

**PUBLIC REVIEW DRAFT  
RESOURCE DOCUMENT**



# **Multiple Species Conservation Program (MSCP)**

**Volume I: MSCP Resource Document**

**Prepared for:**

**City of San Diego**

**Prepared by:**

**Ogden Environmental and Energy Services Co., Inc.**

**The Rick Alexander Company**

**Onaka Planning & Economics**

**Douglas Ford & Associates**

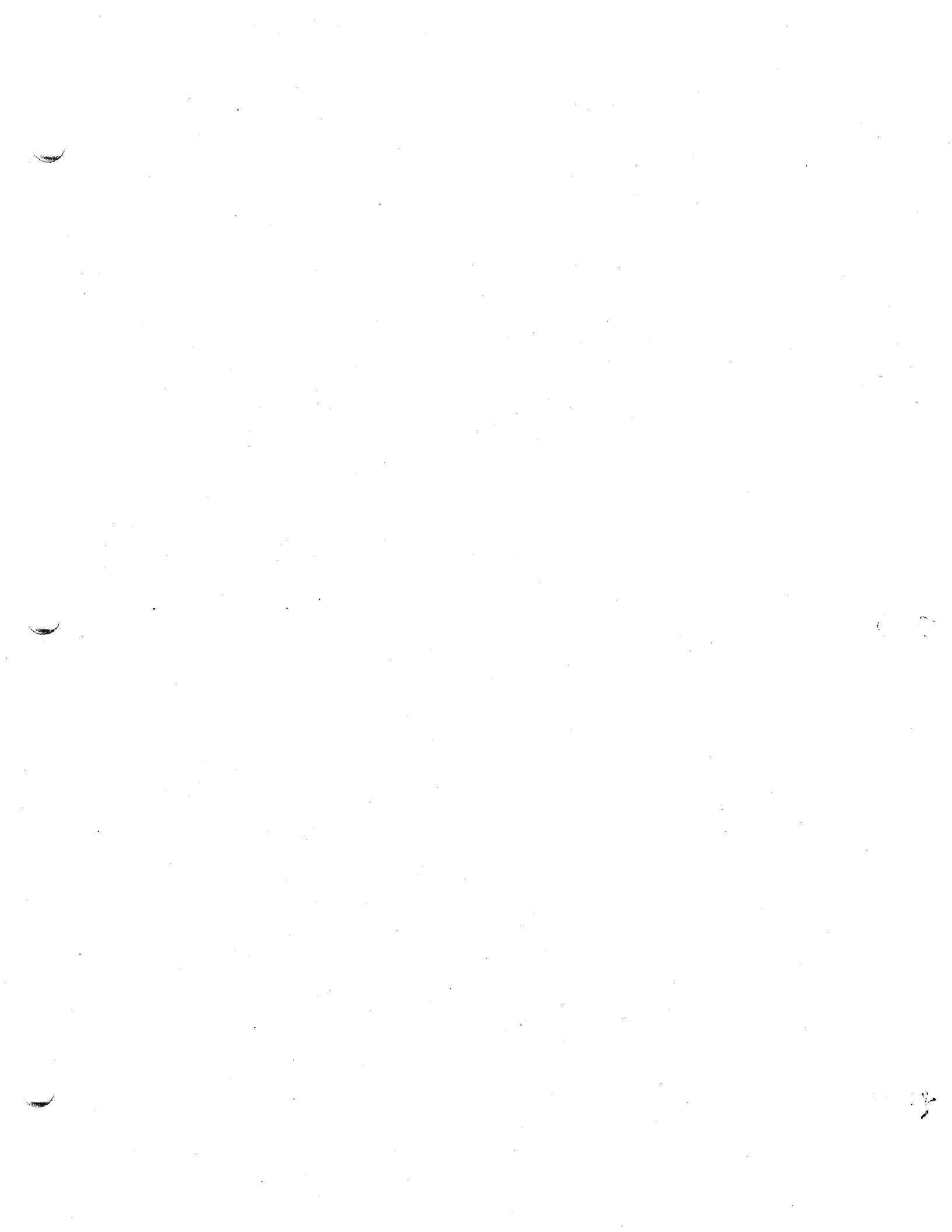
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## **EXECUTIVE SUMMARY**

### **1.0 INTRODUCTION**

The Multiple Species Conservation Program (MSCP) is a comprehensive habitat conservation planning program which addresses multiple species habitat needs and the preservation of natural communities for a 900-square mile area in southwestern San Diego County. The MSCP addresses the potential impacts of urban growth, loss of natural habitats, and species endangerment and develops a plan to mitigate for the loss of plant and wildlife species and habitat due to the direct and indirect impacts of future development of both private and public lands.

The MSCP creates a new process for the issuance of federal and state permits and other authorizations under the state and federal Endangered Species Acts (ESA) and the Natural Community Conservation Planning (NCCP) Act of 1991. The MSCP will allow the participating local jurisdictions to maintain development flexibility by proactively planning a regional preserve system which can meet future public and private project mitigation needs. This new approach emphasizes the protection and management of habitats rather than focusing preservation efforts on one species at a time. Preservation of natural habitat and wildlife will significantly enhance the quality of life in the San Diego region and set aside lands for the future use and enjoyment of the citizens within the MSCP study area.

### **Background**

The MSCP began in July 1991 as a proactive way to address the mitigation needs of the City of San Diego Metropolitan Wastewater Department (formerly the Clean Water Program) for planned improvements to the Metropolitan Sewerage System (Metro System). Under the federal Clean Water Act, the City of San Diego is required to upgrade the sewer system to provide secondary wastewater treatment. In 1987, the City formed the Clean Water Program for purposes of attaining three major goals for the region:

- Provide secondary treatment of wastewater discharged to the ocean;
- Achieve the maximum amount of water reclamation possible to minimize dependence on imported water supplies; and
- Accommodate future increases in wastewater flows.

Implementation of these goals will involve siting and construction of wastewater treatment, water reclamation, sludge management, conveyance pipelines, and associated facilities. The overall Metro System configuration was the subject of a three-year planning effort which culminated with the issuance of a nine-volume report for modifications to the system and certification of a joint environmental impact report/environmental impact statement (EIR/EIS, City of San Diego 1991).

Successful implementation of the Metro System program will accommodate the region's growth as projected by the San Diego Association of Governments (SANDAG). The U.S. Fish and Wildlife Service (USFWS) and U.S. Environmental Protection Agency (EPA) contend that, since population growth may not occur to the same extent or in the same form without sewerage system improvements, the adoption of the Metro System program requires mitigation of not only potential direct impacts (i.e., construction and operation-related) but also potential secondary impacts (i.e., population growth-related impacts). As documented in the joint EIR/EIS (City of San Diego 1991), the City of San Diego Metropolitan Wastewater Department (MWWD) committed to prepare the MSCP as a major step toward mitigation of these potential impacts.

There are numerous reasons for undertaking a subregional habitat conservation planning program:

- Historic habitat loss has resulted in many species of plants and animals becoming increasingly rare, and in some cases threatened with extirpation or extinction.
- Without a multiple habitat conservation plan, the ability to site future housing, employment, and public facilities will be severely constrained as species are added to the state and federal threatened and endangered species lists.
- Proactive and cooperative planning at the subregional and local level can mitigate and preempt unwanted regulation by other entities.
- Dynamic plans to maintain the San Diego region's biodiversity benefit our quality of life and serve generations to come.

## **Objectives**

The objectives of the MSCP are to develop and implement a program for the conservation and management of habitats of federally endangered, threatened, or key candidate species within the MSCP study area. The program calls for the establishment of a preserve system which will replace the currently fragmented, project-by-project biological mitigation areas, which by themselves do not contribute adequately to the continued existence of sensitive species or to the maintenance of the natural biodiversity. The program would meet the MWWD's needs to mitigate the direct biological impacts of the mandated improvements to the region's sewage treatment facilities and potential secondary impacts associated with these improvements and would provide long-term conservation and economic benefits to the participating jurisdictions in the MSCP study area.

The ultimate objectives of the MSCP are to:

1. Develop a program for the maintenance of biological diversity and the conservation/protection of self-sustaining viable populations of federally listed endangered, threatened, and key candidate species and their habitats.
2. Define an area within which preserve planning is focused, or within which a preserve is defined, and implement a preserve system which conserves viable habitat and provides for wildlife use and movement.
3. Reduce the human-related causes of species extirpation within the MSCP study area.
4. Establish a partnership among state, federal, and local agencies of government to facilitate mitigation and approval of public and private sector land development and construction projects by expediting acquisition of federal and state permits.
5. Establish and maintain a workable balance between preservation of natural resources and regional growth and economic prosperity.

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6. Contribute to future economic viability by providing a component of an open space system. This amenity is important in attracting new employment to the region.
7. Meet the applicable requirements of the federal and state ESAs and the NCCP Act.
8. Describe a finance and acquisition strategy which spreads implementation costs equitably among all beneficiaries and which is affordable to the region.
9. Provide a framework for development of subarea and project plans which directly implement the MSCP.
10. Provide a plan for general public benefit through open space conservation and access to natural preserves for passive recreation and an improved quality of life.

### **Purpose and Need**

San Diego County is a microcosm of the State of California with respect to its extremely high biodiversity. This biodiversity results from the peculiarities and diversity of topography, climate, and soil found in the region. The high biodiversity within the county is apparent in the sheer numbers of species that are present, including over 1,740 plant taxa, 80 mammalian species, 435 bird species, 75 reptile and amphibian species, 125 butterfly species, and perhaps 10,000 to 20,000 other terrestrial and aquatic invertebrate species. The county also supports a wide range of habitats, including 23 major vegetation types and 51 plant communities.

The MSCP study area occupies approximately 581,650 acres in southwestern San Diego County. This area contains most of the major topographical, climatic, and soil features of the county, exclusive of those found in mountain and desert zones. As a result, the study area also supports a rich assemblage of flora and fauna. The geographic position of the study area also contributes to its high species richness; many species reach either northern or southern distributional limits in the study area. For many species with more southerly affinities, southwestern San Diego County comprises their only U.S. occurrence.

Urbanization of San Diego's natural lands is severely threatening the biodiversity and long-term biological viability of this unique region. The MSCP study area contains much of the current or proposed urbanization in the county; consequently, its remaining native habitats are most threatened by development. Twelve major habitats considered sensitive by federal, state, or local agencies occur in the study area. Some of these habitats, such as coastal bluff scrub, maritime succulent scrub, southern maritime chaparral, Torrey pine forest, and southern interior cypress forest, are found primarily in San Diego County, and all or a large portion of their U.S. distribution falls within the MSCP study area. Most of these habitats are considered sensitive because they have been severely reduced in distribution as a result of urbanization.

San Diego County contains approximately 200 plant and animal species that are federally and/or state endangered, threatened, rare, or proposed or candidates for listing. Nearly half of these species occur in the MSCP study area, although this area comprises only about 20 percent of the total acreage in the county. Recent federal listings and proposed listings of species in the study area underscore the importance and urgency of habitat preservation in order to avoid species extinctions and further listings. No other subregion of the continental U.S. supports as many listed and candidate species as the MSCP study area.

At the same time, recent listings, including the federal listing of the California gnatcatcher as threatened, and proposed listings have placed severe restrictions on the region's ability to accommodate future growth and development in habitat areas. A coordinated regional plan for species and habitat conservation would aid in the rational management of regional growth and improve the quality of life of current and future residents.

### **MSCP Working Group**

The MSCP Working Group serves as an advisory body which contributes technical expertise to the City of San Diego Clean Water Program, the administering agency of the MSCP. The Working Group has been the primary vehicle for community and interagency involvement in formulation of the MSCP Plan. The membership includes community interests, the local jurisdictions, special purpose agencies, and state and federal resource agencies. In addition, an Implementation Strategy Subcommittee was formed to provide review and expertise to development of the finance and acquisition plan and overall implementation strategy.

The Working Group has relied on development and review of Issue Papers and Discussion Papers as a means to resolve issues associated with development of a comprehensive habitat conservation plan.

## **2.0 BIOLOGICAL RESOURCES**

### **Data Sources**

A comprehensive database of vegetation communities and MSCP target species locations was developed for the study area, using a geographic information system (GIS). Vegetation communities were delineated by interpretation of June 1990 color infrared aerial photography (1:24,000 scale) and field-checked by helicopter overflights, use of existing vegetation maps, and ground-truthing in certain potential problem areas. On-screen digitizing was used to input vegetation data onto a merged Spot and Thematic Mapper (TM) satellite image base. The satellite data served as a source of coordinate control. An accuracy assessment of the vegetation mapping was performed.

Target species locations were mapped onto 1:24,000 scale topographic maps from existing data (including the California Natural Diversity Data Base and unpublished data from local experts), Environmental Impact Reports, and surveys of selected areas. Field survey data were available for less than half the study area; therefore, distribution data for most of the target species are considered incomplete, though adequate for regional planning purposes. Other data sources included a digital elevation model, USFWS National Wetlands Inventory maps, U.S. Forest Service topographic maps, Soil Conservation Service soils maps, vernal pools maps, and unpublished data on documented golden eagle nest sites.

### **Vegetation Communities**

Eighteen native vegetation associations were mapped within the study area: southern foredunes, southern coastal bluff scrub, coastal sage scrub, maritime succulent scrub, chaparral, southern maritime chaparral, a coastal sage scrub-chaparral mix, grassland, southern coastal saltmarsh, freshwater marsh, oak riparian forest, riparian forest, riparian woodland, riparian scrub, dense and sparse phases of oak woodland, Torrey pine forest, and southern interior cypress forest. All of these habitat types, with the exception of chaparral and non-native grassland, are either considered sensitive or rare and/or receive regulatory protection (i.e., wetlands, coastal sage scrub).

## **Target Species**

The USFWS developed a list of 93 target species (48 plant species and 45 animal species) to be addressed by the MSCP Plan. Not all of these species are proposed to be adequately protected by the Plan. The list is comprised of 26 federal or state endangered species, 3 federal or state threatened species, 4 state rare species, 10 state species of special concern, 39 federal candidate species (not including species that are also state listed), 6 species proposed for federal listing (not including species proposed for federal listing which are also state listed), and 5 additional species important as habitat indicators or important for preserve design. Of this total, the U.S. distribution of 8 plant species and 1 animal species lies entirely within the MSCP area.

## **3.0 LAND USE**

As part of the mapping effort, existing and planned land uses and public properties were mapped (1:24,000) on the GIS to identify existing and planned open space areas and other compatible areas for preserve planning. Data were obtained through SANDAG and represent information contained in General Plans and Community Plans for the area, as updated through satellite imagery and aerial photographs. These maps were reviewed with staffs of the local jurisdictions in the MSCP study area, the County Water Authority, and Caltrans to ensure they were accurate and current.

### **Existing and Planned Land Use**

Approximately 47 percent of the 581,649-acre study area is currently vacant lands, 32 percent is currently developed (urban), 7 percent is agriculture, 5 percent is parks and preserves, and 3 percent is low density residential (residential land with densities less than or equal to 1 dwelling unit per acre). The remainder is classified as active parks, extractive, golf courses, and water. According to General and Community Plans, planned land uses in the study area are 42 percent urban, 28 percent low density residential, 19 percent parks/preserves/open space, 5 percent agriculture, and the remainder in miscellaneous other uses.

## **Public Ownership**

Approximately 29 percent of the land within the MSCP study area is in public ownership. Approximately 20 percent of the public lands are administered by the U.S. Department of Defense, 25 percent are owned by local jurisdictions, 15 percent are administered by the Bureau of Land Management, 13 percent are owned by the City of San Diego Water Utilities Department, 10 percent are owned by the State of California (Caltrans, parks, education), and 7 percent are owned by the County of San Diego. Additional public lands are owned or administered by school districts, special districts, the U.S. Bureau of Indian Affairs, U.S. Forest Service, and other federal agencies.

## **Categories of Land Use Protection**

A land use policy analysis was conducted for vacant lands within each jurisdiction to estimate the level of resource protection afforded vacant property through the land use process. "Protected" lands were categorized as public or private lands that are permanently protected and managed for habitat purposes, and public or private lands designated by the applicable general or community plan for passive park, preserve, or open space uses, but which have not been permanently dedicated for such uses. Lands "at risk" of development were categorized as either "constrained," proposed for agriculture, proposed for low density residential use or public or semi-public use, or proposed for urban or extractive uses.

## **4.0 BIOLOGICAL PRESERVE DESIGN CONSIDERATIONS**

### **Criteria and Considerations for Preserve Design**

The MSCP preserve system will be designed based on accepted principles of conservation biology. Criteria for preserve design include:

- extent and richness of high quality habitat and corridors for target MSCP and other native species
- size of habitat area
- plant and animal diversity
- shape which minimizes the edge-to-area ratio of preserve blocks
- adequate distribution of preserves throughout the MSCP study area

- ability of preserve blocks to be buffered by areas of limited-intensity development
- ability of preserves to be managed for desired use
- ability of preserves to be connected by adequate corridors to adjacent habitat patches
- adequate connectivity with habitat patches outside the MSCP study area
- ability to add large habitat areas to, or function as corridors between, areas of existing public lands or proposed open space.

To effectively preserve and manage rare species populations, it is critical to understand the genetic structure and demography of the species of concern. The basic assumption is that populations with relatively high levels of genetic diversity (heterozygosity) are less vulnerable to extinction than populations with relatively less genetic diversity. The type of preserve blocks in the system (e.g., small versus large, few versus many, etc.) required to adequately preserve genetic diversity will vary with each species, and will be dependent on factors such as distribution (current and historic), population size, and breeding system, in conjunction with genetic structure. Preserve size should be adequate to 1) maintain conditions that allow natural ecological and evolutionary processes to continue, 2) provide a buffer against adverse environmental processes (including random "natural catastrophes"), 3) provide suitable habitat to accommodate spatial fluctuations and colonizing events, and 4) allow for the maintenance of gene flow between populations (via pollinators, seed dispersal agents, habitat linkages, etc.), where appropriate.

### **Population Viability Analyses**

Population viability analyses (PVA) were prepared for populations of California gnatcatchers and coastal cactus wrens within San Diego County and the MSCP study area. The PVAs assumed these species exist in metapopulations (i.e., a group of interconnected semi-autonomous subpopulations). The criterion for viability was defined by the USFWS as 95 percent probability for metapopulation persistence over a 200-year planning horizon. The current California gnatcatcher metapopulation within the MSCP study area likely exceeds 900 pairs. The results of the metapopulation simulations suggest that the current MSCP population is probably viable, due to the existence of five major concentrations (Otay, Sweetwater, Mission Trails/Miramar/Santee, Poway, and Lake Hodges), which act as source populations to the relatively smaller intervening populations. Various potential preserve designs were evaluated with the PVA model simulations for the gnatcatcher. The

PVA indicated that economically feasible preserve design within the MSCP study area appears to be dependent on its connectivity with key source populations located in the Multiple Habitat Conservation Program (MHCP) study area in North San Diego County. Retaining interconnections of the metapopulation is crucial to the viability of each gnatcatcher subpopulation.

The current coastal cactus wren metapopulation within San Diego County consists of less than 270 pairs distributed primarily in five disjunct populations (Camp Pendleton, Lake Hodges/San Pasqual Valley, Santee/Lake Jennings, Sweetwater Reservoir, and Otay River/Mesa). This metapopulation does not appear to be currently viable using the criterion of 95 percent probability of persistence over 200 years, as estimated by the PVA simulation. This lack of viability is due to small population size, severe habitat fragmentation, and isolation by distance between populations. However, most populations with more than 5 pairs are located within core gnatcatcher populations; hence, conserving these populations of cactus wrens will not necessarily require additional areas beyond that needed for a viable gnatcatcher preserve network.

While PVAs should not be used as a definitive measure of preserve adequacy, they can be used as a tool in comparing various preserve configurations.

### **Habitat Evaluation Model**

A GIS model was developed to aid in prioritizing critical biological resource areas within the study area. In the absence of adequate and systematically-collected biological data for the entire study area, the model uses biological and physical data relating to the potential presence of 93 target species and factors that contribute to high biodiversity. Habitat Evaluation Model components include: priority gnatcatcher habitat, biological diversity/species richness, high priority target species and vernal pool habitat, and potential wildlife corridors. The model results serve as a tool for use in regional planning and for delineating core biological resource areas. However, the model results are not intended to replace site-specific field survey data and evaluations. Rather, they provide a regional perspective for site-specific biological assessments. Site-specific verification of biological resources (or lack of biological resources) is needed before land use decisions for sites are finalized.

Of all the habitats evaluated in the study area (314,890 acres), approximately 42 percent are ranked Very High and 22 percent are ranked High in habitat value. Approximately 57 percent of the coastal sage scrub in the study area is ranked Very High and 21 percent ranked High. The majority of the rarer communities are ranked Very High (e.g., saltpan, southern foredunes, coastal bluff scrub, maritime succulent scrub, southern maritime chaparral, saltmarsh, Torrey pine forest, and Tecate cypress forest). The four riparian communities in the study area are ranked entirely as Very High because of their role as potential wildlife corridors in the habitat evaluation model.

### **Core Biological Resource Areas**

The Habitat Evaluation Maps along with the extensive MSCP database of target species information, vegetation communities, field survey results, and other parameters were used to identify biologically important areas (core areas) and habitat linkages between them. Core areas are defined as areas supporting a high concentration of sensitive biological resources which, if lost or fragmented, could not be mitigated elsewhere. Core areas should be the basis for designing the preserve system boundaries, i.e., inclusion of unfragmented core resource areas should be maximized within the final preserve boundaries and should serve as "cornerstones" upon which larger preserve areas are built.

Sixteen core areas and associated habitat linkages were identified for the MSCP study area. The core and linkage areas, which total approximately 202,900 acres of habitat, include:

1. Tijuana Estuary/River Valley
2. South San Diego Bay/Silver Strand
3. Point Loma
4. Otay Lakes/Otay Mesa/Otay River Valley
5. Otay Mountain/Marron Valley
6. Jamul Mountains
7. Sweetwater Reservoir/San Miguel Mountain/Sweetwater River
8. McGinty Mountain/Sequan Peak-Dehesa
9. Lake Jennings/Wildcat Canyon-El Cajon Mountain
10. Mission Trails/East Elliott/Santee/Miramar
11. Central Poway/San Vicente Reservoir/North Poway
12. Lake Hodges/San Pasqual Valley
13. San Dieguito Lagoon

14. Los Peñasquitos Lagoon/Del Mar Mesa/Peñasquitos Canyon
15. Vernal Pools, Miramar
16. Vernal Pools, Otay Mesa

### **Biological Goals, Standards, and Guidelines**

The Biological Goals, Standards, and Guidelines (Guidelines) were prepared by a Biological Task Force that was formed in September 1992 as an alternative to prematurely drawing preserve boundaries prior to completion of the plan. The goal of the Guidelines is to allow flexibility in establishing preserve boundaries based on specific surveys, land use, ownership, and economic information. To provide a planning context for conservation standards, a broader understanding of the importance and extent of the region's habitats and target species was needed. The Guidelines are a set of biological goals, standards, and criteria to guide both the preparation of the MSCP Plan and subsequent subarea and project plans. The Guidelines are intended to provide a way to measure the success of the incremental building of a preserve system and to assist in future management and maintenance decisions once the preserve, or portions of it, have been established.

The Guidelines address three areas:

- Protection of vegetation communities with a focus on habitats considered sensitive, rare, or declining;
- Maintenance of functional wildlife corridors and habitat linkages between critical biological resources areas; and
- Maintenance of viable populations of target plant and animal species.

The Guidelines are a synopsis of the scientific information available on the region's habitats and sensitive species. However, in many cases, it is not known how much of a habitat or species will need to be preserved in order to ensure viable, self-sustaining populations and habitat areas. By preserving multiple habitats and targeting the most critical species, it is expected that many other species will be protected, even though specific data and research may not be available on all the species. Therefore, the emphasis of the Guidelines is to preserve sufficient varieties of habitat types in large enough areas and with sufficient linkages, wildlife corridors, and buffers to create a regional, interconnected system that meets the goals of the MSCP.

It is recognized that there are economic constraints to habitat preservation, and non-biological objectives and needs must be addressed for both public and private lands that contain biological resources. However, if the biological standards and criteria are not met, future listings of some species as endangered or threatened may become necessary as more information becomes available. The MSCP is designed to avoid future listings and constraints to development by taking a proactive approach to habitat conservation.

### **Recommendations for Future Studies**

Additional research will be needed to aid in the characterization and prioritization of areas for preservation, refinement of preserve planning area boundaries in subarea planning, and management of preserve areas and individual target species. Recommendations include studies of: species distribution and ecology, dispersal characteristics and corridor use, demography and population viability, genetic variation, and the relationship between species richness and habitat composition. It is assumed that some of these studies will be conducted as part of future subarea and project planning efforts, while others will be the focus of longer-term research projects.

### **Gap Analysis**

Any analysis of preserve design should consider and build upon important biological resource areas that are already protected or planned for protection. The GIS allows the overlay of data layers describing vegetation communities, habitat value, core biological resource areas, ownership, and protection category, in various combinations, to examine where resources are currently protected and where there are gaps in conservation protection. This technique, termed "gap analysis," is a frequently used and accepted methodology in conservation biology studies. The MSCP gap analysis is habitat-based, rather than species-based, due to the lack of sufficient distributional data on most target species in the MSCP study area. Inferences can be drawn regarding the current level of a species' protection based on the percent of its habitat, the percent of Very High and High value habitats, and the percent of the biological core resource areas and linkages preserved in biological open space. This analysis, therefore, uses the results of the vegetation mapping, the Habitat Evaluation Model, and the core and linkage areas map.

Protected lands are reasonably well distributed throughout the study area, but not adequately interconnected to form a preserve network. Approximately 71 percent

(80,388 acres) of all public lands with habitat and less than one-fourth (47,401 acres) of all private lands with habitat are either protected or planned for protection/open space. Only 12 percent are currently preserved (38,553 acres). Approximately 72 percent (92,128 acres) of the preserved lands and lands proposed for open space are categorized as Very High and High value habitat.

Only three of the very rare habitats, Torrey pine forest, saltmarsh, and Tecate cypress forest, currently have adequate acreage in open space to ensure long-term viability, assuming adequate preserve management. Of the more abundant habitats, slightly over 30 percent of chaparral, coastal sage scrub, and grassland are currently protected or planned for preservation. The adequacy of this acreage in meeting preserve design objectives depends on the location and resource value of these areas. The distribution of these habitats within protected areas is currently fragmented and would require significant acreages of additional habitat in order for this level of protection to be adequate. The majority of core cactus wren and gnatcatcher populations in coastal sage scrub is not currently protected or planned for open space; therefore, these species are currently not adequately protected.

Approximately 45 percent (91,623 acres) of the total core and linkage habitat areas is currently dedicated open space or designated as planned open space in Community/General Plans. Of the linkages (13,166 acres), about one-fifth are protected. These currently protected core and linkage areas serve as appropriate building blocks for designing a preserve network.

## **5.0 BIOLOGICAL ANALYSIS OF PRESERVE SCENARIOS**

### **Focused Planning Area Scenarios**

Four sample focused planning area (FPA) configurations were developed for the purposes of analyzing and comparing land dedication acreages, land acquisition costs, and efficacy of biological conservation. Economic and financial analyses were also conducted on two of the four scenarios. These example FPAs define general areas within which viable preserves could be delineated. While none of the four scenarios currently represents the MSCP Working Group's final recommended FPA, the Working Group has acknowledged that delineation of a focused planning area is needed to serve the following functions:

- Identify the geographic area in which the ultimate preserve system would be contained.
- Identify areas of focus for subarea planning.
- Provide greater assurance to the USFWS/CDFG about where conservation planning will be undertaken.
- Define areas where jurisdictions would apply interim protection to habitat lands.
- Identify areas potentially suitable for off-site mitigation.
- Define an area boundary for the payment of in-lieu mitigation fees.

The Coastal Sage Scrub (CSS) scenario (84,900 acres) was developed to meet the minimum criteria for satisfying the NCCP Conservation Guidelines for coastal sage scrub target species (California gnatcatcher, coastal cactus wren, and orange-throated whiptail) and to consume less than 100,000 acres total. The Multiple Habitats (MH) scenario (147,000 acres) was developed to meet preserve design objectives for multiple habitats and species and also meet the acreage criterion recommended by members of the Implementation Strategy Committee (approx. 150,000 acres). Analyses of biological conservation, land dedication and acquisition costs, financing, and economic impacts were conducted for these two scenarios.

The Biologically Preferred (BP) scenario (185,700 acres) includes most of the core biological resource areas and linkages, as well as all public lands supporting valuable habitat. The Public Lands (PL) scenario (147,000 acres) includes all public land containing habitat. The approach for developing the PL alternative differed from the other three by using the premises of minimum disruption to existing General Plans and lowest cost of land acquisition. Analyses of biological conservation and land dedication and acquisition costs were conducted for the BP and PL scenarios, but financing and economic impacts were not addressed.

The four alternative designs represent different weightings or rankings of preserve design criteria. The major categories of criteria are:

- biological priorities as defined by the Habitat Evaluation Map, core areas and linkages, Biological Goals, Standards, and Guidelines for habitats and target species in the study area, and basic principles of conservation biology;
- land use and ownership; and
- acquisition costs, financing, and economic constraints.

## Summary of Conservation Analysis

The four alternative focused planning areas were analyzed for their effectiveness in meeting the following biological objectives and criteria for preserve design:

1. Maintain functional ecosystems within the MSCP study area.
2. Maintain viable populations of priority MSCP species.
3. Provide for the maintenance of viable populations of as many of the remaining target MSCP and other native species as possible.
4. Maintain functional wildlife corridors and habitat linkages between critical biological resource areas.
5. Maintain the full range of vegetation communities and successional phases in the preserve system, with a focus on habitats considered sensitive, rare, or declining.

Biological processes and functions are not easily measurable at the ecosystem level because of the inherent complexity and variability of biological systems and because of the paucity of quantifiable data. Thus, the MSCP analyses must rely on indicators or characteristics of functional systems, corridors, and viable populations. Analyses of preserve design at the subregional level are necessarily general, while analyses at the subarea level are expected to address biological criteria more specifically.

While the analyses cannot definitively answer the question "How much is enough?," the four scenarios address the biological objectives and criteria to varying degrees and provide varying levels of assurance that species richness and long-term viability of target and non-target species' populations can be maintained. The MH and BP scenarios support a similar number of priority target species (31 and 33, respectively) and other target species (32 and 40, respectively), the same number of rare habitats (7 of 14 adequately protected) and other habitats (24), and high biodiversity (80 percent and 86 percent, respectively, of all the Very High value habitats in the study area); however, the BP scenario provides greater assurances of long-term viability and ecosystem functionality by virtue of its larger buffers,

wider, shorter linkages, and greater number of coastal/inland linkages and linkages to areas outside the MSCP study area.

The PL scenario protects slightly more than half of the species protected by the MH scenario (18 priority species, 17 other target species), adequately protects 6 of 14 rare habitats, and has moderate biodiversity (61 percent of all the Very High value habitats in the study area). This scenario includes a large amount of habitat that is severely fragmented, thus providing no appreciable value to a regional preserve system.

The CSS scenario protects less than half the number of species protected by the MH scenario (12 priority species, 14 other target species), does not adequately protect rare habitats, and has limited biodiversity (49 percent of Very High value habitats), smaller core areas, no buffers, and fewer linkages than the MH and BP scenarios. While the CSS and PL scenarios may adequately protect some species, the longer-term maintenance of ecosystem-level processes by this alternative is questionable. Because of edge effects, smaller population sizes, and the increased severity of catastrophic environmental events in smaller systems, proportionately more intensive management and monitoring activities would likely be required for the PL and CSS scenarios to be successful. It is also not clear to what extent movements or interactions of species outside of coastal sage scrub habitat are crucial for long-term viability of the CSS scenario.

Implementation of the BP or MH scenarios would protect more listed and candidate species than the CSS and PL scenarios, as well as more non-target species, and therefore provide greater and longer-term assurances for development planning. The increasing level of assurance (both biological and development potential) provided by the CSS, PL, MH, and BP scenarios must be weighed against economic and land use benefits and costs.

## **6.0 IMPLEMENTATION STRATEGIES**

### **The Process of Preserve Land Assembly**

The regional preserve system would be assembled principally by the local jurisdictions as a network of habitats located within the boundaries of the focused planning area. In the case of the CSS, MH, and BP scenarios, the target for preservation is 90 percent of natural habitats found in the FPA. In the case of the PL scenario, target preservation would also

be approximately 90 percent of natural habitats. However, with the PL FPA, 50 percent of habitat in certain locations may be consumed for development.

The assembly of land for a regional preserve system under the alternative scenarios would be accomplished by the following methods:

- For public lands, the agency holding title to habitat lands would voluntarily and permanently restrict uses of the land to those which are compatible with the protection or continued presence of plant and animal species of interest.
- For private lands, the owner would sell or dedicate to federal, state, or local government or a qualified conservation organization fee simple, or permanent conservation easement, or permanent open space easement in habitat lands.
- The agencies or organizations responsible for the management and maintenance of habitat lands would be identified.

This MSCP Plan describes alternative procedures for assembling the preserve land, the estimated amount of land that may be protected under each procedure, and the potential sources of funds for public acquisition, management, and maintenance of habitat lands. It is anticipated that, at completion, the preserve system will consist of a patchwork or a mosaic of ownerships.

Habitat lands would be assembled in segments over time. The planning horizon for completing this process is 2015, which is the same horizon year used by SANDAG for the most recent series of forecasts of regional population, housing, and employment. However, depending on the rate of urbanization in the study area and the availability of acquisition funds, the assembly of habitat lands may require additional time. In the meantime, local jurisdictions would need to use interim measures to protect habitat lands, particularly in the preserve planning area. The interim protection measures are extensions of existing land use controls and public agency review of proposed development projects.

The MSCP Subregional Plan would be supplemented by Subarea Plans, except where a local jurisdiction adopts the Subregional Plan as the Subarea Plan. The Subarea Plans would delineate public and private lands for potential inclusion in the preserve system, refining the recommended FPA to develop a preserve system adequate for resource agency

approval. Specific habitat lands would be identified for public purchase, dedication, or voluntary restriction. Other habitat lands may be identified for on-site preservation when specific development plans are submitted to the local jurisdiction for approval.

Since the regional preserve system would be assembled incrementally, keeping accurate records of habitat conservation and take is an essential component of program implementation. The regional database created by the MSCP would be maintained (potentially by SANDAG and/or a new regional conservancy) and updated with information obtained during the subarea planning effort and later biological surveys. A preserve status report would be prepared annually, summarizing habitat acquisitions, restorations, and takes and additions to or consumption of mitigation credits. Agencies responsible for the above functions will be identified during the implementation of the MSCP (see Section 7.0).

### **Equity Issues of Allocating Program Costs**

There are many benefits of establishing a regional preserve system such as the MSCP. The principal benefits are:

- Protection of habitats of animal and plant species of concern.
- Recreational, visual, and open space benefits of habitat preservation.
- Providing a method of or reducing the cost of habitat mitigation for future development projects which impact the habitats of animal and plant species of concern.

The benefits accrue to many individuals and organizations. For planning purposes, the following groups of participants, or sectors, were identified by the MSCP Working Group:

- The federal and state governments, representing the interests of individuals and organizations outside the study area, including the society at large.
- Local governments with jurisdiction in the MSCP study area, representing the interests of individuals and organizations who reside in existing developments in the study area.

- Landowners and developers of private projects which require mitigation for habitat impacts.

To the extent that the cost of impact mitigation is passed forward to future residents, their interests parallel those of the private property owners and developers who supply new housing and other facilities. That is, if the cost of impact mitigation is reflected in housing and building prices, then both future residents and current landowners and developers would benefit from a reduced allocation of program costs to new development.

The total contribution of any sector to the assembly of a regional preserve system may consist of a combination of 1) land dedication or restriction of uses to those compatible with habitat preservation and 2) acquisition of private habitat lands and dedication or restriction of use. There are two principal issues concerning the allocation of responsibilities to contribute habitat lands to the preserve system. First is the extent to which private landowners and developers would be required to protect habitat lands in the focused planning area, as mitigation for impacts to other habitats. Of necessity, important habitat lands not dedicated or otherwise voluntarily restricted to uses compatible with habitat preservation must be purchased. Second is the nature and extent of the mitigation requirement placed on the impact to habitat outside the focused planning area. In-kind mitigation or in-lieu mitigation fees collected from developments outside the planning area can supplement publicly funded habitat purchase inside the planning area.

These two issues may be addressed in many ways. Three alternative methods of program cost allocation were discussed by the MSCP Working Group:

1. Allocation Based on Historical Impact. The private sector would dedicate habitat lands to the preserve system in the same proportion as that represented by future, private-sector habitat consumption (i.e., between adoption of the MSCP Plan and buildout of the study area) to the cumulative, historical habitat consumption at buildout of the study area. The public sector would contribute or acquire the remaining habitat lands in the preserve system.
2. Equal Shares Allocation. The private sector would contribute one-third of habitat lands to the preserve system. The federal and state governments together and the local public sector would each contribute one-third to the preserve system.

3. Allocation Based on Existing Land Use Controls. The private sector would dedicate the same amount of habitat in the focused planning area as it would normally do so under existing land use controls. The public sector would contribute or acquire the remaining habitat lands in the preserve system.

As a variation to each of these approaches, in-kind mitigation or in-lieu mitigation fees collected from private development impacting habitats outside the preserve system may supplement public purchase of habitats inside the focused planning area. In particular, the following variation on the third approach was selected by the MSCP Working Group for financial analysis and economic impact study:

4. Allocation based on existing land use controls, supplemented by mitigation fees. For reference, this will be called the Modified Land Use Controls alternative. Under this alternative, private landowners inside the focused planning area would dedicate the same amount of habitat to the preserve system as they would normally under existing land use controls. A landowner may dedicate a smaller amount if the location or configuration of preserved habitat substantially restricts the development opportunity of the remaining parcel. In addition, private landowners and developers outside the focused planning area would mitigate impacts to habitats by acquiring habitat inside the focused planning area or paying fees to the local jurisdiction, which in turn acquires habitat inside the focused planning area. The total amount of on-site dedication and mitigation-based acquisition would not exceed the amount which would normally be required under existing land use controls. The public sector would contribute or acquire the remaining habitat lands in the preserve system.

#### **Estimated Acquisition Cost Under Cost Allocation Based on Modified Land Use Controls**

Under the Modified Land Use Controls alternative, habitat conservation would occur through a combination of on-site dedication, mitigation-based acquisition, and other public acquisition. On-site dedication is typically required by existing land use controls for steep slopes, floodplains, archaeological and historical sites, and presence of sensitive biological resources. Mitigation-based acquisition includes both in-kind mitigation and the portion of

public acquisition funded by mitigation fees. Other public acquisition would be funded through federal and state grants and local government debt financing.

Total private sector contribution, including on-site dedication and mitigation-based acquisition, varies from 35 percent of the target preserve size under the PL scenario to 52 percent under the CSS scenario. Local governments' contribution ranges from 24 percent under the MH scenario to 31 percent under the PL scenario. The remainder would be contributed by federal and state governments.

Total estimated cost of habitat acquisition is \$96 million under the PL scenario, \$375 million under the CSS scenario, \$532 million under the MH scenario, and \$634 million under the BP scenario. Actual cost may vary from the estimate, depending on the amount and mix of habitat lands which are acquired and future changes in land prices. The cost estimates do not include purchase of Water Utilities Department lands. Acquisition is anticipated to take place between 1994 and 2015, with most of the purchases occurring by the year 2000 and bonds repaid over subsequent years.

The acquisition program would be funded from three principal sources: federal and state grants, local government debt financing, and private habitat mitigation. For purposes of this analysis, it is assumed that federal and state funds would be obtained as matching grants to the locally generated acquisition funds, or 50 percent of total acquisition funds. Locally, habitat mitigation would generate from 25 to 28 percent of total acquisition funds, and from 22 to 25 percent through local government debt financing. Total acquisition cost to be debt financed is \$24 million under the PL scenario, \$83 million under the CSS scenario, \$120 million under the MH scenario, and \$145 million under the BP scenario.

The shares of costs allocated to the federal and state governments, local governments, and the private sector are specific to the allocation formula selected for analysis. The Working Group did not achieve consensus on this allocation formula, and other allocations are possible. For example, if federal and state funds do not cover 50 percent of total acquisition costs, either the acquisition program will be reduced or local and private shares increased correspondingly.

## **Preserve Operation and Maintenance Cost**

Annual operation and maintenance cost is estimated to be \$2.0 million per year under the CSS scenario with a maximum of \$2.4 million, and \$3.0 million per year under the MH scenario, with a maximum of \$3.6 million. The annual cost includes field maintenance, biological studies, preparation of Subarea Plans, and program administration. The illustrative financing plan identifies sources of funds for both habitat acquisition and maintenance.

## **7.0 MSCP IMPLEMENTATION PROCESS AND STRUCTURE**

The proposed implementation structure, which evolved through Working Group discussion, adoption of a Resolution of Intention, preparation of a Statement of Assurances, and other actions, relies on existing institutions to implement the MSCP. Actions to implement the MSCP Plan are required of all institutional participants at the local, state, and federal levels and by private and semi-public entities as well. The basic structure of the MSCP Plan, however, calls for its implementation by local general purpose agencies of government. These are the eleven cities and the unincorporated area in the southwestern portion of San Diego County. These jurisdictions will use the MSCP as a framework plan or subregional plan to guide the preparation of subarea plans and project plans which are the basic building blocks of MSCP implementation.

### **MSCP Plan Implementation and Coordination Functions**

The functions necessary to implement and coordinate the MSCP Plan include subregional planning, acquisition (of land), and preserve management. The Working Group concluded that the practical choices for entities to perform these implementation functions already exist in the region, and that formation of new entities, with the possible exception of a land conservancy, is unnecessary. The plan recommends that the region's jurisdictions act cooperatively to assign responsibility for these functions as a part of the MSCP adoption process.

### **Responsibilities of the Participants**

The MSCP Plan proposes a new process for implementation of the state and federal ESAs which relies on local agency land use review and approval powers. The new process

places conservation responsibilities on local jurisdictions, which will implement their respective portions of the MSCP Plan. In exchange for these coordinated conservation actions, local jurisdictions will receive authorizations for the taking of listed species. The guarantees of implementation and corresponding authorizations for all parties will be contained in an implementing agreement between each local jurisdiction and the wildlife agencies. This new process makes local agencies a partner with the USFWS and CDFG in conserving resources, and replaces the traditional regulatory role of those agencies as well as the sometimes adversarial process of project plan review.

Responsibilities of participating jurisdictions are outlined in the MSCP Plan, focusing on incorporation of the MSCP Plan into general plans, community plans, zoning ordinances, and other land use policies, and the adoption of conservation goals for subarea plans and project plans. Jurisdictions must assure interim protection of habitat between approval of the MSCP Plan and approval of subarea and project plans. Once the plans are completed and approved by the USFWS/CDFG, an appropriate authorization to allow take of habitat and species based on those plans would be issued to the local jurisdiction(s).

Responsibilities of participating governmental entities other than local general purpose agencies are also outlined in the MSCP Plan. These agencies include the USFWS, CDFG, other federal and state agencies, regional public facility providers, special purpose agencies, and land management entities and groups.

### **Preserve Management**

Preserve system management will be accomplished by a potentially large group of agencies and organizations. As the preserve system will be composed of land in separate ownerships, including public agencies, public utilities, and private conservation groups, these property owners presumably will choose to continue management of their lands. Each of these groups should prepare or update a habitat management plan, consistent with MSCP guidelines, for their preserves. New lands also will be acquired for the preserve system through purchase, dedication, or easements, and while some of these lands may be managed by existing participants, other parcels may be managed by a separate entity selected as part of the MSCP approval process.

## **Implementation Monitoring**

Monitoring of MSCP Plan implementation involves 1) annual accounting of the amount, type, and location of habitat conserved and destroyed (taken) by permitted land use and other activities, and 2) biological surveys to monitor achievement of conservation goals. The jurisdictions will monitor acres of land conserved in the preserve system compared to disturbance or development acres, and compare conserved acres by habitat type with conservation target acres of that habitat. This information will be documented in annual reports.

