treaty Act of 1974, 348 species, or 43 percent occur in the Santa Monica Mountains.

ALTERNATIVE ACTIONS IMPACT CATEGORIES	PROPOSED ACTIONS Cooperative avifaunal dynamics and habitat program	NO ACTION No action	ALTERNATIVE Continue present status	ALTERNATIVE
Resources	NPS will be able to coordinate the gathering of useful data at several levels to elucidate the resource. Data will show long-term trends.	Occasional bird counts by private groups will continue, but will only show species presence or absence. No systematic ecological information will be available. Some informal studies will be done on NPS property.	Same as no action	
Ecosystem Resource Management	NPS will coordinate several agencies and jurisdictions in collecting data and in managing avifaunal resources in the Santa Monica Mountains, bringing into this area an ecosystem perspective.	Avifaunal management will be fragmented, and lack of an ecosystem overview and interagency cooperation could be wasteful, and inadvertently lead to habitat loss.	Same as no action	

PROJECT STATEMENT TITLE: BIRD POPULATIONS OF THE SANTA MONICA MOUNTAINS COAST: DYNAMICS AND HABITAT UTILIZATION STUDIES (Continued)

	PROPOSED ACTIONS	NO ACTION	ALTERNATIVE	ALTERNATIVE
Recreation	Preservation and knowledge of avifaunal resources will greatly enhance bird watching, a popular and inexpensive activity, as well as encourge it in new areas throughout the mountains. A bird observation driving route will be created.	No new recreational opportunities will be created. Competing recreational interests could intrude upon or destroy primary birding areas.	Same as no action	
Other Human Activities	Activities that might significantly affect migratory or resident birds and/or their habitat could be anticipated and mitigated accordingly.	The absence of sufficient ecological data may lead to continuing impacts and make appropriate mitigations difficult to arrive at.	Same as no action	
Legislative and Other Legal Mandates	NPS will fulfill Public Law 95-625 and attendant resource laws and policies.	NPS will only partially fulfill its mandates and attendant resource laws and policies.	Same as no action	

PROJECT STATEMENT TITLE: ANADROMOUS FISHERIES RESOURCE PROGRAM AND HABITAT ENHANCEMENT STUDIES

NEED FOR THE PROPOSAL: Steelhead rainbow trout (Salmo gairdnerii gairdnerii), along with other anadromous species, are known to spawn in at least two of the coastal creeks of the Santa Monica Mountains. Habitat loss has led to their disappearance farther south. Studies and possible enhancement are needed on this significant biological and recreational resource.

ALTERNATIVE ACTIONS / IMPACT CATEGORIES	PROPOSED ACTIONS	NO ACTION	ALTERNATIVE	ALTERNATIVE
	Anadromous fisheries program and habitat enhancement studies	No action	Continue present status	
Resources	An understanding and an accurate assessment of the condition of the anadromous fishes can be made from data gathered.	Only occasional, superficial data will be gathered and there will be no way of knowing whether trout are "homing" to these streams--or the stream conditions. Stream habitats will continue to demise.	Same as no action	
Ecosystem Resource Management	The stream corridors will be studied on an ecosystem basis, leading to ecosystem management.	Fisheries resource will be impossible to understand and manage on an ecosystem basis.	Same as no action	

PROJECT STATEMENT TITLE: ANDROMOUS FISHERIES RESOURCE PROGRAM AND HABITAT ENHANCEMENT STUDIES (Continued)

	PROPOSED ACTIONS	NO ACTION	ALTERNATIVE	ALTERNATIVE
Recreation	The NPS will have the tools necessary for continuing and enhancing a popular recreational resource.	Recreation potential for fishing will continue to demise and possibly be lost. Loss of fish populations will reduce the diversity of recreational opportunity, not just for fishing, but for bird watching and other activities.	Same as no action	
Other Human Activities	Actual impacts of varying human activities can be measured and assessed relative to continuation of fish population.	Impacts of different human activities will continue with no tangible way of knowing their magnitude or what can be done to mitigate for stream and fish survival.	Same as no action	
Legislative and Other Legal Mandates	NPS will fulfill Public Law 95-625 and attendant resource laws and policies.	NPS will not fulfill Public Law 95-625 to preserve and enhance the natural resources.	Same as no action	





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APPENDICES

APPENDIX A

RARE AND ENDANGERED FAUNA OF THE SANTA MONICA MOUNTAINS

RARE AND ENDANGERED ANIMALS OF THE SANTA MONICA MOUNTAINS

SPECIES	*STATUS	HABITAT
STATE AND FEDERALLY LISTED ENDANGERED AND RARE BIRDS:		
Family Pelecanidae		
California Brown Pelican *Pelecaanus occidentalis californicus*	FE,SE	Open ocean, bays, harbors beaches, estuaries, mudflats and tidal lagoons
Family Rallidae		
California Black Rail *Laterallus jamaicensis carticulus*	SR	Fresh and saltwater marshes
Light-footed Clapper Rail *Rallus longirostris levipes*	FE,SE	Marshes, mudflats and tidal lagoons
Family Laridae		
California Least Tern *Sterna albifrons browni*	FE,SE	Inshore waters, beaches, estuaries, tidal lagoons
Family Vireonidae		
Least Bell's Vireo *Vireo bellii pusillus*	SE	Riparian woodlands and thickets
Family Emberizidae		
Belding's Savanna Sparrow *Ammodramus sandwichensis beldingi*	SE	Coastal salt marshes
STATE AND FEDERALLY LISTED ENDANGERED BIRDS NOW EXTIRPATED FROM THE SANTA MONICA MOUNTAINS:		
Family Cathartidae		
California Condor *Gymnogyps californicus*	FE,SE	Chaparral, oak woodland, and grassland (historic records)
Family Accipitridae		
Bald Eagle *Haliaeetus leucocephalus*	FE,SE	Lakes, estuaries, tidal lagoons, and mudflats (historic records)
Family Falconidae		
Peregrine Falcon *Falco peregrinus anatum*	FE,SE	Estuaries, tidal lagoons, and mudflats (historic records)

* FE: Federally listed endangered species
SE: State listed endangered species
SR: State listed rare species

LOCALLY RARE RAPTORIAL BIRDS:

Family Accipitridae	
White-tailed kite *Elanus leucurus*	Grasslands, marshes, riparian woodlands and thickets
Golden Eagle *Aquila chrysaetos*	Inland chaparral and oak woodland
Family Falconidae	
Merlin *Falco columbarius*	Oak and riparian woodlands
Prairie Falcon *Falco mexicanus*	Fields and grasslands
Family Strigidae	
Long-eared Owl *Asio otus*	Riparian woodland and forest
Short-eared Owl *Asio flammeus*	Marshes, tidal lagoons and grasslands

LOCALLY RARE MAMMALS:

Family Procyonidae	
Ring-tailed "Cat" *Brassariscus astutus octavus*	Riparian and oak woodland
Family Mustelidae	
Long-tailed Weasel *Mustela frenata latirosta*	Riparian woodland and coastal sage
Badger *Taxidae taxus neglecta*	Riparian areas
Family Felidae	
Mountain Lion *Felis concolor californicus*	All habitats, hunts mostly in oak savanna

LOCALLY RARE REPTILES:

Family Testudinidae	
Pacific Pond Turtle *Clemmys marmorata pallida*	Streams, ponds and brackish water densely grown with aquatic vegetation

Family Iguanidae	
Coast Horned Lizard *Phyrnosoma coronaum blainvillei*	Sandy soils in open areas with low plant cover
Family Anniellidae	
Silvery Legless Lizard *Anniella pulchra pulchra*	Loose soil and leaf litter including coastal strand
Family Colubridae	
Mountain Kingsnake *Lampropeltis zonata pulchra*	Sunny rocky streams of chaparral and oak woodlands
Two-striped Garter Snake *Thamnophis couchi hammondi*	Semiaquatic, in streams of chaparral and oak woodland, and sea level brackish marshes

APPENDIX B

FEDERALLY AND STATE LISTED ENDANGERED PLANTS OF THE SANTA MONICA MOUNTAINS

FEDERALLY AND STATE LISTED ENDANGERED PLANTS OF THE SANTA MONICA MOUNTAINS

SPECIES	*STATUS	HABITAT
FEDERALLY AND STATE ENDANGERED PLANTS:		
Family Scrophulariaceae		
Salt Marsh Bird's Beak *Cordylanthus maritimus maritimus*	FE,SE	Coastal salt marsh
STATE LISTED RARE PLANTS AND PLANTS NOMINATED FOR FEDERALLY LISTED ENDANGERED STATUS:		
Family Asteraceae		
Santa Susana Tarweed *Hemizonia minthornii*	NFE,SR	Crevices of sandstone outcrops and on sandstone bluffs in chaparral areas
Lyon's Pentachaeta *Pentachaeta lyonii*	NFE,SE	Open grasslands and open chaparral
Family Polygonaceae		
Conejo Buckwheat *Eriogonum crocatum*	NFE,SR	Dry rocky hillsides of coastal sage scrub
Family Crassulaceae		
Santa Monica Mountains Liveforever *Dudleya cymosa marcescans*	NFE,SR	Sheer rock surfaces of chaparral slopes

* FE: Federally listed endangered plants
SE: State listed endangered plants
NFE: Nominated for Federally endangered listing
SR: State listed rare plants

APPENDIX C

LOCALLY UNCOMMON PLANTS OF THE SANTA MONICA MOUNTAINS

LOCALLY UNCOMMON PLANTS OF THE SANTA MONICA MOUNTAINS

SPECIES	HABITAT
Family Apocynaceae	
Dogbane *Apocynum cannabinum glabrrimum*	Tangled vegetation of lower creek beds
Family Aspidiaceae	
Fern *Thelypteris puberula*	In clumps along streams
Family Asteraceae	
Bur-marigold *Bidens laevis*	Wet sandy places
Coreopsis bieglovii	Grassland and open oak-woodland, eastern half of the mountains
Blow-wives *Achyrachaena mollis*	Open grassy slopes
Lagophylla ramossissima	Hard clay soils of open fields
Tarweed *Hemizonia pungens*	Wet sand along Los Angeles River
Psilocarpus tenellus tenellus	Along streams and formerly wet places
Marsh Flea-bane *Pluchea purpurascens*	Wet places along the Los Angeles River; Paramount Ranch; Cheeseboro Canyon
Golden Aster *Chrysopsis villosa sessiliflora*	Oak woodland
Chrysopsis villosa fastigiata	Disturbed coastal sage
Malacothrix clevelandii	Open grassy spots of oak woodland or on burns, low elevations away from coast
Family Boraginaceae	
Popcorn Flower *Plagiobothrys nothofluvu*	Grassy hillsides of the eastern mountains
Plagiobothrys cansecens	Open grassy slopes of the eastern mountains
Plagiobothrys acanthocarpus	Upper canyons