The biological surveys are a joint responsibility of MSCP Plan participants, the CDFG, and USFWS. Plants and animals on the Covered Species List, as well as habitats included in the MSCP Plan, will be monitored on a continuous basis, with reporting every three years to the USFWS and CDFG. Monitoring should assess success of the management activities, study ecological trends, describe new biological data collected, identify management and research priorities, evaluate impacts of land uses and construction activities in and adjacent to the preserve, evaluate enforcement difficulties, and determine funding needs. The details of a specific biological monitoring strategy must be determined by the plan participants, CDFG, and USFWS once a final preserve and Covered Species List are determined, documented in the habitat management plan prepared by each jurisdiction, and included in the implementing agreements.

## **Data Base Update and Review Process**

When the participating local jurisdictions consider adoption of the MSCP Plan, they also may select an entity responsible for subregional planning. This entity could coordinate data base updating when needed.

A data base update, review, and reporting program is needed to track the amount of land in different categories being planned, conserved, taken, and/or re-vegetated; record new biological data; and record changes in habitat protection policies. Other corollary long-term planning tasks, separate from data base updating, could include updating economic and land use impacts of MSCP implementation, evaluating the finance and acquisition strategy, and setting the ongoing biological research agenda.

## **8.0 LAND USE AND MANAGEMENT ACTIVITIES WITHIN AND ADJACENT TO THE PRESERVES**

The compatibility of various land uses and management practices within and adjacent to the preserve system was evaluated, and a general framework was established by which the MSCP preserve system should be designed and managed. This framework will help to ensure that individual subareas of the preserve network will be managed consistently across the MSCP subregion.

Potential direct and indirect impacts of recreation, agriculture, various types of development, mineral extraction, military use, and itinerant worker camps on biological resources were analyzed, and guidelines were developed for siting various land uses within and adjacent to core preserves, linkages, and buffer areas. Passive recreation, limited grazing, utility or water projects with limited, temporary impacts (e.g., pipelines, transmission lines, pump stations), and limited low density residential areas ( $\leq 1$  du/acre) are conditionally compatible within core preserves, linkages, and buffers, with some restrictions on intensity consistent with biological goals. Agricultural activities, while not compatible in core preserve areas, may be conditionally compatible in linkages and buffers. Many land activities may be compatible in buffer areas, if guidelines are followed which are consistent with biological goals.

Guidelines were developed for various management activities, including fire management for biological and safety goals; grazing; restoration; hydrology; insects and disease; fencing, signing, and lighting; and predator and exotic species control.

The guidelines are general and recognize that detailed preserve designs and management plans for specific preserve areas will be prepared as part of or following the subarea planning or project approval process. Detailed management plans should be reviewed and approved by the USFWS and CDFG, and should be annually reviewed and updated.

Preserve areas should be monitored on a regular basis to address several objectives:

- Assess success in accomplishing resource management goals for a particular preserve area.
- Study ecological trends in target populations of sensitive species or specific habitats.

- Evaluate the effectiveness of various management activities.
- Examine the impacts of land uses within and adjacent to the preserve.
- Construction monitoring for new projects within and adjacent to the preserve.
- Compliance monitoring for enforcement purposes.

## **9.0 ECONOMIC IMPACT ANALYSIS**

A study was conducted to evaluate and compare the impacts of implementing alternative MSCP preserve scenarios on the region's economy, housing prices and affordability, and the general fiscal effects of different growth patterns. Two "impact" scenarios (CSS and MH) were compared against a baseline or No Preserve (NP) scenario. The NP scenario is represented by SANDAG's Series 8 Regionwide Existing Policies Growth Forecast, produced using SANDAG's Demographic and Economic Forecasting Model, which has the capability of providing economic impact simulations.

### **Direct Impacts**

The results of the simulations show that the local economy and its components may be directly impacted in three ways by the implementation of the three alternative habitat conservation strategies:

#### **1. Mitigation Costs for Private Landowners and Developers**

The estimates of these costs are directly related to the ability of a proposed habitat preservation scenario to minimize the disruptions in economic growth. Information provided by the impact analysis will allow policy makers to determine which scenario (NP, CSS, MH) is most or least disruptive to the local economy. This information, provided in the form of the net relative difference in economic costs between the NP and CSS and MH scenarios, will answer whether the current project-by-project mitigation method is more or less costly to the region than the proposed MSCP.

In addition, the increased costs on the development process may be understated. This study proceeds on the grounds that, although more expensive, the development process would continue. It is possible that, without a comprehensive habitat preservation process, the federal protection laws would

severely restrict development on specific habitat(s), similar to what has happened recently with the proposed interim take allowable for coastal sage scrub. This more severe form of constraint may have even greater economic implications.

- a. Costs of complying with mitigation requirements. This cost of mitigation is highest for the CSS scenario because it includes both in-lieu fees for coastal sage scrub habitat and potential in-kind mitigation for chaparral and grassland habitats. For the MH scenario, only mitigation fees are an economic cost. The in-kind mitigation is not required because sufficient multiple species and habitats are conserved by design. This represents the assurance of uninterrupted economic growth. For the NP scenario, the current method of off-site in-kind mitigation would continue.
- b. Cost of construction delay. These costs are estimated based on the assurance each scenario provides to uninterrupted economic growth. The less assurance of uninterrupted economic growth, the higher the costs. Carrying costs would be highest under the NP scenario, lower under the CSS scenario, and lowest under the MH scenario.
- c. Cost of plan preparation and permit processing. Under all three scenarios, the construction process is expected to incur higher costs due to more complex habitat planning and permit processing. These privately funded planning and permit costs are highest under the NP scenario, less under CSS, and less again under the MH scenario.

- 2. Federal/State Grants for Habitat Land Acquisition.** These assumed grants would enable local government to purchase habitat lands. The grant amounts are greatest for the MH scenario, less for the CSS scenario, and assumed to be unavailable for the NP scenario.

These grants can affect the outcome of the analysis in two important ways. First, without these grants, the burden of paying for the privately owned land would fall to local government (local taxpayers) and new development, or the size and composition of the habitat scenario (CSS, MH) would need to be adjusted.

Second, the revenue from these grants acts as an economic stimulant, similar to the way other federal funds affect the local economy, such as those from the Department of Defense. Funds collected from taxpayers throughout the nation would be directed to this region to purchase private property for inclusion in the habitat preserve. The grant funds from the federal government would have a positive effect on the local economy (more jobs, higher income). This trend of an improving economy is not related directly to the size of the preserve; however, it is directly related to the size of the federal/state contribution, which is directly related to the size and quality of the proposed preserve.

**3. Publicly Funded Operation and Maintenance (O&M) of the Preserve.** Public O&M costs are assumed to be highest for the MH scenario, less for the CSS scenario, and lowest for the NP scenario. These costs are expected to be collected from existing households and transferred to local government for expenditure on O&M requirements.

The MSCP financing plan may call for higher taxes and/or facility and service rates. These fees would be collected from existing and future households throughout the MSCP study area. Revenues from the higher taxes and/or rates would be used for land acquisition. Under a traditional government program that raises taxes to fund a social program, there would be a reduction in the potential output of the local economy from this kind of funding scheme. The case under study, however, is not a traditional government-supported social program. Regionwide, this portion (higher taxes and/or utility rates) of the proposed program results in a transfer of wealth from all households in the region to land owners whose properties are acquired inside the focused planning area. The net effect on the region is small, and therefore not simulated.

This proposed program is more similar to a public sector investment than a social program, and the effects on the local economy are very different from these two distinct kinds of programs. The tax funds collected would be used to purchase an asset (a habitat preserve) that will facilitate economic activity in the region. Also, the characteristics of the recipients of these tax funds (private land owners with habitat on their land) are such that the funds probably will be spent in the region.

It may be time to think about habitat preservation, or open space in general, as public infrastructure. A system for the preservation of multiple habitats appears to have become just as important as other infrastructure systems in ensuring the opportunity for uninterrupted economic growth. The region's opportunity for economic growth hinges on new public and private investment in capital and technology. Private investment in the local economy, however, likely would be curtailed unless a regional plan for habitat conservation is agreed to by all levels of government.

### **Economic Impact Simulation Results**

NP Scenario vs. CSS Scenario. The San Diego region's economy would fare marginally better under the CSS scenario than the NP scenario. The impact simulation estimated only small population and employment differences between the two scenarios. Under the NP scenario, the region could expect to have fewer people, fewer jobs, more unemployment, less personal income, and lower retail sales, and local government should expect less property and sales tax revenue than under the CSS scenario.

Proceeding under the CSS scenario would provide the region with an estimated 1,000 additional jobs; 40 percent of these additional jobs would be in the construction industry. These additional jobs would increase personal income in the region by \$21.5 million. Higher incomes would generate additional retail sales and sales tax revenue for local governments.

The NP scenario imposes higher construction cost increases than the CSS scenario, and does not offer an economic stimulant, such as the federal grants. Combined, these two differences make the NP scenario less desirable than the CSS scenario, from an economic standpoint.

NP Scenario vs. MH Scenario. The San Diego region's economy would fare much better under the MH scenario than the NP scenario. The economic impact simulation estimated notable population and employment differences between the two scenarios. Under the NP scenario, the region could expect to have fewer people, fewer jobs, more unemployment, less personal income, and lower retail sales, and local government should expect less property and sales tax revenue than under the MH scenario.

Proceeding under the MH scenario would provide the region with 4,400 additional jobs; over 40 percent of these added jobs would be in the construction sector. The increased number of jobs would lower the unemployment rate and increase personal income in the region by \$107.9 million. The increased income would result in higher retail sales (\$51.8 million higher under the MH scenario) and sales tax revenue to local governments (\$0.6 million higher under the MH scenario compared to the NP scenario). All figures are annual.

As with the NP vs. CSS comparison, the NP scenario imposes higher construction cost increases than the MH scenario, and it does not provide any federal grant money to the region.

Without these federal funds, the economic impacts on the local economy from the habitat preservation scenarios may be very different from the ones estimated in this study. Excluding federal and state grant funds from the simulation procedure affects the economic impacts of the CSS and MH scenarios. First, without the grant funds, there would be no economic stimulant; and, second, the loss of these funds would need to be compensated from another source. Determining this source is a key to simulating the impact.

If the funding for the compensation of the lost federal and state grants is obtained only from an increase in fees or exactions on development activity, this would increase construction costs. Under the CSS scenario, construction costs would increase by 2.26 percent, not 1.46 percent. Under the MH scenario, construction costs would rise by 1.69 percent, not 0.6 percent. No change in construction costs would occur for the NP scenario; it would remain at 1.65 percent. The economic impacts to the region's economy under the CSS scenario with no federal grants may be 30 percent higher (worse) than the NP scenario. The impacts to the region's economy under the MH scenario without federal funds would be about the same as the NP scenario. If the funding source for the compensation of the lost grants consists of increases to both existing households and fees or exactions, then the increase in construction cost and corresponding impacts to the region's economy would be less than would be the case if all costs were borne by new development activity.

### **Effects On Housing Prices and Affordability**

When the price of construction activity rises as a result of mitigating against the loss of habitat (this can occur through fees or land exactions) or by increased carrying costs, this

impact falls on one or more of three areas: 1) the increased cost is passed back to the owners of the land or material needed to construct the house; 2) the higher cost is absorbed by the developer, reducing profits; or 3) the cost is passed forward to purchasers or renters of the housing unit. The ultimate incidence of the higher cost is largely dependent on the demand and supply elasticity of the housing market, but the effect on housing prices would be the greatest under the third scenario.

### **Effects of Development Impact Fees on Housing Affordability**

Once the habitat preservation program is fully implemented, construction costs would rise by 1.65 percent each year under the NP scenario, 1.46 percent under the CSS scenario, and 0.6 percent under the MH scenario. Assuming these increased costs are passed forward to the home buyer, the price of a new home for a household with an annual income of \$33,720 (regional median annual household income) would rise by \$1,988 under the NP scenario, \$1,759 under the CSS scenario, and \$723 under the MH scenario. The number of households able to meet the minimum income requirement in 1990 for the increased home price would decline by about 8,100 households under the NP scenario, 7,500 households under the CSS scenario, and 3,100 households under the MH scenario.

### **Infrastructure Costs of Forecast Alternatives**

As part of its Regional Growth Forecasts, SANDAG is evaluating alternative growth management policies that result in different land development patterns. One of the important results from the forecast alternatives is fewer acres being consumed by projected growth. These policy changes may help relieve some of the pressure of development on land containing valuable habitat.

Different growth patterns may also mean different costs to accommodate growth. The Quality of Life growth management policy shifts more development into the urbanized portions of the region, while the Existing Policies alternative allows more development to occur in the unincorporated areas of the region. The cost to accommodate units in the urbanizing areas under the Quality of Life alternative is higher than the cost to accommodate them under the Existing Policies alternative. The cost is 50 percent higher to accommodate growth in the urbanized areas.

It is important to note that the shift in the pattern of growth is not occurring because of any habitat preservation process. SANDAG's forecasts show that at some point soon after the turn of the century, under current General Plan policies, the region can not efficiently handle the projected growth. The potential lack of adequate types of land is exacerbated under the NP scenario, where there would be less land available for development in the future than under either the CSS or MH scenarios.

## **10.0 STATEMENT OF ASSURANCES, IMPLEMENTING AGREEMENTS, AND ENVIRONMENTAL DOCUMENTATION**

### **Statement of Assurances**

The Statement of Assurances outlines the major policies and procedures upon which implementation of the regional habitat conservation programs can depend. The local jurisdictions require assurances that adopting and implementing the subregional plans will result in guarantees from the wildlife agencies that agreed-upon species have been adequately protected, and all parties require assurances on how achievement of the plans will be measured along the way.

### **Implementing Agreement**

The implementing agreement is the vehicle by which USFWS and CDFG will issue permits to take listed species and to provide pre-listing agreements and assurances for unlisted species. It is a binding contract between an individual local jurisdiction, the USFWS, and CDFG in which all parties agree to specific actions to implement the MSCP Plan.

### **CEQA/NEPA Documentation**

An EIR/EIS is currently being prepared to identify environmental consequences of implementing the MSCP, evaluate the cumulative environmental impacts associated with MSCP implementation, provide an environmental data base that will allow future environmental documents to focus on those key issues identified in the EIR/EIS as concerns for individual projects, and consider broad policy alternatives and program-wide mitigation measures. The EIR/EIS will address impacts to biological resources, land use, regional transportation/circulation, public services/utilities, and housing/population for the proposed Multi-Habitat Planning Area, the No Project alternative, Coastal Sage Scrub

alternative, Public Lands alternative, and Biologically Preferred alternative. It will include a program-level analysis for the entire study area as well as a project-level analysis for selected jurisdictions that have drawn "hard line" preserve boundaries.

## **11.0 COORDINATION WITH OTHER CONSERVATION PLANS**

Three subregional habitat planning efforts are currently underway in the San Diego region, as well as others in Orange and Riverside counties. These include the MSCP in southwestern San Diego County, the MHCP in northwestern San Diego County, and the County of San Diego Multiple Habitat Conservation and Open Space Program. A focused effort has been made to assure the coordination of these programs in all key scientific, public policy, and finance/acquisition strategy aspects. Additional effort has been applied to achieving coordination between the MSCP and its evolving subarea plans and other habitat conservation plans, such as the Conservation Plan for the Least Bell's Vireo and Riparian Habitat on the Sweetwater and San Diego Rivers.

The MSCP Plan is a fully integrated element of the NCCP program and has been designated an Ongoing Multi-Species Plan. The success of the individual programs noted above is dependent on the integration of conservation efforts throughout the region, including San Diego County, Orange County, and Riverside County.

## **12.0 CITY OF SAN DIEGO CORNERSTONE LANDS AND SAN PASQUAL VALLEY**

The City of San Diego owns four large contiguous areas of land in the study area containing valuable biological resources which are not within public parks or preserves. Some of these lands, identified as "cornerstone lands" in the EIR/EIS for the secondary treatment system and associated facilities, will be protected as habitat lands as part of the MSCP. The City of San Diego will use these cornerstone lands for watershed and habitat protection purposes on an interim basis, except as needed for the Water Utilities Department and other department projects and for existing leases. The cornerstone lands will be permanently protected as habitat to the extent that other City departments acquire property rights to use the lands as mitigation for impacts caused by their public projects. Portions of San Pasqual Valley, also in Water Utilities' ownership, will also be protected as habitat, though they are not part of the cornerstone lands. The City is currently negotiating the terms of the agreement with the USFWS and EPA as to the extent of lands

to be designated for resource protection and preservation, and the mitigation credit to be received in return. Due to the nature of the land purchases per the City Charter, the Water Utilities Department must be paid fair market value for any encumbrances that restrict the use of the land for watershed.

The following lands will be protected as habitat lands as part of the MSCP preserve system:

- watershed management lands around Hodges Reservoir, including that portion of San Pasqual Valley from Hodges Reservoir east to the area referred to as the "narrows".
- lands surrounding portions of Upper and Lower Otay Lakes.
- lands surrounding San Vicente Reservoir.
- lands owned by the City of San Diego in Marron Valley.
- San Pasqual Valley from the "narrows" east to Boden Canyon; this area of San Pasqual Valley is not part of the cornerstone lands.

The majority of these areas were ranked Very High on the Habitat Evaluation Map, and each has been identified as a core biological resource area. Each of these areas was evaluated for its biological resources, conservation and restoration potential, and protection feasibility, based on current and proposed land uses.

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## **1.0 INTRODUCTION**

The Multiple Species Conservation Program (MSCP) is a comprehensive habitat conservation planning program which addresses multiple species habitat needs and the preservation of natural communities for a 900-square mile area in southwestern San Diego County (Figure 1-1). The MSCP addresses the potential impacts of urban growth, loss of natural habitats, and species endangerment and develops a plan to mitigate for the loss of plant and wildlife species and habitat due to the direct and indirect impacts of future development of both private and public lands.

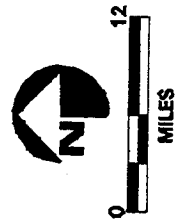
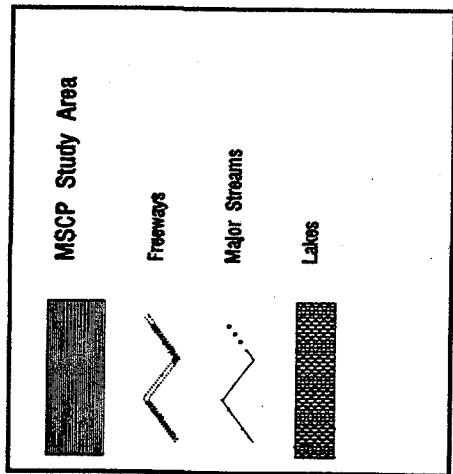
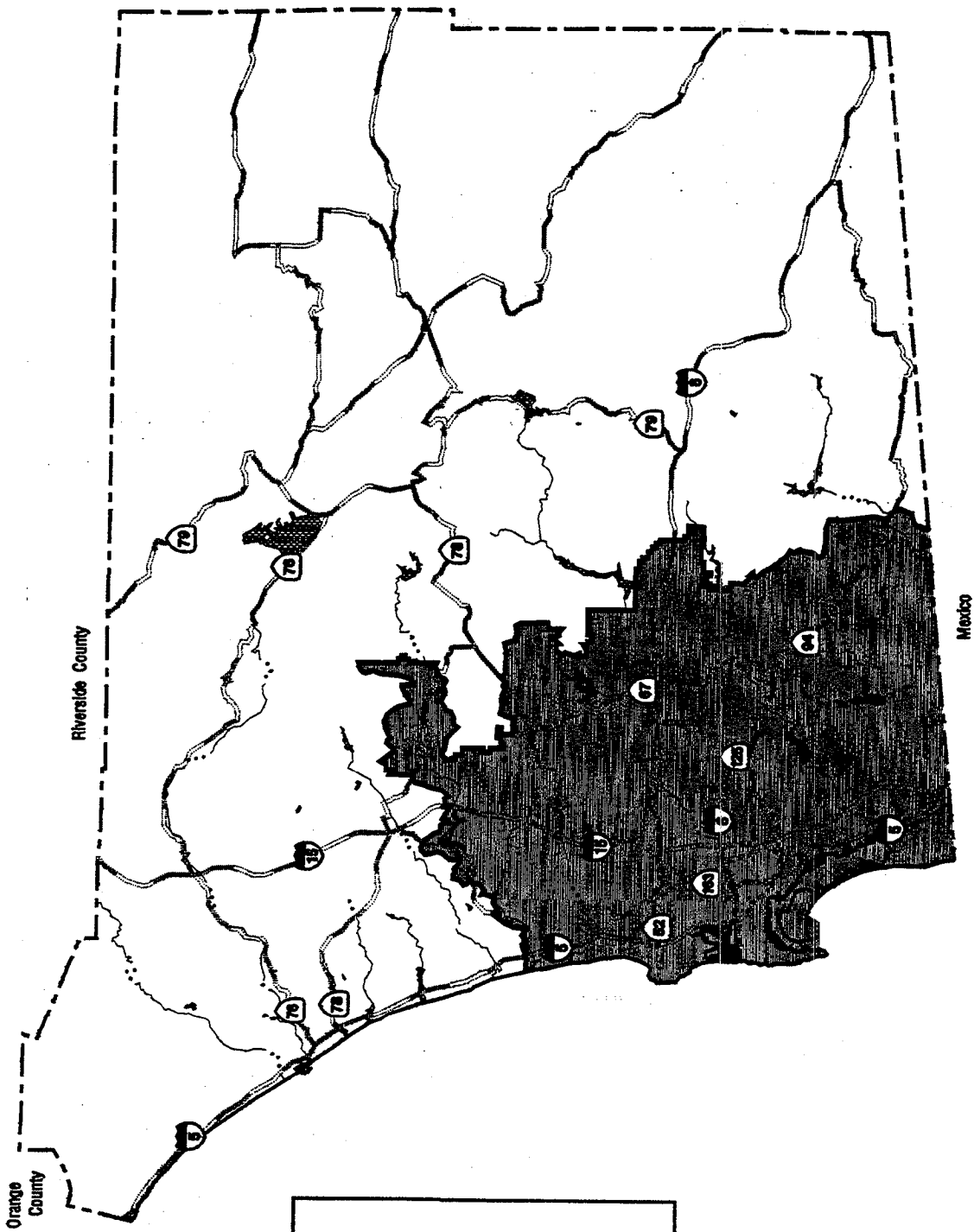
The MSCP creates a new process for the issuance of federal and state permits and other authorizations under the state and federal Endangered Species Acts (ESA) and the Natural Community Conservation Planning (NCCP) Act of 1991. The MSCP will allow the participating local jurisdictions to maintain development flexibility by proactively planning a regional preserve system which can meet future public and private project mitigation needs. This new approach emphasizes the protection and management of habitats rather than focusing preservation efforts on one species at a time. Preservation of natural habitat and wildlife will significantly enhance the quality of life in the San Diego region and set aside lands for the future use and enjoyment of the citizens within the MSCP study area.

## **1.1 BACKGROUND**

The MSCP began in July 1991 as a proactive way to address the mitigation needs of the City of San Diego Metropolitan Wastewater Department (formerly the Clean Water Program) for planned improvements to the Metropolitan Sewerage System (Metro System). Under the federal Clean Water Act, the City of San Diego is required to upgrade the sewer system to provide secondary wastewater treatment. In 1987, the City formed the Clean Water Program for purposes of attaining three major goals for the region:

- provide secondary treatment of wastewater discharged to the ocean;
- achieve the maximum amount of water reclamation possible to minimize dependence on imported water supplies; and
- accommodate future increases in wastewater flows.

Implementation of these goals will involve siting and construction of wastewater treatment, water reclamation, sludge management, conveyance pipelines, and associated facilities.



MSCP Study Area Location in San Diego County

The overall Metro System configuration was the subject of a three-year planning effort which culminated with the issuance of a nine-volume report for modifications to the system and certification of a joint environmental impact report/environmental impact statement (EIR/EIS, City of San Diego 1991).

Successful implementation of the Metro System program will accommodate the region's growth as projected by the San Diego Association of Governments (SANDAG). The U.S. Fish and Wildlife Service (USFWS) and U.S. Environmental Protection Agency (EPA) contend that, since population growth may not occur to the same extent or in the same form without sewerage system improvements, the adoption of the Metro System program requires mitigation of not only potential direct impacts (i.e., construction and operation-related) but also potential secondary impacts (i.e., population growth-related impacts). As documented in the joint EIR/EIS (City of San Diego 1991), the City of San Diego Metropolitan Wastewater Department (MWW) committed to prepare the MSCP as a major step toward mitigation of these potential impacts.

There are numerous reasons for undertaking a subregional habitat conservation planning program:

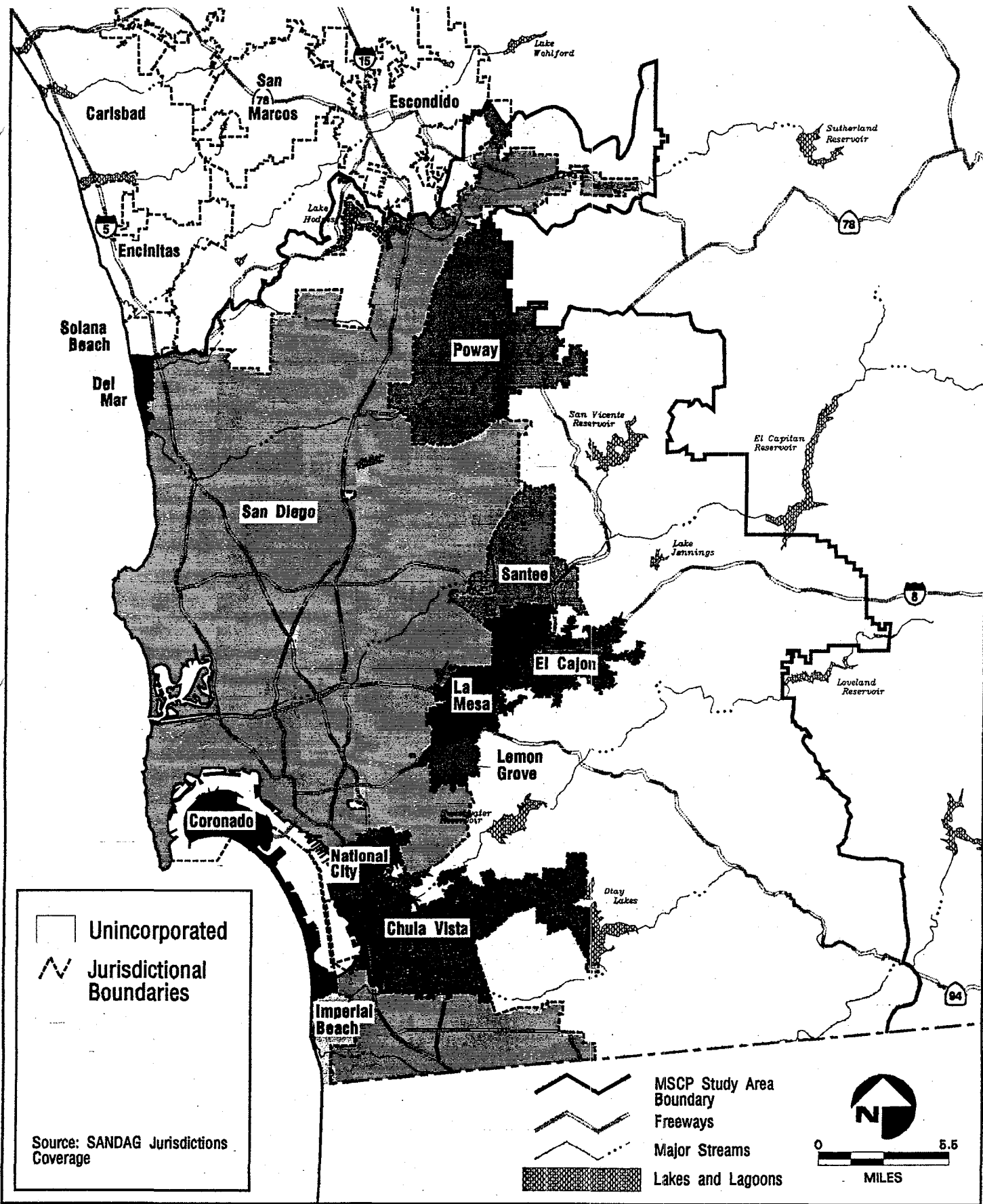
- Historic habitat loss has resulted in many species of plants and animals becoming increasingly rare, and in some cases threatened with extirpation or extinction.
- Without a multiple habitat conservation plan, the ability to site future housing, employment, and public facilities will be severely constrained as species are added to the state and federal threatened and endangered species lists.
- Proactive and cooperative planning at the subregional and local level can mitigate and preempt unwanted regulation by other entities.
- Dynamic plans to maintain the San Diego region's biodiversity benefit our quality of life and serve generations to come.

## 1.2 OBJECTIVES

The objectives of the MSCP are to develop and implement a program for the conservation and management of habitats of federally endangered, threatened, or key candidate species within the MSCP study area (Figure 1-1). The program calls for the establishment of a preserve system which will replace the currently fragmented, project-by-project biological mitigation areas, which by themselves do not contribute adequately to the continued existence of sensitive species or to the maintenance of the natural biodiversity. The program would meet the MWWD's needs to mitigate the direct biological impacts of the mandated improvements to the region's sewage treatment facilities and potential secondary impacts associated with those improvements and would provide long-term conservation and economic benefits to the participating jurisdictions in the MSCP study area (Figure 1-2).

The ultimate objectives of the MSCP are to:

1. Develop a program for the maintenance of biological diversity and the conservation/protection of self-sustaining viable populations of federally listed endangered, threatened, and key candidate species and their habitats.
2. Define an area within which preserve planning is focused, or within which a preserve is defined, and implement a preserve system which conserves viable habitat and provides for wildlife use and movement.
3. Reduce the human-related causes of species extirpation within the MSCP study area.
4. Establish a partnership among state, federal, and local agencies of government to facilitate mitigation and approval of public and private sector land development and construction projects by expediting acquisition of federal and state permits.
5. Establish and maintain a workable balance between preservation of natural resources and regional growth and economic prosperity.



FIGURE

Jurisdictions Within MSCP Study Area 06946

1-2



6. Contribute to future economic viability by providing a component of an open space system. This amenity is important in attracting new employment to the region.
7. Meet the applicable requirements of the federal and state ESAs and the NCCP Act.
8. Describe a finance and acquisition strategy which spreads implementation costs equitably among all beneficiaries and which is affordable to the region.
9. Provide a framework for development of subarea and project plans which directly implement the MSCP.
10. Provide a plan for general public benefit through open space conservation and access to natural preserves for passive recreation and an improved quality of life.

### **1.3 PURPOSE AND NEED**

San Diego County is a microcosm of the State of California with respect to its extremely high biodiversity. This biodiversity results from the peculiarities and diversity of topography, climate, and soil found in the region. The high biodiversity within the county is apparent in the sheer numbers of species that are present, including over 1,740 plant taxa, 80 mammalian species, 435 bird species, 75 reptile and amphibian species, 125 butterfly species, and perhaps 10,000 to 20,000 other terrestrial and aquatic invertebrate species (Beauchamp 1986; Unitt 1983; City of Carlsbad and Fieldstone/La Costa Associates 1993). The county also supports a wide range of habitats, including 23 major vegetation types and 51 plant communities (Holland 1986; Oberbauer 1992).

The MSCP study area occupies approximately 581,650 acres in southwestern San Diego County (Figure 1-1). This area contains most of the major topographical, climatic, and soil features of the county, exclusive of those found in mountain and desert zones. As a result, the study area also supports a rich assemblage of flora and fauna. The geographic position of the study area also contributes to its high species richness; many species reach either northern or southern distributional limits in the study area. For many species with more southerly affinities, southwestern San Diego County comprises their only U.S.

occurrence(s). The higher peaks in the study area provide habitat for cool-temperate species that were formerly widespread in the region.

Urbanization of San Diego's natural lands is severely threatening the biodiversity and long-term biological viability of this unique region. The MSCP study area contains much of the current or proposed urbanization in the county; consequently, its remaining native habitats are most threatened by development. Twelve major habitats considered sensitive by federal, state, or local agencies occur in the study area. Some of these habitats, such as coastal bluff scrub, maritime succulent scrub, southern maritime chaparral, Torrey pine forest, and southern interior cypress forest, are found primarily in San Diego County, and all or a large portion of their U.S. distribution falls within the MSCP study area. Most of these habitats are considered sensitive because they have been severely reduced in distribution as a result of urbanization. For example, it has been estimated that over 90 percent of maritime succulent scrub has been lost to development; of the remaining acreage, approximately 98 percent occurs in the study area. Other sensitive habitats that have been severely depleted on a countywide basis and that are represented in the study area include coastal sage scrub (>70 percent of the original acreage has been lost to development), southern maritime chaparral (>82 percent lost), riparian woodland (>60 percent lost), coastal salt marsh (>87 percent lost), freshwater marsh (90 percent lost), and vernal pools (98 percent lost) (Oberbauer and Vanderweir 1991).

San Diego County contains approximately 200 plant and animal species that are federally and/or state endangered, threatened, rare, or proposed or candidates for listing. Nearly half of these species occur in the MSCP study area, although this area comprises only about 20 percent of the total acreage in the county. Recent federal listings and proposed listings of species in the study area underscore the importance and urgency of habitat preservation in order to avoid species extinctions and further listings. No other subregion of the continental U.S. supports as many listed and candidate species as the MSCP study area.

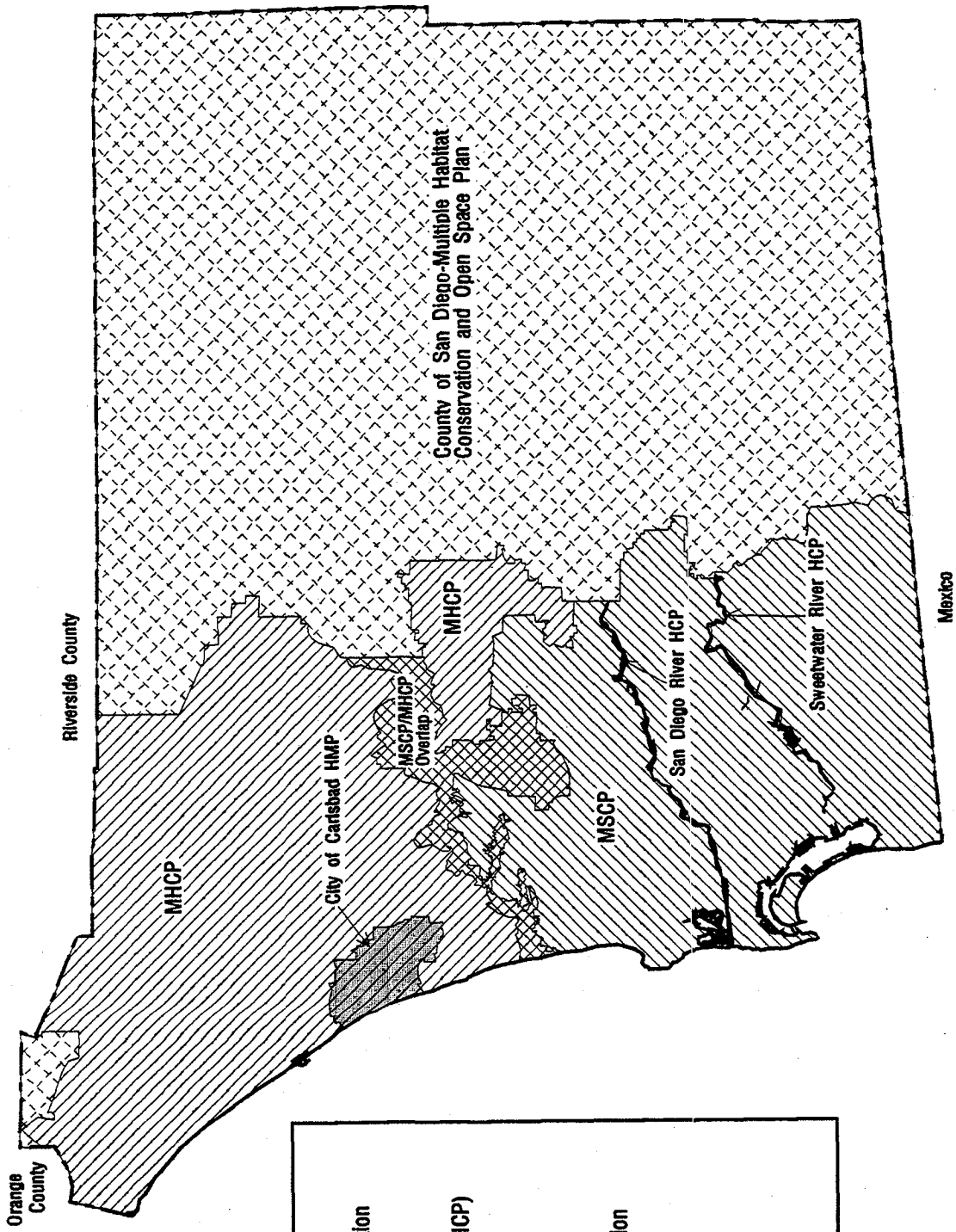
At the same time, recent listings, including the federal listing of the California gnatcatcher as threatened, and proposed listings have placed severe restrictions on the region's ability to accommodate future growth and development in habitat areas. A coordinated regional plan for species and habitat conservation would aid in the rational management of regional growth and improve the quality of life of current and future residents.

The USFWS identified 48 plant and 45 animal species for consideration in the MSCP preserve planning. Not all of these species are proposed to be adequately protected by the Plan. Among this group are:

- 26 federal or state endangered species
- 3 federal or state threatened species
- 4 state rare species
- 10 state species of special concern
- 6 species proposed for federal listing (not including species proposed for federal listing which are also state listed)
- 39 candidates for federal listing (not including species that are also state listed)
- 5 additional species which are important habitat-indicators and/or important in preserve design

#### **1.4 RELATIONSHIP OF THE MSCP TO OTHER PLANNING EFFORTS**

Three subregional habitat planning efforts are currently underway in the San Diego region as well as others in Orange and Riverside counties. These include the MSCP in southwestern San Diego County, the Multiple Habitat Conservation Program (MHCP) in northwestern San Diego County, and the County of San Diego Multiple Habitat Conservation and Open Space Program (Figure 1-3). A focused effort has been made to assure the coordination of these plans in all key scientific, public policy, and finance/acquisition strategy aspects. The success of the individual programs is dependent on the integration of conservation efforts throughout the region, including San Diego County, Orange County, and Riverside County. Additional effort has been applied to achieving coordination between the MSCP and its evolving subarea plans and other habitat conservation plans, such as the Conservation Plan for the Least Bell's Vireo and Riparian Habitat on the Sweetwater and San Diego Rivers. Section 11.0 describes the related plans and their relationship to the MSCP. Section 7.0 discusses the coordination and preparation of Subarea Plans.



City of San Diego-  
 Multiple Species Conservation  
 Program (MSCP)

North County Wildlife  
 Forum-Multiple Habitat  
 Conservation Program (MHCP)

MSCP/MHCP Overlap

City of Carlsbad-Habitat  
 Management Plan (HMP)

County of San Diego-  
 Multiple Habitat Conservation  
 and Open Space Plan

San Diego River Habitat  
 Conservation Plan (HCP)

Sweetwater River Habitat  
 Conservation Plan (HCP)

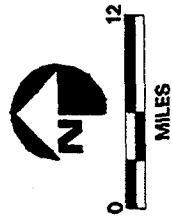


FIGURE  
**1-3**

**Conservation Programs in San Diego County**

06950



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## **1.5 RELATIONSHIP OF THE MSCP TO THE CALIFORNIA NATURAL COMMUNITY CONSERVATION PLANNING (NCCP) PROGRAM**

The MSCP Plan is a fully integrated element of the NCCP program and has been designated an Ongoing Multi-Species Plan (OMSP). This relationship is further described in Section 11.3 and documented by inclusion of the OMSP Agreement in Appendix B-2.

## **1.6 MSCP WORKING GROUP**

The MSCP Working Group serves as an advisory body which contributes technical expertise to the City of San Diego Clean Water Program, the administering agency of the MSCP. The Working Group has been the primary vehicle for community and interagency involvement in formulation of the MSCP Plan. Through a process which focused on development of consensus, the Working Group has endeavored to reach agreement on the contents of the Draft MSCP Plan. Of particular importance has been the leadership of MSCP Chair Karen Scarborough and the contributions of Vice-Chair Jim Whalen.

### **MSCP Working Group Role Statement**

The MSCP Working Group has been formed to advise the City of San Diego's Clean Water Program on development of the MSCP Plan. Formation of this Working Group is pursuant to mitigation measures specified in the Final Joint EIR/EIS for Secondary Treatment System and Associated Sludge Management Facilities, dated March 1991.

We, the members of the Working Group, represent sectors of the community which will be involved in reaching a consensus on how the Plan is designed, financed, and implemented. Each of our members is encouraged to share his/her expertise and to represent his/her organization's point of view when considering issues associated with the MSCP and when reviewing and commenting on elements of the Plan.

The MSCP Plan will be designed to meet multiple objectives of the community. Our assumptions in advising the Clean Water Program during design are threefold: 1) that the Plan will be implementable, equitable, and affordable, 2) that the proposed wildlife preserves are likely to be successful, and 3) that issues important to the community have been addressed in the design and in the manner in which the Plan will be financed and implemented.

## **Working Group Membership**

The design of the membership of the Working Group was carefully considered to represent community interests whose participation and ultimate support would be necessary to reach a conclusion to implement the MSCP Plan. Likewise, state and federal resource agencies, local jurisdictions of government, and special purpose agencies were invited to participate. In addition, an Implementation Strategy Subcommittee (Section 14.0) was formed to provide review and expertise to development of the finance and acquisition plan and overall implementation strategy.

The full Working Group listed below has met at least monthly since July 1991 to consider important plan-related issues.

1. Karen Scarborough, City of San Diego Mayor's Office -- Chair
2. James E. Whalen, Newland California -- Vice-Chair
3. Craig Adams, Sierra Club
4. Karen Bartlet-Adams, Citizens Coordinate for Century 3
5. Meryl Balko, City of San Diego
6. Cameron Barrows, The Nature Conservancy
7. Jerry R. Boggs, Naval Facilities Engineering Command
8. Rob Cameron, The Baldwin Company
9. Constance Clover-Byram, McMillin Communities
10. Diane B. Coombs, San Dieguito River Park Joint Powers Authority
11. Larry L. Eng, California Department of Fish and Game
12. Leonard S. Frank, Pardee Construction Company
13. Niall Fritz, City of Santee
14. Nancy Gilbert, U.S. Fish and Wildlife Service
15. Chris White, Caltrans
16. Kevin Knowles, The Trust for Public Lands
17. Robert Leiter, City of Chula Vista
18. Michael McLaughlin, San Diego Association of Governments
19. Dennis Moser, Alliance for Habitat Conservation
20. Jim Nessel, City of Poway
21. Philip R. Pryde, Audubon Society
22. Larry Purcell, County Water Authority
23. Anne Rast, County of San Diego

24. Robert Robenhymmer, San Diego Metropolitan Transit Development Board
25. Don Rose, San Diego Gas and Electric Company
26. Tom Sheffer, Construction Industry Federation
27. Dr. Daniel Silver, Endangered Habitats League
28. William D. Toone, San Diego Wild Animal Park
29. William Witman, San Diego County Farm Bureau

### **Development of MSCP Issue Papers and Discussion Papers**

The Working Group has relied on development and review of the following Issue Papers and Discussion Papers as a means to resolve issues associated with development of a comprehensive habitat conservation plan (see also Appendices C-1 and C-11). It is important to note that consensus was not achieved on all issues.

- IP#1 Crediting Off-Site Mitigation in the MSCP Preserve System. Approved by the MSCP Working Group 2/19/92.
- IP#2 Relationship Between the MSCP and the Natural Community Conservation Program. Approved by the MSCP Working Group 2/19/92.
- IP#3 Relationship Between the MSCP and Subarea Habitat Plans. Approved by the MSCP Working Group 6/17/92.
- IP#4 Coordination of Interim Permit Activities. Approved by the MSCP Working Group 7/15/92.
- IP#5 A Conceptual Framework for MSCP Preserve Design. Approved by the MSCP Working Group 12/16/92.
- IP#6 Implementation of the MSCP Through Subarea Plans. Approved by the MSCP Working Group 8/18/93.
- IP#7 MSCP Implementation Equity Issues. Approved by the MSCP Working Group 10/27/93.

IP#8 Originally distributed as a Memorandum of Agreement recognizing the subarea planning process. IP#8 was replaced by the Resolution of Intention described in Section 7.

IP#9 Planning Regulatory Devices for Habitat Preservation (Working Paper).

IP#10 A Plan Review, Approval and Implementation Structure for the MSCP. Approved by the MSCP Working Group 8/18/93.

IP#11 MSCP Implementation Agreement (Draft).

IP#12 Cooperative MSCP Planning and Implementation Issues (distributed to Working Group 11/10/93; approval not yet considered).

#### Discussion Papers on Financing and Acquisition Strategy

- Statements of Responsibility for Federal and State Government Contribution to the MSCP Preserve System (February 16, 1994).
- Policies Regarding the Use of Local General Revenues to Acquire and Maintain the MSCP Preserve System (February 16, 1994).
- Policies Regarding the Use of Mitigation Fees to Acquire, Restore, or Enhance Habitat in the MSCP Preserve System (March 15, 1994).
- Discussion Paper and Available Options Concerning the Potential Economic and Fiscal Impacts of MSCP on Individual Jurisdictions (March 24, 1994).

Other MSCP participation activities have included publication of a brochure, information packets and handouts, newspaper articles, regular coverage in the Clean Water Program newsletter, participation in Earth Day events, presentation to local governments and citizens' groups, and other public information efforts.

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## **2.0 BIOLOGICAL RESOURCES**

### **2.1 DATA SOURCES, AERIAL PHOTOGRAPHY, AND REFERENCES**

This study focused on undeveloped lands and identified high value biological resource areas within the study area, with particular emphasis on larger connected tracts of undisturbed land. Data were also reviewed from areas outside the study area that could provide important information on plant and animal distribution in the region, as well as information on important movement corridors between the study area and adjacent open space.

#### **2.1.1 Data Sources**

Existing data for the study area were collected from a variety of sources, including the California Natural Diversity Data Base (CNDDB) (Alpine, Barrett Lake, Del Mar, Dulzura, El Cajon, El Cajon Mountain, Escondido, Imperial Beach, Jamul Mountains, La Jolla, La Mesa, National City, Otay Mesa, Otay Mountain, Point Loma, Poway, Ramona, Rancho Santa Fe, Rodriguez Mountain, San Pasqual, San Vicente Reservoir, Tecate, Valley Center, and Viejas Mountain 7.5-minute USGS topographical quadrangles, CDFG 1991), the California Native Plant Society's (CNPS) Inventory of Rare and Endangered Vascular Plants of California (Skinner and Pavlik 1994), environmental impact reports (EIRs), environmental assessments (EAs), land and habitat management plans, and other natural resource inventory reports and publications, soils maps (USDA 1973), National Wetland Inventory maps (USFWS 1990), existing vegetation and habitat maps produced by public and private sources, discussions with local experts, and the vernal pool data base (Bauder 1986; Beauchamp 1979). The focus was on data collected from approximately 1988 to the present. These data sources are included in Appendix A-1.

#### **2.1.2 Aerial Photography**

Color infra-red aerial photography (1:24,000) was available for the majority of the study area (Aerial Fotobank, June 1990). High altitude transparencies (1:65,000) were obtained from CESAR for areas not covered by Aerial Fotobank. The high altitude photographs were taken in June and July 1990 and later enlarged to a scale of 1:24,000. A total of 67 photographs were produced for the purposes of this study (62 color infra-red photographs and 5 high altitude transparencies). The photographs were used as base maps

for vegetation mapping, and were laminated so that vegetation boundaries could be drawn directly onto the photographic image.

### **2.1.3 References**

Scientific nomenclature used throughout this report conforms to Munz (1974), Beauchamp (1986), and Skinner and Pavlik (1994) for plants; a revision of Holland's (1986) classification system (Oberbauer 1991) that has been specifically tailored for San Diego County for vegetation; Jennings (1983) for amphibians and reptiles; AOU (1983, 1986, 1989) for birds; and Jones et al. (1982) for mammals.

## **2.2 SURVEY METHODS AND LIMITATIONS**

### **2.2.1 Vegetation Mapping**

#### **2.2.1.1 Aerial Photographs**

Color infrared aerial photographs and high altitude transparencies were lightened so that the vegetation would be more discernible. All photographs were laminated to allow for delineation of vegetation boundaries directly onto photographs. Overlap existed between the aerial photographs. To minimize duplication of work on each photograph, a photo extent was defined towards the center of each photograph. A 1-inch overlap was included between photographs to aid the digitizers in edge-matching interpretation.

#### **2.2.1.2 Pilot Study**

A pilot study was conducted with the purposes of (a) developing and assessing the methodology for the vegetation mapping effort and the Geographic Information System (GIS) digitization process, (b) coordinating activities between CESAR, SourcePoint, and Ogden, and (c) evaluating categorical and positional accuracy. This study was conducted prior to the initiation of the vegetation mapping phase of the entire study area.

A portion of the City of Poway was chosen as the area to be mapped for the pilot study. Ogden had previously created a vegetation map for Poway from 1:2400 scale orthophotographs (ERCE 1991). The vegetation data for the Poway study were selectively

field-verified where access was permitted, and there was high confidence in the accuracy of the resulting map.

The pilot study area was photointerpreted by Ogden biologist Dan Kelly, who had not been involved in the Poway mapping effort. The resulting map was then field-verified by vehicle and binocular surveys. Comparisons were then made between the pilot study map and the map produced during the Poway study, and the appropriate corrections were made to the pilot study map. The pilot study map was then given to CESAR for digitizing onto a Thematic Mapper (TM) image of the area. CESAR overlaid the pilot study data with the digital file of the more detailed Poway map.

Conclusions from this pilot study included:

- Guidelines were needed to ensure consistency in the digitizing effort;
- Differences between the pilot study and Poway study data bases existed; however, these differences were not significantly greater than what was anticipated due to the scale differences of the aerial photographs used for the two studies; and
- Utilization of SourcePoint's land use files to develop an urban mask was found to be inappropriate.

### **2.2.1.3 Existing Digital Data Sources**

A number of digital data sources for vegetation existed within the study area, including mapping efforts for Poway, East Otay Mesa, Otay Ranch, Tijuana River Estuary, Santa Fe Valley, Point Loma, NAS Miramar, 4S Ranch, San Vicente Reservoir, and the County's mapping of the Jamul area. These data, all developed using ARC/INFO software, were incorporated directly into the MSCP vegetation data layer, also in ARC/INFO. Digital data for the City of San Diego's Future Urbanizing Area were not incorporated directly, although maps were used for reference for the vegetation mapping effort. Existing digital data that were incorporated directly were recoded and dissolved to match the MSCP vegetation classification scheme.

#### **2.2.1.4 Vegetation Classification**

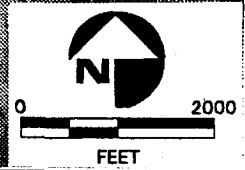
Vegetation was classified primarily according to Holland's (1986) system, although modifications were made to more accurately characterize the vegetation within San Diego County and reflect the level of delineation feasible during the different mapping phases. Ogden's proposed vegetation mapping categories were developed in coordination with SANDAG's vegetation mapping subcommittee prior to the onset of the 1991 vegetation mapping effort to ensure that these categories were congruent with the County-wide Holland classification scheme (Oberbauer 1991) (Appendix A-2). The mapping categories were designed to allow for both a constraints-level (i.e., small scale with minimal ground-verification) and a more detailed level (i.e., extensive ground-verification) of analysis.

In order to maintain consistency between the individuals conducting the vegetation mapping, specific guidelines were developed to aid in identifying and delineating vegetation on the aerial photographs. These guidelines included minimum mapping units for each vegetation type, general and specific rules for identifying vegetation types based on aerial photograph interpretation, and detailed descriptions of each vegetation type based on plant species composition, equivalent habitat types, known range and occurrence within the study area, and associated physical parameters (e.g., soil type, slope aspect and position, elevation). Mapping guidelines are included in Appendix A-3 of this report. In addition, vegetation codes were assigned to each vegetation category to facilitate GIS data entry. These codes were used during the vegetation mapping, and were later correlated to the Holland vegetation classification codes (Holland 1986).

#### **2.2.1.5 Vegetation Mapping**

Vegetation boundaries were delineated initially on the aerial photographs (Figure 2-1), based on aerial photograph interpretation and the information collected from existing maps, EIRs and other reports, and discussions with local authorities. Initial mapping efforts were conducted by Ogden biologists Daniel Kelly and Margaret Zalejko, under the supervision of Patricia Gordon-Reedy. Due to the number of photographs and the large area encompassed by the study area, the study area was divided into seven geographic subregions. Vegetation mapping was conducted by subregion.

After vegetation maps were generated using photo interpretation and existing data sources, each of the maps was field-verified using vehicle and binocular surveys from vantage



**LEGEND**

CSS Coastal Sage Scrub	OW Oak Woodland
CHP Chaparral	CF Coniferous Forest
CSCP Coastal Sage Scrub/Chaparral	DIST Disturbed Habitat
GR Grassland	AG Agriculture
RIP Riparian/Wetlands	DEV Developed

**OGDEN**  
■■■■■

Example of Vegetation Aerial Photo Interpretation  
with Satellite Imagery

06960

FIGURE

**2-1**

points and, to a limited extent, on foot. Subsequent to field-verification efforts, helicopter overflights were used to check all areas that were inaccessible or could not be viewed during the vehicle surveys. A single helicopter survey was flown for each subregion, with the exception of subregion 1, which is mostly urbanized and, therefore, almost entirely accessible by vehicle. The products of this initial mapping effort were the draft MSCP vegetation maps (1 in = 2000 ft).

Detailed field-verification of the vegetation mapping was conducted in selected portions of the study area during spring and early summer 1992 (Appendix A-6). Verification efforts focused on habitat within 22 survey areas (33,500 acres) that had been identified as comprising gaps in the biological data base. In order to maintain a consistent vegetation data base throughout the study area, mapping was done at a scale of 1 in = 2000 ft, and the same mapping categories were used in this phase as had been used in the initial mapping effort. Additional vegetation changes were made based on comments received on the draft MSCP maps. The product of this detailed mapping effort was the final MSCP vegetation map.

The one exception to the mapping methodology described above was vernal pool data. A separate vernal pools coverage was created by using digital information from the National Wetlands Inventory data base, and by digitizing additional sites compiled by Ogden at a scale of 1 in = 2000 ft.

#### **2.2.1.6 Data Input**

Vegetation information was input to the GIS by SourcePoint and CESAR using a technique of on-screen digitizing with a satellite image as a base. The satellite image was a merged Landsat and SPOT image processed to look very similar to the infrared photos. The geo-referenced satellite data served as a source of coordinate control. Checkplots for each aerial photograph were created by SourcePoint and CESAR to overlay onto the photos as a quality check. The hardcopy output was checked by Ogden for accuracy of digitization and labels. All changes and corrections were noted and the maps were returned to SourcePoint and CESAR for editing.

Final plots were produced at two scales: (1) a map showing the entire study area on one sheet (scale: 1 in = 6500 ft) and (2) maps that overlaid USGS topographical quadrangles

(scale: 1 in = 2000 ft). On the first map, vegetation categories were aggregated to simplify the map.

### **2.2.1.7 Accuracy Assessment**

The accuracy of the vegetation GIS map was assessed in an independent study conducted by the San Diego State University Geography Department researchers (Stow et al. 1993). The final report of the accuracy assessment is provided as Appendix A-12. The accuracy assessment was conducted in two phases with the second phase focusing on habitat types (i.e., coastal sage scrub, chaparral, grassland, oaks, and disturbed habitat) and polygon sizes (greater than 25 acres in size) that were deemed most influential to the development of a regional preserve design.

Vegetation mapping aggregated into nine basic vegetation communities without regard to levels of disturbance and having polygons greater than 25 acres in size had an overall accuracy of 77 percent with a 95 percent confidence interval of  $\pm 5.5$  percent. Accuracy, in this case, refers to the correct labeling of polygons rather than the accuracy of the positions or boundaries of polygons. The sample size for this estimate was 239 randomly selected polygons. Relatively large polygons of the two most abundant habitat types (coastal sage scrub and chaparral) were 80 to 90 percent accurate. Grassland, the third most abundant vegetation community, was 70 to 80 percent accurate. Other native habitats were not adequately represented in the sample of polygons assessed to estimate their mapping accuracy with any degree of confidence. Polygons incorrectly labeled as coastal sage scrub were actually chaparral or grassland. This type of mapping error is to be expected for vegetation types that have similar aerial photo signatures.

More detailed vegetation mapping with 18 sampled habitat categories and their respective undisturbed and disturbed classes had an overall accuracy of  $55.6 \pm 8.2$  percent based on 153 sampled polygons. Confusion between disturbed and undisturbed classes within (e.g., coastal sage scrub vs. disturbed coastal sage scrub) and between (e.g., disturbed coastal sage scrub vs. disturbed habitat) habitat categories appeared to be the most significant source of mapping error. The disturbance classes within habitat categories were not used in the Habitat Evaluation Model or preserve design planning due to the relatively high rate of mapping error apparent in the accuracy assessment. Polygon size also appeared to contribute to mapping accuracy. Ignoring relatively small polygons generally

increased the accuracy estimate by 5 to 15 percent, depending on the habitat type considered.

There are few available and appropriate assessments of vegetation mapping efforts to compare to the MSCP mapping effort. Map users often tend to have expectations of mapping accuracy that may not be consistent with the technical limitations associated with the mapping process. The user's expectations of mapping accuracy may not be practicable. While the level of mapping accuracy of this effort is adequate for regional preserve design purposes, it should be cautioned that it would not be adequate for project level analyses.

#### **2.2.1.8 Public Review**

Regional land use and general ownership data were reviewed by the MSCP participating jurisdictions. Regional vegetation community maps were developed by the MSCP project team with the cooperation of all the jurisdictions within the MSCP study area, as well as property owners, developers, and other interested parties. Because these maps form the basis of preserve planning, it was important to obtain consensus on the regional mapping effort. Therefore, the vegetation and sensitive species maps were distributed for public review in spring 1992 and again in spring 1993 to update the data base and to correct inaccuracies in the vegetation communities and sensitive species mapping. After each review period, revisions were made to the maps, where appropriate, based on public comment.

#### **2.2.2 Target Species Mapping**

Historical data on target species locations within the study area were compiled from approximately 300 references in a variety of document types. The types of documents from which the data were obtained, as well as the sources of these documents, are listed below.

##### **Types of Documents Containing Sensitive Species Data:**

- EIRs, EISs, EAs
- Initial studies and negative declarations
- Technical reports and constraints analyses
- Specific plans, community plans and general plans
- Mitigation and enhancement plans
- Master plans for parks

Management plans  
Feasibility studies  
National Wetlands Inventory maps  
Soil survey maps  
Vegetation maps  
Bird surveys and species lists  
Timber stand maps  
Unpublished data  
Personal communications

Sources of biological data:

Small Jurisdictions:

Coronado  
Chula Vista  
Del Mar  
El Cajon  
Imperial Beach  
La Mesa  
Lemon Grove  
National City  
Poway  
Santee

Quasi-Public Agencies/Utilities

SDG&E  
County Water Authority  
San Diego Unified Port District  
Padre Dam Municipal Water District  
SANDAG

Private Preserve Landholders

Trust for Public Land  
The Nature Conservancy  
The Environmental Trust  
Center for Natural Lands Management  
San Dieguito River Park JPA  
Audubon Society  
Los Peñasquitos Lagoon Foundation

Federal Agencies

U.S. Fish and Wildlife Service  
Bureau of Land Management  
National Park Service  
Forest Service  
U.S. Department of Agriculture

Large Jurisdictions:

County Planning Department  
County Parks Department  
City of San Diego Planning Department  
City of San Diego Parks Department  
City of San Diego Property Department  
Bureau of Indian Affairs  
United States Navy

Private Entities

Alliance for Habitat Conservation  
Developers and Land Owners  
Consultants  
Individual Researchers

State Agencies

Department of Fish and Game  
Department of Parks and Recreation  
State Lands Commission  
Scripps Institute of Oceanography  
UC Natural Reserve System  
Department of Forestry  
University of California, San Diego (UCSD)  
San Diego State University (SDSU)  
Caltrans  
California Coastal Conservancy  
Coastal Commission  
Boating and Waterways  
California State Polytechnic University, U.S.  
Pomona

In order to achieve maximum accuracy, only recent data (1988 to present) from projects of at least 100 acres were recorded. Exceptions include older sensitive species data from areas such as parks and reserves where the resources are protected, and areas of high biological importance that are known to be extant. Point and area locations of sensitive species were transferred from documents to 1 in = 2000 ft topographical maps and given unique numbers that are referenced to bibliographical information, date, and population data. The data from these maps were digitized into a GIS using ARC/INFO software. Existing GIS sensitive species data for Poway, 4S Ranch, Future Urbanizing Area, NAS Miramar, Point Loma, Santa Fe Valley, Otay Ranch, and the East Otay Mesa Planning Area were merged directly into the MSCP database, as were appropriate data from the CNDDDB.

### 2.2.3 Target Species Surveys

Detailed field surveys for sensitive plant and animal species were conducted for some lands lacking adequate survey data. Upon completion of the regional vegetation mapping and plotting of sensitive species based on existing information, it was apparent that there were large areas of the MSCP study area for which we had little information on habitat quality, species diversity, wildlife movement, or the potential for MSCP target species. Therefore, Ogden designed a field sampling program with the objective of establishing a more complete data base on sensitive species, biodiversity, wildlife movement, and habitat quality across unstudied portions of the study area. The objective of these studies was to obtain additional data to provide a more complete data base from which we could make more informed decisions in identifying preserve planning areas.

Twenty-two areas, totalling approximately 33,500 acres across the study area, were identified for study during the period April through July 1992 (see Appendix A-6). The survey sites were selected using the following criteria: 1) areas which appear to be ecologically significant portions of a potential preserve design for the MSCP area, based on existing biological resources data; 2) areas for which more information is needed to determine ecological significance; 3) areas adjacent to or with the potential to function as corridors connecting areas of existing open space and/or public lands; and 4) areas for which there is a moderate to high potential for development based on criteria including land ownership, proposed land uses, and topographic characteristics.

Two teams of botanists and two teams of wildlife biologists began field surveys in April, and field work was conducted almost daily through July. Separate field forms for plants

and wildlife and accompanying maps were completed and filed daily by each team, according to standardized field survey guidelines. Access was denied to areas 1, 15, and 17, and to specific parcels within several of the remaining study areas. However, the majority of the designated survey areas (excluding 1, 15, and 17) were surveyed in detail.

### 2.2.3.1 Plants

Rare plant surveys followed a modified floristic approach that embodied the following floristic concepts: (a) an attempt was made to examine all taxa in the survey area, within the timeframe of this contract; (b) each species encountered was identified to a level sufficient to determine its rarity; and (c) selected areas were surveyed more than once due to the variable phenologies of the potentially-occurring annual and herbaceous perennial species. The advantage of a floristic approach is that it allows a thorough coverage of the survey area and encourages detection of new localities for sensitive species (Nelson 1986). This is also the approach recommended by the California Department of Fish and Game (CDFG) and other regulatory agencies (CDFG 1984; Nelson 1986) to ensure the most complete examination possible and thus an adequate survey. Aspects of targeted or focused sensitive species survey methods were incorporated into the study plan through the use of existing records and other predictive tools (habitat, soils, topography) to prioritize search efforts and survey intensities in selected areas. The methodology for rare plant surveys is included as Appendix A-4.

A systematic survey effort was conducted in 22 separate areas, covering approximately 33,500 acres. Within the project area, a generalized transect methodology was followed in an attempt to cover the area as thoroughly as possible with as little overlap as possible (Nelson 1986). The transects were roughly parallel lines that allowed for some meandering to accommodate changes in habitat or topography. Deviations generally occurred on extremely steep slopes or in dense, impenetrable habitats. In accessible areas, the distance between transect lines varied depending on the level of survey intensity required and the particular species of concern. For example, transects were closer together in areas where diminutive annuals were expected versus herbaceous perennials, shrubs, or trees. Survey prioritization occurred within each area, with the highest priority and most intensive efforts given to habitats or soil types that had a high potential to support sensitive species. Moderate priority areas included habitats that were relatively undisturbed but historically expected to support few sensitive species, or disturbed habitats (i.e., nonnative grassland) that could nonetheless support sensitive species. Moderate priority areas received an initial,

relatively thorough survey; if sensitive species were detected, more intensive localized surveys were conducted to determine the extent of the population. Subsequent surveys through moderate priority areas followed a more focused approach. Although some native species proliferate under conditions of moderate disturbance (i.e., roadcuts, burns, clearings in dense vegetation), few sensitive species were expected in areas subject to repeated disturbance such as agricultural activities, due largely to soil displacement and destruction of the seed bank. Therefore, current or old agricultural areas and developed areas were generally given the lowest survey priority.

### **2.2.3.2 Animals**

Detailed field surveys were also conducted to evaluate wildlife habitat value, survey for California gnatcatchers and coastal cactus wrens, and sample wildlife diversity in each survey area. Methodology for these surveys is provided in Appendix A-5. Significant wildlife resources were identified and mapped, including known locations of sensitive wildlife habitats or habitat associations, and critical movement corridors. Habitats were analyzed specifically for:

- Potential to support the California gnatcatcher and cactus wren;
- Potential to support other sensitive bird species including the least Bell's vireo;
- Potential for sensitive herptofauna including the orange-throated whiptail, San Diego horned lizard, granite night lizard, coast banded gecko, and others;
- Connectivity between potential preserve areas and use as a wildlife corridor;
- Raptor foraging and breeding potential;
- High deer use areas; and
- Areas of high wildlife abundance or diversity.

## **2.3 GENERAL PHYSIOGRAPHY**

The MSCP study area occupies approximately 900 square miles (581,649 acres) in southwestern San Diego County, California. The study area is topographically diverse and supports a number of soil associations. Topography, soils, and climate combine to influence vegetative associations, which in turn support characteristic plant and animal species.

### **2.3.1 Topography**

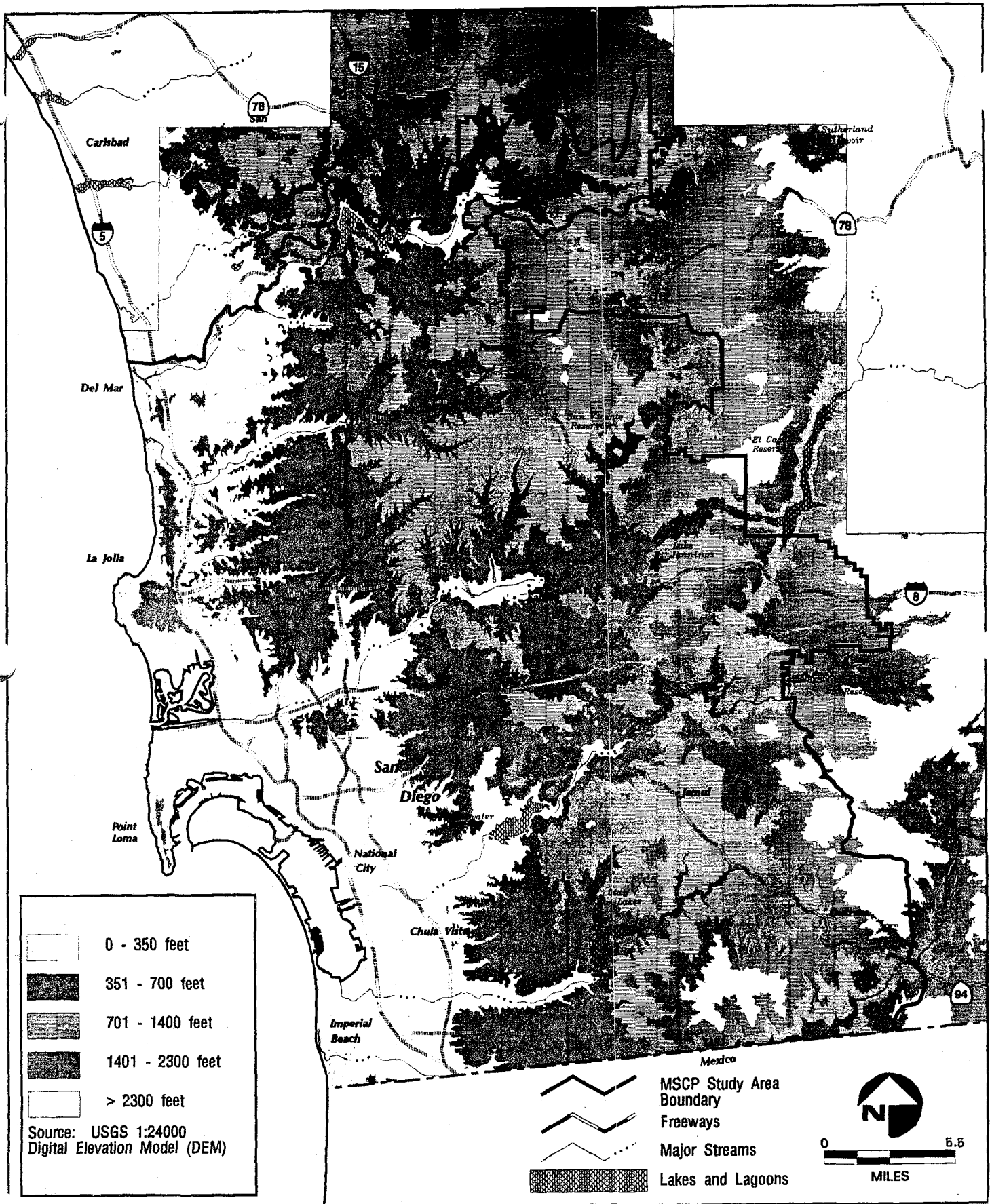
San Diego County lies in the Peninsular Range geologic province of southern California. A northwest to southeast-trending mountainous zone occupies the central portion of the county, with a series of cismontane foothill peaks and valleys extending west to the coastal mesa region. The coastal mesas are characterized by rolling hills and nearly level terraces dissected by a system of drainages that empty into shallow water bays and lagoons of the coastal plain. In some areas, the terraces extend to the Pacific coastline where they end abruptly, forming an eroded bluff zone (Beauchamp 1986; USDA 1973). The study area encompasses that portion of southwestern San Diego County that includes the cismontane foothill zone west to the coastal plain and bluffs.

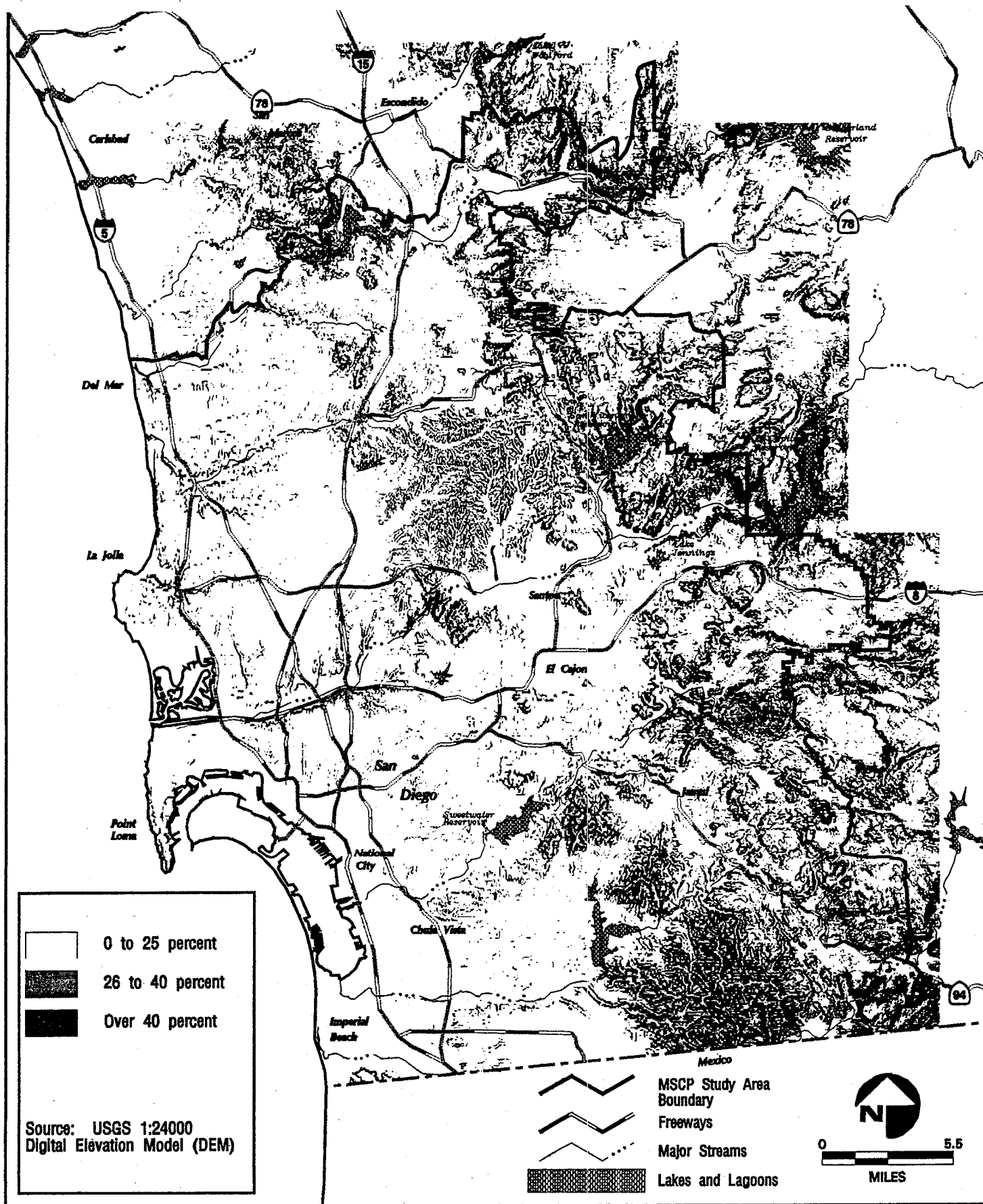
Topographic features in the study area include broad, flat valleys, deep canyons, perennially flowing rivers and intermittent creeks, moderately sloped terrain and steep hillsides, rolling foothills and nearly level mesas, coastal bluffs, and a series of coastal bays, inlets, and lagoons. Elevations in the study area range from mean sea level (msl) along the coast to approximately 3738 feet above msl on Lyons Peak. Figures 2-2 and 2-3 show elevation ranges and slopes, respectively, for the MSCP study area.

### **Drainage Systems**

Several major drainage systems or watersheds extend from the peninsular mountains and foothills to the coast, forming an east-west network of canyons and valleys (Figure 2-4). In the northeast portion of the study area, Santa Ysabel Creek flows through a steep-sided canyon and eventually opens into the San Pasqual Valley, which is a broad alluvial floodplain east of Lake Hodges. West of Lake Hodges, the San Dieguito River Valley widens progressively until it opens into San Dieguito Lagoon. To the south, Carmel Valley, Poway Creek, and Los Peñasquitos Creek carry water from the foothills and coastal terraces into Los Peñasquitos Lagoon, a relatively large estuarine system.

The San Vicente Reservoir is situated in the east-central portion of the study area, and receives runoff from San Vicente Creek and Foster Canyon. To the west, San Clemente and Rose canyons originate in the foothills south of the City of Poway and receive runoff from these hills, as well as from Kearny and Clairemont mesas. These canyons are characterized by well-defined valley floors bordered by steep slopes to the south.





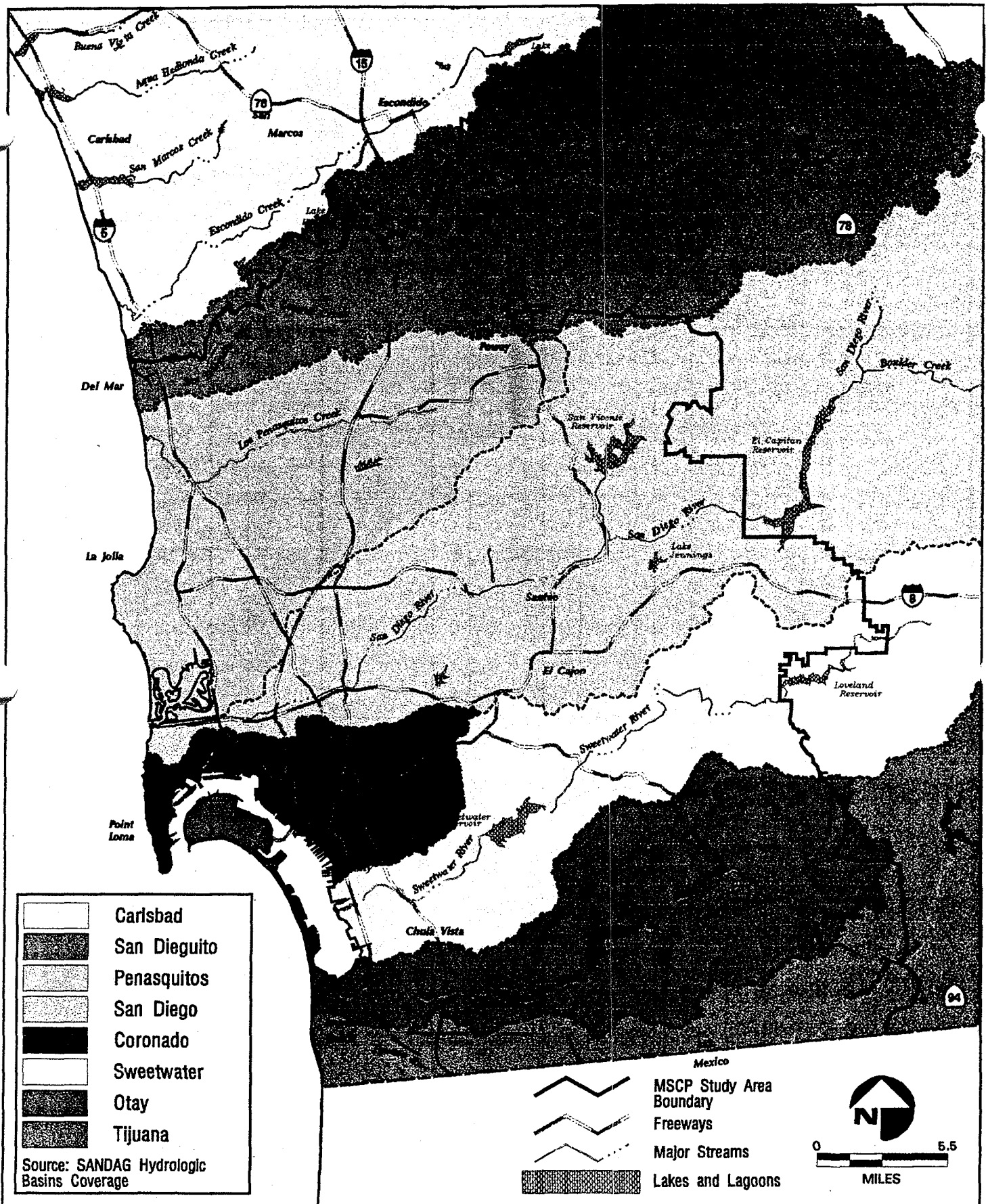
FIGURE

Slopes of MSCP Study Area

06970

2-3





FIGURE

Watersheds Within MSCP Study Area 0697

2-4



The San Diego River, with its headwaters in the Cuyamaca Mountains, is constricted into a deep gorge (Mission Gorge) near Cowles Mountain, west of the City of Santee, then flows through a broad river valley (Mission Valley) before emptying into the ocean just south of Mission Bay. Further south, the Sweetwater River, which also originates in the Cuyamaca Mountains, has formed a series of canyons and valleys (including Dehesa and Jamacha valleys) that stretch from the eastern edge of the study area, near the City of Alpine and Loveland Reservoir, to the Sweetwater Marsh and San Diego Bay. The Sweetwater Reservoir is situated along the river, and lies just northwest of Mother Miguel Mountain.

Jamul and Dulzura creeks flow from the foothills along the southeastern study area boundary westward into Lower Otay Reservoir. The Otay River is the major drainage system west of the reservoir, carrying water from the Jamul and San Ysidro mountains, as well as Otay Mesa, westward to south San Diego Bay. Enroute to the bay, the Otay River transects the broad floodplain of the Otay Valley.

The Tijuana River Valley is the southernmost, major drainage in the study area. It is characterized by a broad alluvial floodplain bordered by steep canyon walls where it dissects the San Ysidro Mountains and Otay Mesa along the southeastern boundary of the study area. Near the coast, the floodplain widens as the valley opens into the Tijuana River Estuary. Steep hillsides border the estuary to the south along the Mexican border, while the land to the north is primarily flat coastal lowland.

Numerous secondary canyons and valleys are also present in the study area, and many of these contain creeks and streams that are tributaries to the larger east-west drainages. Several of the larger canyons include Boden Canyon in the northeast corner of the study area, Beeler and Sycamore canyons south of Poway, Murphy Canyon south of the Miramar area, Alvarado Canyon near the City of La Mesa, Wildcat Canyon east of the San Vicente Reservoir, Harbison Canyon near Alpine, Telegraph Canyon between the San Diego Bay and Otay Reservoir, and O'Neal Canyon along the western slopes of the San Ysidro Mountains. Additional valleys in the study area include Barona, Chollas, El Cajon, Lyons, Moreno, and Proctor. The large Marron Valley anchors the southeastern corner of the study area.

## **Foothills and Mountains**

The eastern portion of the study area is characterized by a system of foothills and mountains that rise above the coastal plain region. The highest elevations in the study area occur in the San Ysidro, Jamul, and San Miguel mountains and adjacent peaks. Otay Mountain (3572 ft) and Lyons Peak (3738 ft) in the San Ysidro and Jamul mountains, respectively, are the highest points in the study area. San Miguel Mountain (2565 ft), McGinty Mountain (2183 ft), and Sycuan Peak (2801 ft) are also prominent landmarks. The northern and central portions of the foothill region are characterized by a series of east-west oriented unnamed ranges. Elevations are generally lower in these ranges, although Mt. Woodson is 2894 ft above msl and Iron Mountain approaches 2696 ft. Additional peaks in these ranges include Bernardo Mountain (1150 ft) near Lake Hodges, Black Mountain (1563 ft) in Rancho Peñasquitos, and Fortuna (1292 ft) and Cowles (1591 ft) mountains west of Santee.

## **Coastal Plains**

The coastal plains are characterized by several large terraces or mesas that extend from the interior foothills and mountains to near the coast. To the north, Del Mar Mesa extends from the San Dieguito River Valley south to Los Peñasquitos Canyon and includes the coastal mesas of the Torrey Pines and La Jolla area. Kearny Mesa is a large terrace formation that is roughly bounded by Interstate 15 on the east, Mission Valley on the south, Interstate 5 on the west, and Los Peñasquitos Canyon to the north. Kearny Mesa, as described here, includes Mira Mesa, and Clairemont and Serra mesas, as well. Much of this area has been urbanized, but undeveloped lands still occur on or near Miramar Naval Air Station. Further south, the highly urbanized areas of La Mesa and eastern San Diego occur on a large terrace that extends between Mission Valley and the Sweetwater River. Otay Mesa extends from the Otay River valley south to the Mexican border, and from the western base of the San Ysidro mountains west to the Tijuana River Estuary.

## **Coastal Bluffs, Bays, Lagoons, and Dunes**

Along the immediate coastline the topography varies from flat, low-lying areas that are at or just above msl to coastal bluffs that range from 50 to 100 ft above msl. The lowlands are characterized by bays, lagoons, and estuaries, as well as coastal dunes. Two large shallow water bays occur along the coastline of the study area: Mission Bay and San Diego Bay.

The major estuarine systems occur at the mouths of several of the major east-west drainages in the study area. These estuaries are San Dieguito Lagoon, Los Peñasquitos Lagoon, and the Tijuana River Estuary. Estuarine wetlands were probably also present at the mouths of the other major river drainages prior to urban and industrial expansion in these areas. Coastal foredunes are most extensively developed in the southern study area at Borderfield State Park and along the Silver Strand of Coronado.

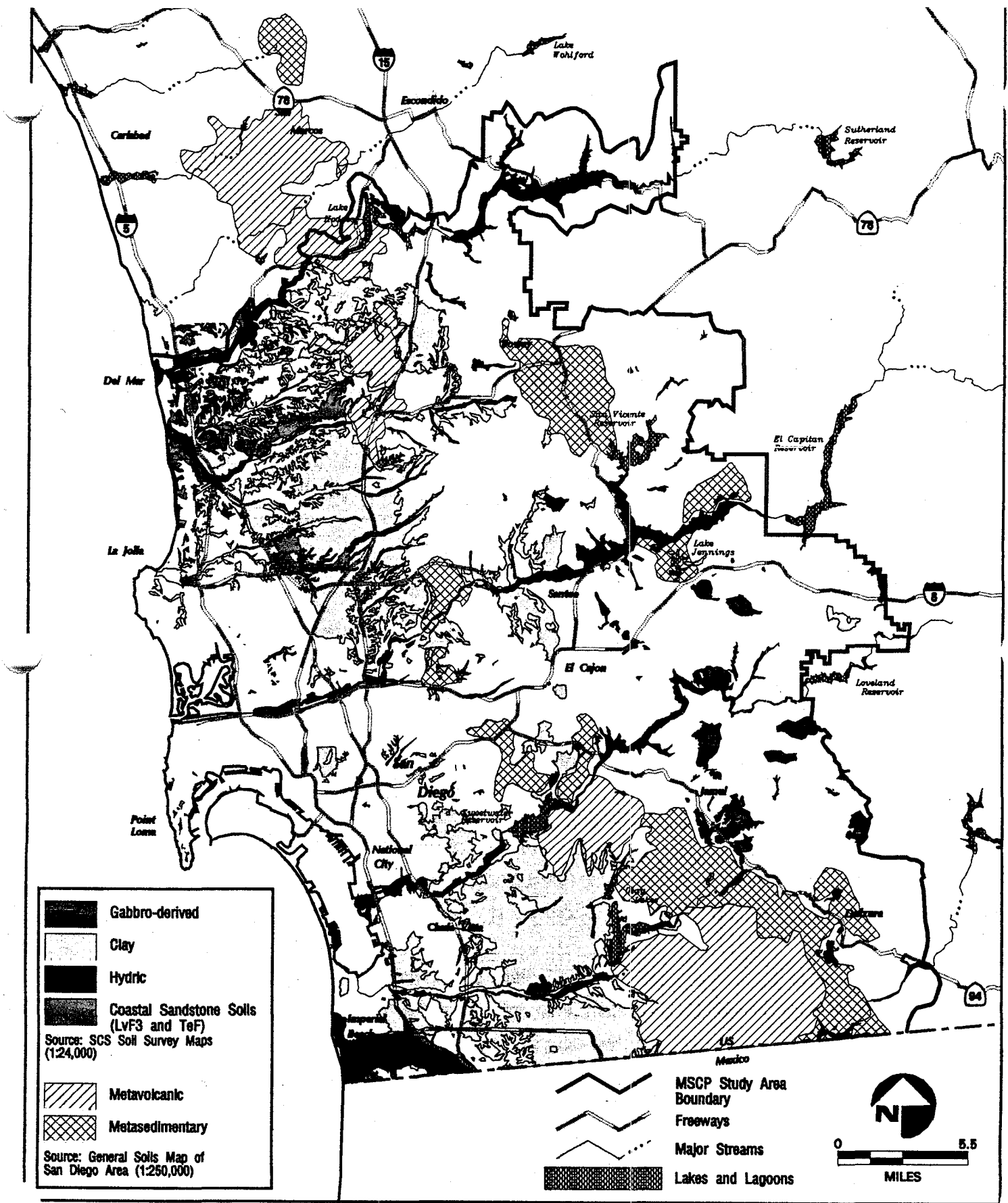
### 2.3.2 Soils

A wide diversity of soil types occurs within the study area, including upland soils and soils of alluvial fans, marine terraces, and coastal wetlands. A discussion of all soil types in the study area is beyond the scope of this text. However, descriptions of soils that are known to support sensitive plants or habitats are presented below. The discussion of soil types generally follows the Soil Conservation Service soil survey for San Diego County (USDA 1973).