SPECIES	HABITAT
Family Brassicaceae	
Prince's Plume Stanleya pinnata	Road cut along coastal sage, facing the ocean
Wallflower Erysimum suffrutescens	Coastal strand
Family Campanulaceae	
Nemacladus ramosissimus	Dry sandy places under shrubs
Family Caryophyllaceae	
Campion Silene antirrhina	Disturbed canyon soils
Silene multinervia	Disturbed canyon soils and on burn sites
Family	
Saltbush Atriplex coulteri	Coastal bluffs
Family Cornaceae	
Dogwood Cornus glabrata	Shaded canyons
Family Crassulaceae	
Live-forever Dudleya parva	Clayey rocky grasslands
Stonecrop Sedum spathulifolium	North facing cliffs
Family Cyperaceae	
Umbrella Sedge Cyperus esculentus	Moist sand along the Los Angeles River
Family Ericaceae	
Summer Holly Comarostaphylis diversifolia planifolia	Chaparral and oak woodland
Family Fagaceae	
Interior Live Oak Quercus wislizenii	Chaparral and oak woodland
Valley Oak Quercus lobata	Deep soils of broad inland valleys

SPECIES	HABITAT
Family Gramineae	
Fescue Festuca octoflora	Open soil in chaparral and locally on burns
Festuca eastwoodae	Shallow soil on grassy slopes
Deergrass Muhlenbergia rigens	Open ground and under oaks in western two-thirds of the range
Family Hydrophyllaceae	
Nama stenocarpum	Wet heavy lowlands soils
Phacilia longipes	Openings in chaparral
Family Leguminosae	
Clover Trifolium gracilentum	North slope of western half of the mountains in low elevation grassy openings
Trifolium albopurpureum	Shallow soil in grassland
Vetch Vicia exigua	Grassy or bushy slopes of coastal sage and chaparral
Vicia americana	Protected slopes of lower elevations
Locoweed Astragalus brauntonii	Above firebreaks, disturbed soils or on burns
Family Liliaceae	
Brodiaea jolonesis	Open clay flats of central mountains away from the coast
Family Onograceae	
Willow-herb Epilobium paniculatum	Dry slopes of oak woodland, north slope of west end of the mountains
Evening Primrose Oenothera californica	Sandy soil along the Los Angeles River
Oenothera hookeri grisea	Moist places in canyons
Link Camissonia boothii decorticans	Open banks and flats
Family Orobanchaceae	
Broomrape Orobanche bulbosa	Dry chamise chaparral
Orobanche grayana	Dry chamise chaparral

SPECIES	HABITAT
Family Polemoniaceae	
Eriastrum densiflorum elongatum	Open sandy soils
Mocrosteris gracilis gracilis	Rocky grassland low elevations of range's northern edge
Family Polgonaceae	
Chorizanthe coriacea	Sandy slopes near coast
Wild Buckwheat *Eriogonum wrightii membranacem*	Forms mats on bare weathered sandstone cliffs
Eriogonum gracile	Open slopes or flats away from the coast
Family Polygalaceae	
Milkwort *Polygala cornuta fishiae*	Shaded slopes of chaparral or dense oak woodland
Family Pteridaceae	
Cotton Fern *Notholaena newberryi*	Rock crevices
Notholaena californica	Rocky slopes under brush
Family Ranunculaceae	
Buttercup *Runnunculus cymbalaria saximontanus*	Wet sandy places along the Los Angeles River
Family Rosaceae	
Ocean Spray *Holodiscus discolor*	Shady potected sites along streams
Family Scrophulariaceae	
Monkey Flower *Mimulus pilosus*	Western half of the mountains away from the coast
Mimulus floribundus	Sandy flats along streams
Family Solanaceae	
Box-thorn *Lycium californicum*	Coastal bluffs
Tobacco *Nicotiana bigelovii*	Disturbed soils or burns
Family Umbelliferae	
Caucalis microcarpa	Grassy openings and slopes under bushes of western north slopes
Poison Sanicle *Sanicula bipinnata*	Open grasslands
Family Vitaceae	
Wild Grape *Vitis girdiana*	Deep canyons

APPENDIX D

WILDLIFE SPECIES INVENTORY: MAMMALS, REPTILES, AMPHIBIANS AND BIRDS

CLASS MAMMILIA	CLASS MAMMALS
Order ARTIODACTYLA	Order of Even-toed Ungulates
Family Cervidae	Family of Deer
Odocoileus hemionus californicus	California Mule Deer
Order CARNIVORA	Order of Flesh Eaters
Family Procyonidae	Family of Raccoons
Procyon lotor psora	Raccoon
Brassariscus astutus octavus	Ring-tailed "Cat"
Family Mustelidae	Family of Weasels
Mephitis mephitis holzerni	Striped Skunk
Mustela frenata latirosta	Long-tailed Weasel
Taxidea taxus neglecta	Badger
Family Felidae	Family of Cats
Felis concolor californicus	Mountain Lion
Lynx rufus californicus	Bobcat
Felis domestica	*House Cat
Family Canidae	Family of Dogs
Canis latrans ochropus	Coyote
Urocyon cineroargenteus californicus	Gray Fox
Vulpes fulva	*Red Fox
Family Phocidae	
Phoca vitulina	Harbor Seal
Order MARSUPIALIA	Order of Marsupials
Family Didelphidae	
Didelphis marsupialis	*Common Opossum
Order INSECTIVORA	
Family Soricididae	
Sorex ornatus	Ornate Shrew
Family Talpedae	
Scapanus latimanus	Broad Handed Mole
Order CHIROPTEN	
Family Vespertilionidae	
Myotis sp. (Many species)	Bats

Order LAGOMORPHA

Family Leporidae	
Sylvilagus audubonii	Audubon Cottontail
Sylvilagus bachmanii	Brush Rabbit

Order RONDENTIA

Family Sciuridae	
Otospermophilus beecheyi	Beechey Ground Squirrel
Sciurins grisens	Gray Squirrel
Family Gromyidae	
Thomomys bottae	Botts Pocket Gopher
Family Heteromyidae	
Dipodomys agilis	Pacific Kangaroo Rat
Family Cricetidae	
Peromyscans californicas	California Mouse
Peromyscans maniculatus	Deer Mouse
Peromyscans boylii	Brush Mouse
Peromyscans triei	Pinion Mouse
Neotoma lepida	Desert Wood Rat
Microtus californicus	California Meadow Mouse

* Introduced Species

REPTILES

CLASS REPTILIA	CLASS REPTILES
Order TESTUDINATA	Order of Turtles
Family Testudinidae	Family of Water and Box Turtles and Tortoises
Clemmys marmorata pallida	South Western Pacific Pond Turtle
Order SQUAMATA	Order of Scaled Reptiles
Suborder SAURIA	Suborder of Lizards
Family Iguanidae	Family of Iguanid Lizards
Sceloporus occicentalis biseriatus	Great Basin Western Fence Lizard
Uta stansburiana hesperis	California Side-blotched Lizard
Phyrnosoma coronatum blainvillei	San Diego Coast Horned Lizard
Family Scincidae	Family of Skinks
Eumeces skiltonianus skiltonianus	Western Skink
Eumeces gilberti	Gilbert's Skink

Family Teiidae	Family of Whiptails
Cnemidophorus tigris multiscutatus	Coastal Western Whiptail
Family Anguidae	Family of Alligator Lizards
Gerrhonotus multicarinatus webbi	San Diego Southern Alligator Lizard
Family Anniellidae	Family of California Legless Lizards
Anniella pulchra pulchra	Silvery Legless Lizard
Suborder SERPENTES	Suborder of Snakes
Family Colubridae	Family of Colubrid Snakes
Diadophis punctatus modestus	San Bernardino Western Ring-necked Snake
Masticophis lateralis lateralils	California Striped Racer
Masticophis flagellum piceus	Red Racer
Coluber constrictor mormon	Western Yellow-bellied Racer
Pituophis melanoleucus annectens	San Diego Gopher Snake
Lampropeltis getulus californiae	California Common King Snake
Lampropeltis zonata pulchra	San Diego California Mountain King Snake
Thamnophis couchi hammondi	Western Aquatic Two-striped Garter Snake
Hypsigleua torquata klauberi	* San Deigo Night Snake
Family Viperideae	Family of Vipers
Subfamily Crotalinae:	Subfamily of Pit Vipers:
Cortalus viridus helleri	**Southern Pacific Western Rattlesnake

* Mildly Poisonous
** Dangerously Poisonous

AMPHIBIANS

CLASS AMPHIBIA	CLASS AMPHIBIANS
Order CAUDATA	Order of Newts and Salamanders
Family Salamandridae	Family of Newts
Taricha torosa torosa	California Coast Range Newt
Family Plethodontidae	Family of Lungless Salamanders
Esatina eschscholtzi eschscholtzi	Monterey Red Salamander
Batrachoseps attenuatus	California Slender Salamander
Batrachoseps pacificus major	Garden Slender Salamander
Aneides lugubris lugubris	Arboreal Salamander

Order SALIENTIA	Order of Toads and Frogs
Family Pelobatidae	Family of Spadefoot Toads
Scaphiopus hammondi	Western Spadefoot Toad
Family Bufonidae	Family of True Toads
Bufo boreas halophilus	California Western Toad
Bufo microscaphus californicus	Southwestern Arroyo Toad
Family Hylidae	Family of Treefrogs
Hyla cadaverina	California Treefrog
Hyla regilla	Pacific Treefrog
Family Ranidae	Family of True Frogs
Rana catesbeiana	*Bullfrog

* Introduced Species

BIRDS

CLASS AVES	CLASS BIRDS
Order GAVIIFORMES	Order of Loons
Family Gaviidae	Family of Loons
Gavia stellata	Red-throated Loon
Gavia arctica	Arctic Loon
Gavia immer	Common Loon
Order PODICIPEDIFORMES	Order of Grebes
Family Podicipedidae	Family of Grebes
Podilymbus podiceps	Pied-billed Grebe
Podiceps auritus	Horned Grebe
Podiceps grisegena	Ring-necked Grebe
Podiceps nigricollis	Eared Grebe
Aechmophorus occidentalis	Western Grebe
Order PELECANIFORMES	Order of Pelicans and their Allies
Family Pelecanidae	Family of Pelicans
Pelecanus erythrorhynchos	American White Pelican
Pelecanus occidentalis californicus	California Brown Pelican
Family Phalacrocoracidae	Family of Cormorants
Phalacrocorax auritus	Double-crested Cormorant
Phalacrocorax penicillatus	Brandt's Cormorant
Phalacrocorax pelagicus	Pelagic Cormorant

Order CICONIIFORMES	Order of Herons and their Allies
Family Ardeidae	Family of Herons
Botaurus lentiginosus	American Bittern
Ardea herodias	Great Blue Heron
Casmerodius albus	Common Egret
Egretta thula	Snowy Egret
Egretta tricolor	Louisiana Heron
Bubulcus ibis	Cattle Egret
Butorides striatus	Green Heron
Nycticorax nycitcorax	Black-crowned Night Heron
Family Threskiornithidae	Family of Ibises and Spoonbills
Plegadis chihi	White-faced Ibis
Ajaia ajaia	Roseate Spoonbill
Order ANSERIFORMES	Order of Waterfowl
Family Anatidae	Family of Waterfowl
Subfamily Anserinae:	Subfamily of Geese:
Branta canadensis	Canada Goose
Subfamily Anatinae:	Subfamily of Surface-feeding Ducks:
Aix sponsa	Wood Duck
Anas americana	American Wigeon
Anas strepera	Gadwall
Anas crecca	Green-winged Teal
Anas cyanoptera	Cinnamon Teal
Anas platyrhinchos	Mallard
Anas acuta	Pintail
Anas clypeata	Northern Shoveler
Subfamily Aythyinae:	Subfamily of Bay Ducks and Sea Ducks:
Aythya valisineria	Canvasback
Aythya americana	Redhead
Aythya collaris	Ring-necked Duck
Aythya marila	Greater Scaup
Aythya affinis	Lesser Scaup
Clangula hyemalis	Oldsquaw
Melanitta nigra	Black Scoter
Melanitta fusca	White-winged Scoter
Melanitta perspicillata	Surf Scoter
Bucephala albeola	Bufflehead
Bucephala clangula	Common Goldeneye
Subfamily Merginae:	Subfamily Mergansers:
Mergus cucullatus	Hooded Merganser
Mergus serrator	Red-breasted Merganser
Mergus merganser	Common Merganser
Subfamily Oxyurinae:	Subfamily of Stiff-tailed Ducks:
Oxyura jamaicensis	Ruddy Duck

Order FALCONIFORMES	Order of Vultures, Hawks, and Falcons
Family Cathartidae	Family of New World Vultures
Cathartes aura	Turkey Vulture
Gymnogyps californianus	California Condor
Family Accipitridae	Family of Hawks
Pandion haliaetus	Osprey
Elanus leucurus	White-tailed Kite
Haliaeetus leucocephalus	Bald Eagle
Aquila chrysaetos	Golden Eagle
Circus cyaneus	Marsh Hawk
Accipiter striatus	Sharp-shinned Hawk
Accipiter cooperii	Cooper's Hawk
Accipiter gentilis	Goshawk
Buteo lineatus	Red-shouldered Hawk
Buteo jamaicensis	Red-tailed Hawk
Family Falconidae	Family of Falcons
Falco sparverius	American Kestrel
Falco columbarius	Merlin
Falco peregrinus anatum	Peregrine Falcon
Falco mexicanus	Prairie Falcon
Order GALLIFORMES	Order of Gallinaceous Birds
Family Phasianidae	Family of Grouse and Quail
Oreortyx pictus	Mountain Quail
Callipepla californica	California Valley Quail
Order GRUIFORMES	Order of Cranes and Rails
Family Rallidae	Family of Rails
Laterallus jamaicensis carticulus	California Black Rail
Rallus longirostris levipes	Light-footed Clapper Rail
Rallus limicola	Virginia Rail
Porzana carolina	Sora
Gallinula chloropus	Common Gallinule
Fulica americana	American Coot
Order CHARADRIIFORMES	Order of Shorebirds, Gulls, and Alcids
Family Haematopodidae	Family of Oystercatchers
Haematopus bachmani	Black Oystercatcher
Family Recurvirostridae	Family of Stilts and Avocets
Himantopus mexicanus	Black-necked Stilt
Recurvirostra americana	American Avocet

Family Charadriidae	Family of Plovers
Subfamily Charadriinae:	Subfamily of Plovers:
Pluvialis squatarola	Black-bellied Plover
Charadrius alexandrinus	Snowy Plover
Charadrius semipalmatus	Semipalmated Plover
Charadrius vociferus	Killdeer
Family Scolopacidae	Family of Sandpipers
Tringa melanoleuca	Greater Yellowlegs
Tringa flavipes	Lesser Yellowlegs
Tringa solitaria	Solitary Sandpiper
Actitis macularia	Spotted Sandpiper
Heteroscelus incanus	Wandering Tattler
Catoptrophorus semipalmatus	Willet
Numenius phaeopus	Whimbrel
Numenius americanus	Long-billed Curlew
Limosa fedoa	Marbled Godwit
Arenaria interpres	Ruddy Turnstone
Arenaria melanochephala	Black Turnstone
Aphriza virgata	Surfbird
Calidris canutus	Red Knot
Calidris alba	Sanderling
Calidris mauri	Western Sandpiper
Calidris minutilla	Least Sandpiper
Calidris melanotos	Pectoral Sandpiper
Calidris alpina	Dunlin
Limnodromus griseus	Short-billed Dowitcher
Limnodromus scolopaceus	Long-billed Dowitcher
Gallinago gallinago	Common Snipe
Family Phalaropodidae	Family of Phalaropes
Phalaropus tricolor	Wilson's Phalarope
Phalaropus lobatus	Northern Phalarope
Phalaropus fulicarius	Red Phalarope
Family Laridae	Family of Gulls and Terns
Subfamily Larinae:	Subfamily of Gulls:
Larus pipixcan	Franklin's Gull
Larus philadelphia	Bonaparte's Gull
Larus heermanni	Heermann's Gull
Larus canus	Mew Gull
Larus delawarensis	Ring-billed Gull
Larus californicus	California Gull
Larus argentatus	Herring Gull
Larus thayeri	Thayer's Gull
Larus occidentalis	Western Gull
Larus glaucescens	Glaucous-winged Gull
Rissa tridactyla	Black-legged Kittiwake
Subfamily Sterninae:	Subfamily of Terns:
Sterna caspia	Caspian Tern
Sterna maxima	Royal Tern
Sterna elegans	Elegant Tern
Sterna hirundo	Common Tern
Sterna paradisaea	Arctic Tern

Subfamily Sterninae: (Cont'd.)	Subfamily of Terns: (Cont'd.)
Sterna forsteri	Forster's Tern
Sterna albifrons browni	California Least Tern
Chlidonias niger	Black Tern
Family Alcidae	Family of Alcids
Aria aalge	Common Murre
Cepphus columba	Pigeon Guillemot
Order COLUMBIFORMES	Order of Doves and Pigeons
Family Columbidae	Family of Doves and Pigeons
Columba fasciata	Band-tailed Pigeon
Columba livia	(I) Rock Dove
Zenaida asiatica	White-winged Dove
Zenaida macroura	Mourning Dove
Streptopelia chinensis	(I) Spotted Dove
Streptopelia risoria	(I) Ringed Turtle Dove
Order CUCULIFORMES	Order of Cuckoos
Family Cuculidae	Family of Cuckoos
Geococcyx californianus	Roadrunner
Order STRIGIFORMES	Order of Owls
Family Tytonidae	Family of Barn Owls
Tyto alba	Barn Owl
Family Strigidae	Family of Typical Owls
Otus asio	Common Screech Owl
Bubo virginianus	Great Horned Owl
Athene cunicularia	Burrowing Owl
Asio otus	Long-eared Owl
Asio flammeus	Short-eared Owl
Order CAPRIMULGIFORMES	Order of Goatsuckers
Family Caprimulgidae	Family of Nightjars
Chordeiles acutipennis	Lesser Nighthawk
Phalaenoptilus nuttallii	Poorwill
Order APODIFORMES	Order of Swifts and Hummingbirds
Family Apodidae	Family of Swifts
Cypseloides niger	Black Swift
Chaetura vauxi	Vaux's Swift
Aeronautes saxatalis	White-throated Swift

Family Trochilidae	Family of Hummingbirds
Archilochus alexandri	Black-chinned Hummingbird
Calypte costae	Costa's Hummingbird
Calypte anna	Anna's Hummingbird
Selasphorus rufus	Rufous Hummingbird
Selasphorus sasin	Allen's Hummingbird
Order CORACIIFORMES	Order of Kingfishers
Family Alcedinidae	Family of Kingfishers
Ceryle alcyon	Belted Kingfisher
Order PICIFORMES	Order of Woodpeckers
Family Picidae	Family of Woodpeckers
Melanerpes lewis	Lewis' Woodpecker
Melanerpes formicivorus	Acorn Woodpecker
Sphyrapicus varius nuchalis	Red-naped Sapsucker
Picoides nuttallii	Nuttall's Woodpecker
Picoides pubescens	Downy Woodpecker
Picoides villosus	Hairy Woodpecker
Colaptes auratus cafer	Red-shafted Flicker
Order PASSERIFORMES	Order of Perching Birds
Family Tyrannidae	Family of Tyrant Flycatchers
Contopus borealis	Olive-sided Flycatcher
Contopus sordidulus	Western Wood Pewee
Empidonax traillii	Willow Flycatcher
Empidonax hammondii	Hammond's Flycatcher
Empidonax oberholseri	Dusky Flycatcher
Empidonax difficilis	Western Flycatcher
Sayornis nigricans	Black Phoebe
Sayornis saya	Say's Phoebe
Myiarchus cinerascens	Ash-throated Flycatcher
Tyrannus vociferans	Cassin's Kingbird
Tyrannus verticalis	Western Kingbird
Family Alaudidae	Family of Larks
Eremophila alpestris	Horned Lark
Family Hirundinidae	Family of Swallows
Progne subis	Purple Martin
Tachycineta bicolor	Tree Swallow
Tachycineta thalassina	Violet-graeen Swallow
Stelgidopteryx ruficollis	Rough-winged Swallow
Riparia riparia	Bank Swallow
Hirundo pyrrhonota	Cliff Swallow
Hirundo rustica	Barn Swallow

Family Corvidae	Family of Crows, Jays, and Magpies
Aphelocoma coerulescens	Scrub Jay
Corvus brachyrhynchos	Common Crow
Corvus corax	Common Raven
Family Paridae	Family of Chickadees and Titmice
Parus gambeli	Mountain Chickadee
Parus inornatus	Plain Titmouse
Family Aegithalidae	Family of Bushtits
Psaltriparus minimus	Common Bushtit
Family Sittidae	Family of Nuthatches
Sitta canadensis	Red-breasted Nuthatch
Sitta carolinensis	White-breasted Nuthatch
Family Certhiidae	Family of Creepers
Certha familiaris	Brown Creeper
Family Cinclidae	Family of Dippers
Cinclus mexicanus	Dipper
Family Troglodytidae	Family of Wrens
Campylorhynchus brunneicapillus	Cactus Wren
Salpinctes obsoletus	Rock Wren
Catherpes mexicanus	Canyon Wren
Thryomanes bewickii	Bewick's Wren
Troglodytes aedon	House Wren
Cistothorus palustris	Long-billed Marsh Wren
Family Mimidae	Family of Thrashers
Mimus polyglottus	Mockingbird
Toxostomas redivivum	California Thrasher
Family Muscicapidae	Family of Thrushes and their Allies
Subfamily Turdinae:	Subfamily of Thrushes:
Sialia mexicana	Western Bluebird
Myadestes townsendi	Townsend's Solitaire
Zoothera naevia	Varied Thrush
Catharus ustulatus	Swainson's Thrush
Catharus guttatus	Hermit Thrush
Turdus migratorius	American Robin
Subfamily Sylviinae:	Subfamily of Old World Warblers:
Regulus satrapa	Golden-crowned Kinglet
Regulus calendula	Ruby-crowned Kinglet
Polioptila caerrulea	Blue-gray Gnatcatcher
Subfamily Timaliinae:	Subfamily of Babblers:
Chamaea fasciata	Wrentit
Family Motocillidae	Family of Wagtails and Pipits
Anthus spinoletta	Water Pipit