Soils within the study area that are often associated with the occurrence of sensitive plants or habitats include gabbro-derived soils, clay soils, and hydric (or potentially hydric) soils. In addition, the soft marine sediments, sandstone, and shales along the immediate coast (e.g., the loamy alluvial land-Huerhuero complex (LvF3)) appear to be correlated with the occurrence of a sensitive habitat, and are also discussed below. Other microhabitat features that may be associated with sensitive biological resources include springs and rock outcrops. These features were mapped from soils maps and USGS topographic quadrangles, and will be discussed in other sections of this report, as appropriate. The distribution of soils supporting sensitive plant species is shown in Figure 2-5.

#### Gabbro-derived Soils and Metavolcanic Soils

Gabbro-derived soils in the study area include the Boomer and Las Posas series. Soils of the Boomer series (BoC, BoE, BrE, BrG) consist of well-drained, moderately deep to deep stony loams that have a stony clay loam subsoil. Soils of the Las Posas series (LpB, LpC, LpC2, LpD2, LpE2, LrE, LrE2, LrG) are characterized by well-drained, moderately deep stony fine sandy loams that have a clay subsoil. Soil phases of each of these series occur on uplands with slopes ranging from 2 to 65 percent. Gabbro-derived soils are known from several locations within the study area including (but not limited to) Bernardo Mountain (north of Lake Hodges), several scattered locations in the vicinity of the



Sweetwater and San Diego rivers, on McGinty Mountain and Sycuan Peak, and north of the Otay River near Lower Otay Reservoir. High magnesium concentrations in gabbroic soils result in the exclusion of many plant taxa from this substrate. However, some plant species can tolerate such conditions, and a few of these are restricted to growing on gabbroic soils (i.e., edaphic endemics). Species that are wholly or partially restricted to gabbro-soils are often limited in extent and may be considered sensitive. Sensitive plants often associated with gabbroic soil in the study area include Dunn's mariposa lily (*Calochortus dunnii*), Gander's butterweed (*Senecio ganderi*), Dehesa nolina (*Nolina interrata*), slender-pod jewelflower (*Caulanthus stenocarpus*), Tecate cypress (*Cupressus forbesii*), and Parry's tetracoccus (*Tetracoccus dioicus*), among others.

Metavolcanic soils have similar properties to gabbro-derived soils in terms of how they affect the distribution of sensitive plant species. Tecate cypress, Otay manzanita (*Arctostaphylos otayensis*), and Dunn's mariposa lily occur on both gabbro and metavolcanic soils, while Gander's pitcher sage (*Lepechinia ganderi*), among other sensitive plants, occurs only on metavolcanic soils. Metavolcanic soils have relatively high acidity which may affect the ionic uptake of nutrients in plants (Oberbauer and Vanderwier 1991).

### Clay Soils

Clay soils in the study area include various phases of the Altamont (AtC, AtD, AtD2, AtE, AtE2, AtF), Auld (AwC, AwD, AyE), Bosanko (BsC, BsD, BsE, BtC), Diablo (DaC, DaD, DaE, DaE2, DaF), Diablo-Olivenhain (DoE), Huerhuero (HrC), Linne (LsE, LsF), Olivenhain (OhC), Redding (RdC, ReE), Salinas (SbA, SbC, ScA, ScB), and Stockpen (SuA, SuB) series. Soils in these series range from well-drained clays that have formed in material weathered from calcareous shale (i.e., Altamont clays) to well-drained clays underlain by metavolcanic rock (i.e., Auld clays) to well-drained, undulating to steep gravelly loams that have a gravelly clay subsoil and a hardpan (i.e., Redding series). Clay soils are widespread throughout the western half of the study area, particularly on flat coastal terraces. Areas supporting extensive clay soil formations include the Miramar area and Del Mar Mesa to the north, and Otay Mesa to the south.

A number of sensitive plant species are associated with clay soils, as are vernal pool formations and native grasslands. Sensitive plant species often associated with clays of the Diablo and Diablo-Olivenhain series include San Diego thorn-mint (*Acanthomintha*

*ilicifolia*), thread-leaved brodiaea (*Brodiaea filifolia*), and Cleveland's golden-star (*Muilla clevelandii*). Soils of the Olivenhain and Redding series may exhibit a microrelief of broad-based low hummocks called mima mounds. Depressions associated with this mima mound topography often support vernal pools, along with their characteristic suite of plant species.

### **Hydric Soils**

Wetland or hydric soils support wetland communities that are uncommon and declining habitats in San Diego County. Hydric soils within the study area include loamy alluvial land (Lu), saltpans/saltflats, tidal flats (Tf), and Chino (ChA, CkA), Mottsville (MxA), Tujunga (TuB), Visalia (VaA), Indio (InA, IoA, IsA), and Riverwash (Ru) sandy loams. Loamy alluvial land consists of somewhat poorly-drained, very deep silt loams and sandy loams that formerly supported wet meadows. Saltpans/saltflats are poorly-drained alkaline soils near the coast that are subject to direct tidal influence, while tidal flats occur as level areas that are periodically covered with tidal water. Soils of the Chino, Mottsville, Tujunga, and Visalia series are typically well-drained and derived from granitic parent material. Indio series soils are also well-drained and formed in alluvium derived from acid, igneous, and micaceous rock. Riverwash occurs in intermittent streams, is typically sandy, gravelly, or cobbly, and is excessively drained and rapidly permeable. Hydric soils occur within most of the river floodplains and intermittent drainages in the study area, as well as the coastal and inland marshlands.

### **Marine Sediments, Sandstone, and Shale**

It has been postulated that certain soil types along the coast support southern maritime chaparral, a restricted and declining vegetation type that includes such sensitive and/or uncommon species as wart-stemmed ceanothus (*Ceanothus verrucosus*), Del Mar Mesa sand-aster (*Corethrogyne filaginifolia* var. *linifolia*), and thick-leaved Del Mar manzanita (*Arctostaphylos glandulosa* ssp. *crassifolia*). These soils include the loamy alluvial land-Huerhuero complex (LvF3), terrace escarpments (TeF), and the Carlsbad (CbB, CbC, CbD, CbE), Chesterson (CfB, CfC, CfD2), Corralitos (CsD), Marina (MIC, MIE), and Las Flores (LeC2, LeC, LeD, LeE) series. Within the MSCP study area, the first two types were most often correlated with the presence of southern maritime chaparral, and will be discussed in further detail below.

The loamy alluvial land-Huerhuero (LvF3) complex occurs on old coastal ridges with strongly sloping to steep, severely eroding soils and alluvial fill along drainageways. These soils are typically poorly-drained and runoff is rapid. Barren exposures of soft marine sediments, sandstone, and shale are common. Within the study area, this soil phase has a very limited distribution, being known only from several coastal areas near Del Mar and the San Dieguito River Valley.

Terrace escarpments (TeF) consist of steep to very steep escarpments and escarpment-like landscapes. These formations occur on the fronts of terraces or alluvial fans, and are generally situated between narrow floodplains and adjoining uplands. Typically, there are 4 to 10 inches of loamy or gravelly soil over soft marine sandstone, shale, or gravelly sediments (USDA 1973). Terrace escarpments are more widespread along coastal San Diego County than the loamy alluvial land-Huerhuero complex. Terrace escarpments occur in association with southern maritime chaparral directly adjacent to the coast at Torrey Pines State Park, and in the vicinity of the San Dieguito River Valley, Carmel Valley, and Los Peñasquitos Canyon.

#### 2.4 VEGETATION COMMUNITIES

Eighteen native vegetation associations were mapped within the study area. In addition, introduced or nonnative communities, such as eucalyptus woodland, were also delineated, as were larger bodies of open water, salt pans, beaches, disturbed wetlands, natural flood channels, disturbed habitat, and developed areas. Native vegetation communities include southern foredunes, southern coastal bluff scrub, coastal sage scrub, maritime succulent scrub, chaparral, southern maritime chaparral, a coastal sage scrub-chaparral mix, grassland, southern coastal saltmarsh, freshwater marsh, oak riparian forest, riparian forest, riparian woodland, riparian scrub, dense and sparse phases of oak woodland, Torrey pine forest, and southern interior cypress forest. All associations or mapping units are discussed below with respect to general habitat structure, species composition, potential habitat inclusions, and location within the study area. It should be noted that locational information presented below is not comprehensive. Rather, these locations generally include large stands or representative examples of a particular habitat type. Acreages of vegetation communities within the MSCP study area are included in Table 2-1, and a generalized vegetation map is shown in Figure 2-6.

Table 2-1

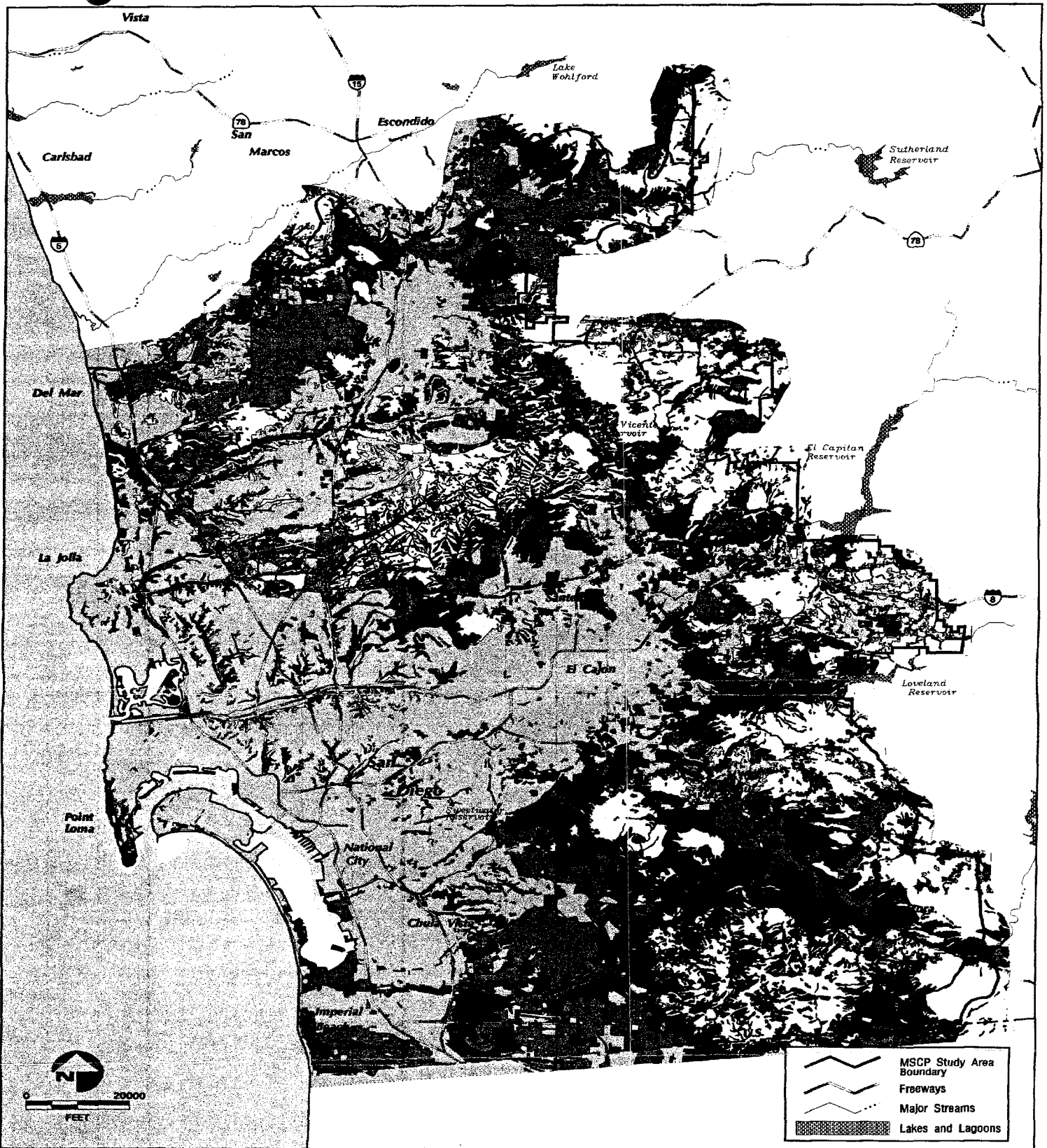
## ACREAGES OF MSCP VEGETATION COMMUNITIES

Vegetation Communities	Total Areas	Percent of Total Vegetation <sup>2</sup>
Beach	1206	<1%
Saltpan	235	<1%
Southern Foredunes	188	<1%
Southern Coastal Bluff Scrub	198	<1%
Coastal Sage Scrub	115,636	37%
Maritime Succulent Scrub	1,804	<1%
Chaparral	110,191	35%
Southern Maritime Chaparral	1,777	<1%
CSS/Chaparral Scrub	3,878	1%
Grassland	28,400	9%
Southern Coastal Saltmarsh	1,870	<1%
Freshwater Marsh	817	<1%
Riparian Forest	1,328	<1%
Oak Riparian Forest	5,382	2%
Riparian Woodland	731	<1%
Riparian Scrub	5,395	2%
Oak Woodland	5,622	2%
Torrey Pine Forest	169	<1%
Tecate Cypress Forest	5,696	2%
Eucalyptus Woodland	1,631	<1%
Open Water	5,726	2%
Disturbed Wetlands	928	<1%
Natural Flood Channel	860	<1%
Shallow Bays	9,581	3%
Pacific Ocean	4,888	2%
Other <sup>1</sup>	756	<1%
<i>Subtotal</i>	<i>314,890</i>	<i>100%</i>
Disturbed Habitat	22,984	
Agriculture	28,594	
Developed	215,181	
<i>Subtotal</i>	<i>266,759</i>	
<b>TOTAL</b>	<b>581,649</b>	

<sup>1</sup> Disturbed Habitat, Agriculture, and Developed areas with habitat value.

<sup>2</sup> Percent of 314,890 acres of habitat.





- |  |                              |  |                   |  |                     |  |             |
|--|------------------------------|--|-------------------|--|---------------------|--|-------------|
|  | Coastal Sage Scrub           |  | Grassland         |  | Beach/Foredunes     |  | Developed   |
|  | Chaparral                    |  | Riparian/Wetlands |  | Eucalyptus Woodland |  | Agriculture |
|  | Coastal Sage Scrub Chaparral |  | Oak Woodland      |  | Disturbed Habitat   |  | Shallow Bay |
|  | Coniferous Forest            |  |                   |  |                     |  |             |

Source: Aerial photo interpretation from June 1990 photos

Vegetation Communities for MSCP Study Area

FIGURE

2-6

## Beach

Beach habitat is the flat, sandy area along the immediate coastline that occurs between mean tide and the foredune, or to the furthest inland reach of storm waves. This habitat is characterized by high exposure to salt spray and sand blast, and sandy substrate with a low organic content and water holding capacity (Barbour and Major 1977). The lower portions of beaches are unvegetated, while the upper beach sometimes supports a sparse herbaceous cover, especially in areas where foredunes are present. Plant species occurring on these upper beaches include sea-rocket (*Cakile* spp.), beach saltbush (*Atriplex leucophylla*), and other species characteristic of foredunes.

Beaches occur within the study area along most of the Pacific Ocean coastline from San Dieguito Lagoon south to the Mexican border. Beach habitat also occurs along the shores of Mission Bay and at a few scattered locations on the west shore of San Diego Bay.

## Saltpan

Salt pans are unvegetated to sparsely vegetated flat, alkaline areas near the coast that are subject to tidal influence. In coastal areas, salt pans are most often associated with saltmarsh habitat. While salt pans can cover relatively large areas, they often occur in a mosaic pattern with more densely vegetated areas within the saltmarsh. The paucity of vegetation on salt pans is apparently due to seasonally high soil salinity levels that prevent colonization by perennial saltmarsh species. However, the open substrate associated with salt pans is available for colonization by short-lived annual species after winter rains temporarily reduce salinity levels (Ferren et al. 1987).

The most extensive saltpan habitat within the study area is located within the Tijuana River Estuary. The salt pans at this location are sparsely vegetated with saltmarsh species such as coastal saltgrass (*Distichlis spicata* ssp. *spicata*), pickleweed (*Salicornia* spp.), and sea-blite (*Suaeda* spp.). Areas with sparse plant cover are interspersed with more densely vegetated sites supporting these same species. Other representative saltpan habitat in the study area occurs on the U.S. Naval Radio Station at Imperial Beach and at San Elijo Lagoon. Representative species from the Imperial Beach site include pickleweed, California boxthorn (*Lycium californicum*), and variegated dudleya (*Dudleya variegata*) (MSA 1982). Potential inclusions (i.e., other habitat types that were included in the mapping polygon due

to minimum mapping units and/or limitations in aerial photointerpretation) within saltpan habitat are southern coastal saltmarsh, disturbed wetland, and open water.

### **Southern Foredunes**

Southern foredunes are sandy, open habitat between the area of direct tidal influence and stabilized substrate supporting typically inland vegetation (Barbour and Major 1977). Southern foredunes are often sparsely vegetated, with the dominant plants being perennial species that are able to survive the unstable conditions associated with shifting sands. Representative foredune species include sand-verbena (*Abronia* spp.), sea-rocket, beach saltbush, and coastal saltgrass.

Representative foredune habitat within the study area occurs at Monument Beach, Imperial Beach, and Peñasquitos Lagoon. Much of the dune habitat at these locations has been disturbed and, therefore, supports a disproportionately high number of nonnative species. The foredunes of Monument Beach are sparsely vegetated with species such as hottentot-fig (*Carpobrotus edulis*), sea-rocket, sea-blite, and alkali-heath (*Frankenia grandifolia*). Hottentot-fig also dominates much of the remaining dune habitat along Imperial Beach. Potential inclusions within southern foredune habitat are southern coastal saltmarsh and beach.

### **Southern Coastal Bluff Scrub**

Southern coastal bluff scrub is a low, sometimes prostrate scrub that occurs at localized sites along the coast south of Point Conception. Dominant plants are mostly woody and/or succulent and include such species as saltbush (*Atriplex* spp.), iceplant (*Mesembryanthemum* spp.), coastal prickly-pear (*Opuntia littoralis*), lemonadeberry (*Rhus integrifolia*), dudleya (*Dudleya* spp.), and giant and San Diego sea-dahlia (*Coreopsis gigantea* and *C. maritima*). Development along the southern California coastline has reduced this community throughout its range. Representative southern coastal bluff scrub within the study area is located at Torrey Pines State Reserve and Point Loma. Potential inclusions within southern coastal bluff scrub are coastal sage scrub, maritime succulent scrub, southern maritime chaparral, grassland, and beach.

## Coastal Sage Scrub

Coastal sage scrub is comprised of low, soft-woody subshrubs to about 1 meter (3 ft) high, many of which are facultatively drought-deciduous. This association is typically found on dry sites, such as steep, south-facing slopes or clay-rich soils that are slow to release stored water. Dominant shrub species in this vegetation type may vary, depending on local site factors and levels of disturbance. Dominants include California sagebrush (*Artemisia californica*), flat-top buckwheat (*Eriogonum fasciculatum* ssp. *fasciculatum*), laurel sumac (*Malosma laurina*), white sage (*Salvia apiana*), and black sage (*Salvia mellifera*). Other, less frequent, constituents of this community include spiny redberry (*Rhamnus crocea*), deerweed (*Lotus scoparius*), broom baccharis (*Baccharis sarothroides*), and yellow bush-penstemon (*Keckiella antirrhinoides*).

Although a number of coastal sage scrub subtypes have been identified in the county, these types were not identified during the mapping phase of this study due to the mapping scale and relatively low survey intensity over much of the study area. These types are generally distinguished by the dominance of one species (e.g., California sagebrush-dominated scrub, black sage-dominated scrub, Munz's sage-dominated scrub, etc.).

The shrub layer in this community ranges from a continuous canopy and little understory to a more open canopy with widely-spaced shrubs and a well-developed understory. Native understory species present in this association include foothill stipa (*Stipa lepida*), giant stipa (*S. coronata* var. *coronata*), mesa clubmoss (*Selaginella cinerascens*), fascicled tarweed (*Hemizonia fasciculata*), chalk live-forever (*Dudleya pulverulenta*), wishbone bush (*Mirabilis californica* var. *californica*), and coast barrel cactus (*Ferocactus viridescens*). Common nonnative species in open or disturbed sage scrub include wild oat (*Avena* spp.), tocalote (*Centaurea melitensis*), red brome (*Bromus rubens*), and Russian-thistle (*Salsola australis*), among others.

Disturbed coastal sage scrub was also delineated in the initial mapping effort. A disturbed qualifier was placed on coastal sage scrub (or any other native habitat) based on mechanical disturbance (e.g., brushing or clearing, off-road vehicle activity), a high percentage of nonnative species, and/or habitat fragmentation.

Representative stands of coastal sage scrub are numerous and occur throughout the study area. Several of the best-developed stands include those located within the City of Poway

near Poway Lake and Blue Sky Ranch, Jamul, around the Sweetwater Reservoir, and in the Lake Hodges area. Potential inclusions within coastal sage scrub habitat are southern coastal bluff scrub, maritime succulent scrub, chaparral, southern maritime chaparral, grassland, and disturbed habitat.

### **Maritime Succulent Scrub**

Maritime succulent scrub reaches its northern distributional limits in San Diego County on the mainland and offshore on the California Channel Islands. It is confined to dry, south-facing slopes along the coastal areas, from Torrey Pines State Park south to El Rosario in northern Baja California. This community is a low, open vegetation type with a poorly-developed understory (Holland 1986). The dominant shrub species in this community include some of the coastal sage scrub dominants, as well as a number of cacti and other succulent species. Typical shrub and suffrutescent species include California sagebrush, California copperleaf (*Acalypha californica*), Shaw's agave (*Agave shawii*), California encelia (*Encelia californica*), and cliff spurge (*Euphorbia misera*). Cacti include velvet cactus (*Bergerocactus emoryi*), coast barrel cactus, coastal prickly pear, and coastal cholla (*Opuntia prolifera*). Stands of the shrub species jojoba (*Simmondsia chinensis*) are also scattered to common on the slopes of this community toward the southern portion of the study area.

Within the study area, maritime succulent scrub is best-developed along the coastal slopes and bluffs of Point Loma and Torrey Pines State Reserve. It also occurs further inland to the south (e.g., along the Salt Creek drainage on Otay Ranch; Chula Vista; Otay Valley; west end of Otay Mesa, in the vicinity of Dennery Canyon). Potential inclusions within maritime succulent scrub are southern coastal bluff scrub, coastal sage scrub, and grassland.

### **Chaparral**

Chaparral is widely distributed throughout California on dry slopes and ridges at low and medium elevations where it occupies thin, rocky, or heavy soils. It is typically composed of broad-leaved, sclerophyllous shrubs, although species composition varies considerably with location. The plants of this community have developed the ability to survive recurrent fires by producing seeds that require a fire-related cue to stimulate germination and/or by stump sprouting after being burned. Species of the following genera are characteristic in

chaparral associations: *Adenostoma*, *Arctostaphylos*, *Ceanothus*, *Cercocarpus*, *Heteromeles*, shrubby *Quercus*, and *Rhamnus*.

Four distinct chaparral associations, as recognized by Holland (1986), occur within the study area: chamise chaparral, southern mixed chaparral, scrub oak chaparral, and southern maritime chaparral. Because differentiation of these chaparral types was not possible using the MSCP mapping methodology, all chaparral stands, with the exception of southern maritime chaparral, were categorized simply as chaparral. A discussion of southern maritime chaparral is presented in a separate section below. Disturbed chaparral includes stands of habitat that have been subjected to disturbance factors such as clearing, intensive grazing, off-road vehicle damage, or illegal trash disposal. These areas are generally characterized by a highly reduced and fragmented shrub cover, and may support a high percentage of nonnative species, particularly in the understory.

Chamise chaparral is characterized by nearly monotypic stands of chamise (*Adenostoma fasciculatum*) to 1-3 m (3-9 ft) in height. Additional shrub species, such as mission manzanita (*Xylococcus bicolor*) and our Lord's candle (*Yucca whipplei*), may be present, but contribute little to the overall cover. The herbaceous component of this association is largely lacking. Chamise chaparral occurs on xeric slopes and ridges, and is found on shallower, drier soils or at somewhat lower elevations than southern mixed chaparral. An example of chamise chaparral occurs on slopes south of El Capitan Reservoir.

Southern mixed chaparral tends to occur on steeper, more mesic north-facing slopes than chamise chaparral. This vegetation community type is characterized by relatively high species diversity. Typical species include chamise, Eastwood manzanita (*Arctostaphylos glandulosa* ssp. *glandulosa*), scrub oak (*Quercus dumosa*), holly-leaf cherry (*Prunus ilicifolia*), toyon (*Heteromeles arbutifolia*), and winter currant (*Ribes indecorum*). The understory component is generally better-developed in this association than in chamise chaparral, and may include species such as mariposa-lily (*Calochortus* spp.), soap plant (*Chlorogalum* spp.), and bedstraw (*Galium* spp.), among others. Representative stands of southern mixed chaparral occur in the vicinity of Iron Mountain and Wildcat Canyon.

Scrub oak chaparral is a dense, evergreen chaparral association that approaches 6 m (20 ft) in height and is dominated by scrub oak. This habitat occurs on more mesic sites than other chaparral associations and often at slightly higher elevations. These more favorable sites often allow scrub oak chaparral to recover from fire more quickly than other chaparral

types. Additional shrub species found in scrub oak chaparral include Eastwood manzanita, toyon, mountain-mahogany (*Cercocarpus betuloides*), and holly-leaf redberry (*Rhamnus ilicifolia*). Understory species include poison-oak (*Toxicodendron diversilobum*) and bedstraw, among others.

Several of the most extensive stands of undisturbed chaparral in the study area are found on Miramar Naval Air Station, along the Sweetwater River south of Alpine, on the north-facing slopes south of Barona Valley, and east of Highway 67 in the vicinity of Mt. Woodson. Potential inclusions within chaparral are coastal sage scrub, oak woodland, Tecate cypress forest, and grassland.

### **Southern Maritime Chaparral**

Southern maritime chaparral is a low, relatively open chaparral characterized by such species as wart-stemmed ceanothus (*Ceanothus verrucosus*), Del Mar manzanita (*Arctostaphylos glandulosa* ssp. *crassifolia*), summer-holly (*Comarostaphylis diversifolia* ssp. *diversifolia*), Del Mar sand aster (*Corethrogyne filaginifolia* var. *linifolia*), and sea dahlia (*Coreopsis maritima*), among others. Other species that commonly occur in this habitat are chamise, mission manzanita, and toyon. As with other chaparral associations, fire appears to be necessary for continued reproduction of many of the characteristic species within southern maritime chaparral (Holland 1986).

Distinguishing between southern maritime chaparral and southern mixed chaparral can be difficult, especially in coastal areas where ecotonal or transitional associations between the two types often occur. Important differences between these habitat types include the number and dominance of characteristic southern maritime chaparral species (some of which are listed above), the structural characteristics of the vegetation, and the range of soil types and geographical areas over which these habitats occur. Species such as Del Mar manzanita, wart-stemmed ceanothus, summer-holly, and others tend to be more frequent and have increased dominance in southern maritime chaparral, while species such as chamise, toyon, and mission manzanita typically dominate southern mixed chaparral. Species richness (the number of species per unit area) also seems to be higher in southern maritime than in southern mixed chaparral. Southern maritime chaparral is also often more open and lower growing, possibly as a result of its apparent restriction to relatively infertile, weathered sandstone soils. Geographically, southern maritime chaparral is restricted primarily to the coastal fog belt and currently occurs only at Torrey Pines State

Reserve, Del Mar Mesa, and a few other scattered nearby localities. In contrast, southern mixed chaparral is more wide ranging and occurs on a variety of soil types both along the coast and well inland.

Due to the limitations of the MSCP vegetation mapping procedures, stands of chaparral were categorized as southern maritime chaparral, to the degree feasible, based on results of ground-verification and review of existing documentation. Additional factors that were considered included soil type, position relative to the coast, and occurrence of target species. For example, chaparral in and around the Torrey Pines area that supports some of the key target species of this habitat (based on existing data) and occurs on marine sediments (e.g., LvF3 or TeF soils) was often categorized as southern maritime chaparral because of the apparent association of these formations with this vegetation type, particularly within the coastal region. The best-developed stands of southern maritime chaparral in the study area were found at Torrey Pines State Park, the west end of Del Mar Mesa, and several coastal bluff sites in La Jolla. Potential inclusions within southern maritime chaparral are coastal sage scrub, southern maritime succulent scrub, additional phases of chaparral, and grassland. Because of inaccessibility and/or the limited amount of detailed ground-verification and existing data, it is likely that additional stands of southern maritime chaparral occur in the study area.

### **Coastal Sage - Chaparral Scrub**

This mixed community includes both drought-deciduous sage scrub species and woody chaparral species, and is apparently a post-fire successional community. Total vegetative cover includes roughly equal amounts of both scrub and chaparral species. Characteristic dominant species include chamise, California sagebrush, ceanothus (*Ceanothus* spp.), black sage, and poison-oak. Within the study area, this association occurs on the slopes north and south of Poway Creek, on the hillsides near Crest, and east of Lakeside, on the south-facing slopes above the San Diego River Valley. Potential inclusions within this habitat are coastal sage scrub, chaparral, and grassland.

### **Grassland**

Vegetation classified as grassland includes both areas dominated by native bunchgrasses and previously disturbed areas dominated by nonnative grasses and other annual species.

Due to the quality and scale of the aerial photographs, it was not possible to differentiate native and nonnative grassland.

Native grassland in the study area is characterized by a relatively low (>10 percent) to dense herbaceous cover of the perennial, tussock-forming species, purple needlegrass (*Stipa pulchra*), and most closely corresponds to Holland's (1986) valley needlegrass grassland. Native and introduced annuals occur between the needlegrass, often actually exceeding the bunchgrass in cover (Holland 1986). This association generally occurs on fine-textured clay soils that are moist or wet in winter, but very dry in summer. Shrubs are infrequent, probably due to the unstable clay soils. The degree of habitat quality in native grasslands varies greatly, depending on the history of grazing, cultivation, or other disturbance factors. In addition to purple needlegrass, indicator species include blue-eyed grass (*Sisyrinchium bellum*), mariposa lily, and clarkia (*Clarkia* spp.), among others.

Nonnative grassland generally occurs on fine-textured loam or clay soils which are moist or even waterlogged during the winter rainy season and very dry during the summer and fall. It is characterized by a dense to sparse cover of annual grasses, often with native and nonnative annual forbs (Holland 1986). This habitat is a disturbance-related community most often found in old fields or openings in native scrub habitats. This association may have replaced native grassland and coastal sage scrub at many localities throughout the study area. Typical grasses within the study area include wild oat, soft chess (*Bromus mollis*), red brome, ripgutgrass (*Bromus diandrus*), and foxtail fescue (*Vulpia megalura*). Characteristic forbs include red-stem filaree (*Erodium cicutarium*), mustard (*Brassica* spp.), tarweed (*Hemizonia* spp.), California goldfields (*Lasthenia chrysostoma*), and owl's clover (*Orthocarpus purpurascens*).

Grassland habitat occurs throughout the study area, with some of the most extensive stands being found on a mesa west of Boden Canyon; west of Black Mountain and southeast of the San Dieguito River Valley; on Otay Ranch; and on East Otay Mesa. Many of the pasturelands throughout the study area were also classified as either disturbed or undisturbed grassland depending on the current levels of grazing. Potential inclusions within grasslands are coastal sage scrub, chaparral, and disturbed habitat.

## Vernal Pools

Vernal pools are a highly specialized plant habitat occurring on undeveloped mesa tops and supporting a unique succession of floral species (Purer 1939; Zedler 1987). These pools fill with rainwater which does not drain off or percolate away because of the mesa top topography and underlying soil conditions (i.e., a hardpan or claypan layer that prevents or impedes subsurface drainage). The plant species confined to these pools constitute what Thorne (1976) calls the vernal pool ephemeral plant community and Holland (1986) refers to as San Diego mesa vernal pools. Holland recognizes two types of vernal pools in San Diego County: San Diego mesa hardpan vernal pools and San Diego mesa claypan vernal pools. Vernal pools are often surrounded by low hummocks called mima mounds. Pools and their supporting watershed constitute vernal pool habitat.

Zedler (1987) discusses the effects of climatic variability on a habitat as sensitive and specialized as one dependent on the temporary ponding of water. Even under the best physical vernal pool conditions (level land surface, nearly impermeable subsurface soil layer, distinct basins, and mounded topography), annual rainfall variations have been shown to result in variations in plant species composition. In particular, a succession of below average rainfall years will eliminate many of the vernal pool species and enable the common herbaceous plants surrounding the pools to invade the basins. Subsequent wet years would then favor germination of the seeds of the vernal pool species which have been stored in the soil or introduced from a neighboring area.

San Diego mesa hardpan vernal pools are a low, mesic, herbaceous community dominated by annual herbs and grasses. Typical sensitive plant species in these pools include San Diego button celery (*Eryngium aristulatum* var. *parishii*), little mousetail (*Myosurus minimus* ssp. *apus*), prostrate navarretia (*Navarretia fossalis*), Orcutt's brodiaea (*Brodiaea orcuttii*), California adder's tongue-fern (*Ophioglossum lusitanicum* ssp. *californicum*), and San Diego mesa mint (*Pogogyne abramsii*). Mima mounds are generally well-developed in the hardpan pools, and the surrounding vegetation is often chamise chaparral. Iron-silica cemented soils (often of the Redding series) form the hardpan layer, and the water in pools evaporates rather than drains downward. The soils are always coarser and redder than the claypan pools (Holland 1986). San Diego mesa hardpan vernal pools were formerly extensive on the mesas and flat marine terraces north of San Diego, but have been largely extirpated by urban development.

The best example of undisturbed San Diego mesa hardpan vernal pools is on the Miramar Mounds National Natural Landmark, which is owned by the U.S. Navy. Several sensitive pool species and intact mesa mound topography occur in this location. Other classic examples are pool complexes occurring on NAS Miramar (AA, EE, F, GA, HH, V, W, X, and Z series), Del Mar Mesa (H series), and Mira Mesa (B, C, and D series). Pool complexes in the latter two areas are protected, in part, as a result of mitigation agreements, but portions of each are privately owned and unprotected.

San Diego mesa claypan vernal pools are generally characterized by lower, overall vegetative cover than hardpan pools. Typical sensitive plant species in these pools include San Diego button celery (*Eryngium aristulatum* var. *parishii*), little mousetail (*Myosurus minimus* ssp. *apus*), prostrate navarretia (*Navarretia fossalis*), California Orcutt's grass (*Orcuttia californica*), and Otay mesa mint (*Pogogyne nudiuscula*). The microrelief of these pools is often lower than hardpan pools, and they are generally surrounded by grassland or sparse coastal sage scrub rather than chaparral. An iron-cemented hardpan layer is lacking; the soils are finer-textured and greyer than found in hardpan pools (Holland 1986). Claypan pools are restricted to marine terraces in the southwestern portion of the county. Much of the original vernal pool habitat in this area has been extirpated by urban development and agricultural activities.

Examples of the least fragmented San Diego mesa claypan vernal pool complexes remaining are on coastal terraces around Lower Otay Reservoir (K series), in Proctor Valley (R series), and on Otay Mesa near Brown Field (J29 and J30 pool groups), the State Prison (J23-J25 groups), and the County Jail (J26 group). The majority of these pools are in private ownership and currently are not preserved or formally protected. The City of San Diego owns the K3-K5 pool group and is committed to protecting a minimum of 35 acres of this complex (Bauder 1986). The R1 pool group and a portion of the J26 group are also owned by the City of San Diego, but currently do not have any preserve status (Bauder 1986).

### **Southern Coastal Saltmarsh**

Southern coastal saltmarsh is a highly productive association of herbaceous and suffrutescent, salt-tolerant hydrophytes that form a moderate to dense cover and can reach a height of 1 meter (3 ft). Most species are active in summer and dormant in winter (Holland 1986). This association is usually segregated horizontally with cordgrass (*Spartina foliosa*)

nearest the open water, dwarf glasswort (*Salicornia bigelovii*), woody glasswort (*Salicornia virginica*), and American saltwort (*Batis maritima*) at mid-littoral levels, and a richer mixture of species, including alkali-heath, sea-blite, and/or Parish's glasswort (*Salicornia subterminalis*) at higher elevations (Holland 1986). Other characteristic species include coastal salt-grass, alkali-weed (*Cressa truxillensis* var. *vallicola*), and fleshy jaumea (*Jaumea carnosa*). Wetland habitat was categorized as disturbed saltmarsh if the vegetation had been cleared and/or was dominated by nonnative herbaceous species, but the SCS soil maps indicated that the substrate was Tidal flat (Tf) soil.

Southern coastal saltmarsh occurs at the margins of bays, lagoons, and estuaries along the coast from about Point Conception to the Mexican border. Land development activities in these coastal areas have reduced the occurrence of this habitat considerably (Holland 1986). The most extensive area supporting this wetland habitat within the study area is the Tijuana River Estuary. Although saltmarsh at this location is relatively good-quality habitat, a number of areas within the marsh appear to have been disturbed and currently support such nonnative species as red brome, ripgutgrass, tocalote, and Australian saltbush (*Atriplex semibaccata*). Another relatively large stand of southern coastal saltmarsh occurs at Peñasquitos Lagoon, while smaller stands are found along the coast at San Dieguito Lagoon, the mouth of the San Diego River, the Kendall-Frost Mission Bay Marsh Natural Preserve, and the eastern shore of San Diego Bay at the mouth of the Sweetwater River. Potential inclusions within southern coastal saltmarsh are saltpan, open water, and disturbed wetland.

### **Freshwater Marsh**

Freshwater marsh is dominated by perennial, emergent monocots to 1.3 to 2 m (4.3 to 6.6 ft) tall. Uniform stands of bulrushes (*Scirpus* spp.) or cattails (*Typha* spp.) often characterize this habitat. Freshwater marsh occurs in wetlands that are permanently flooded by standing fresh water (Holland 1986).

Alkali marsh is characterized by standing water or saturated soil during most or all of the year. High evaporation and low input of fresh water render these marshes somewhat saline, particularly during the summer (Holland 1986). Characteristic species include yerba mansa (*Anemopsis californica*), sedges (*Carex* spp.), saltgrass, beardless wild ryegrass (*Elymus triticoides*), and alkali-heath. Because of the small amounts of this association in the study area, and the difficulty in distinguishing it from freshwater marsh without detailed

field surveys, alkali marsh was included in the freshwater marsh category for mapping purposes.

Examples of well-developed freshwater marsh occur along most of the major east-west trending drainages in the study area, including Los Peñasquitos Creek, and the San Dieguito, San Diego, Sweetwater, Otay, and Tijuana rivers. Other examples of this habitat occur around several of the larger bodies of open water, such as Otay Lake, Sweetwater Reservoir, and Santee Lakes, as well as around many of the smaller lakes, ponds, creeks, and reservoirs in the study area. Potential inclusions within freshwater marsh are alkali marsh, open water, and disturbed wetland.

### Riparian Forest

For the purposes of this study, vegetation classified as riparian forest includes southern cottonwood-willow riparian forest and areas dominated exclusively by willows (*Salix* spp.). Riparian forest is an open or closed canopy forest that is generally greater than 6 m (20 ft) high and occupies relatively broad drainages and floodplains supporting perennially wet streams. This community is dominated by mature individuals of winter deciduous trees, including Fremont's cottonwood (*Populus fremontii* var. *fremontii*) and several species of willows (*Salix gooddingii*, *S. lasiandra*, *S. lasiolepis*), and often has a dense understory of shrubby willows, mulefat (*Baccharis glutinosa*), and mugwort (*Artemisia douglasiana*). The dominant species require moist, bare mineral soil for germination and establishment (Holland 1986). This is provided after flood waters recede, leading to uniform-aged stands. Riparian forest differs from riparian woodland in that western sycamore (*Platanus racemosa*) is generally lacking, or at least is not dominant. Coast live oaks (*Quercus agrifolia*) are also mostly absent from this community.

Disturbed riparian forest includes stands of this habitat that have reduced cover due to clearing, off-road vehicle activity, and invasion by exotic species such as giant reed (*Arundo donax*), tamarisk (*Tamarix* spp.), pepper-tree (*Schinus* spp.), and eucalyptus (*Eucalyptus* spp.), among others.

Examples of well-developed riparian forest occur along several of the major drainages within the study area including Santa Ysabel Creek; the San Diego River near El Cajon; the western portion of the Sweetwater River; and the San Dieguito, Otay and Tijuana rivers. One of the largest stands of undisturbed riparian forest in the study area is found in the San

Pasqual Valley east of the San Diego Wild Animal Park, along Santa Ysabel Creek. Riparian forest also occurs along Cottonwood Creek in the Marron Valley. An extensive stand of disturbed riparian forest with a significant cover of eucalyptus occurs along the San Dieguito River at the west end of Lake Hodges. Potential inclusions within riparian forest are oak riparian forest, riparian woodland, riparian scrub, eucalyptus woodland, freshwater marsh, open water, and disturbed wetland.

### **Oak Riparian Forest**

Southern coast live oak riparian forest is characterized by an open to locally dense evergreen sclerophyllous community dominated by coast live oak. This community type appears to be richer in herbs and poorer in understory shrubs than other riparian communities. Southern coast live oak riparian forest is associated with bottomlands and outer floodplains along larger streams, and occurs on fine-grained, rich alluvium (Holland 1986). Structurally, this habitat generally consists of western sycamores, cottonwoods, and willows at the channel margins, bordered by coast live oak at slightly higher elevations. Young willows and cottonwoods, mulefat, San Diego sagewort (*Artemisia palmeri*), and western ragweed (*Ambrosia psilostachya*) dominate the understory. Vegetation within the channel may include sedges, yerba mansa, and scattered patches of cattails. Shrub species in the outer edges of this association may include toyon, California wild rose (*Rosa californica*), desert elderberry (*Sambucus mexicana*), and poison-oak, while typical herbaceous understory species include Douglas mugwort (*Artemisia douglasiana*) and eucrypta (*Eucrypta chrysanthemifolia*), among others. Potential inclusions within oak riparian forest are riparian forest, riparian woodland, riparian scrub, eucalyptus woodland, freshwater marsh, open water, and disturbed wetland.

Disturbed oak riparian forest includes those stands where native species cover has been reduced by clearing, off-road vehicle use, livestock grazing, urban development, or invasion by exotic species. Nonnative and/or ornamental species often encountered in this association include eucalyptus, pepper-trees, palms (*Phoenix* spp.), pines (*Pinus* spp.), and giant reed.

Oak riparian forest occurs along a number of the creeks and drainages throughout the study area. Large stands of this habitat type are found along the primary drainage in Boden Canyon, along Mussey Grade Road between Highway 67 and San Vicente Reservoir, in San Vicente Creek and Longs Gulch in the vicinity of Wildcat Canyon, in the Peutz Valley

south of El Capitan Reservoir, along Poway Creek between Sycamore Canyon Road and Espola Road, and along Dulzura Creek east of Lower Otay Reservoir.

### **Riparian Woodland**

Riparian woodland is a tall, winter-deciduous riparian association with western sycamore as the indicator species; however, other riparian tree species, such as willows and cottonwoods, can also be present. This association occupies broader drainages or floodplains of permanent streams and rarely forms closed canopies. Often it may appear as a stand of scattered trees within a matrix of willows, mulefat, and other shrubby species. Riparian woodland is equivalent to Holland's (1986) southern sycamore-alder riparian woodland habitat type, although white alder (*Alnus rhombifolia*) does not occur within this association in the study area.