Family Icteridae	Family of Blackbirds and Orioles
Icterus cucullatus	Hooded Oriole
Icterus galbula bullockii	Bullock's Oriole
Icterus parisorum	Scott's Oriole
Xanthocephalus xanthocephalus	Yellow-headed Blackbird
Agelaius phoeniceus	Red-winged Blackbird
Agelaius tricolor	Tricolored Blackbird
Sturnella neglecta	Western Meadowlark
Euphagus cyanocephalus	Brewer's Blackbird
Molothrus ater	Brown-headed Cowbird
Family Fringillidae	Family of Finches
Carduelis pinus	Pine Siskin
Carduelis tristis	American Goldfinch
Carduelis psaltria	Lesser Goldfinch
Carduelis lawrencei	Lawrence's Goldfinch
Carpodacus purpureus	Purple Finch
Carpodacus mexicanus	House Finch
Coccothraustes vespertinus	Evening Grosbeak
Family Ploiceidae	Family of Weaver Finches
Passer domesticus	(I) House Sparrow
Family Sturnidae	Family of Starlings
Sturnus vulgaris	(I) European Starling

(I) - Introduced Species

PART I

FLORA OF THE SANTA MONICA MOUNTAINS

Native Species List

Aceraceae	Maple Family
Acer macrophyllum	Big Leaf Maple
Amaranthaceae	Amaranthus Family
Amaranthus californicus	Prostrate Pigweed
Anacardiaceae	Sumac Family
Rhus integrifolia	Lemonade Berry
R. laurina	Lauryl Sumac
R. ovata	Sugar Bush
R. trilobata	Squaw Bush
Toxicodendron diversilobum	Poison Oak
Apiaceae	Carrot Family
Apiastrum angustifolium	Wild Celery
Daucus pusillus	Rattlesnake Weed
Lomatium lucidum	Shiny Lomatium
L. utriculatum	Hog Fennel
Sanicula arguta	Snake Root
Sanicula crassicaulis	Pacific Sanicle
Sanicula sp	Low Sanicle
Tauschia arguta	Southern Tauschia
T. hartwegii	Tauschia
Apocynaceae	Dogbane Family
Apocynum cannabinum glaberrimum	
Asclepiaceae	Milkweed Family
Asclepias californica	California Milkweed
A. eriocarpa	Indian Milkweed
A. fascicularis	Narrow-Leaf Milkweed
Asteraceae	Sunflower Family
Achillea borealis	
A. millefolium	Yarrow
Achyrachaena mollis	Blow Wives
Agoseris grandiflora	Mountain Dandelion
A. psilostachya	Western Ragweed
Amblyopappus pusillus	Amblyopappus
Ambrosia acanthicarpa	Sand Bur
A. chamissonis	Silver Beach Bur
A. confertiflora	
A. psilostachya	Western Ragweed
Artemisia californica	California Sagebrush

A. douglasiana	Mugwort
A. dracunculus	Wild Tarragon
Aster exilis	
Bacharis douglasii	
B. glutinosa	Mule Fat
B. pilularis consanguinea	Coyote Bush
B. plummerae	
Bidens frondosa	Stick Tight
B. laevis	Bur-Marigold
Brickellia californica	California Brickelbush
B. nevinii	Little Brickelbush
Chaenactis artemisiaefolia	White Pincushion
C. glabruiscula	Yellow Pincushion
Chrysopsis villosa	Golden Aster
Cirsium californicum	California Thistle
C. occidentale	Red Thistle
Coreopsis bigelovii	Annual Coreopsis
C. calliopsidea	
C. gigantea	Giant Coreopsis
Corethrogyne filaginifolia	Cudweed Aster
Cressa truxillensis vallicola	Alkali Weed
Encelia californica	Bush Sunflower
Erigeron foliosus	Fleabane Aster
Eriophyllum confertiflorum	Golden Yarrow
Filago californica	California Filago
Gnaphalium beneolens	
G. californicum	Green Everlasting
G. chilense	
G. leucocephalum	
G. microcephalum	Felt-Leaf Everlasting
G. palustre	Cud Weed
G. ramosissimum	
Grindelia robusta	Gum Plant
Gutierrezia bracteata	Snake Weed
Haplopappus ericoides	
H. linearifolius	
H. palmeri	Palmer Goldenbush
H. parishii	
H. squarrosus	Saw Tooth Goldenbush
H. venetus	Coast Goldenbush
Helenium puberulum	Sneezeweed
Helianthus annuus lenticularis	
H. gracilentus	Slender Sunflower
Hemizonia minthorni	Santa Susana Tarweed
H. ramosissima	Tarweed
H. pungens	
Heterotheca grandiflora	Telegraph Weed
Iva axillaris	Poverty Weed
Jaumea carnosa	
Lagophylla ramossissima	Hareleaf
Lasthenia chrysostoma	Goldfields
L. coronaria	
Layia platyglossa	
Lepidospartum squamatum	Scale Broom

Madia elegans	
M. exigua	
M. gracilis	
Malacothrix saxatilis	Cliff-Aster
Malacothrix clevelandii	
Matricaria matricarioides	Pineapple Weed
Micropus californicus	
Microseris	Silver-Puffs
M. douglasii	
M. elegans	
M. heterocarpa	Brown Microseris
M. linearifolia	White Microseris
Microseris sp.	Microseris
Monolopia lanceolata	
Pentachaeta lyonii	
Perezia microcephala	Perezia
Perityle emoryi	Rock Daisy
Pluchea purpurascens	Marsh Fleabane
Psilocarphus tenellus	Woolly-Heads
Rafinesquia californica	California White Chicory
Senecio breweri	Brewer's Butterweed
S. californicus	
S. douglasii	Bush Senecio
Solidago californica	California Goldenrod
S. occidentalis	Western Goldenrod
Stephanomeria cichoriacea	Tejon Milk-Aster
S. virgata	Wand Chicory
Stylocline filaginea	
S. gnaphalioides	
Venegasia carpesioides	Canyon Sunflower
Xanthium strumarium	Cockle Bur
Batidaceae	
Batis maritima	
Berberidaceae	Barberry Family
Berberis pinnata	
Betulaceae	
Alnus rhombifolia	White Elder
Boraginaceae	Borage Family
Amsinckia intermedia	Fiddleneck
A. menziesii	Small Field Fiddleneck
Cryptantha clevelandii	
C. intermedia	
C. micromeres	
C. microstachys	
C. muricata	
Heliotropium curassavicum	Wild Heliotrope
H. curassavicum oculatum	
Pectocarya linearis ferocula	
P. penicillata	
Plagiobothrys acanthocarpus	Popcorn Flower

Brassicaceae	Mustard Family
Arabis glabra	Tower Mustard
Cardamine californica	Milk Maids
Descurainia pinnata	Tansy Mustard
Draba cuneifolia	Annual Draba
Erysimum capitatum	Wallflower
E. suffrutescens	Perennial Wallflower
Rorippa curvisiliqua	Yellow Cress
Streptanthus heterophyllus	Tower Mustard
Thysanocarpus	Fringe-Pod
Tropidocarpum gracile	Dobie Pod
Cactaceae	Cactus Family
Opuntia occidentalis	Coast Prickly Pear
O. oricola	Pancake Prickly Pear
O. littoralis	Coast Prickly Pear
O. prolifera	Coast Cholla
Callitrichaceae	Water Starwort Family
Callitriche marginata	
Campanulaceae	
Githopsis diffusa	
Lobelia dunnii serrata	
Nemacladus ramosissimus	
Capparaceae	
Cleome isomeris	
Capparidaceae	Capper Family
Isomeris arborea	Bladder Pod
Caprifoliaceae	Honeysuckle Family
Lonicera hispidula vacillans	Wild Honeysuckle
L. subspicata johnstonii	
Sambucus mexicana	Elderberry
Symphoricarpos mollis	Snowberry
Caryophyllaceae	Pink Family
Arenaria douglasii	
Cardionema ramosissimum	
Polycarpon depressum	
Silene antirrhina	
S. laciniata	Indian Pink
C. multinervia	
Spergularia macrotheca	
S. marina	
Stellaria nitens	
Chenopodiaceae	Goosefoot Family
Arthrocnemum subterminale	
Atriplex californica	
A. coulteri	

Arthrocnemum lentiformis	Quail Bush
A. leucophylla	Beach Saltbush
A. patula hastata	Spear Saltbush
A. serenana	Annual Saltbush
Atriplex sp	Annual Saltbush
Chenopodium californicum	California Goosefoot
C. macrospermum	Coast Goosefoot
Salicornia virginica	Pickle Weed
S. europaea	
Suaeda californica	Sea Blite
S. depressa erecta	
Cistaceae	Rock Rose Family
Helianthemum scoparium vulgare	
Convolvulaceae	Morning Glory Family
Calystegia macrostegia	Morning Glory
C. soldenella	Beach Morning Glory
Convolvulus simulans	Little Field Morning Glory
Cuscuta ceanothi	Dodder
C. californica	
C. campestris	
C. salina	
Dichondra occidentalis	Wild Dichondra
Cornaceae	Dogwood Family
Cornus glabrata	Brown dogwood
Crassulaceae	Stonecrop Family
Crassula erecta	Pigmy Wood
Dudleya blochmaniae	
D. caespitosa	
D. cymosa	Live-Forever
D. farinosa	
D. lanceolata	Lance Leaf Liveforever
D. multicaulis	
D. parva	
D. pulverulenta	Chalk Liveforever
Sedum spathulifolium	Stonecrop
Curcurbita foetidissima	Calabazilla
Marah macrocarpus	Wild Cucumber
Cruciferae	
Arabis glabra	
A. sparsiflora	
Athysanus pusillus	
Barbarea orthoceras	
Cardamine california	
Descurainia pinnata menziesii	
Dithyrea maritima	
Erysiumum capitatum	
E. suffrutescens	

Lepidum lasiocarpum	
L. latipes	
L. nitidum	
Stanleya pinnata	Prince's Plume
Streptanthus heterophyllus	
Thelypodium lasiophyllum	
Thysanocarpus curvipes	
T. laciniatus	
Tropidocarpum gracile	
Datiscaceae	Datisca Family
Datisca glomerata	Durango Root
Elatinaceae	Waterwort Family
Elatine californica	
Ericaceae	Heath Family
Arctostaphylos glauca	Big Berry Manzanita
A. glandulosa	
Euphorbiaceae	Spurge Family
Croton californicus	California Croton
Eremocarpus setigerus	Turkey Mullein
Euphorbia	Warty-Fruit Spurge
E. albomarginata	
E. crenulata	
E. melanadenia	
E. polycarpa	Mat Spurge
E. serpyllifolia	
Fabaceae	Pea Family
Amorpha californica	False Indigo
Astragalus leucopsis	Locoweed
Lathyrus laetiflorus	Wild Sweet Pea
Lotus purshianus	Spanish Clover
L. salsuginosus	Mat Lotus
L. scoparius	Deer Weed
Lotus sp	Annual Lotus
Lupinus	Annual Lupine
L. bicolor	Dove Lupine
L. hirsutissimus	Stinging Lupine
L. latifolius	Broad Leaf Lupine
L. longifolius	Bush Lupine
L. succulentus	Succulent Lupine
L. truncatus	Nuttals Lupine
Psoralea mascrostachya	Leather Root
P. physodes	California Tea
Trifolium tridentatum	Tomcat Clover
Trifolium spp	Clover
Trifolium sp	Clover
Vica americana	American Vetch