Within the study area, riparian woodland occurs along the floodplains of San Clemente and Rose canyons between Interstates 5 and 805. These woodlands form a relatively open, "park-like" habitat dominated by western sycamore. The understory component is comprised primarily of forbs and nonnative grasses, with shrub species accounting for only a small portion of the cover. The prevalence of nonnative grasses and lack of woody understory species suggest that habitat at these locations has been disturbed. Potential inclusions within riparian woodland are riparian forest, oak riparian forest, riparian scrub, eucalyptus woodland, freshwater marsh, open water, and disturbed wetland.

### **Riparian Scrub**

Riparian scrub varies from a dense, broad-leafed, winter-deciduous association dominated by several species of willow to an herbaceous scrub dominated by mulefat. Because differentiation of willow and mulefat-dominated scrub was not feasible for purposes of this study, riparian scrub includes both the southern willow scrub and mulefat scrub communities of Holland's (1986) classification system. The former association is found on loose, sandy, or fine gravelly alluvium deposited near stream channels during floods, and most stands are too dense to allow much understory to develop (Holland 1986). Typical willow species include black willow (*Salix gooddingii*), arroyo willow (*Salix lasiolepis*), large-leaf willow (*Salix lasiandra* var. *arauipa*), lance-leaf willow (*Salix lasiandra*), and sandbar willow (*Salix hindsiana*). Mulefat-dominated scrub occurs along intermittent streams with a fairly coarse substrate and moderately deep water table. Understory

vegetation is usually composed of nonnative, weedy species or is lacking altogether. Both of these associations may represent a successional stage leading to riparian woodland or forest or they may be stable.

Riparian scrub occurs along both the larger, perennial streams and smaller, intermittent creeks throughout the study area. One of the larger stands of this association is found along the western Tijuana River near the estuary. Large areas of both mulefat and willow-dominated scrub occur at this location. Other representative stands of riparian scrub occur at the eastern end of Lake Hodges where lowered water levels have allowed for the establishment of both mulefat and scrubby willows, along the eastern edge of the Los Peñasquitos Lagoon, around Santee Lakes, and along Cottonwood Creek in the Marron Valley. Potential inclusions within riparian scrub are riparian forest, riparian woodland, oak woodland, eucalyptus woodland, freshwater marsh, open water, and disturbed wetland.

### Oak Woodland

The oak woodland association includes both dense and sparse phases. The dense phase includes oak woodlands dominated by either coast live oak or a combination of both Engelmann oak (*Quercus engelmannii*) and coast live oak. The sparse phase is an open community dominated by widely-spaced Engelmann oak trees. Dense phase oak woodland dominated by coast live oak typically occurs on north-facing slopes or in shaded ravines, and intergrades with coastal sage scrub or chaparral on drier sites (Holland 1986). The shrub layer is typically poorly-developed but may include toyon, currant (*Ribes* spp.), laurel sumac, and desert elderberry. The herbaceous component is continuous and often dominated by nonnative, weedy species. The dense Engelmann oak phase is similar to coast live oak woodland except for the inclusion of Engelmann oak as a dominant canopy species. This association also occurs on slightly drier sites than those dominated by coast live oak, and generally has a less diverse understory shrub component (Holland 1986).

The best-developed stands of the dense phase of oak woodland are found primarily in undeveloped areas, including designated open space. Remnants of this habitat that occur in more urbanized portions of the study area are largely degraded by the presence of nonnative exotic tree species, including eucalyptus, acacia (*Acacia* spp.), pepper-trees, and palms, among others. Extensive stands of undisturbed dense oak woodland occur in northern Poway in the vicinity of Old Coach Road; in the vicinity of Iron Mountain; in Muth Valley,

east of the San Vicente Reservoir; and west of Jamul in Proctor Valley. A stand of coast live oak woodland that is notable for the size of oak trees occurs along the western portion of Los Peñasquitos Creek, on a north-facing slope at the north end of Boulder View Canyon.

The open phase of Engelmann oak woodland is an evergreen woodland dominated by Engelmann oak and has an understory of herbaceous species that are typical of grassland habitat. This habitat occurs in moist sites on fine-textured soils of gentle slopes and valley bottoms (Holland 1986). In wetter sites, coast live oak (*Quercus agrifolia*) can be an additional component of this association. This association is well-developed on a mesa west of Boden Canyon, where Engelmann oak trees are scattered throughout a relatively expansive nonnative grassland. Open Engelmann oak woodland also occurs in the vicinity of Wildcat Canyon. Potential inclusions within oak woodland are oak riparian forest, riparian forest, riparian woodland, eucalyptus woodland, chaparral, and grassland.

### **Torrey Pine Forest**

Torrey pine forest is a moderately dense forest up to 20 m (65 ft) in height in sheltered locations and is dominated by Torrey pine (*Pinus torreyana*). The understory varies from being essentially devoid of vegetation on the driest, rockiest sites to fairly dense chaparral on better-developed soils. This association occurs on rocky sandstone soil in areas of mild, frost-free climate with low precipitation. It intergrades with southern coastal bluff scrub and southern maritime chaparral on more exposed sites and steep slopes (Holland 1986). Understory shrubs are characteristic of these two coastal shrub communities, and include California sagebrush, black sage, chamise, Del Mar Mesa manzanita, San Diego sea-dahlia, toyon, and mission manzanita.

Only two populations of naturally-occurring Torrey pine forest are extant, and one of these is in the study area. The San Diego County population is centered around Torrey Pines State Reserve. The largest stand of trees is located in the main part of the park; a smaller, disjunct stand occurs to the north in Del Mar, in a parcel of land that has been annexed and is also included in the state park system. Scattered individuals or small stands can also be found to the east (e.g., along the San Dieguito River Valley or at the western end of Carmel Valley). The other natural population of Torrey pines occurs on Santa Rosa Island. Potential inclusions within Torrey pine forest are southern coastal bluff scrub, maritime

succulent scrub, coastal sage scrub, chaparral, southern maritime chaparral, and eucalyptus woodland.

### **Southern Interior Cypress Forest**

Southern interior cypress forest is a relatively dense, low, fire-maintained coniferous forest dominated by Tecate cypress (*Cupressus forbesii*). Stands of this association are often even-aged due to high mortality rates during fires and the requirement of high temperature to stimulate seed germination. Tree density varies in relation to site factors and fire history. This forest association often occurs within a matrix of chaparral on north-facing slopes (Holland 1986). Associated chaparral species include chamise, Eastwood manzanita (*Arctostaphylos glandulosa* ssp. *glandulosa*), mountain-mahogany, and toyon.

Southern interior cypress forest occurs at a single location in the study area: on Otay Mountain in the southeast portion of the study area. Tecate cypress is locally common on portions of Otay Mountain, occurring within chaparral on slopes and ridges, and dominating steep drainages. The occurrence of individuals or small stands of Tecate cypress in drainages at lower elevations (i.e., O'Neal Canyon and Marron Valley) is undoubtedly attributable to seed dispersal from the main population. Stands of Tecate cypress on Otay Mountain vary from large numbers of presumably even-aged saplings growing up through the chaparral canopy to stands of mature individuals dominating a dense understory of chaparral shrubs. Potential inclusions within southern interior cypress forest are chaparral, oak riparian forest, riparian forest, riparian woodland, and riparian scrub.

### **Eucalyptus Woodland**

Eucalyptus woodland is typically characterized by dense stands of gum trees (*Eucalyptus* spp.). Plants in this genus, imported primarily from Australia, were originally planted in groves throughout many regions of coastal California as a potential source of lumber and building materials, for their use as windbreaks, and for their horticultural novelty. They have increased their cover through natural regeneration, particularly in moist areas sheltered from strong coastal winds. Gum trees naturalize readily in the state and, where they form dense stands, tend to completely supplant native vegetation, greatly altering community structure and dynamics. Very few native plants are compatible with eucalyptus.

Individual eucalyptus trees or small stands of trees occur along many of the drainages within the study area, and have been addressed above in disturbed phases of native vegetation communities, such as oak woodland and southern coast live oak riparian forest. Extensive stands of eucalyptus within the study area are found at the following locations: south of Lake Hodges on the 4-S Ranch property; Del Mar Mesa, just east of Interstate 5; University of California at San Diego (UCSD); and Rancho Santa Fe and Scripps Ranch. All of these eucalyptus stands, with the exception of that on the 4-S Ranch, occur within a matrix of urban and commercial development. Potential inclusions within eucalyptus woodland are chaparral, oak riparian forest, riparian forest, riparian woodland, riparian scrub, freshwater marsh, and disturbed wetland.

### **Open Water**

Open water includes reservoirs, lakes, ponds, and relatively large sloughs, channels, and rivers or streambeds that contain water throughout the year. Open water habitat occurs throughout the study area. Examples include Lake Hodges, Lake Jennings, Poway Lake, Sweetwater Reservoir, San Vicente Reservoir, Otay Lakes, the larger channels and sloughs of the Tijuana River Estuary and San Dieguito and Los Peñasquitos lagoons, and portions of the San Diego, Sweetwater, and Otay river channels.

### **Disturbed Wetlands**

Areas mapped as disturbed wetlands include wetland habitat that has been recently cleared and/or is dominated by herbaceous, nonnative plant species. Categorization of a site as a disturbed wetland was done based on the presence of hydric soils and/or wetland indicator plant species, including nonnative plants. Hydric, or potentially hydric, soils in the study area include Chino (ChA, CkA), Indio (InA, IoA, IsA), Riverwash (Ru), and Tujunga sand (TuB) soil complexes, among others. Areas lacking saltmarsh species with tidal flat (Tf) soils were also classified as disturbed wetlands. Plant species composition was determined by review of existing documentation and/or ground-verification. Herbaceous, nonnative wetland species found in disturbed wetlands in the study area include eastern cocklebur (*Xanthium strumarium* var. *canadense*) and dock (*Rumex* spp.), among others.

Disturbed wetland habitat occurs within the floodplains of several of the larger drainages within the study area, including Santa Ysabel Creek, Los Peñasquitos Creek, and the

Tijuana River and Estuary. Potential inclusions within disturbed wetland habitat are freshwater marsh, southern coastal saltmarsh, grassland, and disturbed habitat.

### **Natural Flood Channel**

Natural flood channels are unvegetated or sparsely vegetated drainages outside of the area of tidal influence. These areas are generally considered "waters of the U.S" by the ACOE. National Wetland Inventory (USFWS 1990) and USGS maps provided supplemental information regarding the occurrence of unvegetated stream channels within the study area. The lack of significant vegetative cover in such areas can be attributed to either natural processes, such as flooding, or to human activities, such as vegetation clearing, sand mining, or stream channelization. Areas were designated as disturbed flood channels if existing documentation or ground-verification indicated that the channel had been artificially cleared or disturbed, or if the channel was dominated by nonnative trees and lacked any native riparian component.

Most of the flood channel habitat within the study area was classified as disturbed. One example of a disturbed flood channel is found in Santa Ysabel Creek in the San Pasqual Valley where the riparian vegetation appears to be actively removed from the channel for flood control purposes. A second area occurs along the San Dieguito River between Lake Hodges and Rancho Santa Fe where the channel is dominated almost exclusively by eucalyptus. Natural flood channel also occurs at intervals along Cottonwood Creek in Marron Valley. Potential inclusions within flood channel habitat are coastal sage scrub, chaparral, oak riparian forest, riparian forest, riparian woodland, riparian scrub, freshwater marsh, and disturbed wetland.

### **Disturbed Habitat**

Disturbed habitat is any land on which the native vegetation has been significantly altered by agriculture, construction, or other land-clearing activities, and the species composition and site conditions are not characteristic of the disturbed phase of one of the plant associations within the study area. Such habitat is typically found in vacant lots, roadsides, construction staging areas, or abandoned fields, and is dominated by nonnative annual species and perennial broadleaved species. Typical plant species include Russian-thistle, tumbleweed (*Amaranthus albus*), sweet fennel (*Foeniculum vulgare*), horseweed (*Conyza* spp.), mustard, lamb's quarters (*Chenopodium album*), fountain grass (*Pennisetum*

*setaceum*), and castor bean (*Ricinus communis*), among others. Nonnative trees, such as eucalyptus, pepper-trees, and Russian olive (*Olea europea*), can also occur in this association. Disturbed habitat occurs throughout much of the developed portions within the study area, especially near urban and residential areas and adjacent to major highways and roads. Potential inclusions within disturbed habitat are grassland and developed areas.

### **Developed Areas**

Developed areas support no native vegetation and may be additionally characterized by the presence of man-made structures such as buildings or roads. The level of soil disturbance is such that only the most ruderal plant species would be expected. During the initial mapping phase, agricultural lands were included in this category only because they were already mapped in detail by SANDAG. Agricultural areas can be separated from developed areas via the GIS. Overlap between SANDAG-designated agricultural areas and Ogden-designated grasslands, for example, was resolved by field-verification. The agricultural component of developed areas includes actively cultivated lands or lands that support nursery operations; however, pasturelands were mapped as disturbed or undisturbed grassland, depending upon the intensity of grazing. Developed areas are dominant in all of the major urbanized portions of the study area, and are found in varying densities in rural areas. The single potential inclusion within developed areas is disturbed habitat.

## **2.5 SENSITIVE HABITATS**

Sensitive habitats are those which are considered rare in the region, support sensitive plants or animals, receive regulatory protection (i.e., wetlands under the U.S. Army Corps of Engineers (ACOE) 404 permit process and/or the California Department of Fish and Game (CDFG) 1600-1606 Streambed Alteration Agreement), or are listed by the Conservation Element of the General Plan for the County of San Diego (County of San Diego 1980) or the City of San Diego's Resource Protection Ordinance (City of San Diego 1991). In addition, the California Natural Diversity Data Base (CNDDB) of the CDFG has designated a number of communities as rare; these communities are given the highest inventory priority (Holland 1986). Sensitive habitat types within the study area are discussed below and listed in Table 2-2.

Table 2-2

**SENSITIVE HABITATS AND THEIR PROTECTION STATUS  
WITHIN THE MSCP STUDY AREA**

HABITAT	PROTECTION STATUS BY AGENCY <sup>a</sup>				CRITERIA <sup>b</sup>
	ACOE	CDFG	COUNTY	CITY	
SALTPAN	X	X	X <sup>c</sup>	X <sup>c</sup>	1,2,4,5
SOUTHERN FOREDUNES (Coastal Strand)	—	X	X	X	3,4,5
SOUTHERN COASTAL BLUFF SCRUB	—	X	—	X	3,4,5
COASTAL SAGE SCRUB	—	X	X	X	3,5
MARITIME SUCCULENT SCRUB	—	X	—	X	3,4,5
SOUTHERN MIXED CHAPARRAL	—	X	—	—	3,5
SOUTHERN MARITIME CHAPARRAL	—	X	X	X	3,4,5
STIPA GRASSLAND (Valley Needlegrass Grassland)	—	X	X	X	3,5
MARSHES (Southern Coastal Saltmarsh; Cismontane Alkali Marsh; Freshwater Marsh)	X	X	X	X	1,2,3,5
RIPARIAN FOREST/ WOODLAND/SCRUB (Southern Coast Live Oak Riparian Forest; Southern Cottonwood-Willow Riparian Forest; Southern Sycamore Alder Riparian Woodland; Southern Willow Scrub; Mulefat Scrub)	X	X	X	X	1,2,3,5,6
VERNAL POOLS	X	X	X	X	1,2,3,4,5
OAK WOODLANDS: COAST LIVE OAK WOODLAND	—	—	X	X	3,6,7

Table 2-2 (Continued)

**SENSITIVE HABITATS AND THEIR PROTECTION STATUS  
WITHIN THE MSCP STUDY AREA**

HABITAT	PROTECTION STATUS BY AGENCY <sup>a</sup>				CRITERIA <sup>b</sup>
	ACOE	CDFG	COUNTY	CITY	
ENGELMANN OAK WOODLAND (Dense and Open Phases)	—	X	X	X	3,4,5,7
CONIFEROUS FORESTS (Torrey Pine Forest; Southern Interior Cypress Forest)	—	X	X	X	3,4,5,7
DISTURBED WETLANDS/ OPEN WATER	X	X	X	X	1,2,3
NATURAL FLOOD- CHANNEL/STREAMBED	X	X	X	—	1,2,3,6

<sup>a</sup>Agencies:

ACOE = U.S. Army Corps of Engineers; CDFG = California Department of Fish and Game.

<sup>b</sup>Criteria:

- <sup>1</sup>Protected as a wetland by the ACOE under Section 404 of the Clean Water Act.
- <sup>2</sup>Protected as a wetland by the CDFG under Streambed Alteration Agreement.
- <sup>3</sup>Declining habitat.
- <sup>4</sup>Distributionally limited or relictual habitat.
- <sup>5</sup>Supports sensitive species.
- <sup>6</sup>Functions as a wildlife corridor.
- <sup>7</sup>Develops over a very extensive time period, so habitat values can be difficult to re-create.

<sup>c</sup>Protected where it supports wetland vegetation or sensitive species.

## **Southern Foredunes**

Southern foredunes have been much reduced throughout their former range (Point Conception south to the Mexican border) due to urbanization and other development. As a result, this habitat is considered sensitive by the CDFG and the City and County of San Diego. Southern foredunes support at least one sensitive plant species of concern in this study, coastal dunes milk vetch.

## **Coastal Scrub**

Southern coastal bluff scrub and maritime succulent scrub both have restricted ranges and are known from only a few localized sites along the coast in southern California. Both communities have been depleted due to urban development within their ranges, and are therefore considered sensitive by the CNDDDB and the City of San Diego. Several sensitive species are associated with maritime succulent scrub habitat, in particular, including Shaw's agave and San Diego barrel cactus.

Diegan coastal sage scrub is considered a sensitive habitat by the City and County of San Diego and is given the highest inventory priority by the CNDDDB. Coastal sage scrub was listed as the third most extensive vegetation community in the county over 25 years ago (CDFG 1965); however, Oberbauer (1979) suggested that up to 70 percent of the county's original sage scrub habitat had been destroyed or modified, and this loss has continued throughout the last decade, primarily due to urban expansion. Additional evidence of the decline of this once common habitat is the growing number of declining plant and animal species dependent upon it, including the California gnatcatcher, cactus wren, rufous-crowned sparrow, San Diego horned lizard, orange-throated whiptail, and many of the MSCP target plant species.

## **Chaparral**

Southern mixed chaparral is relatively widespread throughout the coastal foothills of San Diego County and northern Baja California. However, due to increasing pressures from urban expansion in the northern portion of its range, and the potential for the presence of several sensitive plant species (e.g., wart-stemmed ceanothus, summer holly), this community is regarded as sensitive by the CNDDDB, particularly where it does support sensitive plant or animal species.

Southern maritime chaparral is considered a sensitive natural community by the City and County of San Diego and is given the highest inventory priority by the CNDDDB. This habitat is restricted in distribution and appears to be tied to particular soil formations. It occurs primarily in Torrey Pines State Reserve and a few scattered nearby locations. Sensitive and/or unique species characteristic of this community include wart-stemmed ceanothus and Del Mar manzanita. Additional sensitive plants found in southern maritime chaparral include Encinitas baccharis, Del Mar Mesa sand aster, and summer holly.

### **Grasslands**

*Stipa* grassland or valley needlegrass grassland is considered sensitive by the City and County of San Diego and the CNDDDB (Holland 1986) due to its limited distribution, potential for supporting sensitive plant species, and habitat loss from agricultural activities and urban and rural development. Within the study area, this association generally occurs as small stands interspersed within scrub habitats. It was not possible to distinguish *Stipa* grassland from nonnative grassland during the initial vegetation mapping phase of this study given the scale of aerial photographs and limited amount of field work. However, focused surveys utilized vegetation and soil types as predictive tools for identifying sensitive grassland plant species, so that grassland areas that appeared relatively undisturbed and supported clay soils were given a high survey priority.

### **Wetlands**

Wetland habitat is considered a sensitive and declining resource by several regulatory agencies including the U.S. Fish and Wildlife Service (USFWS), CDFG, and the City and County of San Diego. Wetlands are specifically addressed by the CDFG Code sections 1600-1606 (Streambed Alteration Agreement), and are also covered under the jurisdiction of the U.S. Army Corps of Engineers' (ACOE) section 404 permit process (Reinen 1978). Clean Water Act permit provisions regulating dredge and fill operations are enforced by the ACOE and U.S. Environmental Protection Agency (EPA), with technical input from the USFWS. Because of the sensitivity of wetland habitats, the regulatory constraints associated with them, and their potential use as important wildlife habitat or wildlife corridors, particular attention was focused on identifying large stands or prime examples of wetland habitat. However, detailed wetland delineations were not conducted as part of this study. Wetland communities identified within the study area include oak riparian forest,

riparian forest, riparian woodland, riparian scrub, freshwater marsh, southern coastal salt marsh, salt pans, vernal pools, natural flood channels, and disturbed wetland. Areas of open water were also mapped.

Vernal pool habitat is also defined as a wetland by the USFWS (Cowardin et al. 1979) and is considered sensitive by the resource agencies. Vernal pools contain a number of high interest plant species and provide temporary breeding pools for amphibians. The great majority of these pools are in danger of being eliminated in the near future due to urbanization. It has been estimated that more than 90 percent of the original vernal pool habitat within the San Diego region has been eliminated (Beauchamp 1979). Of the pool habitat remaining in 1979, an additional 23 percent had been lost by 1986 (Bauder 1986).

The ACOE exerts jurisdiction over "waters of the U.S." which include territorial seas, tidal waters, and non-tidal waters. The ACOE also has jurisdiction over wetlands and drainages that support wetland vegetation, exhibit ponding or scouring, show obvious signs of channeling, or have discernable banks and high water marks.

### **Oak Woodland**

Oak woodlands in general are considered sensitive by the City and County of San Diego primarily due to their limited acreage, high wildlife value, gradual loss as a result of development, and lack of regeneration. Many of the oak-dominated woodlands within the study area have been degraded by urban and rural residential development. Agricultural activities may also have affected the extent and quality of woodlands in the study area. Despite the level of disturbance in some areas, oak woodland provides habitat for many wildlife species which would not otherwise be found in the vicinity. Oak woodland habitats within the study area include coast live oak woodland, Engelmann oak woodland (dense and open phases), and oak riparian forest. The latter community is also a wetland association in many (but not all) locations, and is given the highest inventory priority by the CNDDDB along with Engelmann oak woodland.

### **Coniferous Forest**

Although Torrey pine is widely used as a horticultural species in many parts of the world, only two natural populations are extant, and one of these occurs within the study area. A majority of the naturally-occurring Torrey Pine forest in the county lies within Torrey Pines

State Reserve and, thus, is protected from development pressures or other human-influenced threats. Both the Torrey pine and the forest community that it dominates are considered sensitive resources by the CNDDDB and the City and County of San Diego. Torrey pine is also a federal candidate (C2) for listing as a threatened or endangered species.

Southern interior cypress forest is considered a sensitive natural community by the CNDDDB and the City and County of San Diego. This habitat has a limited distribution, occurring only in four isolated groves in the Peninsular Ranges of southwestern California, with isolated groves also extending about 150 miles into Baja California (Armstrong 1978). Three of the groves in California occur in San Diego County (Otay Mountain, Guatay Mountain, and Tecate Peak); the Otay Mountain population lies within the MSCP study area. The fourth grove is located in Orange County (Sierra Peak), and represents the northernmost extension of this species. Tecate cypress, which is the dominant canopy member in this habitat, is considered a sensitive species by the California Native Plant Society (Smith and Berg 1988).

## 2.6 TARGET PLANT SPECIES

Plant species are designated as sensitive because of their overall rarity, endangerment, unique habitat requirements, and/or restricted distribution. In general, it is a combination of these factors that leads to a sensitivity designation. Sensitive plant species include those listed by the USFWS (1990), California Department of Fish and Game (CDFG 1990b), and California Native Plant Society (Skinner and Pavlik 1994). The CNPS listing is sanctioned by the CDFG and serves as its list of "candidate" species. A list of potentially-occurring "target" plant species in the study area is included in Table 2-3. For the purposes of this study, target plants include those species that are listed as endangered, threatened, or rare at the federal or state levels, are proposed for federal listing, or are candidates (categories 1 or 2) for federal listing. Forty-eight sensitive plant species were identified as target species for this study (Table 2-3). Lower sensitivity species (i.e., species that are listed by the CNPS but are not listed, proposed, or candidate species at the federal or state level) are not included in the following discussion or in Table 2-3. Selected species' localities are mapped in Figures 2-7 through 2-13. See Appendix A-9 for additional information on the protection and management of target plant species.

Table 2-3  
MSCP TARGET SPECIES LIST

SS Code	Species Symbol	Common Name	Scientific Name	Status*	Group**	Habitat***
501	AI	San Diego thorn-mint	<i>Acanthomintha ilicifolia</i>	C1/CE	1	G, CSS, CHP
502	AS	Shaw's agave	<i>Agave shawii</i>	C2/	2	CSS, Bluff scrub
503	AP	San Diego ambrosia	<i>Ambrosia pumila</i>	C2/	2	CSS, Bluff scrub
504	AB	Aphanisma	<i>Aphanisma bitoides</i>	C2/	2	Maritime scrub
505	AG	Del Mar manzanita	<i>Arctostaphylos glandulosa var. crassifolia</i>	PE/	1	CSS, S. Maritime CHP
506	AO	Olay manzanita	<i>Arctostaphylos olayensis</i>	C2/	2	CHP
507	AD	Dean's milk vetch	<i>Astragalus deanei</i>	C2/	2	CSS
508	AT	Coastal dunes milk vetch	<i>Astragalus tener var. itii</i>	C1/CE	1	Coastal strand/foredunes
509	BV	Encinitas baccharis	<i>Baccharis vanessae</i>	PE/CE	1	CHP
510	BF	Thread-leaved brodiaea	<i>Brodiaea filifolia</i>	PT/CE	1	VP, G
511	BO	Orcutt's brodiaea	<i>Brodiaea orcuttii</i>	C2/	2	G, VP, seeps, wet meadows
514	CA	Dunn's mariposa lily	<i>Calochortus dunnii</i>	C2/CR	1	G, CHP (openings)
515	CS	Slender-pod jewelflower	<i>Caulanthus stenocarpus</i>	C3/CR	1	burned CHP
516	CC	Lakeside ceanothus	<i>Ceanothus cyaneus</i>	C2/	2	CHP
517	CV	Wart-stemmed ceanothus	<i>Ceanothus verrucosus</i>	C2/	2	CHP, S. maritime CHP
518	CO	Orcutt's spinneflower	<i>Chorizanthe orcuttiana</i>	PE/CE	1	Maritime CHP
519	CM	Salt marsh bird's-beak	<i>Cordylanthus maritimus ssp. maritimus</i>	FE/CE	1	SM
520	CR	Orcutt's bird's-beak	<i>Cordylanthus orcuttianus</i>	C2/	2	Maritime scrub
521	CL	Del Mar Mesa sand aster	<i>Corethrogyne filaginifolia var. linifolia</i>	PT/	1	CHP (openings)
522	CF	Tecate cypress	<i>Cupressus forbesii</i>	C2/	2	CHP, Cypress Wldd., drainages
523	DB	Short-leaved dudleya	<i>Dudleya brevifolia</i>	PE/CE	1	CHP openings, S. maritime CHP
524	DV	Variegated dudleya	<i>Dudleya variegata</i>	C2/	2	CSS
525	DU	Sticky dudleya	<i>Dudleya viscida</i>	C1/	1	CSS, CHP
526	EP	Palmer's ericameria	<i>Ericameria palmeri ssp. palmeri</i>	C2/	2	Riparian (edges), CSS
527	EA	San Diego button-celery	<i>Eryngium aristulatum var. parishii</i>	FE/CE	1	VP, G
528	ER	Coast wallflower	<i>Erysimum ammophilum</i>	C2/	2	Coastal bluff
529	FV	San Diego barrel cactus	<i>Ferocactus viridescens</i>	C2/	2	CSS
530	FM	Mexican flannelbush	<i>Fremontodendron mexicanum</i>	C2/CR	1	CHP, Cypress Wldd., drainages
531	GD	Mission Canyon bluecup	<i>Githopsis diffusa ssp. filicaulis</i>	C2/	2	CSS
532	HC	Olay tarplant	<i>Hemizonia conjugens</i>	C2/CE	1	G, CSS
533	HF	Tecate tarplant	<i>Hemizonia floribunda</i>	C2/	2	CHP
535	LC	Heart-leaved pitcher sage	<i>Lepechinia cardiophylla</i>	C2/	2	CHP
536	LG	Gander's pitcher sage	<i>Lepechinia ganderi</i>	C2/	2	CHP
553	LN	Nuttall's lotus	<i>Lotus nuttallianus</i>	C2/	2	Foredunes, CSS
539	ML	Willow monardella	<i>Monardella linoidea ssp. viminea</i>	C2/CE	1	RS, washes/floodchannel
540	MC	San Diego goldenstar	<i>Mullea clevelandii</i>	C2/	2	G, CHP (openings)

Table 2-3 (Continued)

## MSCP TARGET SPECIES LIST

SS Code	Species Symbol	Common Name	Scientific Name	Status*	Group**	Habitat***
541	MM	Little mouse-tail	<i>Myosurus minimus ssp. apus</i>	C2/	2	VP
542	NF	Prostrate navaretia	<i>Navarretia fossalis</i>	PT	1	VP
543	NI	Dehesa bear-grass	<i>Nolina interrata</i>	C1/CE	1	CHP, CSS
544	OP	Snake cholla	<i>Opuntia parryi var. serpentina</i>	C2/	2	CSS, maritime scrub
545	OC	California orcutt grass	<i>Orcuttia californica</i>	FE/CE	1	VP
546	PT	Torrey pine	<i>Pinus torreyana ssp. torreyana</i>	C2/	2	S. maritime CHP
547	PA	San Diego mesa mint	<i>Pogogyne abramsii</i>	FE/CE	1	VP
548	PN	Otay Mesa mint	<i>Pogogyne nudiuscula</i>	FE/CE	1	VP
549	RM	Small-leaved rose	<i>Rosa minutifolia</i>	-/CE	1	CSS
550	SG	Gander's butterweed	<i>Senecio ganderi</i>	C2/CR	1	CHP
551	ST	Narrow-leaved nightshade	<i>Solanum tenuilobatum</i>	C2/	2	CHP
552	TD	Parry's tetradococcus	<i>Tetradococcus ditotius</i>	C2/	2	CHP
<b>Invertebrates</b>						
106	HS	Harbison's dun skipper	<i>Euphyes vestris harbisoni</i>	PE/	1	RW, RS, OW
102	MS	Salt marsh skipper	<i>Panoquina errans</i>	C2/	2	SM
101	HB	Hermes copper butterfly	<i>Lycæna hermes</i>	C2/	2	CSS, CHP
105	TH	Thorne's hairstreak butterfly	<i>Mitoura thornei</i>	PE/	1	Cypress Wldd.
103	WC	Quino checkerspot butterfly	<i>Euphydryas editha quino</i>	C1/	1	CSS, VP, NG
104	RS	Riverside fairy shrimp	<i>Streptocephalus woottoni</i>	FE/	1	VP
<b>Amphibians and Reptiles</b>						
201	AA	Arroyo southwestern toad	<i>Bufo microscaphus californicus</i>	FE/SSC	1	CSS, CHP, near water (breeding)
202	RF	California red-legged frog	<i>Rana aurora draytonii</i>	PE/SSC	1	Aquatic/Riparian
203	WT	Southwestern pond turtle	<i>Clemmys marmorata pallida</i>	C2/SSC	2	Aquatic/Riparian
204	HL	San Diego horned lizard	<i>Phrynosoma coronatum blainvillei</i>	C2/	2	CSS, CHP
205	OW	Orange-throated whiptail	<i>Chemidophorus hyperythrus beldingi</i>	C2/	1	CSS, CHP, G
<b>Birds</b>						
301	BP	California brown pelican	<i>Pelecanus occidentalis</i>	FE/CE	1	Open Water
302	RE	Reddish egret	<i>Egretta rufescens</i>	C2/	2	SM
303	WI	White-faced ibis	<i>Plegadis chihii</i>	C2/	2	FWM, Estuaries
351	CU	Canada goose	<i>Branta canadensis</i>	none	4	Ag fields, G, FWM, SM
304	BE	Bald eagle	<i>Haliaeetus leucocephalus</i>	FT/CE	1	Open Water
325	NH	Northern harrier	<i>Circus cyaneus</i>	-/SSC	4	G, SM, Ag
305	CH	Cooper's hawk	<i>Accipiter cooperii</i>	-/SSC	4	OW (breeding), RW

Table 2-3 (Continued)  
MSCP TARGET SPECIES LIST

SS Code	Species Symbol	Common Name	Scientific Name	Status*	Group**	Habitat***
306	SH	Swainson's hawk	<i>Buteo swainsoni</i>	--/CT	1	Ag fields, G
307	FH	Ferruginous hawk	<i>Buteo regalis</i>	C2/	2	G, Ag fields
308	GE	Golden eagle	<i>Aquila chrysaetos</i>	BEP/SSC	3	CSS, CHP, G, cliffs (breeding), Ag fields
309	PF	American peregrine falcon	<i>Falco peregrinus</i>	FE/CE	1	G, Ag fields, cliffs, beach
310	LR	Light-footed clapper rail	<i>Rallus longirostris levipes</i>	FE/CE	1	SM
311	WP	Western snowy plover	<i>Charadrius alexandrinus nivosus</i>	FT/SSC	1	Ocean/bay shoreline, river mouths
312	MP	Mountain plover	<i>Charadrius montanus</i>	C2/	2	open fields, G
313	BC	Long-billed curlew	<i>Numenius americanus</i>	C3/SSC	4	SM
314	ET	Elegant tern	<i>Sterna elegans</i>	C2/	2	SM, salt flat, open water (ocean)
315	LT	California least tern	<i>Sterna antillarum browni</i>	FE/CE	1	Coastal strand, mud flats, beach
350	BW	Burrowing owl	<i>Speotyto cunicularia hypugaea</i>	C2/SSC	4	G, Coastal strand, Ag
316	WF	Southwestern willow flycatcher	<i>Empidonax traillii</i>	PE/CE	1	RW
317	CW	Coastal cactus wren	<i>Campylorhynchus brunneicapillus couesi</i>	C3B/SSC	1	CSS, Cactus patches
318	CG	California gnatcatcher	<i>Poliopitila californica</i>	FT/SSC	1	CSS
319	WB	Western bluebird	<i>Sialia mexicana</i>	none	4	OW (edges, sparse phase), G
320	LB	Least Bell's vireo	<i>Vireo bellii pusillus</i>	FE/CE	1	RW, RF
333	RP	California rufous-crowned sparrow	<i>Aimophila ruficeps canescens</i>	C2/	2	CSS, rock outcroppings
322	BS	Belding's savannah sparrow	<i>Passerculus sandwichensis beldingi</i>	C2/CE	1	SM
321	LS	Large-billed savannah sparrow	<i>Passerculus sandwichensis rostratus</i>	C2/	2	SM, G, FWM
323	GS	Grasshopper sparrow	<i>Aimodramus savannarum</i>	none	4	G
324	TB	Tricolored blackbird	<i>Agelaius tricolor</i>	C2/	2	FWM
<b>Mammals</b>						
403	BB	Townsend's western big-eared bat	<i>Plecotus townsendii</i>	C2/SSC	2	Caves, crevices
402	CB	California mastiff-bat	<i>Eumops perotis californicus</i>	C2/SSC	2	Caves, crevices
401	PM	Pacific little pocket mouse	<i>Perognathus longimembris pacificus</i>	FE/SSC	1	Sandy washes
410	BA	American Badger	<i>Taxidea taxus</i>	--/SSC	4	G
405	LI	Mountain lion	<i>Felis concolor</i>	--/see text	3	CSS, CHP, RW, OW
404	MD	Mule deer	<i>Odocoileus hemionus</i>	--/game spp.	3	CSS, CHP, RW, OW

\*Status (Federal/State)

FE = Federally endangered.  
PE = Proposed for federal listing as endangered.  
FT = Federally threatened.  
PT = Proposed for federal listing as threatened.  
C1 = Category 1 candidate for federal listing.  
C2 = Category 2 candidate for federal listing.

\*\*\*Habitat

CSS - coastal sage scrub.  
CHP - chaparral  
S. maritime CHP - southern maritime chaparral  
G - grassland  
NG - native grassland  
Cypress wld. - Tecate cypress woodland  
RW - riparian woodland  
RS - riparian scrub  
RF - riparian forest  
SM - saltmarsh

Table 2-3 (Continued)

MSCP TARGET SPECIES LIST

C3B = Category 3b candidate for federal listing.

C3 = Category 3 candidate for federal listing.

BEPA = Bald Eagle Protection Act

CE = State endangered.

CR = State rare.

CT = State threatened.

SSC = State Species of Special Concern

**\*\*Group**

1 = All federal and state listed species, category 1 species, species proposed for listing, and NCCP target species.

2 = Federal category 2 species.

3 = Species important to preserve design.

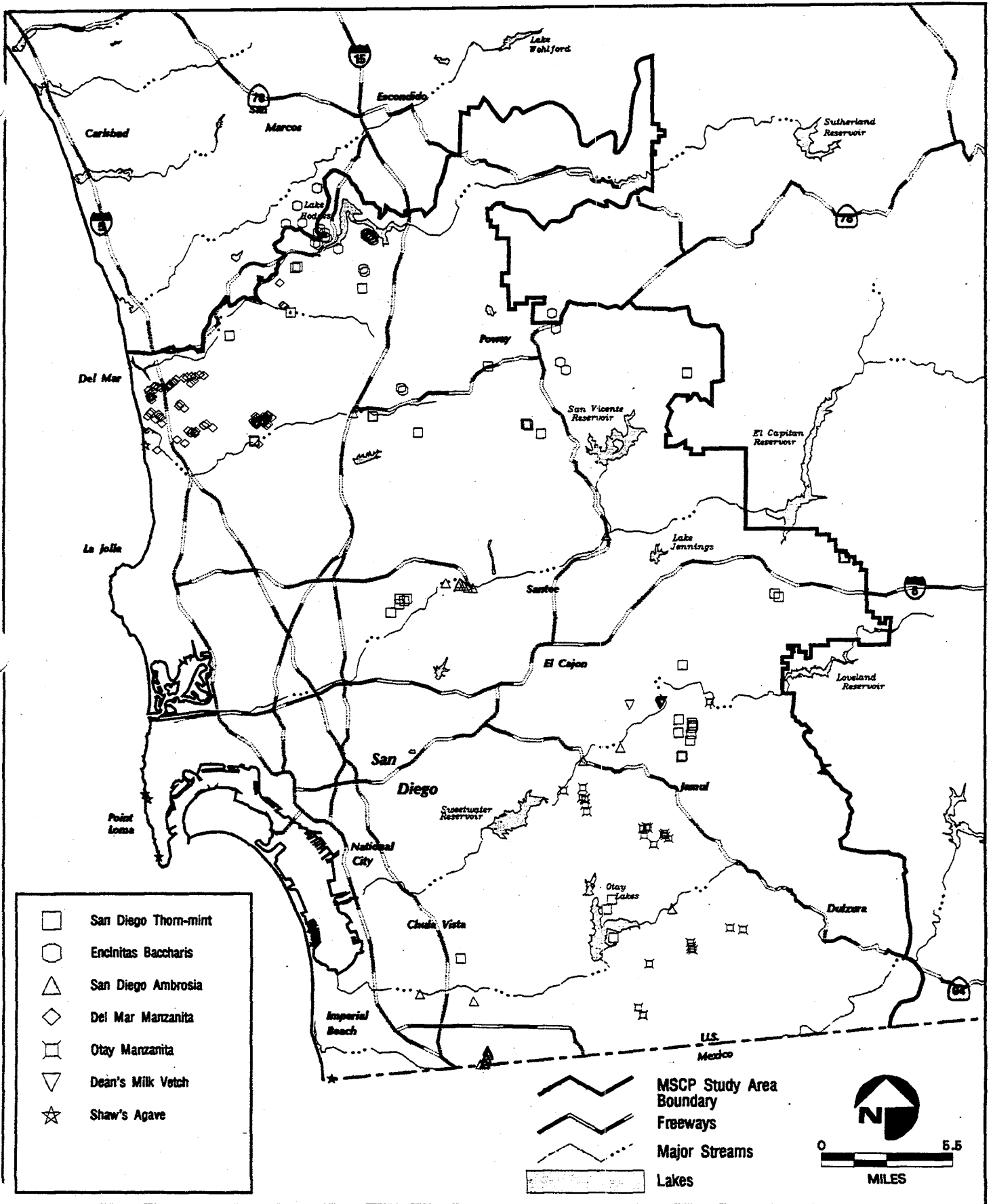
4 = Habitat indicator species.

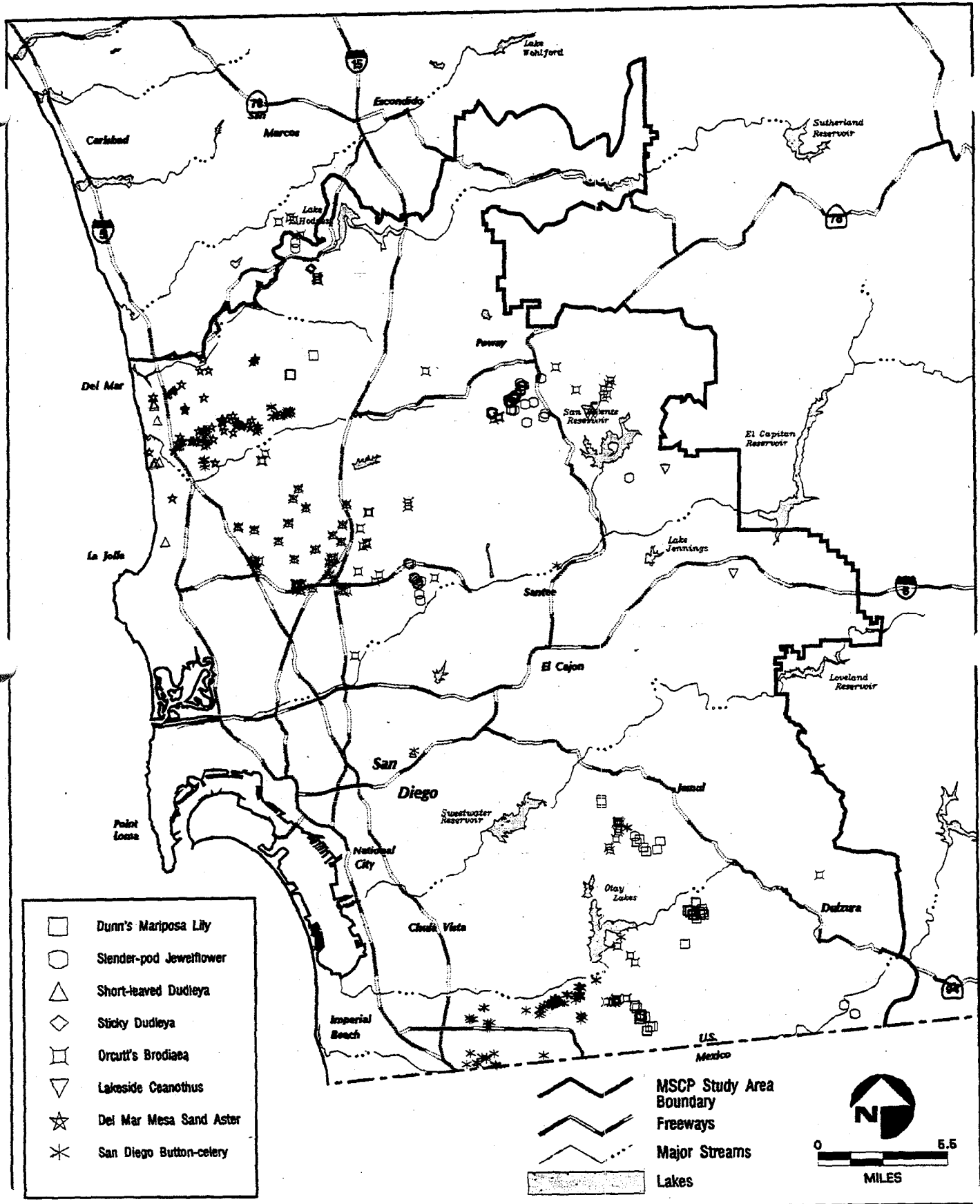
Note: On vegetation maps, plant codes are shown in italics and animal codes are shown in regular type.