Fagaceae	Oak Family
Quercus agrifolia	Coast Live Oak
Q. dumosa	Scrub Oak
Q. lobata	Valley Oak
Q. wislizenii	Interior Live Oak
Frankeniaceae	
Frankenia grandifolia	
Fumariaceae	
Dicentra ochroleuca	
Garryaceae	
Garrya veatchii	
Gentianaceae	Gentian Family
Centaurium venustum	Canchalagua
Geraniaceae	Geranium Family
Erodium macrophyllum	
Geranium carolinianum	Wild Geranium
Hydrophyllaceae	Phacelia Family
Eucrypta chrysanthemifolia	Eucrypta
Emmenanthe penduliflora	Whispering Bells
Nama stenocarpum	
Nemophila menziesii	
N. pedunculata	Meadow Nemophila
Phacelia	Annual Phacelia
P. brachyloba	
P. cicutaria	Caterpillar Phacelia
P. distans	
P. douglasii	
P. egena	
P. grandiflora	
P. imbricata	
P. longipes	
P. minor	
P. parryi	
P. tanacetifolia	
P. viscida	Sticky Phacelia
Juglandaceae	Walnut Family
Juglans californica	Black Walnut
Labiatae	Mint Family
Amorpha californica	False Indigo
Astragalus gambelianus	
A. brauntonii	
A. didymocarpus	
A. leucopsis	
A. tener	
A. trichopodus	

Lathyrus laetiflorus	
Lepechinia fragrans	
Lotus argophyllus	
L. grandiflorus	
L. hamatus	
L. micranthus	
L. oblongifolius	
L. purshianus	
L. salsuginosus	
L. scoparius	
L. strigosus	
L. subpinnatus	
Lupinus bicolor microphyllus	
L. bicolor tridentatus	
L. chamissonis	
L. concinnus	
L. formosus	
L. hirsutissimus	
L. latifolius	
L. longifolius	
L. nanus	
L. polycarpus	
L. sparsiflorus	
L. subvexus	
L. succulentus	
L. truncatus	
Monardella hypoleuca	Shrubby Monardella
M. lanceolata	
Mentha arvensis	
Pickeringia montana	
Psoralea physodes	
P. macrostachya	
Salvia apiana	White Sage
S. columbariae	Chia
S. leucophylla	Purple Sage
S. mellifera	Black Sage
S. spathacea	
Satureja douglasii	
Scutellaria tuberosa australis	Skullcap
Stachys albens	White Hedge Nettle
S. bullata	Hedge Nettle
S. rigida	
Trichostema lanatum	Woolly Blue Curl
T. lanatum	
T. lanceolatum	Vinegar Weed
Trifolium albopurpureum	
T. amplectens	
T. ciliolatum	
T. fucatum	
T. gracilentum	
T. microcephalum	
T. obtosiflorum	
T. tridentatum	
T. variegatum	
Vicia americana	
V. exigua	

Lauraceae	Laurel Family
Pickeringia montana	
Umbellularia californica	California Bay
Lennoaceae	
Pholisma arenarium	
Linaceae	Flax Family
Hesperolinen micranthun	
Loasaceae	Stick-Leaf Family
Mentzelia micrantha	Blazing Star
Lythraceae	Loosestrife Family
Ammannia coccinea	
Lythrium californicum	California Loosestrife
Malvaceae	Mallow Family
Abronia umbellata	
Malacothamnus fasciculatus	Bush Mallow
Mirabilis laevis	
Sida hederacea	
Sidalcea malvaeflora	
Myricaceae	
Myrica californica	California Wax-myrtle
Nyctaginaceae	4-O'Clock Family
Abronia maritima	Sand Verbena
Mirabilis californica	Wishbone Plant
Oleaceae	Olive Family
Fraxinus dipetala	Flowering Ash
F. velutina	Arizona Ash
Onagraceae	Evening Primrose Family
Boisduvalia glabella	
Camissonia bistorta	
C. boothii	
C. californa	California Evening Primrose
C. cheiranthifolia	Beach Primrose
C. dentata	
C. micrantha	Small Field Evening Primrose
Clarkia cylindrica	Clarkia
C. deflexa	
C. epilobioides	
C. purpurea	Purple Clarkia
C. unguiculata	Elegant Clarkia
Epilobium adenocaulon	Willow Herb
E. canum	California Fuschia
E. paniculatum	Willow Herb
Ludwigia peploides	Yellow Water-Weed
Oenothera californica	Evening primrose
O. hookeri	
Zauschneria californica	California Fuchsia
Z. cana	Humming Bird Trumpet

Orobanchaceae	Broomrape Family
Orobanche bulbosa	
O. grayana	
Oxalidaceae	Oxalis Family
Oxalis albicans	Wild Oxalis
Paeoniaceae	Peony Family
Paeonia californica	California Peony
Papaveraceae	Poppy Family
Dendromecon rigida	Bush Poppy
Dicentra ochroleuca	White Ear Drops
Eschscholzia caespitosa	
E. californica	California Poppy
Meconella denticulata	
Papauer californicum	
Platystemon californicus	Cream Cups
Stylomecon heterophylla	
Plantaginaceae	Plantain Family
Plantago erecta	Annual Plantain
Platanaceae	Sycamore Family
Platanus racemosa	Sycamore
Plumbaginaceae	Leadwart Family
Limonium californicum	
Polemoniaceae	Phlox Family
Allophyllus glutinosum	Stinky Gilia
Eriastrum densifolium	
E. filifolium	
E. sapphirinum	
Gilia angelensis	Angels Gilia
G. capitata	Globe Gilia
Leptodactylon californicum	Prickly Phlox
Linanthus androsaceus	Common Linanthus
L. dianthiflorous	Ground Pink
L. liniflorus	
Microsteris gracilis	
Navarretia hamata	
N. pubescens	
Polygalaceae	Milkwort Family
Polygala cornuta fishiae	Milkwort

Polygonaceae	Buckwheat Family
Chorizanthe californica	
C. coriacea	Turkish Rugging
Eriogonum cinereum	Ashy-Leaf Buckwheat
E. crocatum	Conejo Buckwheat
E. elongatum	Wand Buckwheat
E. fasciculatum	California Wild Buckwheat
E. gracile	Annual Buckwheat
E. parvifolum	
E. punctatum	
E. wrightii	
Polygonum	Smart Weed
P. amphibium	
P. hydropiperoides	
P. lapathifolium	Willow Weed
P. punctatum	
Pterostegia drymarioides	Thread Stem
Rumex fueginus	
R. salicifolius	Willow Dock
Portulacaceae	Purslane Family
Calandrinia breweri	
C. ciliata	Red Maids
C. maritima	
Calyptridium monandrum	Sand Cress
Claytonia perfoliata	Miner's Lettuce
Primulaceae	Primrose Family
Dodecatheon cievelandii	Shooting Star
Samolus parviflorus	
Ranunculaceae	Buttercup Family
Clematis lasiantha	
C. ligusticifolia	Virgin's Bower
Delphinium cardinale	
D. parryi	
D. patens	Blue Larskspur
Ranunculus californicus	California Buttercup
R. cymbalaria	
R. hebecarpus	
Thalictrum polycarpum	Meadow-Rue
Resedaceae	Mignonette Family
Oligomerii linifolia	
Rhamnaceae	Buckthorn Family
Ceanothus crassifolius	
C. cuneatus	Buck Brush
C. leucodermis	
C. megacarpus	Big Pod Ceanothus
C. oliganthus	Hairy-Leaf Ceanothus
C. spinosus	Green Stem Ceanothus
Rhamnus californica	Coffee Berry

Rhamnus crocea	Red Berry
R. ilicifolia	Holly Leaf Red Berry
Rosaceae	**Rose Family**
Adenostoma fasciculatum	Chamise
A. sparsifolium	
Alchemilla occidentalis	
Cercocarpus betuloides	Mountain Mahogany
Heteromeles arbutifolia	Toyon
Holodiscus discolor	Cream Bush
Potentilla egedei	
P. glandulosa	Sticky Cinquefoil
P. lindleyi	
Prunus ilicifolia	Holly-Leaf Cherry
Rosa californica	Wild Rose
Rubus ursinus	Black Berry
Rubiaceae	**Coffee Family**
Galium andrewsii	
G. angustifolium	Shrubby Bedstraw
G. nuttallii	
Galium sp	Shrubby Bedstraw
Salicaceae	**Willow Family**
Populus fremontii	Fremont Cottonwood
P. trichocarpa	Black Cottonwood
Salix hindsiana	Sandbar Willow
S. lasiolepis	Arroyo Willow
S. laevigata	Red Willow
Saururaceae	
Anemopsis californica	
Saxifragaceae	**Saxifrage Family**
Boykinia rotundifolia	
B. elata	
Lithophragma affine	Woodland Star
Ribes aureum	Golden Currant
R. californica	California Gooseberry
R. californicum	Hillside Gooseberry
R. malvaceum	Chaparral Currant
R. speciosum	Fuchsia-Field Gooseberry
Saxifraga californica	
Scrophulariaceae	**Snapdragon Family**
Antirrhinum coulterianum	
A. kelloggii	Twining Snapdragon
A. multiflorum	Rose Snapdragon
A. nuttalianum	Wild Snapdragon
Castilleja affinis	Indian Paint Brush
C. foliolosa	Woolly Paint Brush
C. martinii	
C. stenantha	Stream Paint Brush

Collinsia heterophylla	Chinese Houses
C. parryi	
Cordylanthus filifolius	Bird's Beak
C. maritimus	
Keckiella cordifolia	Heart-Leaf Penstemon
Linaria canadensis	Purple Toadflax
Mimullus	Annual Yellow Monkey Flower
Mimullus brevipes	Yellow Monkey Flower
M. cardinalis	Scarlet Monkey Flower
M. floribundus	
M. guttatus	Creek Monkey Flower
M. longiflorus	Bush Monkey Flower
M. pilosus	
Orthocarpus densiflorus	
O. purpurascens	Owl's Clover
Pedicularis densiflora	
Penstemon centranthifolius	Scarlet Bugler
P. cordifolius	
P. heterophyllus	Foothill Penstemon
P. spectabilis	Notable Penstemon
Scrophularia californica	California Bee Plant
Solanaceae	Nightshade Family
Datura meteloides	Jimson Weed
D. wrightii	
Nicotiana bigelovii	Indian Tobacco
Petunia parviflora	Wild Petunia
Solanum douglasii	White Nightshade
S. xanti	Purple Nightshade
Umbelliferae	
Apiastrum angustifolium	
Berula erecta	
Caucalis microcarpa	
Daucus pusillus	
Hydrosotyle umbellata	
Lomatium dasycarpum	
L. lucidum	
L. utriculatum	
Oenanthe sarmentosa	
Osmorhiza brachypoda	
Sanicula arguta	
S. bipinnata	
S. crassicaulis	
S. tuberosa	
Tauschia arguta	
T. hartwegii	
Urticaceae	Nettle Family
Hesperocnide tenella	Annual Stinging Nettle
Parietaria floridana	Pellitory
Urtica holosericea	Stinging Nettle