FWM - freshwater marsh

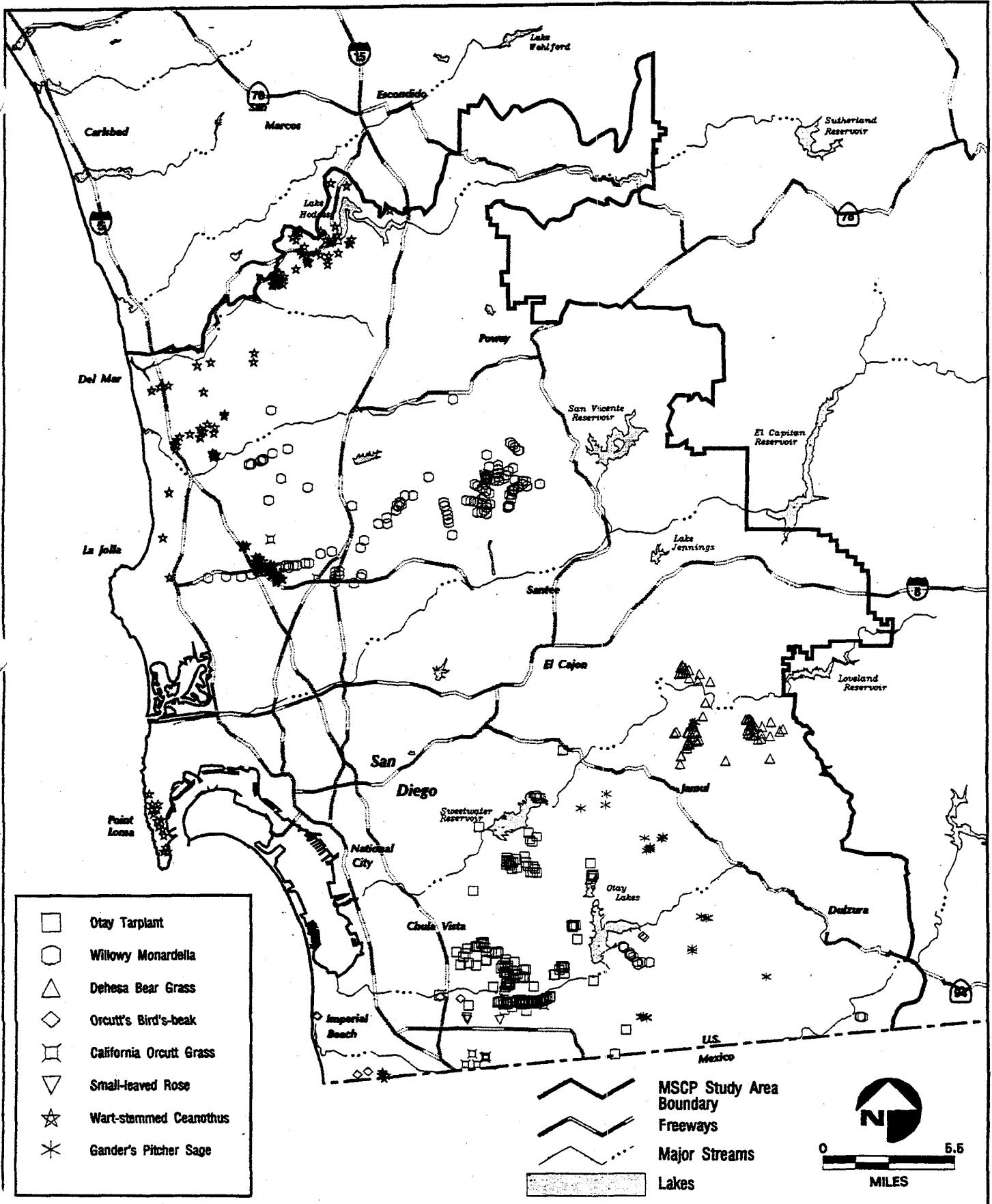
VP - vernal pool

OW - oak woodland





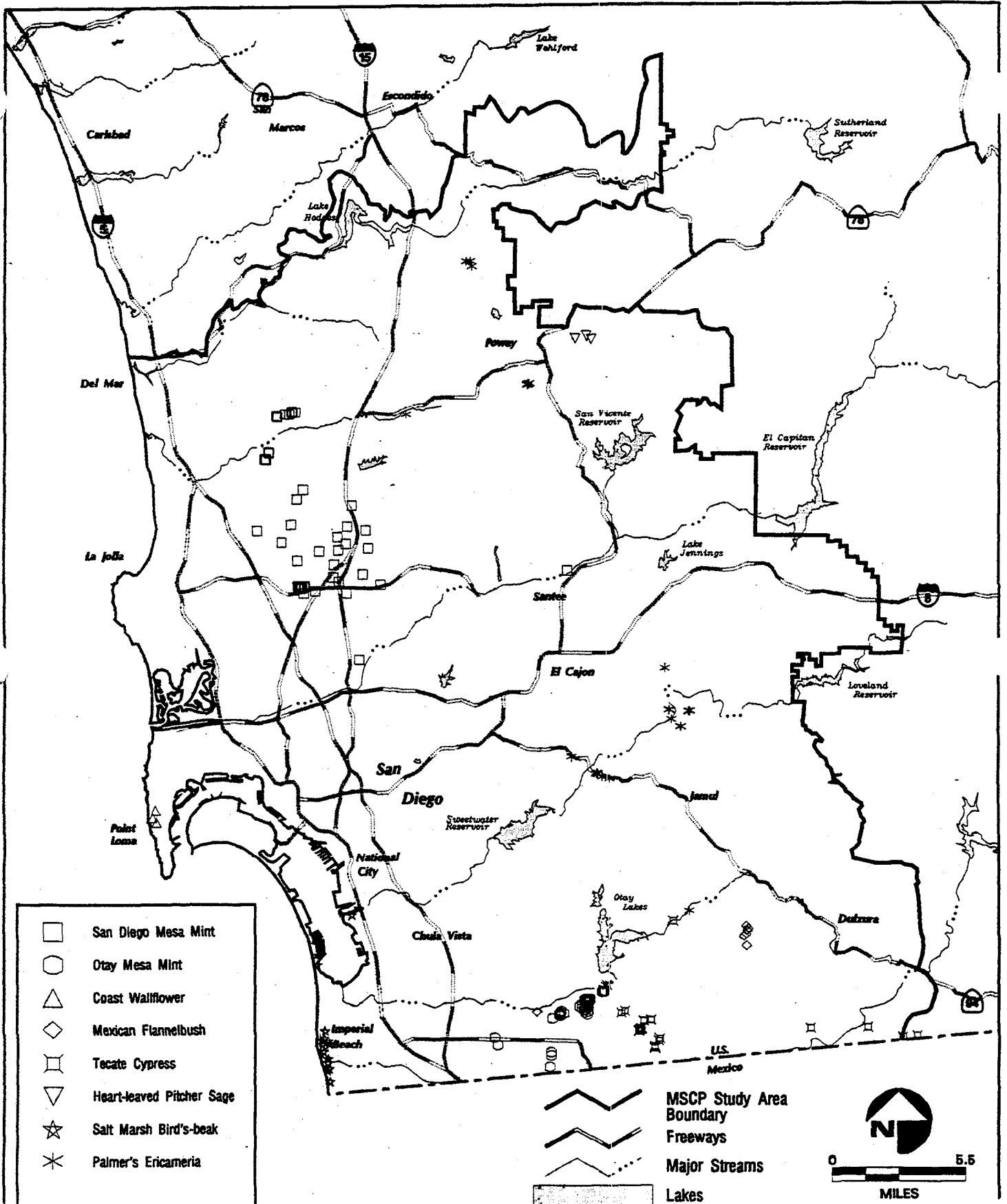
FIGURE

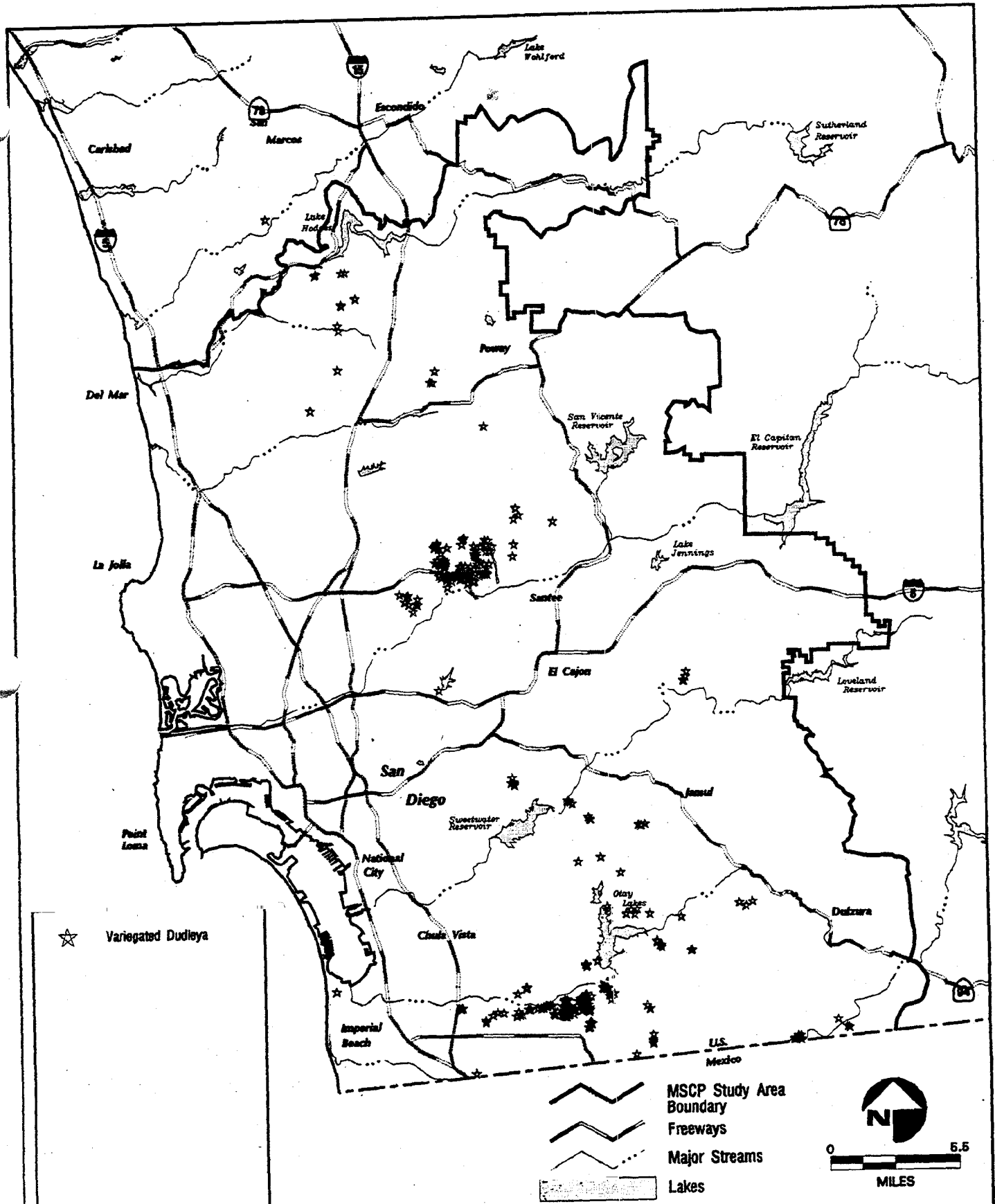


**Sensitive Plants**

07014

**FIGURE**  
**2-9**

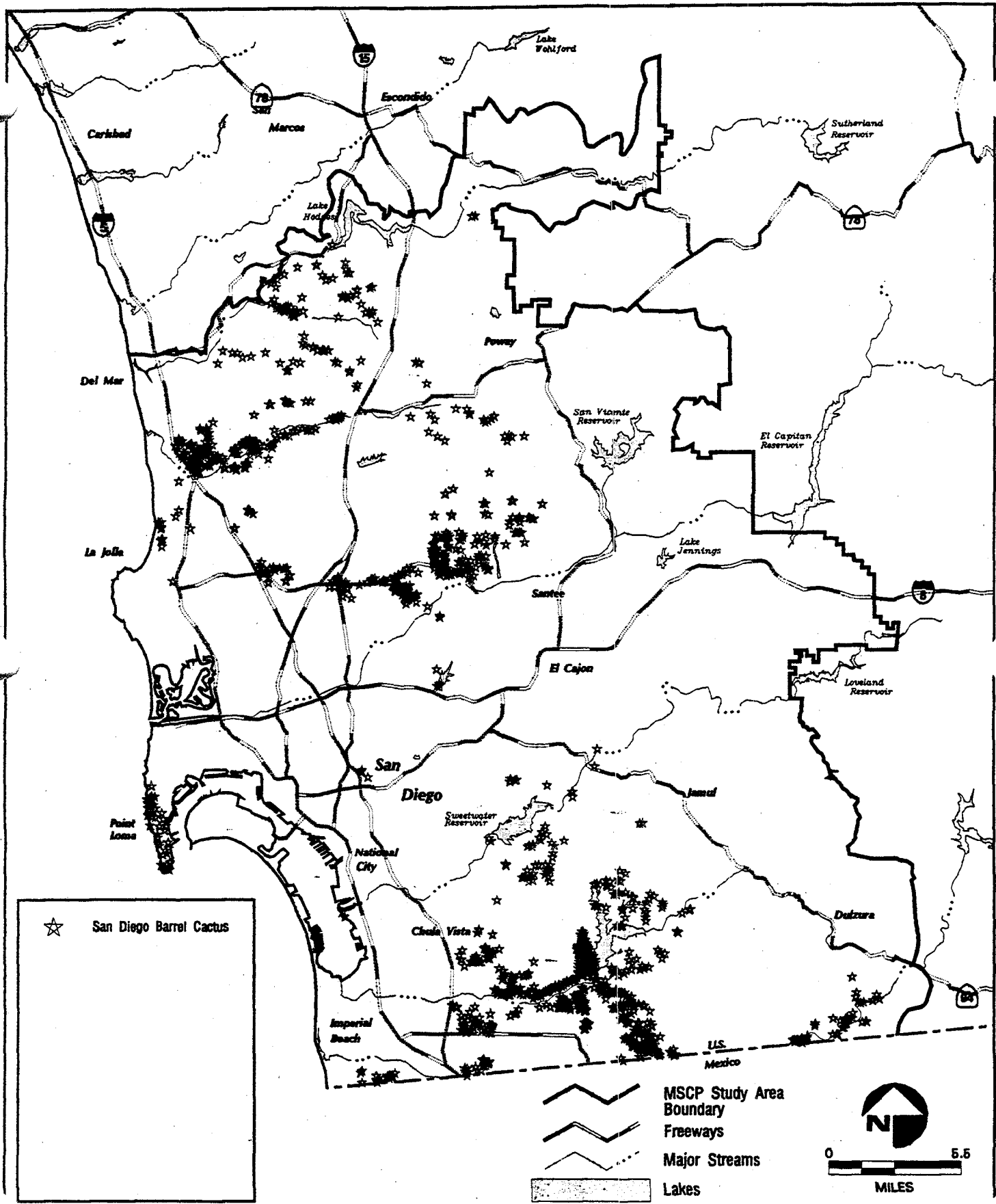




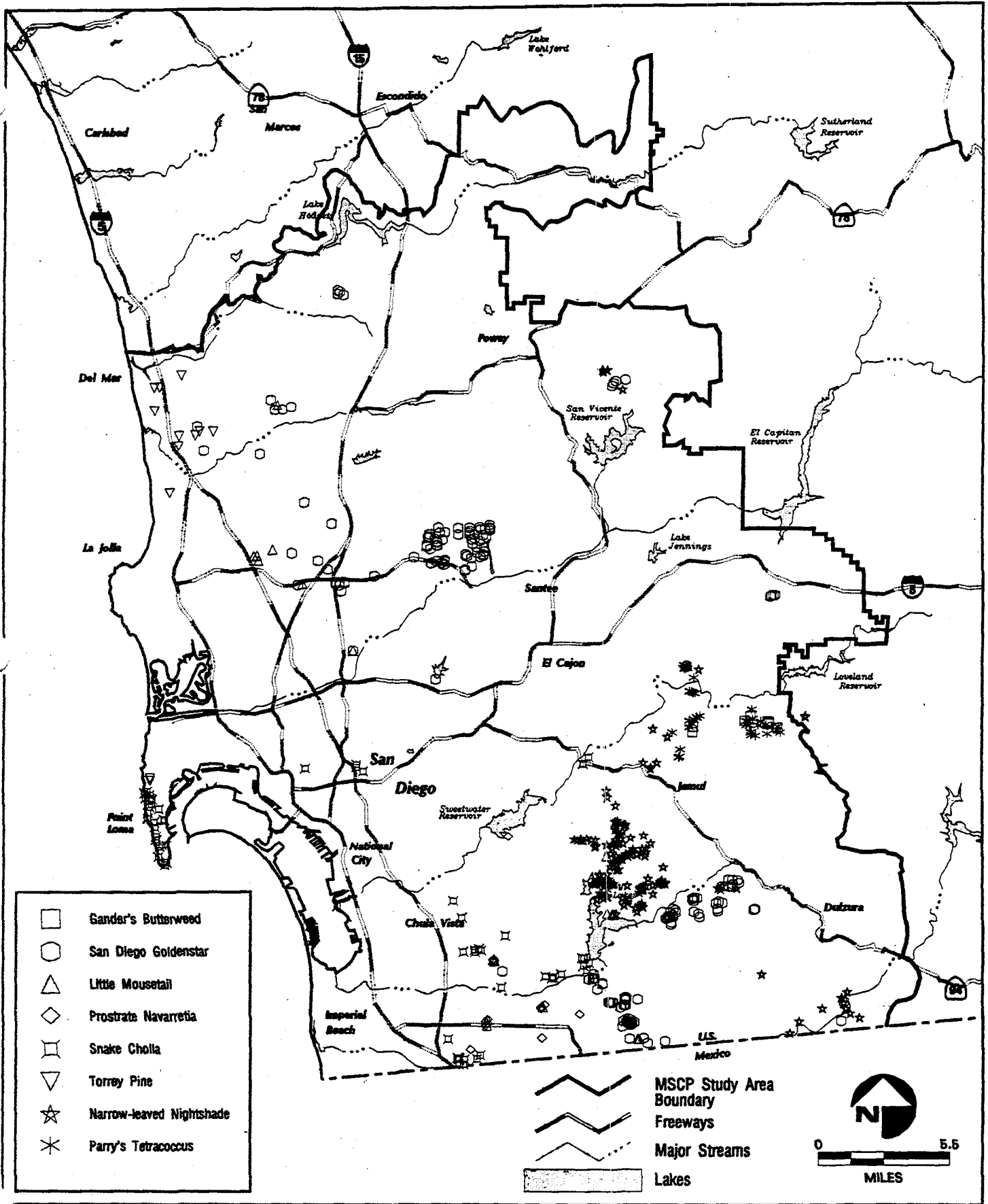
**Sensitive Plants**

07016

**FIGURE**  
**2-11**



FIGURE



FIGURE

2-13

**OGDEN**  
■■■■■

Sensitive Plants

07018

There are a few species that meet the regulatory requirements specified above for inclusion on the MSCP target list, but which were not considered target species or specifically surveyed for because (a) they are known only from a single location just outside the study area (i.e., *Hazardia orcuttii*); (b) they are known from the extremes and/or just beyond the study area, and are not expected to have much potential for occurrence in the MSCP area (i.e., *Ribes canthariforme*, *Mahonia nevinii*); or (c) they are presumed to be extinct within the study area (*Chorizanthe parryi* var. *fernandina*, *Perideridia gairdneri* ssp. *gairdneri*). These species are not included in the discussion below.

*Acanthomintha ilicifolia*

San Diego thorn-mint

USFWS: Candidate (Category 1)

CDFG: Endangered

CNPS rating: List 1B, 2-3-2

San Diego thorn-mint is restricted to San Diego County and Baja California. This spring-blooming (April-May) annual plant occurs in clay depressions on mesas and slopes below 300 m (965 ft) elevation and is associated with coastal sage scrub, chaparral, and grassland. In San Diego County, the species is known from Encinitas and San Marcos south to Sweetwater and Otay lakes (Beauchamp 1986) and from higher elevations on McGinty Mountain (Oberbauer 1979; Wier 1986). Within the MSCP study area, large populations are located in Sycamore Canyon, Poway, Black Mountain Road, the Lake Hodges area, El Capitan, and the Jamul Mountains (Figure 2-6).

During the 1992 MSCP focused survey efforts, previously unrecorded populations of San Diego thornmint were found in several of the survey areas. Large populations were found in the Jamul area (ca. 5000 individuals) and south of El Capitan (ca. 3300 individuals). Both populations occur on gabbro soils. Smaller populations were detected in the Wildcat Canyon (ca. 975 individuals) and Crest-Dehesa-El Cajon (120 individuals) survey areas. San Diego thornmint has been included in a USFWS listing package for plants associated with coastal sage scrub or clay soils; although the status review is complete, the decision is pending on whether to propose this species for listing (F. Roberts pers. comm.).

*Agave shawii*

Shaw's agave

USFWS: Candidate (Category 2)

CNPS rating: List 2, 3-3-1

Shaw's agave is a caespitose perennial that occurs on dry coastal bluffs in coastal sage scrub. Shaw's agave is known only from southwestern San Diego County and northern Baja California. In the county, this species occurs at Torrey Pines State Reserve, Point Loma (Cabrillo National Monument), Boundary Monument (Border Field State Park), and adjacent mesas (Figure 2-6). The Torrey Pines and Cabrillo National Monument locations may be planted, and the occurrence at Border Field State Park is very small (Smith and Berg 1988; Beauchamp 1986). Shaw's agave was included as a MSCP target species primarily because it is considered a good indicator of the sensitive habitat, coastal bluff scrub.

*Ambrosia pumila*

San Diego ambrosia

USFWS: Candidate (Category 2)

CNPS rating: List 1B, 3-3-2

San Diego ambrosia is an herbaceous species that occurs in valleys or disturbed areas below 150 m (470 ft) in southwestern San Diego County and northern Baja California. It is often associated with coastal sage scrub, in addition to disturbed habitats. Within the MSCP area, this summer-blooming (May-October) species is historically known from Lake Hodges, Santee, El Cajon, Padre Dam, Spring Valley, Mission Valley, National City, Sweetwater Dam (T. Cass pers. comm.; T. Oberbauer pers. comm.; H. Wier pers. comm.; Beauchamp 1986), and Otay Valley (H. Wier pers. comm.) (Figure 2-6). Major extant populations occur in Santee (Mission Trails Regional Park, Old Mission Dam-KFMB Radio Towers area) and Otay Mesa (e.g., Spring Canyon).

*Aphanisma blitoides*

Aphanisma

USFWS: Candidate (Category 2)

CNPS rating: List 1B, 2-2-2

Aphanisma is a glabrous, succulent, spring-blooming (April-May) annual that occurs along the coastal strand or on bluffs in coastal sage scrub. Historically, this species occurred from Los Angeles County southward to Baja California, and on most of the Channel Islands. It is now apparently extirpated in the northern end of its range (Smith and Berg

1988). In San Diego County, aphanisma occurs in alkaline areas along the coast below 25 m (82 ft) elevation. Reported localities in the MSCP study area include San Dieguito Creek, the Silver Strand, Imperial Beach (Beauchamp 1986), and possibly, Torrey Pines State Park and Point Loma (T. Oberbauer pers. comm.). The species historically occurred in La Jolla (Beauchamp 1986), as well. This species is currently under status review with the USFWS, although it is not yet included in a listing package (F. Roberts pers. comm.).

*Arctostaphylos glandulosa* ssp. *crassifolia*

Del Mar manzanita, Eastwood's manzanita

USFWS: Proposed Endangered

CNPS rating: List 1B, 3-3-2

This taxon is strictly coastal and largely restricted to siliceous sandstone outcrops of Eocene age on coastal bluffs from Oceanside south to La Jolla, and southward along the immediate coast of Baja California to Cabo Colnett (ca. 200 km south of the U.S.-Mexican border). Within this range, ssp. *crassifolia* is very localized (Wells 1986). It is, however, one of the more consistent and well-defined taxa within the variable *A. glandulosa* complex, and does not overlap in range with other taxa in the complex.

Del Mar manzanita presumably has a mixed breeding system (i.e., sexual and asexual reproduction). This species is a crown-sprouter, with a tetraploid ( $n=26$ ) chromosome number (Grant and Grant 1968; Wells 1968). In general, a reduced seed set has been associated with crown-sprouting, tetraploid manzanitas. The reduced seed set results in lower viable seedbank densities. This reduced seed fertility is overcome by asexual reproduction (i.e., the sprouting adaptation) (Parker and Kelly 1989).

Del Mar manzanita is one of the indicator species of the sensitive habitat, southern maritime chaparral. This taxon currently occurs in the MSCP study area in four general locations: Del Mar-San Dieguito River Valley (i.e., Del Mar eastward to the area southwest of Lake Hodges and south of Del Dios Highway), Torrey Pines, Carmel Mountain-Carmel Valley, and Los Peñasquitos Canyon (Figure 2-6). The subspecies formerly occurred north and south of Miramar Reservoir (Huffman 1981), but most of the occupied habitat has been lost to development. Del Mar manzanita has been included in a USFWS listing package for plants associated with southern maritime chaparral; although the status review is complete, the decision is pending on whether to propose this species for listing (F. Roberts pers. comm.).

*Arctostaphylos otayensis*

Otay manzanita

USFWS: Candidate (Category 2)

CNPS rating: List 1B, 3-2-3

Otay manzanita is a white-flowered shrub that occurs on dry slopes in chaparral in the mountains of southwestern San Diego County. This species is not a crown-sprouter (i.e., it does not possess a burl), has a relatively low chromosome number ( $n=13$ ), and is primarily bee and/or fly-pollinated (Grant and Grant 1968; Beauchamp 1986). Based on these factors, it is presumed to be an outcrossing species, as opposed to Del Mar manzanita, which appears to possess a mixed breeding system. This species, which occurs between 550 and 1525 m (1770 to 4907 ft) elevation, is known only from San Miguel, Jamul, Otay, and Guatay mountains (Munz 1974; Beauchamp 1986 (Figure 2-6)). The first three populations lie within the MSCP study area, while the fourth population (Guatay Mountain) occurs on U.S. Forest Service land to the east.

*Astragalus deanei*

Dean's milk-vetch

USFWS: Candidate (Category 2)

CNPS rating: List 1B, 3-3-3

Dean's milk-vetch (Figure 2-6) is a sprawling, herbaceous perennial with mustard-yellow to cream-colored flowers. It is generally found on dry hillsides between 250 and 350 m (805 and 1126 ft) elevation, and often proliferates in recently burned areas (Beauchamp 1979). This San Diego County endemic occurs locally in open coastal sage scrub, chaparral, or coast live oak woodland, and is known primarily from the Sweetwater River Basin near Dehesa. Reported localities within the MSCP study area include Amber Ridge, Singing Hills (e.g., adjacent to Willow Glen Road) (Wier 1986), and Sloan Canyon (Figure 2-6). Localities outside the study area include Whispering Oaks, Rice Canyon, Barrett Lake, and Tecate Road (Beauchamp 1986).

*Astragalus tener* var. *titi*

Coastal dunes milk-vetch

USFWS: Candidate (Category 1)

CDFG: Endangered

CNPS rating: List 1B, 3-3-3

Coastal dunes milk-vetch is a purple-flowered, spring-blooming (March-May) annual that historically occurred in sandy places (e.g., southern foredunes) along the coast in

Monterey, Los Angeles, and San Diego counties. The species is presumed extinct in Los Angeles County and considered possibly extinct in San Diego County, as well. In San Diego County, this species is reported as scarce in alkaline areas below 20 m (65 ft) elevation. Reported localities within the study area include Soledad and the Silver Strand (Beauchamp 1986). The former locality is almost certainly an historical occurrence. This species is currently under status review with the USFWS, although it is not yet included in a listing package (F. Roberts pers. comm.).

*Baccharis vanessae*

Encinitas baccharis

USFWS: Proposed Endangered

CDFG: Endangered

CNPS rating: List 1B, 2-3-3

Encinitas baccharis is a dioecious, broom-like shrub found in dense chaparral. This San Diego County endemic is limited to a few highly restricted populations and is endangered throughout its range. Within the MSCP study area, this species is known from the Lake Hodges-Del Dios area, Poway, Mt. Woodson, and Iron Mountain (Beauchamp 1986; J. Hirschberg pers. comm.) (Figure 2-6). Additional localities outside the MSCP area include Encinitas and Mt. Israel-Del Dios (Beauchamp 1986). This latter locality is a northward extension of the Lake Hodges-Del Dios population. This species is currently under status review with the USFWS, although it is not yet included in a listing package (F. Roberts pers. comm.).

*Brodiaea filifolia*

Thread-leaved brodiaea

USFWS: Proposed Threatened

CDFG: Endangered

CNPS rating: List 1B, 3-3-3

Thread-leaved brodiaea is a spring-blooming (May) herbaceous perennial from a corm. The primary mode of reproduction in this species appears to be clonal or asexual, i.e., via production of corm offsets (ERCE 1990b). Thread-leaved brodiaea generally occurs in heavy clay soils in natural grasslands or vernal pools. Its range includes the interior valley regions of Riverside and San Diego counties. The species is generally known from the northwest portion of San Diego County (Beauchamp 1986). Although it has not been documented from the MSCP area, it does occur on adjacent lands to the north.

*Brodiaea orcuttii*

Orcutt's brodiaea

USFWS: Candidate (Category 2)

CNPS rating: List 1B, 1-3-2

This herbaceous, spring-blooming (April-July) perennial from a corm is found only in San Diego County and northern Baja California, where it occurs in association with vernal pools, streams, and seeps. It is presumed that Orcutt's brodiaea is similar to the closely related species, thread-leaved brodiaea, with respect to its primary mode of reproduction (i.e., corm offsets). In San Diego County, Orcutt's brodiaea is infrequent, occurring in coastal and foothill regions below 1500 m (4827 ft) elevation. Reported localities in the study area include Fernbrook, Carmel Mountain, Los Peñasquitos Canyon, Poway, Tierrasanta, Mira Mesa, Kearny Villa, Miramar Naval Air Station, Montgomery Field, La Mesa, Proctor Valley Creek, O'Neal Canyon, and lower Otay Reservoir (F. Sproul pers. comm.; H. Wier pers. comm.; T. Cass pers. comm.; T. Oberbauer, pers. comm.; J. Messina pers. comm.; Beauchamp 1986), among others (Figure 2-7).

*Calochortus dunnii*

Dunn's mariposa lily

USFWS: Candidate (Category 2)

CDFG: Rare

CNPS rating: List 1B, 2-2-2

Dunn's mariposa lily is a white-flowered, summer-blooming (June-July) perennial herb that is known only from San Diego County and Baja California. Within the study area, the species has been reported from San Miguel, Otay, and Jamul mountains (Figure 2-7). It also occurs outside the study area, to the east (e.g., Guatay Mountain). Dunn's mariposa lily occurs on gabbro-derived soils at all except perhaps the Baja California sites and San Miguel and Otay mountains, suggesting that the species may prefer clayey soils, which are uncommon. It occurs on metavolcanic soils on San Miguel and Otay mountains. Metavolcanic soils have similar properties to gabbro-derived soils in terms of how they affect the distribution of sensitive plant species. A large, vigorous population of Dunn's mariposa lily occurs on the fuel break along the Otay Mountain Truck Trail. This species is also presumed to reproduce primarily (but not exclusively) by asexual means, i.e., production of bulb offsets.

*Caulanthus stenocarpus*

Slender-pod jewelflower

USFWS: Candidate (Category 3B)

CDFG: Rare

CNPS rating: Considered, but rejected

This purple-flowered, spring-blooming (March-May) annual occurs in San Diego County and northern Baja California, where it is infrequent. Slender-pod jewelflower occurs in chaparral between 300 and 900 m (984 and 2953 ft) elevation, has a particular affinity for burned slopes, and is often associated with gabbro-derived soils. Reported localities in the study area include the vicinity of Wildcat Canyon, Lake Hodges, Poway, Fortuna Mountain, Dehesa-Harbison Canyon (Beauchamp 1986), Jamul Mountains, and Marron Valley (Figure 2-7). In the Jepson Manual (Hickman 1993) and most recent CNPS Inventory (Skinner and Pavlik 1994), this species has been submerged into the more common and wide-ranging species, *C. heterophyllus* var. *heterophyllus*. *Caulanthus heterophyllus* is not considered a sensitive taxon.

*Ceanothus cyaneus*

Lakeside ceanothus

USFWS: Candidate (Category 2)

CNPS rating: List 1B, 3-2-2

This blue-flowered, arborescent shrub occurs in chaparral in Riverside and San Diego counties and in Baja California (Smith and Berg 1988). In San Diego County, it is localized in chaparral between 150 and 1000 m (492 and 3280 ft) elevation. Reported localities in the MSCP area include Barona Valley-Wildcat Canyon (P. Gordon-Reedy pers. obs.; Ogden, unpub. data), Ramona (e.g., Mussey Grade) (F. Sproul, pers. comm.), El Cajon Mountain, and Crest-Harbison Canyon (Beauchamp 1986) (Figure 2-7).

*Ceanothus verrucosus*

Wart-stemmed ceanothus

USFWS: Candidate (Category 2)

CNPS rating: List 2, 1-2-1

Wart-stemmed ceanothus is an evergreen shrub that generally occurs on dry hills and mesas (Munz 1974) below 300 m (984 ft) elevation. This species limited to western San Diego County and Baja California, where it is a dominant component of southern maritime chaparral and also occurs in southern mixed chaparral. In San Diego County, wart-

stemmed ceanothus is found on the immediate coast, from Agua Hedionda south to the U.S.-Mexican border, and inland to Lake Hodges (Higgins 1949). Within the MSCP area, major populations of this species occur at Torrey Pines State Reserve, Carmel Mountain-Carmel Valley, Lake Hodges, and Point Loma (Figure 2-8). Smaller populations are known from Kearny Mesa-Clairemont Mesa-Miramar, Soledad, and Spooner's Mesa. The primary threat to this species is development (Smith and Berg 1988).

*Chorizanthe orcuttiana*

Orcutt's spineflower

USFWS: Proposed Endangered

CDFG: Endangered

CNPS rating: List 1B, 3-3-3

Orcutt's spineflower is endemic to San Diego County. It is found only on marine sandstones on mesas in the coastal region, where it is typically associated with southern maritime chaparral. Within the MSCP area, this prostrate, spring-blooming (March-April) annual is known historically from Del Mar, Point Loma, and Kearny Mesa; no extant locations are known within the MSCP study area. However, the species is considered extant in one location just north of the study area: Oak Crest County Park in Encinitas, and suitable habitat occurs within the MSCP area. Much of the former range of Orcutt's spineflower has been converted to housing tracts, which remain the primary threat to its existence. Orcutt's spineflower has been included in a USFWS listing package for plants associated with southern maritime chaparral; although the status review is complete, the decision is pending on whether to propose this species for listing (F. Roberts pers. comm.).

*Cordylanthus maritimus* ssp. *maritimus*

Salt marsh bird's beak

USFWS: Endangered

CDFG: Endangered

CNPS rating: List 1B, 2-2-2

Salt marsh bird's beak is a spring to summer-blooming (March-October) species that occurs in salt marshes from Santa Barbara County south to Baja California. This annual plant is a hemiparasite (e.g., it derives water and other nutrients via the roots of host plants) that displays two distinctive growth forms. In the northern part of its range, the species is relatively large and profusely branched, whereas in the southern part of its range (i.e., Tijuana Estuary) it tends to be compact and only minimally branched (Lowe et al. 1990).

Flower color is also variable between geographic regions, as well as within marshes supporting more than one colony. Flower color in the San Diego area tends to be pale cream with faint purple lines (Lowe et al. 1990). In San Diego County, this species is now found in salt marshes at the Tijuana Estuary, Sweetwater Marsh, and mouth of the Otay River (Figure 2-9).

Salt marsh bird's beak occurs in the middle littoral zone of salt marshes, generally in well-drained, well-aerated sites. Populations fluctuate widely on a yearly basis, and these fluctuations may be attributable to seed production and/or seed dispersal capabilities. The geographical disjunction of extant populations, in conjunction with relatively low population sizes at several locations, threatens the genetic diversity and ultimately, long-term viability of this species.

At the Tijuana Estuary, stands of bird's beak are known from the area south and west of the Visitor Center; the mouth of the river; 5th and Iris; and along the Seacoast Drive (B. Fink pers. comm.). A 1987 census subsequent to storms and flooding estimated the population size at this estuary at about 1788 individuals (Lowe et al. 1990). At the Sweetwater Marsh, approximately 5000 individuals occur in the area south of Marisma de Nacion, and an additional 50 plants occur on the south connector islands. Apparently, plants may occur on the northern connector islands, as well (B. Fink pers. comm.). An historic population was recorded from the mouth of Otay River. Approximately 700 individuals are currently known from Navy property near the YMCA camp in Imperial Beach, and these plants may be remnants of that historic population. The long-term viability of this population is questionable, however, since the area receives little tidal flushing (B. Fink pers. comm.). Critical habitat for salt marsh bird's beak includes Los Peñasquitos Lagoon and Tijuana Estuary.

*Cordylanthus orcuttianus*

Orcutt's bird's-beak

USFWS: Candidate (Category 2)

CNPS rating: List 2, 3-3-1

Orcutt's bird's-beak is an annual hemiparasitic species that occurs on coastal slopes between 10 and 30 m (30 and 100 ft). The species is found primarily in maritime succulent scrub in the southwestern portion of the MSCP area, although it has been reported from riparian scrub/disturbed floodplain habitat in the Otay River Valley (H. Wier pers. comm.) (Figure 2-8). This spring to fall-blooming species (March-September) occurs only in San

Diego County and Baja California, and is seriously threatened by urbanization (Beauchamp 1986; Smith and Berg 1988). Known localities include the Otay River Valley, between Interstate 5 and Interstate 805, Denney Canyon, and Spooner's Mesa (H. Wier pers. comm.). The species is questionably extant in Chula Vista.

*Corethrogyne filaginifolia* var. *linifolia*

Del Mar Mesa sand aster

USFWS: Proposed Threatened

CNPS rating: List 1B, 3-2-3

Del Mar mesa sand aster is a perennial herb that occurs along bluffs or brushy slopes near the coast from Carlsbad to Los Peñasquitos Canyon. It is generally associated with coastal sage scrub or chaparral on sandstone substrate. Known localities include Carmel Mountain-Del Mar Mesa, Torrey Pines State Park, and the San Dieguito River Valley, among others (Figure 2-7). This subspecies can be positively identified only when in bloom (July-September) because the characters identifying it are features of the involucre. Primary threats are from development (Smith and Berg 1988). Del Mar Mesa sand aster has been included in a USFWS listing package for plants associated with southern maritime chaparral; although the status review is complete, the decision is pending on whether to propose this species for listing (F. Roberts pers. comm.).

*Cupressus forbesii*

Tecate cypress

USFWS: Candidate (Category 2)

CNPS rating: List 1B, 3-2-2

Tecate cypress occurs in one location in Orange County, three locations in San Diego County, and in isolated groves 150 miles south into Baja California (Armstrong 1978). This species is declining in all areas outside San Diego County. The largest of the San Diego County populations lies within the MSCP area, on Otay Mountain (Figure 2-9). In fact, the Otay Mountain population, which occurs largely on federal land, has been estimated to support approximately 84 percent of the U.S. distribution of Tecate cypress. The restricted and scattered distribution of Tecate cypress throughout its range suggests that it may be relictual. It has, nonetheless, adapted well to certain factors (particularly fire) of the Mediterranean climate characteristic of southern California. Tecate cypress is an obligate seeder (i.e., it does not resprout after fire). It is also a candidate for state-listing as threatened.

*Dudleya brevifolia* [formerly *D. blochmaniae* ssp. *brevifolia*]

Short-leaved dudleya

USFWS: Proposed Endangered

CDFG: Endangered

CNPS rating: List 1B, 3-3-3

Short-leaved dudleya is a perennial, rosette-forming, diminutive leaf-succulent that occurs only in a small area of coastal San Diego County. The range of this species is situated between La Jolla and Del Mar, in an area approximately 2.5 miles wide by 7 miles long. Short-leaved dudleya is generally found on dry, sandstone bluffs in chaparral. Populations are confined to the red sandstone-capped areas of the Linda Vista Terrace, a distinctive, uncommon habitat marked by thin soils, reddish ironstone concretions, and sparse vegetation. This tiny plant resembles the small, hard concretions of its habitat. Historical occurrences include Torrey Pines, the rim of La Jolla Canyon, the mesa on the south side of McGonigle Canyon, the mesa east of Del Mar, Crest Canyon, and Carmel Mountain. Extant localities are presumed to be Torrey Pines State Reserve (where the species is protected), Torrey Pines Extension, Crest Canyon, possibly Del Mar Heights Road, and Carmel Mountain (Figure 2-7). Short-leaved dudleya has been included in a USFWS listing package for plants associated with southern maritime chaparral; although the status review is complete, the decision is pending on whether to propose this species for listing (F. Roberts pers. comm.).

*Dudleya variegata*

Variegated dudleya or San Diego hasseanthus

USFWS: Candidate (Category 2)

CNPS rating: List 1B, 2-2-2

Variegated dudleya is a yellow-flowered, late-spring (May-June) blooming species that is restricted in distribution to southern San Diego County and northwestern Baja California. In San Diego County, this species is localized on dry slopes and mesas below 300 m (984 ft) elevation, and typically occurs in clay soils in association with coastal sage scrub. The northern limits of the species appear to be in the vicinity of Miramar Naval Air Station (PSBS 1982) and southeast of Lake Hodges (Wier Biological 1983). Other reported localities in the MSCP study area include Poway, Santee (e.g., Sycamore Canyon-Fortuna Mountain), Dehesa, Naval Radio Receiving Facility towers in Imperial Beach, San Miguel Mountain and Proctor Valley (B. Jones pers. comm.), Otay Mesa (including East Otay Mesa), and Marron Valley (Figure 2-10). The species generally occurs away from the coast and usually grows in areas vulnerable to development rather than at sites at which it

might be more easily protected (i.e., peaks). Among the few "protected" sites for this species are the Naval Radio Receiving Facility towers in Imperial Beach and, possibly, Miramar Naval Air Station.

*Dudleya viscida*

Sticky dudleya

USFWS: Candidate (Category 1)

CNPS rating: List 1B, 3-2-3

Sticky dudleya is an uncommonly-occurring succulent plant that is known from Orange and San Diego counties (Smith and Berg 1988). The species occurs primarily on dry, rocky, slopes, cliffs, or banks below 366 m (1200 ft) elevation, and is largely limited to chaparral or coastal sage scrub from near Oceanside (vicinity of the San Luis Rey River) north to San Juan Capistrano (type locality) (Figure 2-7). Despite its restricted distribution, sticky dudleya appears to be locally abundant, reproducing, and stable (Moran 1979). Within the Narrows section of the San Luis Rey River, for example, population size has been estimated at approximately 10,000 individuals (WESTEC 1983).

Sticky dudleya occurs in one location in the MSCP area: in a canyon near Lake Hodges (Ogden unpub. data). It is also known from just north of the study area, in San Marcos Creek. The most obvious threat to sticky dudleya is road widening, since plants are most often found on cliffs and banks. This species is currently under status review with the USFWS, although it is not yet included in a listing package (F. Roberts pers. comm.).

*Ericameria palmeri* ssp. *palmeri* [formerly *Haplopappus palmeri* ssp. *palmeri*]

Palmer's ericameria

USFWS: Candidate (Category 2)

CNPS rating: List 2, 2-2-1

This medium-sized, light-green, finely-textured shrub is found below 200 m (656 ft) elevation in coastal sage scrub and floodplain habitat primarily in southern San Diego County and Baja California. Reported extant localities in the MSCP area include the Wild Animal Park, Poway (Thompson Creek), Sweetwater River (McGinty Mountain, Amber Ridge, Willow Glen, Singing Hills), Steele Canyon Creek, and Dulzura Creek (H. Wier pers. comm.; Ogden unpub. data) (Figure 2-9). The species is also known historically from Mission Valley, Balboa Park, and Telegraph Canyon (Beauchamp 1986).

*Eryngium aristulatum* var. *parishii*

San Diego button-celery

USFWS: Endangered

CDFG: Endangered

CNPS rating: List 1B, 2-3-2

San Diego button-celery is a prostrate, spring to early summer (March-July) blooming, biennial or perennial species that occurs in clay soils in or near vernal pools, or occasionally, in grassland habitat. This outcrossing species reportedly has limited dispersal abilities (Zedler 1987). Its range includes Riverside and San Diego counties, and northern Baja California. Within the MSCP area, major populations occur on Del Mar Mesa, Tierrasanta, Miramar Naval Air Station, Proctor Valley, Otay Lakes, and Otay River Valley (Figure 2-7). The primary threats to this species are agriculture, urbanization, road maintenance activities, and off-road vehicles (Smith and Berg 1988).

*Erysimum ammophilum*

Coast wallflower

USFWS: Candidate (Category 2)

CNPS rating: List 1B, 2-2-3

This yellow-flowered, spring-blooming (February-May), biennial or short-lived perennial occurs on sandstone substrates along the coastal strand of San Diego County and Santa Rosa Island. In San Diego County, this species occurs below 50 m (164 ft) elevation and is found primarily on Point Loma (Figure 2-9). The species is currently undergoing a taxonomic review and revision, and, according to the new CNPS Inventory (Skinner and Pavlik 1994), the San Diego County population(s) previously included in this species are *E. capitatum* ssp. *capitatum*. Although *E. ammophilum* would be retained as a valid taxon, it would not include the San Diego County plants. This taxonomic revision is considered potentially valid by the regulatory agencies, but is still undergoing review (F. Roberts pers. comm.). *Erysimum capitatum* is not a sensitive species.

*Ferocactus viridescens*

San Diego barrel cactus

USFWS: Candidate (Category 2)

CNPS rating: List 2, 1-3-1

San Diego barrel cactus is limited to San Diego County and Baja California. In San Diego County, this species is occasional on dry slopes below 1500 m (4922 ft) and is found in coastal sage scrub (including maritime succulent scrub and coastal bluff scrub) along the

coastal slope from Oceanside south to Boundary Monument. This species was formerly widespread throughout the coastal areas of San Diego County. At present, it persists in numerous, fragmented populations. Within the MSCP area, large populations of this species are known from Carmel Mountain, the Sycamore Canyon-Fanita Ranch-East Elliott area, Mission Trails Regional Park, Point Loma, Sweetwater Reservoir, Otay River Valley, Otay Mesa, and Marron Valley (Figure 2-11). San Diego barrel cactus is seriously threatened by urbanization, off-road vehicles, and commercial exploitation (Smith and Berg 1988).

*Fremontodendron mexicanum*

Mexican flannelbush

USFWS: Candidate (Category 2)

CDFG: Rare

CNPS rating: List 1B, 3-2-2

This yellow-flowered shrub has been reported from Kern, Monterey, Imperial and San Diego counties, and Baja California, although the first two localities are highly questionable (Smith and Berg 1988). This species is locally-occurring in the southeast part of the MSCP area, in shaded canyons between 300 and 900 m (984 and 2952 ft) elevation (Figure 2-9). Typical habitat is chaparral or southern interior cypress forest. Mexican flannelbush occurs on Otay Mountain and possibly, in the Jamul Mountains (Ogden unpub. data; Beauchamp 1986). This latter locality has not been recently verified. This species is currently under status review with the USFWS, although it is not yet included in a listing package (F. Roberts pers. comm.).

*Githopsis diffusa* ssp. *filicaulis* [formerly *G. filicaulis*]

Mission Canyon blue cup

USFWS: Candidate (Category 2)

CNPS rating: List 1B, 3-3-2

This small, spring-blooming (April-June) annual is known from Riverside and San Diego counties and Baja California (Smith and Berg 1988). The species appears to be uncommon in the MSCP area. Localities where it has been collected include a burn in Harbison Canyon; along the south fork of Featherstone Creek in the Barona Valley; at the north end of El Cajon Mountain in a grassy seepage area on a steep, open slope; and in chaparral on Silverwood Wildlife Sanctuary (Morin 1983).

*Hemizonia conjugens*

Otay tarplant

USFWS: Candidate (Category 2)

CDFG: Endangered

CNPS rating: List 1B, 3-3-2

This late spring-blooming (May-June) annual herb occurs only in southern San Diego County and northwestern Baja California. Within the county, Otay tarplant is found in scattered localities on clay soils and in swales from the vicinity of Sweetwater Reservoir south to the border. It is apparently equally uncommon in Mexico. Major populations in the MSCP area include Dennery Canyon, Otay River Valley, Wolf Canyon, Poggi Canyon, Salt Creek, Proctor Valley, and San Miguel Mountain (Figure 2-8). A smaller population is known from the vicinity of Sweetwater Reservoir. The primary threats to this species are habitat loss due to residential development and habitat degradation due to illegal dumping (Smith and Berg 1988). Otay tarplant has been included in a USFWS listing package for plants associated with coastal sage scrub or clay soils; although the status review is complete, the decision is pending on whether to propose this species for listing (F. Roberts pers. comm.).

*Hemizonia floribunda*

Tecate tarplant

USFWS: Candidate (Category 2)

CNPS rating: List 1B, 2-2-2

Tecate tarplant occurs in Baja California and southeastern San Diego County. South of the border, this annual tarplant occurs on the western foothills of the Sierras Juarez and San Pedro Martir (Wiggins 1980), while in San Diego County it is found east of the MSCP area. Known locations include Dulzura, Potrero, Tecate, McCain Valley, Bankhead Springs, Live Oak Springs, and Jacumba (Beauchamp 1986). Throughout its range, it occurs primarily in washes or drainages in chaparral, although it has also been found near seeps on dry slopes and in valleys. Elevational limits for the species are between 300 and 700 m (984 and 2297 ft). Tecate tarplant appears to thrive in moderately disturbed soils where there is adequate moisture, as at Bankhead Springs. Based on habitat affinities and general distribution, this species has some potential to occur in the very southeastern portion of the MSCP study area.

*Lepechinia cardiophylla*

Heart-leaved pitcher sage

USFWS: Candidate (Category 2)

CNPS rating: List 1B, 3-2-2

Heart-leaved pitcher sage is a low shrub that generally occurs on dry slopes in chaparral in Orange, Riverside, and San Diego counties, and Baja California (Munz 1974; Smith and Berg 1988). This species is considered rare in the county, and is known only from near Iron Mountain (Figure 2-9), between 500 and 900 m (1640 and 2952 ft) elevation (Beauchamp 1986).

*Lepechinia ganderi*

Gander's pitcher sage

USFWS: Candidate (Category 2)

CNPS rating: List 1B, 3-1-2

This species occurs in San Diego County and in Baja California. In San Diego County, Gander's pitcher sage is known only from metavolcanic soils chaparral in the Jamul Mountains, San Miguel Mountain, and Otay Mountain (Beauchamp 1986) (Figure 2-8). Despite its few known locations, this species has not been considered endangered because it occurs in areas not currently threatened by development. Should development or disturbance encroach on these areas, then Gander's pitcher sage would be considered highly endangered.

*Lotus nuttallianus*

Nuttall's lotus

USFWS: Candidate (Category 2)

CNPS rating: List 1B, 3-3-2

This prostrate, yellow-flowered, spring-blooming (March-June) annual occurs in sandy places below 30 m (100 ft) elevation and is generally associated with coastal dunes and coastal scrub habitat. This species is restricted to San Diego County and northern Baja California. In the MSCP area, historic localities include Del Mar, La Jolla, Pacific Beach, Ocean Beach, Coronado, Silver Strand, National City, Tijuana River Estuary, and Boundary Monument (Beauchamp 1986). The species may have been extirpated at several of these locations, and is currently threatened at others due to highway "beautification" plans. Extant populations are known along the San Diego River Flood Control Channel (intersection between Seaworld Drive and Friars Road), in the D Street Fill and Marisma de Nacion, Silver Strand, and Border Field State Park (B. Fink pers. comm.). This species is

currently under status review with the USFWS, although it is not yet included in a listing package (F. Roberts pers. comm.).

*Monardella linoides* ssp. *viminea*

Willow monardella

USFWS: Candidate (Category 2)

CDFG: Endangered

CNPS rating: List 1B, 2-3-2

Willow monardella is an herbaceous perennial that occurs infrequently in rocky washes below 305 m (1000 ft) elevation. This summer-blooming (June-August) mint with rose-lavender flowers is generally associated with coastal sage scrub or chaparral (Munz 1974; Beauchamp 1986). Reported localities for this San Diego County endemic include Miramar Naval Air Station, the Santee-Sycamore Canyon area, Otay Mountain, and Marron Valley (Figure 2-8). All reported localities for this species in San Diego County are in the MSCP area. This species is currently under status review with the USFWS, although it is not yet included in a listing package (F. Roberts pers. comm.).

*Muilla clevelandii*

San Diego golden star

USFWS: Candidate (Category 2)

CNPS rating: List 1B, 2-2-2

San Diego golden star is found only in southwestern San Diego County and northwestern Baja California. This spring-blooming (March-May), herbaceous perennial occurs infrequently in clay soils on dry mesas and hillsides in grassland and coastal sage scrub. It is presumed to reproduce primarily (but not exclusively) by asexual means, i.e., production of corm offsets. San Diego golden star is restricted to several populations on coastal mesas within the MSCP area, and occurs only rarely outside this area (e.g., Carlsbad). Known localities include Rancho Santa Fe, the vicinity of Lake Hodges, Del Mar Mesa, Carmel Mountain, Poway, Fernbrook, Miramar Naval Air Station (several localities), Mira Mesa, Tierrasanta, Santee (Oak Canyon-Little Sycamore Canyon-Sycamore Canyon), Dehesa Mountain, Proctor Valley (City of San Diego lands), Otay Mesa (vernal pool areas J 23-25, J 29-30), and Marron Valley (Figure 2-12). Primary threats to this species are illegal dumping, off-road vehicles, and urbanization (Smith and Berg 1988).

*Myosurus minimus* var. *apus*

Little mousetail

USFWS: Candidate (Category 2)

CNPS rating: List 3, 2-3-2

Little mousetail is a small, tufted, spring-blooming (February-April) annual that occurs in vernal pools and alkaline marshes in Riverside, San Bernardino, and San Diego counties, and in Baja California (Munz 1974; Smith and Berg 1988). In San Diego County, this species is restricted to several vernal pool complexes on the mesas north of San Diego and on Otay Mesa (Figure 2-12). All known localities within San Diego County are in the MSCP area. This species is threatened by the general destruction of vernal pool habitat (Smith and Berg 1988).

*Navarretia fossalis*

Prostrate navarretia

USFWS: Proposed Threatened

CNPS rating: List 1B, 2-3-2

This diminutive, white-flowered annual occurs in western Riverside and southwestern San Diego counties, and in northwestern Baja California. The putative reproduction mode for this species is autogamy, or self-reproduction (Grant and Grant 1965). Prostrate navarretia generally occurs in vernal pools or roadside depressions below 450 m (1476 ft) elevation and can be locally common. The species is known historically from just three areas within the county (San Marcos, National City, and Otay Mesa) (Moran 1977), and is currently restricted to several extant populations on Otay Mesa (Figure 2-12). Prostrate navarretia may be surviving somewhat better in Baja California. Moran (1977) reported that it was well-established in a few vernal pools and, to an even greater degree, in several widely scattered artificial depressions. Overall, the primary threats to this species are loss of habitat to agriculture and urbanization (Smith and Berg 1988).

*Nolina interrata*

Dehesa beargrass

USFWS: Candidate (Category 1)

CDFG: Endangered

CNPS rating: List 1B, 3-3-2

Dehesa beargrass is a yucca-like plant known only from a few locations in southern San Diego County, with major populations in the MSCP area occurring on Dehesa Mountain, McGinty Mountain, and Sequan Peak (Figure 2-8). The species is also known from east of the MSCP area, in Lawson Valley. Within its range, it appears to be highly restricted by climatic and soil conditions. The species is always associated with gabbro-derived or peridotite soils, which it appears to tolerate better than species more commonly occurring in the area. Dehesa beargrass has a mixed breeding system, i.e., it reproduces both sexually and asexually. Asexual or clonal reproduction appears to be an effective reproduction strategy for this species. The population near Dehesa, in fact, is comprised entirely of female plants (Dice 1988). Fire or tissue damage is needed to stimulate flowering, and seedling recruitment is an exceptionally rare event in this species (Dice 1988). Dehesa beargrass is threatened by commercial and private plant collectors (Smith and Berg 1988). This species is currently under status review with the USFWS, although it is not yet included in a listing package (F. Roberts pers. comm.).

*Opuntia parryi* var. *serpentina*

Snake cholla

USFWS: Proposed Endangered

CNPS rating: List 1B, 3-3-2

This prostrate cholla is endemic to southwestern San Diego County and northern Baja California. In San Diego County, this taxon is restricted to the MSCP area, where it occurs at scattered locations from Point Loma south to Chula Vista (Figure 2-12). Snake cholla is generally found on dry slopes near the coast, where it occurs in association with maritime succulent scrub and coastal sage scrub. It is reported from Point Loma, Chollas Canyon, Florida Canyon, Sweetwater Marsh, Wolf Canyon, Poggi Canyon, Salt Creek, Dennery Canyon, and Border Field State Park (T. Oberbauer pers. comm.; H. Wier pers. comm.). It is also known from more inland sites, such as Jamacha (Ogden unpub. data). Population numbers are not well-documented for this taxon, and key taxonomic characters used to distinguish the variety are confusing. Snake cholla has been included in a USFWS listing package for plants associated with coastal sage scrub or clay soils; although the status

review is complete, the decision is pending on whether to propose this species for listing (F. Roberts pers. comm.).

*Orcuttia californica*

California orcutt grass

USFWS: Endangered

CDFG: Endangered

CNPS rating: List 1B, 3-3-2

This low, annual grass is found in or near vernal pools in Riverside and San Diego counties, and in Baja California. California orcutt grass may have a mixed breeding system, i.e., possessing both outcrossing and selfing capabilities (Zedler 1987). In San Diego County, California orcuttia is known from below 200 m (650 ft) elevation on the coastal mesas, with reported localities including Miramar Naval Air Station, south of San Clemente Canyon, and Otay Mesa (Beauchamp 1986) (Figure 2-8). This species is seriously threatened by loss of habitat (Smith and Berg 1988).

*Pinus torreyana* ssp. *torreyana*

Torrey pine

USFWS: Candidate (Category 2)

CNPS rating: List 1B, 3-2-3

Torrey pine may be the most restricted pine species in California, occurring in only two locations: along the coast near Del Mar and on Santa Rosa Island. On the mainland, the major population is now found in Torrey Pines State Reserve (including the extension), where it is protected and managed. Smaller stands occur on Carmel Mountain, Del Mar, and the San Dieguito River Valley (Figure 2-12). Torrey pine is wind-pollinated, and may be self-fertile (Ledig 1987). The species possesses extremely low genetic variability, and it has been suggested that it could be managed in greatly reduced populations without seriously damaging its reproductive capacity from a genetic perspective (Ledig 1987). However, small populations are more susceptible to extirpation. Therefore, maintenance of large populations would provide the best chance for long-term viability for this species.

*Pogogyne abramsii*

San Diego mesa mint

USFWS: Endangered

CDFG: Endangered

CNPS rating: List 1B, 2-3-3

This purple-flowered, spring-blooming (April-June) annual species is endemic to vernal pools in San Diego County. All known populations occur in the MSCP area, where the species is restricted to vernal pool complexes on the mesas north of San Diego (e.g., Miramar Naval Air Station, Tierrasanta, and Kearny Mesa) (Figure 2-9). The primary threats to mesa mint are urban development, off road vehicle activity, and agriculture (Smith and Berg 1988). San Diego mesa mint reproduces by outcrossing, and its primary pollinator is the introduced honeybee (*Apis mellifera*). The dispersal ability of this species is very low (Zedler 1987).

*Pogogyne nudiuscula*

Otay Mesa mint

USFWS: Endangered

CDFG: Endangered

CNPS rating: List 1B, 3-3-2

Otay Mesa mint occurs in vernal pools in southwestern San Diego County and Baja California. In San Diego County, all extant populations of this late spring-blooming, annual species (May-June) occur in the MSCP area. Otay Mesa mint appears to be restricted to 3-5 vernal pool complexes on Otay Mesa (Bauder 1986) (Figure 2-9). The primary threat to Otay Mesa mint is urbanization (Smith and Berg 1988).

*Rosa minutifolia*

Small-leaved rose

USFWS: Candidate (Category 2)

CDFG: Endangered

CNPS rating: List 2, 3-3-1

Small-leaved rose is known only from one location in San Diego County: on western Otay Mesa near Dennery Canyon (Figure 2-8), where this clonal population is associated with disturbed mesa top habitat and adjacent canyons. This occurrence is threatened by off-road vehicles and development. This species, which also occurs in Baja California, is considered a candidate for state-listing as endangered (Smith and Berg 1988). Despite its

highly restricted distribution in the study area, small-leaved rose was included as a target species because of imminent threats to the U.S. occurrence.

*Senecio ganderi*

Gander's butterweed

USFWS: Candidate (Category 2)

CDFG: Rare

CNPS rating: List 1B, 3-2-3

Gander's butterweed is a yellow-flowered, spring-blooming (March-May), herbaceous perennial that has a highly restricted distribution, occurring only in the southwestern part of San Diego County. Known locations include McGinty Mountain, Sequan Peak, El Cajon Mountain, Lawson Peak, and Tecate Mountain (Beauchamp 1986; Wier 1986) (Figure 2-12). The first two localities are in the MSCP area. The species possibly occurs on Cuyamaca Peak, as well, although this siting has not been verified. Gander's butterweed typically occurs in post-burn chaparral between 400 and 1200 m (1312 and 3937 ft) elevation, and has a strong affinity for gabbro-derived soils.

*Solanum tenuilobatum*

Narrow-leaved nightshade

USFWS: Candidate (Category 2)

CNPS rating: Considered, but rejected

This purple-flowered, suffrutescent shrub occurs infrequently between 200 and 1100 m (656 and 3610 ft) elevation in chaparral of southern San Diego County and Baja California. Within the MSCP area, large populations are known from the Jamul Mountains and Otay Mountain; smaller populations occur in Fernbrook, Silverwood Wildlife Sanctuary, Dehesa, Jamul, San Miguel Mountain, Marron Valley, and Bee Canyon (Figure 2-12). The species also occurs east of the MSCP area, at Lyons Valley, Potrero Grade, Barrett Dam, and Campo (Beauchamp 1986). In the most recent CNPS Inventory (Skinner and Pavlik 1994), this species was considered but rejected as sensitive because it is believed to be a synonym of the common taxon, *S. xantii*.

*Tetracoccus dioicus*

Parry's tetracoccus

USFWS: Candidate (Category 2)

CNPS rating: List 1B, 3-2-2

Parry's tetracoccus occurs in Orange County, San Diego County, and Baja California (Smith and Berg 1988). In San Diego County, the species occurs sporadically throughout the coastal foothills, where it appears to be restricted to gabbro-derived soils. Within the MSCP area, relatively large populations of Parry's tetracoccus occur in Ramona/Barona Valley, McGinty Mountain, and Dehesa. The species is also well-documented outside the study area, as at Fallbrook, Monserate Mountain, Rainbow, San Marcos Mountains, Gomez Creek, and McGee Truck Trail (Wier Biological 1984; T. Oberbauer pers. comm.; H. Wier pers. comm.), and Vista, Agua Tibia Mountains, Lee Valley, Tecate Junction, and Jacumba (Beauchamp 1986) (Figure 2-12). Although the number of localities where it occurs is relatively large, many of the populations are not extensive.

## 2.7 TARGET ANIMAL SPECIES

Sensitive animal species are those listed by the USFWS (1991a, 1992), CDFG (1992a), and Tate (1986). The USFWS officially lists sensitive species as either threatened or endangered, and unofficially recognizes many other species as candidates for listing. The Migratory Bird Treaty Act (1916) between the United States and Canada, the Convention for the Protection of Migratory Birds and Animals (1936) between the United States and Mexico, and subsequent amendments to these acts provide legal protection for almost all breeding bird species occurring in the United States. These acts prohibit the killing, taking, collecting, and selling or purchasing of native bird species or their parts, nests, or eggs. Certain gamebird species are allowed to be hunted for specific periods determined by federal and state governments. There are also provisions for collecting birds for scientific purposes, and for controlling birds that cause damage to agricultural or other interests. Introduced species such as house sparrow and European starling are not protected by these laws. Additional protection is provided for bald eagle and golden eagle under the Bald Eagle Protection Act (1940 and 1962).

The CDFG also lists species as threatened or endangered, or candidates for listing as threatened or endangered. Lower sensitivity animals may be listed as "species of special concern" (Remsen 1978; Williams 1986; CDFG 1992a). The CDFG further classifies some species under the following categories: "fully protected," "protected furbearer,"

"protected amphibian," and "protected reptile" (CDFG 1992b). The designation "protected" indicates that a species may not be taken or possessed except under special permit from the CDFG; "fully protected" indicates that a species can be taken only for scientific purposes.

The Audubon Blue List (Tate 1986) is a periodically updated list of birds considered to be declining in the United States; this list does not, however, include species that are already federally listed. Local populations may and often do differ in status from the general Blue List status for the entire United States. A local blue list for sensitive avian species in San Diego County was prepared for the local Audubon Society in 1979 (Everett 1979). Some local reptile and amphibian species have been identified as sensitive by the San Diego Herpetological Society (SDHS) (1980a, 1980b). A list of target sensitive animal species in the MSCP study area is included in Table 2-3. Selected species' localities are mapped in Figure 2-14. See Appendix A-9 for additional information on the protection and management of target animal species.

## Invertebrates

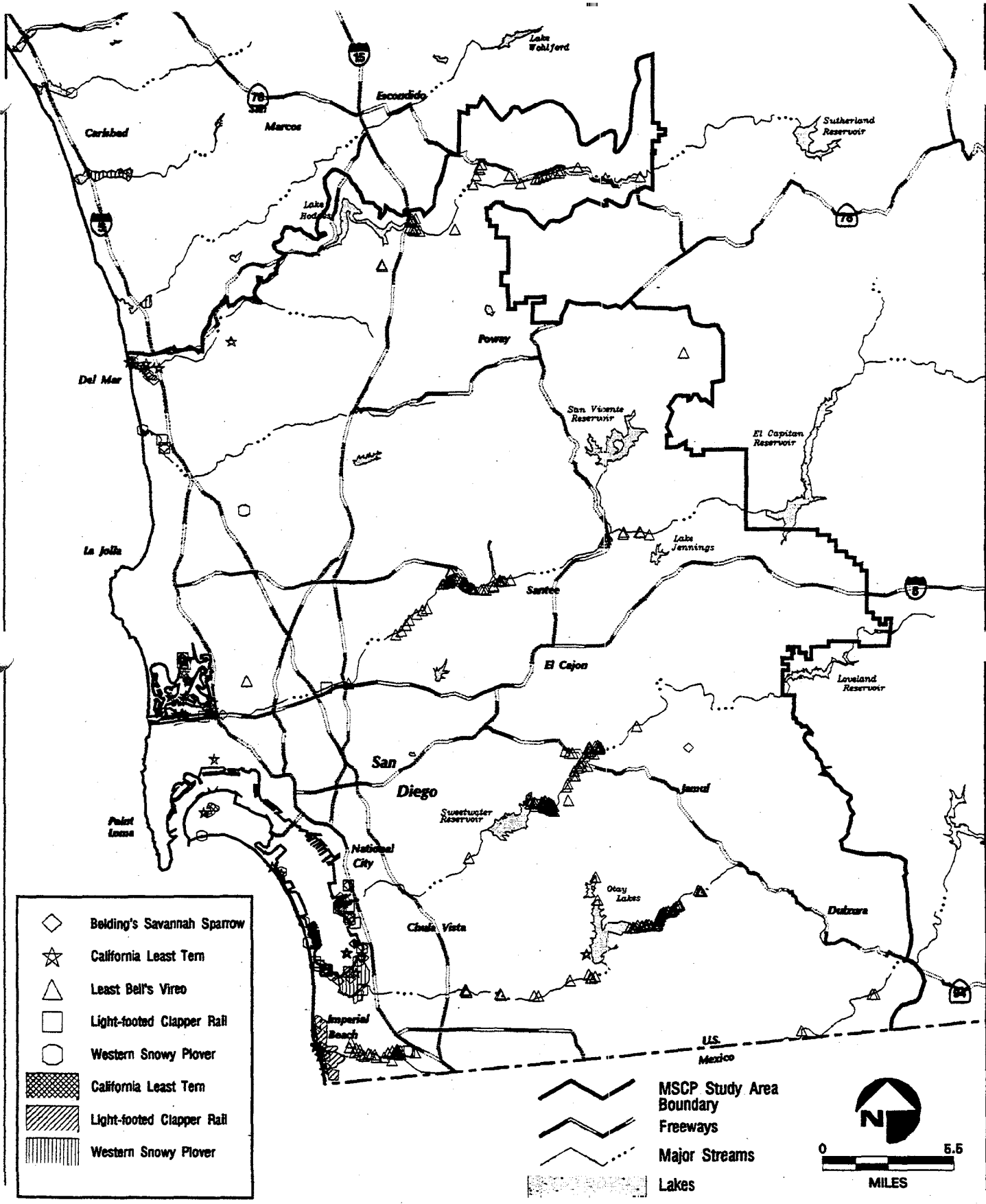
### *Lycaena hermes*

Hermes copper butterfly

USFWS: Candidate (Category 2)

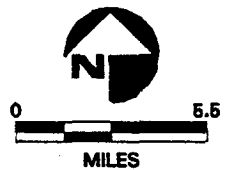
CDFG: None

The Hermes copper butterfly has a very restricted range; its known distribution is from about 18 mi south of Santo Tomas in Baja California, north to about Fallbrook in San Diego County, and from the coast to about 40 mi inland (Brown 1991). Emergence of the adults occurs from about May 20 to July 20 (Emmel and Emmel 1973). Hermes copper butterfly larvae utilize redberry (*Rhamnus crocea*) as a foodplant and the distribution of the Hermes copper is closely tied to the distribution of redberry (Emmel and Emmel 1973), typically occurring in chaparral or coastal sage scrub. Adults visit flowers, especially those of flat-top buckwheat (*Eriogonum fasciculatum*). Fire can rapidly eliminate colonies of Hermes coppers and their host plants. It has been suggested that natural colonization may be very slow due to the sedentary nature of the adult butterfly (Brown 1991). In San Diego County Hermes copper is reported from El Cajon, Suncrest, Mission Gorge, Dulzura, Guatay, Old Viejas Grade, and McGinty Mountain (Brown 1991). Many former localities have been developed or disturbed. The species is thought to occupy less than half of its former range (Brown 1991).



- ◇ Belding's Savannah Sparrow
- ☆ California Least Tern
- △ Least Bell's Vireo
- Light-footed Clapper Rail
- Western Snowy Plover
- ▨ California Least Tern
- ▧ Light-footed Clapper Rail
- ▩ Western Snowy Plover

- MSCP Study Area Boundary
- Freeways
- Major Streams
- ▨ Lakes



*Euphyes vestris harbisoni*

Harbison's dun skipper

USFWS: Proposed Endangered

CDFG: None

Harbison's dun skipper is a subspecies of dun skipper that occurs in San Diego County. This species is always associated with San Diego sedge (*Carex spissa*), its larval host plant. Recent known localities for Harbison's dun skipper include the east side of McGinty Mountain, Old Viejas Grade, Hellhole Canyon, Flinn Springs, and several locations throughout Poway (Brown 1991). This species occurs in highly localized, semi-isolated colonies that can be impacted by development. Development in the Rancho Bernardo, Escondido, Mission Valley, and Fallbrook areas has reduced several local populations (Brown and McGuire 1983; Brown 1991).

*Panoquina errans* (= *P. panoquinoides errans*)

Salt marsh skipper

USFWS: Candidate (Category 2)

CDFG: None

The salt marsh skipper is distributed within the U.S. along the coast from near the mouth of the Santa Clara River to San Diego County (Emmel and Emmel 1973). Adults are dull brown in color with a wingspan of about an inch. Emergence occurs from March through November, but it is uncertain whether or not there is an earlier brood. It is restricted to estuarine and tideland habitats where adults are often associated with salt grass (*Distichlis spicata*). Larvae utilize salt grass as a food plant but females reportedly will deposit their eggs on other grass species and the larvae will occasionally feed on other thin bladed grasses such as cordgrass and Bermuda grass (Busnardo 1989; Emmel and Emmel 1973). Adults have been observed using species such as heliotrope (*Heliotropium curvassavicum*), sea rocket (*Cakile maritima*), sea-fig (*Carpobrotus* sp.), and chrysanthemum (*Chrysanthemum coronarium*) as nectar sources at the Tijuana Estuary (Busnardo 1989). Native nectar sources include deerweed (*Lotus scoparius*), salty Susan (*Jaumea carnosa*), and frankenia (*Frankenia* spp.; Brown 1981). The large reduction of salt marsh habitat in southern California has led to a similar reduction in salt marsh skipper populations (Brown 1991).

*Mitoura thornei*

Thorne's hairstreak

USFWS: Proposed Endangered

CDFG: None

Thorne's hairstreak is known only from the vicinity of Otay Mountain in southwestern San Diego County (Brown 1983). The larval host plant is the endemic Tecate cypress (*Cupressus forbesii*) with which the adults are closely associated. The emergence period for this species is late February through June (Brown 1983). Fire is an important factor in the ecology of the host tree. Too short of an interval between fires (less than 25 years; Zedler 1977) may depress the regeneration of Tecate cypress and adversely affect Thorne's hairstreak populations (Brown 1991). Due to the extremely restricted distribution of Thorne's hairstreak, any extensive ecological disturbance to Tecate cypress, such as a large fire or extended drought, would make Thorne's hairstreak vulnerable to extinction.

*Euphydryas editha quino*

Quino checkerspot butterfly

USFWS: Candidate (Category 1)

CDFG: None

The historical distribution of Quino checkerspot butterfly included Los Angeles, Riverside, Orange, and San Diego counties and south into Baja California (Brown and Faulkner 1984). The current distribution of this species has been greatly reduced, however, primarily by development of its habitat (Murphy 1990; Brown 1991). In San Diego County, recent known localities include Dictionary Hill, Otay Lakes, Otay Mesa, and the western slopes of Otay Mountain (Allen 1990). A recent Endangered Habitats League newsletter indicates that the Dictionary Hill and Otay Mesa populations have not been seen in the past five years. Care must be exercised in describing the distribution of this species because Quino checkerspot butterfly larvae can diapause for as long as seven years. This species is often found on hills and mesas (Emmel and Emmel 1973) and around lake margins and vernal pools (Allen 1990). There is very little migration of adults between centers of population abundance (Ehrlich et al. 1980). Adults emerge from mid-January through April, but peak emergence is from mid-February to early-April. Adults will take nectar from plants such as chia (*Salvia columbariae*) and tidy-tips (*Layia platyglossa*) which are often found growing near larval food plants. Quino checkerspot butterfly larvae utilize the dot-seed plantain (*Plantago erecta*) and vernal pool plantain (*Plantago erecta* ssp. *rigidior*) as food plants. This species is threatened by development of its habitat, and San Diego populations are particularly threatened (Emmel and Emmel 1973).

One of the primary sources of mortality of this species occurs in the pre-diapause larval stage and is related to factors that slow development time. It takes about 5 weeks after eggs are laid for an individual to reach a sufficient size to diapause. If larval food resources are depleted before this size is reached, the individual will die. Populations of checkerspot butterflies in the San Francisco Bay area have pre-diapause larval mortality of over 90 percent. This is often due to the life cycle of the annual larval food plant *Plantago* being completed before the individual *Euphydryas* larva can reach a size sufficient to diapause.

A consideration in designing preserves for this species is to preserve a number of population centers and to ensure that a variety of microhabitats exist for each population. For example, habitat patches with a southern exposure may exhibit early germination of *Plantago* populations which may complete their life cycle before *Euphydryas* larvae can reach the diapausing size. However, the larvae in southern exposed habitats will experience higher mean daily temperatures and can grow faster. Conversely, larvae in cooler northern exposed habitats may grow slower but may potentially have food plants that complete their life cycles later. Another consideration is to attempt to minimize the probability of local extinction of the host *Plantago* populations resulting from competition with annual grasses. By attempting to preserve as many population centers of *Euphydryas* as possible, the probability of all going extinct simultaneously will be reduced.

Although most populations of Quino checkerspot exhibit low rates of dispersal, some individuals may disperse long distances in dry years (Ehrlich 1975; Ehrlich et al. 1980). Population explosions are rare events, but result in the mass dispersal of individuals (Murphy and White 1984). The consequence of such dispersals may be the recolonization of areas that have recovered from fire or other temporary disturbances that may have caused a population to become locally extirpated. The metapopulation dynamics of this species make the regional distribution of populations highly sensitive to factors (e.g., habitat fragmentation) that may interfere with the potential for populations to exchange individuals and allow for recolonization of unoccupied habitat.

### Fairy Shrimp

Fairy shrimp (Class: Crustacea, Order: Anostraca) are conspicuous members of the fauna of ephemeral ponds and vernal pools. California has 20 known species of fairy shrimp belonging to six genera (Simovich and Fugate 1992); however, an additional undescribed

species has been reported from areas of San Diego County (Fugate in press). Fairy shrimp have the ability to produce eggs that can withstand desiccation and freezing, which allows them to survive from year to year in ephemeral aquatic habitats. The continued survival of a fairy shrimp population in a particular location requires water to be ponded for a length of time sufficient for the completion of their life cycle. The length of time for fairy shrimp to reach sexual maturity is variable depending on environmental conditions and the specific species of anostracan. In general, a minimum of 1-2 weeks is required. The presence of fairy shrimp (either free swimming or eggs in the soil) can be considered an indication of an ephemeral pond or vernal pool that holds water for a minimum of 1-2 weeks every few years. Several species of fairy shrimp are considered sensitive by USFWS and CDFG because of their rarity and/or association with sensitive aquatic habitats such as vernal pools (CDFG 1990).

*Streptocephalus woottoni*

Riverside fairy shrimp

USFWS: Endangered

CDFG: None

The Riverside fairy shrimp has a very restricted distribution. It has been detected in vernal pools and temporary ponds in the vicinity of Temecula, Riverside County (Eng et al. 1990), NAS Miramar, Otay Mesa, San Diego County (Simovich and Fugate 1992), and in Baja California (Brown et al. *in press*). The Riverside fairy shrimp appears to be a warm water species, typically not appearing until late in the season (Eng et al. 1990). It can co-occur with other species of anostraca. The primary threats to this species are urban and agricultural development of its habitat.

**Amphibians**

*Bufo microscaphus californicus*

Arroyo southwestern toad

USFWS: Endangered

CDFG: Species of Special Concern

SDHS: Stable

This subspecies of southwestern toad is found in gravely or sandy washes, stream and river banks, and arroyos of semiarid parts of western California from near Santa Margarita in San Luis Obispo County to northwestern Baja California. It often occurs along sandy banks with willows, cottonwoods, or sycamores. The arroyo southwestern toad can also

be found near washes and streams in desert wash, mixed chaparral, Joshua tree, and sagebrush habitats. The several locality records compiled by the San Diego Herpetological Society (SDHS) in 1980 are in the southeastern corner of the MSCP study area.

Breeding activity has been observed from February to April depending on temperatures and precipitation (Sullivan 1992). Breeding occurs in quiet, clear backwaters of streams and rivers or in small ponds (Stebbins 1966). The call is a musical trill heard in 10 second bursts. Arroyo southwestern toad eggs are laid on the bottom of the pool, usually in tangled strings of 1-3 rows. The tadpoles reach a maximum length of about 1.5 in. and are solitary and extremely cryptic, typically mottled or spotted with blackish to brown colors. The adults are nocturnal and can be found at night foraging on open, sandy areas of the drainage. Any attempt to census this species must be conducted at night. The most effective timing of surveys would probably be in early spring between dusk and 2330 when the toads call from the water for a few weeks of the year (Sullivan 1992). This species may be in decline due to the loss and fragmentation of riparian habitat.

*Rana aurora draytonii*

California red-legged frog

USFWS: Proposed Endangered

CDFG: Species of Special Concern

SDHS: Undetermined

The historical range of the California red-legged frog extended from Humboldt County south into the Sierra Nevada Mountains and along the coastal slope to northern Baja California. This species has disappeared from large portions of its range. The California red-legged frog was once common and widespread throughout southern California. At this time, the California red-legged frog appears to be extinct in San Diego County; the only currently known population in southern California is in Riverside County. It is possible, however, that populations in some of the more remote or inaccessible areas of the county have been overlooked due to the frog's secretive, nocturnal habits.

The California red-legged frog frequents marshes, slow parts of streams, lakes, reservoirs, ponds, and other usually permanent water sources. It occurs primarily in wooded areas in lowlands and foothills, although it can also be found in grassland. It is considered a pond frog (Stebbins 1966) and is typically associated with deep water pools at least 0.5 m in depth fringed by thick vegetation (Zweifel 1955; M. Hayes pers. comm.), especially arroyo willows or native cattails. In southern California, the breeding season occurs between

January and July. During this time, males call from the water, producing weak vocalizations (Hayes and Krempels 1986). Adults are strictly nocturnal and extremely wary. Surveys for this species must be conducted at night. Tadpoles of this frog require cool water (>21°C is lethal); therefore, habitat alterations that increase water temperature, such as removal of riparian vegetation or reduction in stream flow, could lead to local extinctions.

The decline of the California red-legged frog, as well as other western ranids, is probably the result of numerous confounding factors such as competition with and predation by introduced species (bullfrogs and large fish), acid rain, pathogens, parasites, and catastrophic events (e.g., severe drought and scouring floods, Hayes and Jennings 1986, M. Hayes, pers. comm.). Another major reason for the frog's decline in San Diego County has been habitat alteration. An estimated one-third of red-legged frog habitat has been altered or destroyed by activities such as agriculture, urbanization, channeling of streams, and construction of reservoirs (SDHS 1980a). These frogs often exist in small populations (Storm 1960; Hayes pers. comm.) and are sensitive and subject to frequent local extinctions.

## Reptiles

### *Clemmys marmorata pallida*

Southwestern pond turtle

USFWS: Candidate (Category 2)

CDFG: Species of Special Concern, currently under consideration for protection

SDHS: Threatened

The southwestern pond turtle inhabits slow moving rivers, streams, small lakes, and ponds of coastal California from the San Francisco Bay area and the central valley south and into northern Baja California. In San Diego County, some of the locations where this species has recently been reported include Lusardi Creek, Sweetwater River, San Dieguito River, Lake Wohlford, Cottonwood Creek, Pine Creek, and in many of the drainages on Camp Pendleton (CDFG 1993; Holland pers. comm.; Ogden unpub. data; WESTEC 1987).

Southwestern pond turtles most often occur in smaller pools and permanent or intermittent streams. In intermittent streams, the turtles rely on small pools that persist through the dry season. Emergent marsh vegetation along the watercourse is needed for cover. A dense riparian canopy does not allow sufficient sunlight through for basking. Water levels must

be deep enough (at least 3 ft) to provide cover and foraging habitat for a population. Pond turtles eat plants, insects, worms, fish, and carrion (Stebbins 1985). Individuals of this species have been observed to move as much as 1.5 km along a drainage in one season (Rathbun et al. 1992), but movement can be restricted by long stretches of dry streambed in intermittent creeks. Other important habitat requirements are protruding rocks, vegetation mats, or partly submerged logs for sunning.

Nests are excavated outside of the watercourse in banks or in open upland areas up to 400 m from the water, often out of the floodplain to avoid winter inundation (Storer 1930, Rathbun et al. 1992). Nesting and oviposition typically occur from May through July. Incubation times in Washington have been recorded at 90-104 days (Holland 1991). Most young are believed to overwinter in the nest and emerge the following March or April (Holland 1985). The female southwestern pond turtle reaches sexual maturity at 9-11 years of age. Records based on recaptured turtles indicate a known lifespan of at least 40 years.

Much of this species' habitat has been disturbed by urban and agricultural development. Introduced aquatic predators such as bullfrogs, bass, and catfish are a threat to hatchlings and young turtles, which measure only 23-31 mm at birth (Holland 1991). Turtles occupying habitat adjacent to urbanized areas are vulnerable to collection for pets, predation by domestic dogs, and competition with introduced exotic turtles. Nest sites and overland routes between the nest site and the water are especially vulnerable to disturbance. The eggs and overwintering young are vulnerable to predation by urban edge predators such as raccoons and skunks, and the adult female is vulnerable to roadkill or crushing by off highway vehicles. Depending on the topography, it has been suggested that habitats up to 500 m on either side of a populated watercourse be considered potential nesting habitat (Rathbun et al. 1992).

*Phrynosoma coronatum blainvillei*

San Diego horned lizard

USFWS: Candidate (Category 2)

CDFG: Species of Special Concern

SDHS: Endangered

The San Diego horned lizard occurs along the coastal slope of southern California from the transverse ranges south to a latitude of approximately 32°N in Baja California (Klauber 1936). This species is still relatively common where it occurs in San Diego County. The San Diego Herpetological Society (1980b) reported a substantial decline in the number of

locations where this species could be found between the early and late 1970s. The San Diego horned lizard currently is found at a number of locations throughout the MSCP area.

The San Diego horned lizard occurs from sea-level to elevations of over 8000 ft and frequents a variety of habitats from coastal vegetated sand dunes, grasslands, river flood plains, sage scrub, and chaparral to coniferous and broadleaf woodlands (Stebbins 1985; Horchar pers. comm.). It is most often found in open scrub, although it can also be found in dense chaparral (Horchar pers. comm.). Habitat requirements include open areas for basking, bushes for cover, and fine, loose soil or leaf litter for rapid burial. San Diego horned lizards also use rodent burrows for hibernation. Distribution of the San Diego horned lizard is limited by the availability of its primary food item, harvester ants (especially *Pogonomyrmex* and *Veromessor* species; Horchar pers. comm.). This species is primarily active in late spring (April-May) and early summer (June-July) after which individuals typically estivate. Because of these activity periods, absence of horned lizards or horned lizard sign outside of their active season does not preclude the presence of a population. It is recommended that surveys of appropriate habitat be conducted during the period of activity. Female San Diego horned lizards dig burrows in which to lay their eggs. They typically lay one clutch per year (Sherbrooke 1981) which can be large, ranging in size from 6 to 21 eggs (Stebbins 1985). Eggs are normally laid from April to June.

Threats to the San Diego horned lizard include urban development, conversion of habitat to agriculture, habitat degradation, and collection of individuals for the pet trade (SDHS 1980b). By 1980, approximately one-half of the total documented historical distribution of this species had been developed. Off-road vehicle activity degrades horned lizard habitat by disturbing vegetation and ant colonies. The San Diego horned lizard has also been popular with the pet trade and individuals have been collected for international and interstate export. The San Diego horned lizard is potentially vulnerable to predation by pets (cats and dogs) in habitats near human development. This species could also be impacted by habitat fragmentation and human disturbance. The application of pesticides that eliminate ant colonies in natural environments could also potentially affect this species.

*Cnemidophorus hyperythrus beldingi*

Orange-throated whiptail

USFWS: Candidate (Category 2)

CDFG: Species of Special Concern

SDHS: Threatened

This whiptail subspecies is restricted to extreme southwestern California, being found in Orange, Riverside, and San Diego counties. Its range extends south into northern Baja California. This species potentially occurs throughout many of the scrub habitats in the MSCP study area. High concentrations of orange-throated whiptails are known from near Jamul, Santee, Alpine, Otay Mesa, Rancho San Diego, Miramar NAS, and Escondido.