Valerianaceae	Valerian Family
Plectritis ciliosa	Plectritis
Verbenaceae	Vervain Family
Lippia lanceolata	
Verbena lasiostachys	Common Vervain
V. robusta	
Violaceae	Violet Family
Viola pedunculata	Johnny-Jump-Up
Viscaceae	Mistletoe Family
Phoradendron tomentesum	
P. villosum	Oak Mistletoe
Vitaceae	Grape Family
Vitis girdiana	

MONOCOTS

Agavaceae	Agave Family
Yucca whipplei	Chaparral Yucca
Alismataceae	Water-Plantain Family
Alisma triviale	
Echinodorus berteroi	Bur-Head
Amaryllidaceae	Amaryllis Family
Allium haematochiton	Wild Onion
Bloomeria crocea	Yellow Star Lily
Brodiaea jolonensis	Wild Brodiaea
Dichelostemma pulchella	Blue Dicks
Cyperaceae	Sedge Family
Carex barbarae	Sedge
C. praegracilis	
C. senta	
C. spissa	
C. triquetra	
Cyperus eragrostis	Umbrella Sedge
C. erythrorhizos	
C. esculentus	
C. niger	
C. odoratus	
Eleocharis macrostachya	Spike Rush
E. montevidensis	
E. radicans	
Scirpus acutus	
S. californicus	California Bulrush
S. cernuus	
S. olneyi	
S. robustus	

Gramineae	Grass Family
Agrostis diegoensis	
Andropogen barbinodis	
A. glomeratus	
Aristida adscensionis	
Arundo donax	
Bromus arizonicus	
B. carinatus	
B. pseudolaevipes	
B. trinii	
Distichlis spicata	
Elymus condensatus	
E. glaucus	
E. multisetus	
E. pauciflorus	
Eragrostis hynoides	
E. orcuttiana	
Festuca eastwoodae	
F. elmeri	
F. megalura	
F. octoflora	
F. pacifica	
F. reflexa	
Hordeum californicum	
H. pusillum	
Koeleria gracilis	
Leptochloa fascicularis	
L. uninervia	
Melica imperfecta	
Monanthochloe littoralis	
Muhlenbergia microsperma	
M. rigens	
Paspalum distichum	
Phragmites communis berlandieri	
Polypogen interruptus	
Poa scabrella	
Stipa cernua	
S. coronata	
S. lepida	
S. pulchra	
Iridaceae	Iris Family
Sisyrinchium bellum	Blue Eyed Grass
Juncaceae	Rush Family
Junus acutus	
J. balticus	
J. bufonius	
J. macrophyllus	
J. mexicanus	
J. patens	
J. phaeocephalus	
J. textilia	

Junus textilis	Giant Rush
J. torreyi	
J. xiphioides	
Juncus sp	Iris-Leaved Rush
Juncus sp	Wire Grass
Juncaginaceae	**Arrow Weed Family**
Triglochin concinna	
Lemnaceae	**Duckweed Family**
Lemna cyclostasa	
L. giba	
L. trisulca	
L. valdiviana	Duckweed
Wolffiella lingulata	
Liliaceae	**Lily Family**
Allium haematochiton	
A. peninsulare	
Bloomeria crocea	
Brodiaea jolonesis	
Calochortus albus	
C. catalinae	White Mariposa Lily
C. clavatus	Yellow Mariposa Lily
C. plummerae	
C. splendens	
C. venustus	
Chlorogalum pomeridianum	Soap Plant
Dichelostemma pulchellum	
Fritillaria biflora	Chocolate Lily
Lilium humboldtii	Humboldt Lily
Yucca whipplei	
Zigadenus fremontii	Star Lily
Najadaceae	**Water Nymph Family**
Najas flexilis	
Orchidaceae	**Orchid Family**
Epipactis gigantea	Stream Orchid
Habenaria unalascensis	Rein Orchid
Poaceae	**Grass Family**
Agrostis sp	Bent Grass
Artistida adscensionis	Triple-Awned Grass
Distichlis spicata	Salt Grass
Echinochloa crusgalli	Barnyard Grass
Elymus condensatus	Giant Wild Rye
E. glaucus	Western Rye Grass
Festuca megalura	Foxtail Fescue
F. pacifica	Pacifica Fescue
Koeleria macrantha	June Grass
Leptochloa uninervia	Sprangle Top
Melica imperfecta	Melica
Muhlenbergia rigens	Deer Grass

Paspalum distichum	Knot Grass
Phalaris sp	Canary Grass
Poa scabrella	Malpais Blue Grass
Stipa pulchra	Nodding Needlegrass
Potamogetonaceae	
Potamogeton pectinatus	Pondweed
Ruppiaceae	
Ruppia spiralis	
Typhaceae	**Cat-Tail Family**
Typha domingensis	Slender Cat-Tail
T. latifolia	Cat Tail
Zannichelliaceae	
Zannichellia palustrus	Grass Wrack
Zosteraceae	**Eelgrass Family**
Phyllospadix scouleri	
P. torreyi	

FERNS AND RELATED SPECIES

Aizoaceae	
Carpobrotus aequilateralis	
Aspidiaceae	**Fern Family #1**
Dryopteris arguta	Coastal Woodfern
Thelypteris puberula	
Woodwardia fimbriata	Chain Fern
Aspleniaceae	
Asplenium vespertinum	Spleenwort
Equisetaceae	**Horsetail Family**
Equisetum	Horsetail
E. laevigatum	Smooth Scouring Rush
E. telmateia	Giant Horsetail
Polypodiaceae	**Fern Family #2**
Polypodium californicum	California Polypody
Pteridaceae	**Fern Family #3**
Adiantum capillus-veneris	Venus-Hair Fern
A. jordanii	California Maidenhair
A. capillus-veneris	Venus-Hair Fern
Cheilanthes californica	
Notholaena newberryi	Cotton Fern
N. californica	
Pellaea andromedifolia	Coffee Fern
P. mucronata	Birds Foot Fern

Pityrogramma triangularis	Goldback Fern
Pteridium	
Pteridium aquilinum pubescens	Western Bracken
Salviniaceae	Western Fern Family
Azolla filiculoides	
Selaginellaceae	Spike-Moss Family
Selaginella bigelovii	Spike-Moss

PART II

FLORA OF THE SANTA MONICA MOUNTAINS

Introduced Naturalized Species

Aceraceae	Maple Family
Acer negundo ssp. *californicum*	Box Elder
Aizoaceae	Carpet Weed Family
Tetragonia tretragonioides	New Zealand Spinach
Mesembryanthemum nodiflorum	
M. crystallinum	
Aptenia cordifolia	
Carpobrotus edulis	Hotentot Fig
Amaranthaceae	
Amaranthus graecizans	
A. albus	Tumbleweed
A. deflexus	
A. retroflexus	
Anacardiaceae	Sumac Family
Schinus molle	Peruvian Pepper
Apocynaceae	Dogbane Family
Vinca major	Periwinkle
Caryophyllaceae	
Herniaria cinerea	
Silene gallica	
Spergula arvensis	
Polycarpon tetraphyllum	
Cerastium glomeratum	Mouse-ear Chickweed
Stellaria media	Common Chickweed
Chenopodiaceae	Goosefoot Family
Salsola iberica	Russian Thistle
Atriplex semibaccata	Australian Saltbush
A. patula ssp. *hastata*	
Beta vulgaris ssp. *maritima*	Garden Beet
Bassia hyssopifolia	
Chenopodium multifidum	
C. pumilio	
C. ambrosioides	Mexican Tea
C. murale	
C. berlandieri ssp. *zschakei*	
C. strictum ssp. *glaucophyllum*	

Compositae	Sunflower Family
Verbesina encelioides ssp. exauriculata	
Bidens pilosa	
Galinsoga parviflora	
Xanthium spinosum	Spiny Clotbur
Erigeron canadensis	
E. bonariensis	
Anthemis cotula	
Chrysanthemum coronarium	
Soliva daucifolia	
Cotula australis	
C. coronopifolia	Brass Buttons
Artemisia biennis	
Senecio mikanioides	German Ivy
S. vulgaris	Common Groundsel
Gnaphalium luteo-album	
Eupatorium adenophorum	
Centaurea repens	Russian Knapweed
C. melitensis	Yellow Starthistle
Circium vulgare	
Cichorium intybus	Chicory
Hedypnois cretica	
Tragopogon porrifolius	Oyster Plant
Hypochoeris glabra	
H. radicata	
Taraxacum officinale	Common Dandelion
Picris echiodes	Bristly Ox-tongue
Lactuca serriola	Prickly Lettuce
Sonchus oleraceus	Sow Thistle
S. asper	
Silybum marianum	
Convolvulaceae	Morning-Glory Family
Ipomoea purpurea	Common Morning-glory
Convolvulus arvensis	Bindweed
Cruciferae	
Raphanus sativus	Wild Radish
Cakile maritima	Sea Rocket
Matthiola incana	
Brassica nigra	Black Mustard
Brassica rapa ssp. sylvestris	Common Mustard
Hirschfeldia incana	
Sinapis arvensis	
Sisymbrium officinale	
S. altissimum	Tumble Mustard
S. irio	London Rocket
S. orientale	
Diplotaxis tenuifolia	Wall Rocket
Descurainia sophia	
Rorippa nasturtium-aquaticum	Water Cress
Lobularia maritima	Sweet Alyssum
Coronopus didymus	Wart Cress
Capsella bursa-pastoris	Shepherd's-Purse
Lepidium virignicum ssp. pubescens	
Cardaria draba	Hoary Cress

Euphorbiaceae	Spurge Family
Ricinus communis	Castor Bean
Euphorbia maculata	
E. peplus	
Geraniaceae	Geranium Family
Erodium-obtusiplicatum	
E. botrys	
E. moschatum	
E. cicutarium	
Geranium molle	
Labiatae	Mint Family
Marrubium vulgare	
Mentha pulegium	Pennyroyal
M. spicata	Spearmint
Leguminosae	
Spartium junceum	Spanish Broom
Trifolium repens	White Clover
T. incarnatum	Crimson Clover
Medicago sativa	Alfalfa
M. lupulina	Black Medic
M. polymorpha	Bur-clover
Mililotus alba	
M. indica	
Lotus corniculatus	
Vicia villosa	Winter Vetch
V. dasycarpa	
V. sativa	
Loganiaceae	
Buddleia davidii	
B. saligna	
Malvaceae	Mallow Family
Malva parviflora	Cheeseweed
Modiola caroliniana	
Martyniaceae	Unicorn-Plant Family
Proboscidea parviflora	
Myrtaceae	Myrtle Family
Eucalyptus globulus	Blue Gum
E. ssp.	
Nymphaeaceae	Water Lily Family
Nuphar polysepalum	
Oxalidaceae	Oxalis Family
Oxallis rubra	
O. pes-caprae	
O. corniculata	

Papaveraceae	
Romneya coulteri	Matilija Poppy
Plantaginaceae	Plantain Family
Plantago major	Common Plantain
P. lanceolata	English Plantain
Plumbaginaceae	Leadwort Family
Limonium perezii	
Polygonaceae	
Polygonum arenastrum	Knotweed
P. argyrocoleon	
Rumex acetosella	Sheep Sorrel
R. conglomeratus	
R. crispus	Curly Dock
Portulacaceae	Purslane Family
Portulaca oleracea	Purslane
Primulaceae	Primrose Family
Anagallis arvensis	Pimpernel
Rosaceae	
Rubus procerus	Himalaya-berry
Sanguisorba minor	
Rubiaceae	Madder Family
Sherardia arvensis	Field Madder
Galium aparine	
Scrophulariaceae	Figwort Family
Veronica anagallis-aquatica	
Linaria pinifolia	
Simarubaceae	Quassia Family
Ailanthus altissima	Tree of Heaven
Solanaceae	Nightshade Family
Solanum eleagnifolium	Silverleaf-nettle
S. rostratum	Buffalo-bur
S. lycopersicum	
S. sarachoides	
S. nodiflorum	
Nicotiana glauca	Tree Tobacco
Datura stramonium	
Salpichroa origanifolia	Lily-of-the-Valley Vine
Tropaeolaceae	
Tropaeolum majus	Garden Nasturtium
Umbelliferae	
Bowlesia incana	
Apium graveolens	Celery
A. leptophyllum	
Foeniculum vulgare	Fennel
Conium maculatum	Poison Hemlock

Urticaceae	
Urtica urens	Dwarf Nettle
Soleirolia soleirolii	Baby Tears
Valerianaceae	
Kentranthus ruber	
Verbenaceae	
Lippia nodiflora ssp. rosea	
Zygophyllaceae	Caltrop Family
Tribulus terrestris	Puncture Vine

Monocotyledoneae

Cyperaceae	Sedge Family
Cyperus alternifolius	Umbrella Plant
C. rotundus	Purple Nut-grass
Gramineae	Grass Family
Ehrharta erecta	
Schismus barbatus	
Oryzopsis miliacea	Rice Grass
Parapholis incurva	
Dactylis glomerata	Orchard Grass
Festuca pratensis	Meadow Fescue
F. arundinacea	
F. myuros	Rat-tail Fescue
Lamarckia aurea	Goldentop
Lolium perenne	Perennial Ryegrass
L. multiflorum	Italian Reygrass
L. temulentum	
Poa palustris	Fowl Bluegrass
P. annua	Annual Bluegrass
Bromus wildenovii	Rescue Grass
B. unioloides	
B. mollis	
B. rubens	Foxtail Chess
B. madritensis	
B. tectorum	
B. diandrus	Rigput Grass
Hordeum glaucum	
H. leporinum	Foxtail Barley
H. vulgare	Common Barley
H. geniculatum	
Triticum aestivum	Wheat
Avena barbata	Slender Oat
A. fatua	Wild Oat
A. sativa	Oat
Phalaris tuberosa ssp. stenoptera	
P. canariensis	
P. minor	
Agrostis stolonifera	

Gramineae (Cont'd.)

Ammophila arenaria	Beachgrass
Gastridium ventricosum	
Polypogon semiverticillatus	
P. monspeliensis	
Eragrostis cilianensis	
E. barrelieri	
Crypsis schoenoides	
Sporobolus indicus	
Chloris gayana	Rhodes Grass
Cynodon dactylon	Bermuda Grass
Digitaria adcendens	
D. ischaemum	
Echinochloa crusgalli	Barnyard Grass
E. colonum	
Panicum miliaceum	Broom-corn Millet
Paspalum dilatatum	
Pennisetum clandestinum	Kikuyu Grass
P. setaceum	Fountain Grass
Setaria geniculata	
S. lutescens	
Stenotapharum secundatum	St. Augustine Grass
Sorghum halepense	Johnson Grass

APPENDIX F

LEGISLATION

PUBLIC LAW 95-625—NOV. 10, 1978

SANTA MONICA MOUNTAINS NATIONAL RECREATION AREA

SEC. 507. (a) The Congress finds that— 16 USC 460kk.

(1) there are significant scenic, recreational, educational, scientific, natural, archeological, and public health benefits provided by the Santa Monica Mountains and adjacent coastline area;

(2) there is a national interest in protecting and preserving these benefits for the residents of and visitors to the area; and

(3) the State of California and its local units of government have authority to prevent or minimize adverse uses of the Santa Monica Mountains and adjacent coastline area and can, to a great extent, protect the health, safety, and general welfare by the use of such authority.

(b) There is hereby established the Santa Monica Mountains National Recreation Area (hereinafter referred to as the "recreation area"). The Secretary shall manage the recreation area in a manner which will preserve and enhance its scenic, natural, and historical setting and its public health value as an airshed for the Southern California metropolitan area while providing for the recreational and educational need of the visiting public. Establishment. Management.

(c)(1) The recreation area shall consist of the lands and waters and interests generally depicted as the recreation area on the map entitled "Boundary Map, Santa Monica Mountains National Recreation Area, California, and Santa Monica Mountains Zone", numbered SMM-NRA 80,000, and dated May 1978, which shall be on file and available for inspection in the offices of the National Park Service, Department of the Interior, Washington, District of Columbia, and in the offices of the General Services Administration in the Federal Office Building in West Los Angeles, California, and in the main public library in Ventura, California. After advising the Committee on Interior and Insular Affairs of the United States House of Representatives and the Committee on Energy and Natural Resources of the United States Senate, in writing, the Secretary may make minor revisions of the boundaries of the recreation area when necessary by publication of a revised drawing or other boundary description in the Federal Register. Description. Boundary revisions, notice to congressional committees and publication in Federal Register.

(2) Not later than ninety days after the date of enactment of this Act, the Secretary, after consultation with the Governor of the State of California, the California Coastal Commission, and the Santa Monica Mountains Comprehensive Planning Commission, shall commence acquisition of lands, improvements, waters, or interests therein within the recreation area. Such acquisition may be by donation, purchase with donated or appropriated funds, transfer from any Federal agency, exchange, or otherwise. Any lands or interests therein owned by the State of California or any political subdivision thereof (including any park district or other public entity) may be acquired only by Lands, waters, and interests, acquisition and consultation.

donation, except that such lands acquired after the date of enactment of this section by the State of California or its political subdivisions may be acquired by purchase or exchange if the Secretary determines that the lands were acquired for purposes which further the national interest in protecting the area and that the purchase price or value on exchange does not exceed fair market value on the date that the State acquired the land or interest: *Provided, however*, That the value of any lands acquired by the Secretary under the exception in this sentence shall be deducted from the amount of moneys available for grants to the State under subsection (n) of this section. Notwithstanding any other provision of law, any Federal property located within the boundaries of the recreation area shall, with the concurrence of the head of the agency having custody thereof, be transferred without cost, to the administrative jurisdiction of the Secretary for the purposes of the recreation area.

Federal property, transferral.

Site transferral.

(3) The Administrator of the General Services Administration is hereby authorized and directed to transfer the site generally known as Nike Site 78 to the Secretary for inclusion in the recreation area: *Provided*, That the county of Los Angeles shall be permitted to continue to use without charge the facilities together with sufficient land as in the determination of the Secretary shall be necessary to continue to maintain and operate a fire suppression and training facility and shall be excused from payment for any use of the land and facilities on the site prior to the enactment of this Act. At such time as the county of Los Angeles, California, relinquishes control of such facilities and adjacent land or ceases the operation of the fire suppression and training facility, the land and facilities shall be managed by the Secretary as a part of the recreation area.

Lands, waters, and interests, identification.

(d)(1) Within six months after the date of enactment of this Act, the Secretary shall identify the lands, waters, and interests within the recreation area which must be acquired and held in public ownership for the following critical purposes: preservation of beaches and coastal uplands; protection of undeveloped inland stream drainage basins; connection of existing State and local government parks and other publicly owned lands to enhance their potential for public recreation use; protection of existing park roads and scenic corridors, including such right-of-way as is necessary for the protection of the Mulholland Scenic Parkway Corridor; protection of the public health and welfare; and development and interpretation of historic sites and recreation areas in connection therewith, to include, but not be limited to, parks, picnic areas, scenic overlooks, hiking trails, bicycle trails, and equestrian trails. The Secretary may from time to time revise the identification of such areas, and any such revisions shall become effective in the same manner as herein provided for revisions in the boundaries of the recreation area.

Revisions.

Plan, submittal to congressional committees.

(2) By January 1, 1980, the Secretary shall submit, in writing, to the committees referred to in subsection (c) and to the Committees on Appropriations of the United States Congress a detailed plan which shall indicate—

(A) the lands and areas identified in paragraph (1),

(B) the lands which he has previously acquired by purchase, donation, exchange, or transfer for the purpose of this recreation area,

(C) the annual acquisition program (including the level of funding) recommended for the ensuing five fiscal years, and

(D) the final boundary map for the recreation area.

(e) With respect to improved properties, as defined in this section, fee title shall not be acquired unless the Secretary finds that such lands are being used, or are threatened with uses, which are detrimental to the purposes of the recreation area, or unless each acquisition is necessary to fulfill the purposes of this section. The Secretary may acquire scenic easements to such improved property or such other interests as, in his judgment are necessary for the purposes of the recreation area. Improved properties, acquisition. Scenic easements.

(f) For the purposes of this section, the term "improved property" means— Definition.

(1) a detached single-family dwelling, the construction of which was begun before January 1, 1976 (hereafter referred to as "dwelling"), together with so much of the land on which the dwelling is situated as is in the same ownership as the dwelling and as the Secretary designates to be reasonably necessary for the enjoyment of the dwelling for the sole purpose of noncommercial residential use, together with any structures necessary to the dwelling which are situated on the land so designated, and

(2) property developed for agricultural uses, together with any structures accessory thereto as were used for agricultural purposes on or before January 1, 1978.

In determining when and to what extent a property is to be treated as "improved property" for purposes of this section, the Secretary shall take into consideration the manner of use of such buildings and lands prior to January 1, 1978, and shall designate such lands as are reasonably necessary for the continued enjoyment of the property in the same manner and to the same extent as existed prior to such date. Designation.

(g) The owner of an improved property, as defined in this section, on the date of its acquisition, as a condition of such acquisition, may retain for herself or himself, her or his heirs and assigns, a right of use and occupancy of the improved property for noncommercial residential or agriculture purposes, as the case may be, for a definite term of not more than twenty-five years, or, in lieu thereof, for a term ending at the death of the owner or the death of her or his spouse, whichever is later. The owner shall elect the term to be reserved. Unless the property is wholly or partially donated, the Secretary shall pay to the owner the fair market value of the property on the date of its acquisition, less the fair market value on that date of the right retained by the owner. A right retained by the owner pursuant to this section shall be subject to termination by the Secretary upon his determination that it is being exercised in a manner inconsistent with the purposes of this section, and it shall terminate by operation of law upon notification by the Secretary to the holder of the right of such determination and tendering to him the amount equal to the fair market value of that portion which remains unexpired. Use and occupancy rights, retention. Payment. Termination, notification.

(h) In exercising the authority to acquire property under this section, the Secretary shall give prompt and careful consideration to any offer made by an individual owning property within the recreation area to sell such property, if such individual notifies the Secretary that the continued ownership of such property is causing, or would result in, undue hardship.

(i) The Secretary shall administer the recreation area in accordance with this Act and provisions of laws generally applicable to units of the National Park System, including the Act of August 25, 1916 (39 Stat. 535; 16 U.S.C. 1 et seq.). In the administration of the recreation area, the Secretary may utilize such statutory authority Administration.

available for the conservation and management of wildlife and natural resources as appropriate to carry out the purpose of this section. The fragile resource areas of the recreation area shall be administered on a low-intensity basis, as determined by the Secretary.

Cooperative agreements.

(j) The Secretary may enter into cooperative agreements with the State of California, or any political subdivision thereof, for the rendering, on a reimbursable basis, of rescue, firefighting, and law enforcement services and cooperative assistance by nearby law enforcement and fire preventive agencies.

Donations.

(k) Notwithstanding any other provision of law, the Secretary is authorized to accept donations of funds, property, or services from individuals, foundations, corporations, or public entities for the purpose of land acquisition and providing services and facilities which the Secretary deems consistent with the purposes of this section.

Report.

(l) By January 1, 1981, the Santa Monica Mountains National Recreation Area Advisory Commission, established by this section, shall submit a report to the Secretary which shall—

(1) assess the capability and willingness of the State of California and the local units of government to manage and operate the recreation area,

(2) recommend any changes in ownership, management, and operation which would better accomplish the purposes of this section, and

(3) recommend any conditions, joint management agreements, or other land use mechanisms to be contingent on any transfer of land.

Report to congressional committees.

(m) The Secretary, after giving careful consideration to the recommendations set forth by the Advisory Commission, shall, by January 1, 1982, submit a report to the Committees referred to in subsection (c) which shall incorporate the recommendations of the Advisory Commission as well as set forth the Secretary's recommendations. Such report shall—

(1) assess the benefits and costs of continued management as a unit of the National Park System,

(2) assess the capability and willingness of the State of California and the local units of government to manage and operate the recreation area, and

(3) recommend any changes in ownership, management, and operation which would better accomplish the purposes of this section.

Comprehensive plan.

(n)(1) The Secretary shall request the Santa Monica Mountains Comprehensive Planning Commission to submit a comprehensive plan, prepared in accord with this section and title 7.75 of the California Government Code (commencing with section 67450), for the Santa Monica Mountains Zone generally depicted on the map referred to in subsection (c) of this section for approval.

(2) The comprehensive plan shall include, in addition to the requirements of California State law—

(A) an identification and designation of public and private uses which are compatible with and which would not significantly impair the significant scenic, recreational, educational, scientific, natural, archeological, and public health benefits present in the zone and which would not have an adverse impact on the recreation area or on the air quality of the south coast air basin;

(B) a specific minimum land acquisition program which shall include, but not be limited to, fee and less than fee acquisition

of strategic and critical sites not to be acquired by the Federal Government for public recreational and other related uses; and a program for the complementary use of State and local authority to regulate the use of lands and waters within the Santa Monica Mountains Zone to the fullest extent practicable consistent with the purposes of this section; and

(C) a recreation transportation system which may include but need not be limited to existing public transit.

(3) No plan submitted to the Secretary under this section shall be approved unless the Secretary finds the plan consistent with paragraph (2) and finds that—

(A) the planning commission has afforded adequate opportunity, including public hearings, for public involvement in the preparation and review of the plan, and public comments were received and considered in the plan or revision as presented to him;

(B) the State and local units of government identified in the plan as responsible for implementing its provisions have the necessary authority to implement the plan and such State and local units of government have indicated their intention to use such authority to implement the plan;

(C) the plan, if implemented, would preserve significant natural, historical, and archeological benefits and, consistent with such benefits, provide increased recreational opportunities for persons residing in the greater Los Angeles-southern California metropolitan area; and

(D) implementation of the plan would not have a serious adverse impact on the air quality or public health of the greater Los Angeles region.

Consultation with EPA.

Before making his findings on the air quality and public health impacts of the plan, the Secretary shall consult with the Administrator of the Environmental Protection Agency.

(4) Following approval of the plan with respect to the Santa Monica Mountains Zone, upon receipt of adequate assurances that all aspects of that jurisdiction's implementation responsibilities will be adopted and put into effect, the Secretary shall—

Grants.

(A) provide grants to the State and through the State to local governmental bodies for acquisition of lands, waters, and interests therein identified in paragraph (2)(B), and for development of essential public facilities, except that such grants shall be made only for the acquisition of lands, waters, and interests therein, and related essential public facilities, for park, recreation, and conservation purposes; and

Funds.

(B) provide, subject to agreements that in the opinion of the Secretary will assure additional preservation of the lands and waters of the zone, such funds as may be necessary to retire bonded indebtedness for water and sewer and other utilities already incurred by property owners which in the opinion of the Secretary would if left outstanding contribute to further development of the zone in a manner inconsistent with the approved plan developed by the planning commission.

Assurance requirements.

No grant for acquisition of land may be made under subparagraph (A) unless the Secretary receives satisfactory assurances that such lands acquired under subparagraph (A) shall not be converted to other than park, recreation, and conservation purposes without the approval of the Secretary and without provision for suitable replacement land.

Grant requirements.

(5) Grants under this section shall be made only upon application of the recipient State and shall be in addition to any other Federal financial assistance for any other program, and shall be subject to such terms and conditions as the Secretary deems necessary to carry out the purposes of this section. Any jurisdiction that implements changes to the approved plan which are inconsistent with the purposes of this section, or adopts or acquiesces in changes to laws regulations or policies necessary to implement or protect the approved plan, without approval of the Secretary, may be liable for reimbursement of all funds previously granted or available to it under the terms of this section without regard to such additional terms and conditions or other requirements of law that may be applicable to such grants. During the life of the planning commission, changes to the plan must be submitted by the planning commission to the Secretary for approval. No such application for a grant may be made after the date five years from the date of the Secretary's approval of the plan.

Plan changes.

Comments.

(o) The head of any Federal agency having direct or indirect jurisdiction over a proposed Federal or federally assisted undertaking in the lands and waters within the Santa Monica Mountains Zone, generally depicted on the map referred to in subsection (c), and the head of any Federal agency having authority to license or permit any undertaking in such lands and waters shall, prior to the approval of the expenditure of any Federal funds on such undertaking or prior to the issuance of any license or permit, as the case may be, afford the Secretary a reasonable opportunity to comment with regard to such undertaking and shall give due consideration to any comments made by the Secretary and to the effect of such undertaking on the "findings" and purposes of this section.

(p) The Secretary shall give full consideration to the recommendations of the California Department of Parks and Recreation, the Santa Monica Mountains Comprehensive Planning Commission, and the California Coastal Commission.

Santa Monica Mountains National Recreation Area Advisory Commission. Establishment. Membership.

(q)(1) There is hereby established the Santa Monica Mountains National Recreation Area Advisory Commission (hereinafter referred to as the "Advisory Commission"). The Advisory Commission shall terminate ten years after the date of establishment of the recreation area.

(2) The Advisory Commission shall be composed of the following members to serve for terms of five years as follows:

(A) one member appointed by the Governor of the State of California;

(B) one member appointed by the mayor of the city of Los Angeles;

(C) one member appointed by the Board of Supervisors of Los Angeles County;

(D) one member appointed by the Board of Supervisors of Ventura County; and

(E) five members appointed by the Secretary, one of whom shall serve as the Commission Chairperson.

Meetings. Notice, publication in newspapers.

(3) The Advisory Commission shall meet on a regular basis. Notice of meetings and agenda shall be published in local newspapers which have a distribution which generally covers the area. Commission meetings shall be held at locations and in such a manner as to insure adequate public involvement. Such locations shall be in the region of the Santa Monica Mountains and no more than twenty-five miles from it.

(4) Members of the Commission shall serve without compensation as such, but the Secretary may pay expenses reasonably incurred in carrying out their responsibilities under this Act on vouchers signed by the Chairperson. Compensation and expenses.

(5) The Secretary, or his or her designee, shall from time to time but at least semiannually, meet and consult with the Advisory Commission on matters relating to the development of this recreation area and with respect to carrying out the provisions of this section. Consultation.

(r) There are authorized to be appropriated such sums as may be necessary for acquisition of lands and interests in land within the boundaries of the recreation area established under this section, but not more than $15,000,000 for fiscal year 1979, $40,000,000 for fiscal year 1980, $45,000,000 for fiscal year 1981, $10,000,000 for fiscal year 1982, and $15,000,000 for fiscal year 1983, such sums to remain available until expended. For grants to the State pursuant to subsection (n) there are authorized to be appropriated not more than $10,000,000 for fiscal year 1979, $10,000,000 for fiscal year 1980, $5,000,000 for fiscal year 1981, and $5,000,000 for fiscal year 1982, such sums to remain available until expended. For the authorizations made in this subsection, any amounts authorized but not appropriated in any fiscal year shall remain available for appropriation in succeeding fiscal years. Appropriation authorization.

(s) For the development of essential public facilities in the recreation area there are authorized to be appropriated not more than $500,000. The Congress expects that, at least until assessment of the report required by subsection (t), any further development of the area shall be accomplished by the State of California or local units of government, subject to the approval of the Director, National Park Service.

(t) Within two years from the date of establishment of the recreation area pursuant to this section, the Secretary shall, after consulting with the Advisory Commission, develop and transmit to the Committees referred to in subsection (c) a general management plan for the recreation area consistent with the objectives of this section. Such plan shall indicate— Management plan, transmittal to Congress.

(1) a plan for visitor use including the facilities needed to accommodate the health, safety, education and recreation needs of the public;

(2) the location and estimated costs of all facilities;

(3) the projected need for any additional facilities within the area;

(4) any additions or alterations to the boundaries of the recreation area which are necessary or desirable to the better carrying out of the purposes of this section; and

(5) a plan for preservation of scenic, archeological and natural values and of fragile ecological areas.

As the nation's principal conservation agency, the Department of the Interior has basic responsibilities to protect and conserve our land and water, energy and minerals, fish and wildlife, parks and recreation areas, and to ensure the wise use of all these resources. The department also has major responsibility for American Indian reservation communities and for people who live in island territories under U.S. administration.

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