Orange-throated whiptails are primarily found at elevations below 2800 ft. This species appears to prefer sage scrub with about 50 percent shrub cover and minimal herb cover (Horchar pers. comm.). It is also found around oak woodlands, in open ruderal areas, chamise chaparral, and riparian scrub habitats. Orange-throated whiptails often occur in washes and other sandy areas where there are patches of brush and rocky hillsides (Stebbins 1985). This species requires loose or sandy soil for digging burrows in which to hibernate (Bostic 1965). Distribution of this species is biased towards open areas with high concentrations of subterranean termites (*Reticulitermes hesperus*). Orange-throated whiptails also eat other insects (such as beetles) and spiders (Stebbins 1985). The mean home range of this species has been estimated at 0.11 acre (Bostic 1965), with a documented maximum of 1 acre (Milstead 1957). Orange-throated whiptails have one to two clutches of one to four eggs which are laid in June and July (Bostic 1965; Stebbins 1985).

The principal threat to this species is loss of open sage scrub, its preferred habitat (SDHS 1980b). It is still locally common in many areas where it remains. This species can also be impacted by habitat degradation through off-road vehicle activity and over-grazing of livestock. It is also vulnerable to predation by feral and domestic pets (cats and dogs) where it occurs near developed areas.

## Birds

### *Pelecanus occidentalis californicus*

California brown pelican

USFWS: Endangered

CDFG: Endangered

Everett: Threatened

The brown pelican is found primarily in estuarine, marine subtidal, and marine pelagic waters, especially within 30 km (12 mi) of shore, but regularly to 175 km (109 mi). Nesting sites for the Southern California Bight population are located in the Channel Islands: Anacapa, Santa Barbara, San Miguel, and Santa Cruz and a small breeding colony occurs on the Coronado Islands (Garrett and Dunn 1981). Non-breeding members of this population may be observed throughout the year in San Diego County. The local brown pelican population is largest during late summer and fall months due to the northern dispersal of individuals from breeding colonies in the Gulf of California (Unitt 1984; Zeiner et al. 1990). This species is considered fairly common throughout the year in San Diego County, with smallest numbers occurring in April to May (Unitt 1984). Within the MSCP area, non-breeding brown pelicans occur along coastal waters, beaches, and in estuaries and bays.

Nesting begins in March and eggs are laid in late March or April. The nest is a small mound of interwoven sticks, or a shallow scrape lined with feathers. Reproductive success varies widely from year to year, depending on oceanographic conditions and the abundance of forage fish. There are usually three eggs which are incubated for four weeks. Fledglings first leave the nest at nine weeks. After breeding, brown pelicans leave their nesting sites and disperse along the entire California coast. The young become sexually mature and first breed at two or three years of age.

The brown pelican usually roosts on water, rocky cliffs, jetties, sandy beaches, and mudflats. Northern anchovies comprise nearly the entire diet of brown pelicans in southern California. The brown pelican also occasionally feeds on crustaceans, carrion, and young of its own species (Palmer 1962).

The brown pelican population declined sharply in the 1960s due to contamination of the marine food chain with DDT, dieldrin, and other chlorinated hydrocarbons. Nesting success was nearly zero in the Channel Island colony from 1969 to 1971 due to eggshell

thinning and altered parental behavior (Anderson et al. 1975; Zeiner et al. 1990). Brown pelicans can be seriously affected by oil spills because of their foraging strategy of plunge diving for fish and open water roosting. Commercial harvesting of anchovies may also be threatening brown pelican food resources. Breeding brown pelicans are also highly susceptible to disturbance. Important pelican roosting sites should be protected from human disturbance and illegal shooting.

*Egretta rufescens*

Reddish egret

USFWS: Candidate (Category 2)

CDFG: None

Tate: Audubon Special Concern

This subtropical species reaches its regular northern distributional limit at 30° north latitude in Baja California (Palmer 1962; Cogswell 1977; Wilbur 1987). Although not mentioned in Grinnell and Miller's (1944) distributional treatment of California birds, Willett (1933) called the species a "rare straggler" on the San Diego County coast as early as the late 1920s. Except for frequency of occurrence, this status has not changed, as a small number of these birds (1 to 4 individuals) is typically found along the south county coast from the mouth of the Tijuana River to Del Mar. Reddish egrets have been detected as far north as the mouth of the Santa Margarita River. Most birds occur in San Diego County during the fall and winter, but there are records for all months of the year (Unitt 1984; McCaskie 1987, 1989, 1990, 1991). Within the MSCP area, reddish egrets occur primarily in open tidal mudflats and salt marshes of the Tijuana and San Diego rivers, mudflats in south San Diego Bay (Unitt 1984), and the Kendall-Frost Marsh in Mission Bay (Konecny and Newman 1989). There are no breeding records for the county.

*Plegadis chihi*

White-faced ibis

USFWS: Candidate (Category 2)

CDFG: Species of Special Concern, first priority

Everett: Declining

White-faced ibis formerly nested from Minnesota west to Oregon and south in to Utah and Colorado and locally down to the Gulf coast and Mexico (Terres 1980). Breeding colonies are now isolated, with the greatest abundance of breeding birds occurring in Utah, Texas, and Louisiana. This species has historically had a disjunct distribution in California, at least within the 20th century. San Diego County represents the southern extreme of the

species' west coast distribution, as it is considered rare in Baja California (Wilbur 1987). The white-faced ibis is an uncommon and irregular resident in San Diego County. Populations, however large, have always been concentrated in localized, suitable wetlands. There is little disparity in range between breeding and non-breeding seasons. Southern California's largest population (several hundred breeding birds) was at San Jacinto Lake, Riverside County, but this disappeared when the lake was drained in 1917. Records for the MSCP area are very few from the early part of the century, revealing a scattered winter distribution and one breeding record: about six pairs nesting near Escondido in 1901 (Willett 1933). This record is probably the same as that of the same number of birds in the same year reported from Guajome Lake on the San Luis Rey River (Garrett and Dunn 1981). No nesting was known in the county as of the mid-1930s (Willett 1933), and by 1965 there was no nesting documented in southern California other than a colony of 100 pairs at the mouth of the Alamo River (Salton Sea), Imperial County (Small 1960; Ryder 1967). The lack of early documentation may be an artifact of low observer effort during the first half of the century.

Records suggest an incipient and sporadic recovery from earlier in the century. Presently the white-faced ibis occurs in small numbers in lower river valleys in north coastal San Diego County, although small numbers also winter in the Tijuana River Valley (Unitt 1984; Konecny unpub.). Breeding remains sporadic in the county; recent colonies include only Buena Vista Lagoon (8 pairs in 1979) (Garrett and Dunn 1981; Unitt 1984) and Guajome Lake (20 pairs in 1986) (McCaskie 1986). Non-breeding birds are occasionally found along the coast in summer. Presence of non-breeders may represent potential breeding range expansion by young birds (see below). Consistent occurrence of a small flock on the San Dieguito River east of Lake Hodges in the summer of 1992 (Ogden unpub. data) is particularly intriguing given the lack of former breeding records from this river. Recent confirmed and suspected breeding colonies in inland locations in Los Angeles, Riverside, and Imperial counties (McCaskie 1986, 1988, 1991) suggest that the increase in San Diego County may be part of a regional phenomenon.

The white-faced ibis requires perennial marsh, wet fields, and shallow open water for its aquatic-based feeding habits (Grinnell and Miller 1944; Unitt 1984) and is thus geographically restricted in arid southern California. Aquatic habitats must be rich in invertebrate and small vertebrate prey. Unlike most other wading birds, this species nests near the ground in tall, extensive, undisturbed marshes (Palmer 1962; Burger and Miller 1977). Nesting begins in April. Three to five eggs are incubated mostly by the female

(Bent 1926). The young remain associated with the nest for about five weeks (Cogswell 1977), but the birds remain gregarious at all times of year (Palmer 1962; Burger and Miller 1977).

Several factors of age, sociality, and site fidelity may affect the establishment of new breeding colonies. These include: the species is long-lived (approximately 10 years) and age at first breeding is not documented (Palmer 1962), but may be as long as 2 or 3 years (Ryder 1967); white-faced ibis are able to shift nesting areas in response to changing availability of marsh habitat (Ryder 1967); and there is need for social nesting with other ibises and other waders, such as herons, gulls, and ducks (Palmer 1962; Burger and Miller 1977).

The primary reason for the decline of this species in California is the loss of extensive marsh nesting habitats (Remsen 1978). Allowing wetlands to dry up in the spring and summer for mosquito and cattail control also adversely impacts this species. Pesticides (e.g., dieldrin) were documented in the 1970s as causing large scale nesting failures at breeding colonies of this species in Utah, Texas, and Nevada and may be an additional cause of the decline of this species in California (Remsen 1978; Terres 1980). The lack of large undisturbed wetlands in San Diego County increases the probability of disturbance from human activity and livestock grazing at any current nesting locations. There is also a potential threat of nest predation by introduced domestic animals (e.g., dogs) and enhanced populations of natural predators (e.g., raccoons).

*Branta canadensis*

Canada goose

USFWS: Regulated game species

CDFG: Regulated game species

The Canada goose is the most widely distributed of North American waterfowl species, occurring from the Atlantic to the Pacific coast and from Alaska south to Mexico (Terres 1980). Canada geese breed in the northern United States, Canada, and Alaska and winter in the United States and Mexico. This species is composed of at least eleven recognized races that have developed because of ecological or geographical isolation on their breeding grounds (Belrose 1980). This species has a strong tendency to use particular migration and winter grounds resulting in highly localized populations which can include one or more races. There are twelve generally recognized wintering populations in the United States. The intermountain population ranges from central British Columbia east to central Alberta

and south to southern California (including San Diego County) and Arizona and is composed primarily of the western race of Canada goose, *B. c. moffitti* (Belrose 1980). The western race has a discontinuous breeding distribution in scattered wetlands and water bodies from northeastern California into Canada. Two other races -- the cackling goose, *B. c. minima*, a rare winter visitor, and the lesser Canada goose, *B. c. parvipes*, a winter visitor of undetermined frequency -- have also been reported from San Diego County. Within San Diego County, the Canada goose is an abundant but localized winter visitor with large flocks occurring at Whalen Lake and Lake Henshaw (Unitt 1984). Within the MSCP area some locations where flocks of Canada goose are often detected during winter include Sweetwater Reservoir, Lake Hodges, the eastern and western ends of the San Dieguito River Valley, Tijuana River Valley, and coastal marshes and bays. Compared with the nineteenth century, wintering Canada geese had become rarer and less widespread in San Diego County by the 1970s (Unitt 1984).

Canada geese first arrive on San Diego wintering grounds in early November and leave by March. During the winter, the Canada goose often forages in marshes, agricultural fields, grasslands, and other open fields and meadows. Canada geese browse on the leaves of clovers and grasses, and utilize cultivated grains (e.g., corn, winter wheat, alfalfa, soybeans, millet, etc.) (Belrose 1980). This species also forages in wetlands on roots, tubers, seeds, stems, and leaves of marsh plants (e.g., marsh grasses, eelgrass, algae, widgeon grass, pondweeds, and bulrushes) (Terres 1980). Canada geese feed in the early morning and late afternoon and in between they often rest on open water, open shoreline, sandbars, and mudflats where they are safe from disturbance. It is important that foraging habitat be large and open with a close undisturbed body of water that is large enough to provide a feeling of security (Belrose 1980; Zeiner et al. 1990).

Canada geese are among the earliest birds to nest in the Arctic and subarctic regions in the spring, nesting as soon as the snow has melted from the nest site. This species prefers islands and islets for nesting but will also use a variety of other sites including dense marshes, cliffs, muskeg, tundra, abandoned heron and osprey nests, elevated man-made structures, haystacks, dikes and ditch banks, and the tops of muskrat houses (Belrose 1980). The nest site must be close to water (90 percent of nests are within 50 yd of water), and provide nesting cover with an exposed view for the incubating bird. The average clutch size is approximately 5 eggs and varies from 2 to 12 eggs (Belrose 1980; Terres 1980). Depending on the race of goose incubation takes from 25 to 30 days and is performed only by the female with the male standing guard nearby. The primary cause of

nest failure is predation followed by desertion and destruction of the nest by other natural agents (e.g., flooding). Both parents watch after the brood, which leaves the nest within several to 24 hours of hatching. Depending on race of Canada goose, goslings fledge at approximately 45 to 70 days and remain with their parents until the following spring.

Canada geese are a regulated game species. Harvesting quotas and hunting regulations for each geographic region are decided upon by the Director of the USFWS based on recommendations of the four North American flyway councils (made up of directors of state conservation departments), major conservation organizations, and USFWS staff. The four flyway councils develop and adopt recommendations on population objectives and hunting regulations for each waterfowl species. These decisions are based on extensive data obtained from annual breeding and winter surveys, and from information on annual hunting harvest and mortality rates.

The decline of the wintering population of Canada geese in San Diego County over the last century is attributed to the loss of wetland habitat. Canada geese foraging areas are also impacted by livestock over-grazing which reduces the food supply (Zeiner et al. 1990).

*Haliaeetus leucocephalus*

Bald eagle

USFWS: Threatened

CDFG: Endangered

Everett: Declining

The bald eagle breeds from Alaska and Canada south along the Rocky Mountains, along the Pacific Coast to northern California, and along much of the Atlantic Coast, with some isolated populations in other areas (e.g., Arizona, Gulf of Mexico; Johnsgard 1990). This species winters throughout its breeding range, especially, along the coasts, as well as further south in scattered local populations throughout the western United States, and along the Upper Mississippi River Valley. In California, bald eagles still breed in Butte, Lake, Lassen, Modoc, Plumas, Shasta, Siskiyou, and Trinity counties and have been reintroduced on Catalina Island. The bald eagle occurs in San Diego County as an uncommon winter visitor, being most frequent at Lake Henshaw and occasionally at Whalen Lake, Lake Cuyamaca, Sweetwater Reservoir, San Vicente Reservoir, Torrey Pines State Reserve, Point Loma, and Tijuana River Valley (Unitt 1984; Ogden unpub. data). Fall migrants are rarely seen along the coast (Unitt 1984). Historically, the bald

eagle bred at Little Tecate Mountain in 1936, the only known location in San Diego County.

The bald eagle requires large bodies of water or free flowing streams and rivers with fish and adjacent snags or trees for perches. This species feeds on fish, waterfowl, muskrats, squirrels, rabbits, and carrion. Foraging usually occurs just after dawn and in late afternoon. Bald eagles spend much of their time perching and often forage from perches (Caton et al. 1992). Preferred eagle perches consist of large diameter, tall trees which extend above the canopy providing greater ease of accessibility and a good view of the surrounding terrain (Buehler et al. 1992). Preferred perches are usually located close to favored foraging areas, which are often shallow waters near shorelines where fish are concentrated, visible, and accessible to eagles (Caton et al. 1992; Brown 1993). Bald eagles will frequently use live trees for perching, although they preferentially use dead or partially dead trees with a more open structure conducive to perching (Caton et al. 1992; Buehler et al. 1992). Wintering bald eagles often use creeks to successfully forage for prey in arid habitats in Arizona (Brown 1993). Bald eagles are sensitive to human disturbance and will avoid areas situated near human development or with high levels of human activity (Caton et al. 1992; Buehler et al. 1992).

Breeding habitat generally consists of mature conifer forests. In California, 87 percent of nesting sites are within 1.6 km (1 mi) of water Johnsgard 1990. Breeding territories in Alaska varied from 28 to 112 acres and averaged 57 acres (Hensel and Troyer 1964). Distance between nests varied from 1 km (0.6 mi) in Alaska to 17 km (10 mi) in Washington. Nesting can begin as early as February, but more commonly begins in March. One to three eggs are laid and are incubated for 34 to 36 days. The nest can be up to 8 ft in diameter and 12 ft in depth (Brown and Amadon 1968) and is composed of sticks with a lining of mosses, pine needles, grasses, or feathers. Nests can be built in trees 10 to 150 ft off the ground, on rocky cliffs, or on the ground. The young fledge 75 days after hatching and become sexually mature in their fifth year.

This species has declined because of shooting, human disturbance at nest sites, loss of nesting trees, loss of open water habitat due to human activities, and contamination of food, especially by pesticides, which has resulted in a decrease in reproduction through DDE-induced eggshell thinning (Anderson and Hickey 1970). Bald eagles are often electrocuted while perching on high voltage power lines.

*Circus cyaneus*

Northern harrier

USFWS: Protected by the Migratory Bird Treaty Act and the Convention for the Protection of Migratory Birds and Animals

CDFG: California Species of Special Concern, second priority

Tate: Audubon Blue List

Everett: Declining

The northern harrier is distributed throughout North American and Eurasia (Johnsgard 1990). Northern harriers breed from northern Alaska and Canada, south into roughly the northern two-thirds of the western United States, and the northern one-third of the eastern United States. San Diego County lies at the southwest edge of the harrier's breeding range in North America. Northern harriers are migratory and utilize the southern portion of their breeding range during the winter. They also extend their range further south in the winter to as far as Central America. The northern harrier is declining in North America, with the southernmost limits of its breeding range contracting northward. Within California, the northern harrier breeding population has greatly declined, especially since the early 1940s (Remsen 1978). The wintering population has also decreased since the early 1950s. In San Diego County, the harrier was once more widespread in its breeding distribution over the coastal lowlands (Bloom pers. comm.; Unitt 1984). San Diego County has a small breeding population and a larger wintering population of northern harriers (Unitt 1984). In San Diego County, some of the locations where harriers have recently been documented nesting include the Otay River Valley (Ogden 1992e), Proctor Valley (Unitt 1984), Camp Pendleton and the Sweetwater River Estuary (Bloom pers. comm.). Northern harriers are also suspected of breeding within the last fifteen years at Otay Mesa (Ogden 1992e), Tijuana River Estuary, Sorrento Valley, northeast Lake Hodges, and south of San Marcos (Unitt 1984).

Northern harriers forage in open habitats such as grassland, agricultural fields, marshes, and open coastal sage scrub habitats in San Diego County (Unitt 1984; Ogden 1992e). Harriers have a varied diet, often specializing on small to medium-sized animals such as meadow voles (*Microtus* spp.; Johnsgard 1990). Northern harriers will also prey upon avian species, especially fledgling passerines, and upon insects, reptiles, amphibians, and carrion (Terres 1980). Harriers have a specialized hunting style which involves flying very close over low vegetation, systematically covering an area until a prey species is detected. At this point the harrier hovers, stalling and blocking escape by the prey, until it is able to

ascend for a strike. Northern harriers have a facial disk and well developed hearing similar to an owl's, allowing them to hunt for concealed prey using auditory cues (Rice 1982).

Northern harriers are unique among raptors, as males tend to have more than one mate under appropriate ecological conditions (Johnsgard 1990; Simmons et al. 1986; Hamerstrom 1986). Northern harrier pair bonds typically last for one breeding season. Harriers nest on the ground and prefer wetland areas (e.g., marshes, wet meadows) with adequate cover for concealment of the nests. Harriers will also nest in cultivated fields, grasslands, pastures, and occasionally in brushland or rangeland. The female harrier normally lays four to five eggs in April or early May and incubates them for 29 to 39 days (Johnsgard 1990). Replacement clutches will be laid if the first clutch is lost early in incubation. After a week of brooding the nestlings, the female begins to augment the food brought in by the male for the chicks. Fledging occurs an average of 35 days after hatching, with the smaller males maturing and leaving the nest quicker than the larger female nestlings. Fledglings can remain dependent on the adults for three or more weeks after leaving the nest. Northern harriers are very protective of nesting sites and will attempt to chase away intruders, including humans, near nesting areas. To prevent disruption of breeding, a buffer zone with a width of 300 ft is recommended around each nesting site (Bloom pers. comm.). In this buffer zone new development and the construction of roads and trails would be prohibited and human activity would be restricted.

Reasons for the decline of the northern harrier are destruction of marsh habitat, loss of other foraging and nesting habitats (e.g., native grasslands and moist meadows) to development, grazing of grasslands (reducing nesting cover), adverse agricultural practices (e.g., plowing and burning of fields during the breeding season), and increases in reproductive failure caused by environmental contaminants (e.g., DDT) (Remsen 1978; Hamerstrom 1986; Zeiner et al. 1990).

*Accipiter cooperii*

Cooper's hawk

USFWS: Protected by the Migratory Bird Treaty Act and the Convention for the Protection of Migratory Birds and Animals

CDFG: Species of Special Concern, third priority

Tate: Audubon Blue List

Everett: Declining

Cooper's hawks breed from central Canada south to northern Baja California and into central Mexico. This species was once considered a common nester throughout California (Grinnell and Miller 1944). The Cooper's hawk is an uncommon migrant, winter visitor, and rare breeding resident in San Diego County (Unitt 1984). Some documented nesting locations within the MSCP area include the San Diego Wild Animal Park, Balboa Park, San Ysidro Mountains, Lake Hodges, Dulzura Creek, and the Sweetwater River (Unitt 1984; Ogden 1992e and unpub. data).

The Cooper's hawks nest primarily in oak woodlands and occasionally in riparian habitat and eucalyptus, ranging from sea level to an altitude of 9000 ft. Foraging usually occurs in riparian and oak woodland habitats. Cooper's hawks also forage in coastal sage scrub and chaparral, typically on small mammals and birds. Cooper's hawks nest in trees usually 6 to 15 m (20 to 50 ft) above the ground. The nest is a platform of sticks lined with bark. Nesting can begin in late March, but more commonly later in April. Two to six eggs are laid and are incubated by the female for 35 to 65 days, during which time she is fed by the male. Typical fledging success is two young per pair (Craighead and Craighead 1956). Cooper's hawks disperse widely outside the breeding season. Nests have been reported to be 1.6 to 4.2 km (1 mi to 2.6 mi) apart. Cooper's hawks do not tolerate other birds of prey nesting in the same woodland. Prior to pair formation, males will defend an area about 100 m (330 ft) around potential nest sites (Brown and Amadon 1968). Home ranges have been estimated to vary from 45 to 1312 acres (Craighead and Craighead 1956). Cooper's hawks are susceptible to disturbance from human activity at nest sites (Bloom pers. comm.). A buffer zone of 300 ft width is recommended around nesting trees (Bloom pers. comm.). Within this buffer zone, new development and the construction of roads and trails should be prohibited and human activity should be restricted.

The Cooper's hawk has declined as a breeding species in California. This decline is attributed to destruction of riparian and oak woodlands, human disturbance, egg shell

thinning from pesticide contamination, and illegal take of nestlings for falconry (Remsen 1978; Anderson and Hickey 1970).

*Buteo swainsoni*

Swainson's hawk

USFWS: Protected by the Migratory Bird Treaty Act and the Convention for the Protection of Migratory Birds and Animals

CDFG: Threatened

Tate: Audubon Special Concern

Everett: Declining

The Swainson's hawk breeds from central Alaska to western Minnesota, south to south-central Texas. In California, current nesting locations are in the Central Valley, Klamath Basin, Mojave Desert, Owens Valley, Antelope Valley, Fish Lake Valley, and eastern San Luis Obispo County. Remsen (1978) considers the Swainson's hawk to have suffered the most severe decline of any bird in the state, with the exception of the least Bell's vireo. Bloom (1980) estimates a breeding population of 100 pairs remaining in California. The Swainson's hawk is an uncommon spring and rare fall migrant to San Diego County (Unitt 1984). It was once a common breeding hawk throughout nonforested lowlands in California, but has been extirpated as a breeding resident from San Diego County since the 1930s. In western San Diego County it is irregularly and uncommonly seen during migration in the Tijuana River Valley, Point Loma, and Presidio Park (Unitt 1984), Salt Creek Canyon, Proctor Valley (Ogden unpub. data), Camp Pendleton (Bloom pers. comm.) and the lower Sweetwater River (Lovio unpub. data). Swainson's hawks forage during migration in grasslands and agricultural fields. They feed largely on insects, and also on small mammals, reptiles, and amphibians.

Swainson's hawks usually nest in single trees located in open riparian areas, oak savannah, and juniper-sage flats. Nesting begins in late March. Clutch size is usually two to four eggs. The eggs are incubated by both sexes for 28 days (Beebe 1974). Young hawks leave the nest 30 days after hatching. Typical fledging success is 0.6 young per pair (Craighead and Craighead 1956). The nest can be located in trees, bushes, or utility poles 1.3 m to 30 m (4 to 100 ft) above the ground. The nest is composed of twigs, weeds, bark, and grasses, and is often repaired after fledging and used for several years. Documented home range sizes for Swainson's hawks are 0.7 to 5.4 km<sup>2</sup>. Distance separating active nests averaged 1.8 km (1.1 mi) (Craighead and Craighead 1956; Smith and Murphy 1973).

The major reason for decline of this species has been the conversion of its preferred breeding habitat to cropland (Remsen 1978). Swainson's hawks are shot while perched and in flight. Additionally, contamination with pesticides, human disturbance, and deterioration of wintering habitat in South America may be affecting the species' decline.

*Buteo regalis*

Ferruginous hawk

USFWS: Candidate (Category 2)

CDFG: Species of Special Concern, third priority

Tate: Audubon Special Concern

The ferruginous hawk breeds from southeastern Oregon, north into Saskatchewan and Manitoba, Canada, and east to northwest Texas and western Oklahoma (Johnsgard 1990). There are no breeding records from California (Zeiner et al. 1990). It winters primarily from southwestern United States to Baja California and central Mexico (Terres 1980). The ferruginous hawk is an uncommon visitor in San Diego County that prefers open fields and grasslands. Within the MSCP area, some locations where ferruginous hawks have been seen include the Otay River Valley, Otay Mesa, Proctor Valley, San Dieguito River Valley, and the Wild Animal Park (Ogden 1992e and unpub. data).

Ferruginous hawks forage on primarily jackrabbits, cottontails, ground squirrels, mice, and gophers found in grasslands. Nesting begins in February. Two to six eggs are laid, and are incubated for about 28 days by both sexes (Olendorff 1973). The young leave the nest between 38 and 50 days after hatching. Ferruginous hawks prefer to nest in tall, often isolated trees. The nest is typically 12 to 15 ft above the ground and is composed of sticks, twigs and old bones, lined with dried grasses and occasionally cow or horse dung. Home range sizes for ferruginous hawks have been reported to be from 17 to 117 km<sup>2</sup> (7 to 46 mi<sup>2</sup>). Ferruginous hawks do not tolerate other predators in their nesting area and have been known to attack red-tailed hawks, great horned owls, and coyotes (Angell 1969).

The decline of the ferruginous hawk can be attributed to loss of large, open tracts of grasslands and desert scrub habitats used for nesting and for winter foraging. They are also shot by hunters while feeding on roadside rodents and are highly susceptible to human disturbance at the nest.

*Aquila chrysaetos*

Golden eagle

USFWS: Fully Protected by the Bald Eagle Protection Act

CDFG: California Fully Protected Species; Species of Special Concern, third priority

The golden eagle is distributed throughout the northern hemisphere with a single subspecies found in North America (Johnsgard 1990). The North American breeding distribution encompasses the western half of the United States and much of Canada and Alaska. San Diego County is near the southwestern limits of distribution for this species in North America with some golden eagles occurring south into Baja California. Golden eagle have historically been found throughout San Diego County from the coast to the foothills, mountains, and deserts.

There is extensive historic eagle nesting information in San Diego County from egg collectors and naturalists. James B. Dixon (1937) studied golden eagle pairs in the northern portions of the county from 1900 to 1936, documenting nest sites, and delineating territories. He found golden eagle densities ranged between 49 and 153 km<sup>2</sup> per pair (19 and 59 mi<sup>2</sup> per pair) with an average density of one pair per 93 km<sup>2</sup> (36 mi<sup>2</sup>). Scott (1985) conducted a recent study of the golden eagle population in the western half of San Diego County, focusing on human impacts to the breeding population. He found a 33 percent decrease in breeding golden eagle pairs between 1928 (estimated 55 pairs) to 1978 - 1981 (38 pairs). Most breeding pairs were lost from coastal and foothill areas bordering developing cities (e.g., Oceanside, Escondido, El Cajon, and San Diego). The density of the breeding population decreased from Dixons' early estimates to 142 to 181 km<sup>2</sup> kilometers per pair (55 to 70 mi<sup>2</sup> per pair) in 1978. Recent field observations suggest that golden eagles are still declining in San Diego County (Scott pers. comm.; Bloom 1991). Within the MSCP area, some locations where golden eagle breeding activity has been observed during the last few years include Ramona, Lake Hodges, tributary canyons of eastern San Pasqual Valley, San Vicente Reservoir, El Capitan Reservoir, the San Miguel Mountains, San Ysidro Mountains, and Marron Valley (Bloom 1991, Colton pers. comm.; Ogden unpub. data; Preston pers. comm.; Roychak pers. comm.; Scott unpub. data; and USFS unpub. data). There are a number of other historic and potential nesting sites within the MSCP area for which there is no information on the current status of eagle breeding activity.

Golden eagles primarily forage in grassland, broken chaparral, and coastal sage scrub in San Diego County where eagle prey species (California ground squirrel *Spermophilus*

*beecheyi*, black-tailed jackrabbit *Lepus californicus*, desert cottontail *Sylvilagus audobonii*, and brush rabbit *Sylvilagus bachmani*) are present (Bloom 1991, pers. comm.; Johnsgard 1990; Unitt 1984). Golden eagles also utilize carrion and will rarely kill larger prey such as domestic sheep and goats, and mule deer (*Odocoileus hemionus*) fawns (Snow 1973; Johnsgard 1990).

Juvenile eagles have a relatively high mortality rate compared to adults and reach sexual maturity at three to four years of age (Snow 1973; Johnsgard 1990). Golden eagles tend to maintain long-term, year-round, monogamous pair bonds. A pair may not attempt to breed every year. Studies have documented that in some cases 10 to 25 percent of the adult population do not breed in a given season. Pairs often build and maintain more than one nest site, typically having two to three alternate nest sites, which can be used in different breeding attempts. In San Diego County, golden eagles nest primarily on ledges in granite cliffs but will also use trees (e.g., oak and sycamore). Nests are frequently located in areas of rugged terrain associated with chaparral and sage scrub habitats. Nest maintenance often occurs throughout the year, with the majority of courtship and nest building occurring in January and February (Scott 1985). Eggs are typically laid in February and incubation lasts approximately 42 days. Clutch size ranges from one to four eggs with most pairs producing two to three eggs (Johnsgard 1990). Incubation and brooding are primarily done by the female. The male usually captures and brings food into the nest, which the female feeds to the young. Fledging occurs nine to ten weeks after hatching (by late June) and parental care continues into August. Scott (1985) documented a mean of 1.02 ( $\pm$  0.07) young fledged per pair of golden eagles for 113 nesting attempts in western San Diego County between 1971 and 1981.

Golden eagles have historically declined in the United States because of shooting, poisoning, egg collecting, power line electrocution, habitat loss, and human disturbance at the nest (Snow 1973; Johnsgard 1990). Golden eagles are sensitive to human activity near the nest, especially at the pre-egg laying, incubation, and young chick stages of the nest cycle (Bloom 1991). Human disturbance ranging from nest visitation, rock climbing, hiking, and other human activity near a nest can cause abandonment or disrupt important nesting activities (e.g., incubation, brooding), causing a subsequent nest failure. Human disturbance was the cause of 21, 46, and 85 percent of observed golden eagle nest desertions in three different studies (Snow 1973). Scott (1985) found that as the regional human population and associated disturbances increased in San Diego County, some eagles abandoned traditional nest sites and either remained as non-breeders within their territories

or disappeared altogether. To avoid disturbing nesting golden eagles, a buffer zone with a width of 4000 ft is recommended around the nest site (Bloom pers. comm.). Within this buffer zone there should be no new construction of roads or structures, and human activities should be restricted during the breeding season.

*Falco peregrinus anatum*

American peregrine falcon

USFWS: Threatened

CDFG: Endangered

Everett: Threatened

The peregrine falcon is an uncommon breeding resident of North America. In California, it breeds along the coast, in the Sierra Nevada, and in mountainous areas of northern California. This species is most often seen as a rare fall and winter, and casual spring visitor in San Diego County. In 1989 one pair of peregrine falcons successfully nested on the Coronado Bridge and has subsequently nested each year since (Pavelka 1990). This is the first documented nesting of this species in San Diego County since 1950. Monk (1981) estimated the breeding population in California to be 39 pairs. Peregrine falcons are likely to occur in coastal areas where avian prey species are abundant. They have been detected in the Tijuana River Valley, San Diego Bay, San Diego River Valley, Mission Bay Park, Batiquitos Lagoon, Lake Hodges, San Pasqual River Valley, San Vicente Reservoir, and Sweetwater Reservoir (Unitt 1984; Ogden unpub. data; Konecny unpub. data; Patten unpub. data; Preston unpub. data).

Nesting begins in early March. Three to seven eggs are laid and incubated for about 32 days. Peregrine falcons will lay a second clutch if the first is destroyed or removed. The young fledge 35 to 42 days after hatching (Brown and Amadon 1968). Fledging success has been reported to range from 2.2 to 2.5 young per pair (Monk 1981). Nesting sites are located on high cliffs and in trees or man-made structures. Peregrine falcons do not build their own nest, but use abandoned nests of eagles, hawks or ravens, or will scrape out a shallow hollow in soil, decomposed rock, or gravel to lay their eggs. The same nest site may be used for many years. Home range size is approximately 320 km<sup>2</sup> (125 mi<sup>2</sup>) and nests are spaced 5 to 12 km (3 to 7 mi) apart (Hickey 1969). Peregrines are more adaptable to human activity and development near nesting areas than other raptors and have been established in urban areas as breeders (Cade and Bird 1990). However, human activity at the nest site (e.g., rock climbing or camping directly below the nest) can cause disruption of breeding. In natural areas, activity or development near the nest site may be

disruptive and buffer zones for this species should be established individually for each site based on topography, cover, type of proposed development and activity near the nest (Bloom pers. comm.).

Peregrine falcons forage on a variety of birds including pigeons, ducks, grebes, coots, sandpipers, other raptors (e.g., northern harrier and American kestrel), and passerines. They will also forage on small mammals, fish, and insects. In Utah, nests averaged 12.2 km (7.6 mi) from the nearest large marsh (over 320 surface acres) (Porter and White 1973).

The population of peregrine falcons suffered dramatic reproductive failure due to pesticide pollution in the 1960s and 1970s (Johnsgard 1990). Peregrine falcon populations continue to be vulnerable to pesticide contamination while wintering in Central and South America. Low breeding densities, minimal migration between populations, and reduced foraging habitat also contribute to unstable demographic conditions (Finch 1992). In the 1970s, a captive breeding program was implemented to supplement wild populations. Many captive reared peregrine falcons have been successfully introduced into the wild. Predation by great horned owls on captive-reared young falcons has been a problem because there are no adults around to protect them. The California program has met its success criteria. Recently the federal status of the peregrine falcon was changed from endangered to threatened because of the increase in the population nationwide.

*Rallus longirostris levipes*

Light-footed clapper rail

USFWS: Endangered

CDFG: Endangered

Tate: Audubon Special Concern

Everett: Threatened

The light-footed clapper rail was formerly common in all coastal marshes from Santa Barbara south to Bahia de San Quintin, Baja California. Light-footed clapper rails are uncommon and very localized residents in San Diego County (Unitt 1984). Since 1980, breeding pairs of light-footed clapper rails have been found at 22 marshes in California. A 1991 survey found a total of 235 pairs in 11 marshes in southern California (Zemba 1991). This represents a decline in the number of marshes with breeding pairs. About 55 percent of the state population is found in Upper Newport Bay. The second largest population is found in the Tijuana National Wildlife Refuge. Within the MSCP study area,

Zembal reported 9 pairs in the Kendall-Frost Marsh, 5 pairs in the San Diego River Flood Control Channel, 4 pairs in the Sweetwater Marsh, 1 pair at the E Street Marsh, 2 pairs at the South Bay Marine Reserve, and 41 pairs in the Tijuana Marsh in 1991 (Figure 2-13). The population in the MSCP study area represents 27 percent of the total state population.

Light-footed clapper rails are found in saltwater marshes dominated by cordgrass (*Spartina foliosa*) and pickleweed (*Salicornia*) which they use for nesting and escape cover. Clapper rails require a healthy tidal saltmarsh environment; abundant food in the form of crabs, clams, and related invertebrates; and tidal flats interspersed with saltmarsh vegetation as a feeding area. These conditions occur in marshes with an adequate tidal flow to preserve normal salinity ranges and prevent stagnation (USFWS 1980).

The clapper rail's nest is a loose arrangement of plant stems on high ground, well concealed in dense vegetation, usually *Spartina*. One typical nest measured 28 cm by 18 cm on the outside, with a cavity 13 cm across and 1.3 cm deep. Nests are constructed of whatever vegetation is available and are well concealed. The nests are buoyant and will float with the rising tide (Jorgensen 1975). Nesting occurs from mid-March to 1 July. Most egg laying occurs from early April to early May, with 3 to 11 eggs per clutch, usually 5 to 9. The incubation period averages 23 days (Jorgensen 1975). Both sexes are believed to incubate. The young are able to swim on the day of hatching.

This rail is endangered because its range is restricted to the relatively small remnants of healthy marsh habitat which remain in disjunct patches along the coast. Much of the former habitat of this species has been developed or degraded so that it no longer supports light-footed clapper rails. All of the small subpopulations face serious problems as a result of habitat degradation, human disturbance, and predation of nests, adults, and young by domestic animals (e.g., dogs and cats), introduced predators (e.g., red fox), and artificially enhanced populations of native predators (e.g., gulls, raccoons, and skunks). Habitat degradation is caused in part by dredging and filling of wetlands, sediment build up in wetlands caused by upstream development or flood control, and the loss of regular tidal connection with the ocean. Potential problems with contaminants have been identified in a significant portion of the Tijuana National Wildlife Refuge (USFWS 1986). Noise levels may affect light-footed clapper rail communication and breeding success and should be studied. At least one additional large, viable population center is needed to provide this species with adequate protection from extinction (Zembal 1989). Creating nesting

substrates (e.g., floating platforms) has been shown to be a successful management technique at the Kendall-Frost Reserve (Zemba 1989).

*Charadrius alexandrinus nivosus*

Western snowy plover

USFWS: Threatened

CDFG: Species of Special Concern, second priority

Tate: Audubon Special Concern

Everett: Declining

The western snowy plover occurs along the Pacific coast from southern Washington, south into Baja California and east into Utah and New Mexico. Surveys conducted between 1977 and 1980 of portions of the western range of this species documented that it had disappeared from a number of breeding sites along the coast (Page and Stenzel 1981). Surveys in 1988 and 1989 showed that the western snowy plover population had continued to decline by 20 percent from the levels documented from 1977 to 1980 (Page et al. 1991). The western snowy plover is a common migrant, winter visitor, and a declining and local resident in San Diego County (Unitt 1984). Known breeding locations within the MSCP study area include the mouth of the Tijuana River, Silver Strand State Beach, Silver Strand bay shore, Western Saltworks in south San Diego Bay, Torrey Pines State Beach, and Sweetwater River mouth (Figure 2-13). Other historical nesting sites in the MSCP area include the North Island Naval Air Station, Mission Bay, Mission Beach, Ocean Beach, Pacific Beach, and Lindberg Field (Page and Stenzel 1981).

Western snowy plovers breed on undisturbed, flat areas with loose substrate, such as sandy beaches or dried mudflats, along the California coast between April 1 and September 15. Two to six eggs are laid in a shallow depression, scraped in the sand. The scrape usually has small pieces of shell and vegetation or driftwood associated with it. The eggs are incubated for 24 days, mostly by the male. Adults use distraction displays to lead predators away from the nest. The young are highly precocial and are following the adults within hours of hatching. Young fledge and are independent of the adults after 29 to 47 days (Ehrlich et al. 1988). Nesting density is apparently dependent on predatory pressure. Page et al. (1983) documented nesting density to be one nest per 15 acres at Mono Lake where predatory pressure was high, and 20 nests per 15 acres at Monterey Bay where predatory pressure was low. Western snowy plovers forage primarily on wet sand and at the beach-surf interface, where they feed on small crustaceans, marine worms, insects, and amphipods.

The snowy plover is declining because of human disturbance, vehicular destruction of nests, loss of feeding and nesting habitats to development, and habitat degradation (Remsen 1978; Page et al. 1983). This species is also vulnerable to predation of nests and young by domestic animals (e.g., dogs and cats), introduced predators (e.g., red fox), and artificially enhanced populations of native predators (e.g., raptors, gulls, raccoons, skunks, and coyotes). In some areas, such as in the Tijuana National Wildlife Refuge and Silver Strand State Beach, the western snowy plover co-occurs with the California least tern. Common least tern management practices, such as placing a chick fence around the colony, are not compatible with the foraging requirements of the snowy plover.

*Charadrius montanus*

Mountain plover

USFWS: Candidate (Category 2)

CDFG: Species of Special Concern,

Everett: Declining

Mountain plovers breed on the short grass prairies of the high plains of Montana, Wyoming, Colorado, and New Mexico. They have been extirpated from previous breeding areas in North and South Dakota, Nebraska, and Kansas. California supports most of the wintering population of mountain plovers. An analysis of Christmas Bird Counts in southern California suggests that mountain plovers have declined by 89 percent (Leachman and Osmundson 1990). Mountain plovers are a locally common winter visitor to San Diego County, usually arriving in October and leaving by late January (Unitt 1984). This population has declined in recent years due to conversion of grassland habitat to urbanization. Guy McCaskie reports that flocks up to 1,000 birds were relatively common in 1962, whereas now, flocks do not exceed 300 birds (pers. comm. in Leachman and Osmundson 1990). Within the MSCP area mountain plovers are known to occur regularly only in the Tijuana River Valley (Unitt 1984).

Mountain plovers arrive on their breeding grounds in late March or early April. They exhibit some site tenacity; some individuals return to the same area each year. The nest is a slight depression on barren ground or grassland and commonly contains one to four eggs. The eggs are incubated for 29 days and fledging occurs 33 to 34 days after hatching. The female typically lays a second clutch of eggs which she incubates, leaving the male to incubate the first clutch. Nest density has been reported to be 31 nests per 162 acres (Graul 1975).

In winter, mountain plovers prefer grasslands and plowed fields. They have also been observed on football fields, bare dirt, coastal prairies, alkaline flats, and sprouting grain fields. They feed almost exclusively on grasshoppers, with crickets, beetles, and flies constituting a small proportion of their diet.

As early as 1914, declines were reported in this once abundant species due primarily to market hunting and conversion of habitat to agriculture. The Migratory Bird Treaty Act of 1918 outlawed hunting of this species, but the loss of both breeding and wintering habitat to urbanization and agriculture continues (Terres 1980). Chemical spraying and automobile traffic are also reported reasons for its decline (Leachman and Osmundson 1990). The extent of the decline has been difficult to assess due to the lack of any range-wide census. Counts of this bird are often unreliable due to its cryptic coloration and behavior.

*Numenius americanus*

Long-billed curlew

USFWS: Candidate (Category 3C)

CDFG: Species of Special Concern

Tate: Audubon Special Concern

The long-billed curlew nests throughout Canada, south into Utah, New Mexico, and Texas. In California, it breeds in Siskiyou, Modoc, and Lassen counties. By the 1930s this species has declined from many breeding places in the plains and prairies. It winters from California and east to Louisiana and south to Baja California and Guatemala. In San Diego County, the long-billed curlew is a fairly common fall and spring migrant and winter visitor, and is uncommon and local in summer (Unitt 1984). It is not known to breed in San Diego County. Localities in the MSCP study area where the long-billed curlew regularly occurs include the Tijuana River mouth, Tijuana River Valley, San Diego Bay, Silver Strand, San Diego River Flood Control Channel and San Diego River mouth, Kendall-Frost Marsh in Mission Bay, Los Peñasquitos Marsh, and San Dieguito Marsh (Unitt 1984; Konecny and Newman 1989; Konecny unpub. data).

The timing of migration into San Diego County is not well documented. The long-billed curlew probably begins to appear in July and is most numerous in August and September (Unitt 1984). Small numbers of curlews remain through spring and summer at preferred wintering locations. The curlew requires salt marsh, tidal mudflats, flooded agricultural fields, sand spits, or salt ponds for foraging during winter. Long-billed curlews feed on

crayfish, small crabs, snails, toads, grasshoppers, beetles, caterpillars, and occasionally berries (Terres 1980).

Breeding occurs in April or May in grassland or meadow habitats. Four eggs are usually laid in a nest which is a slight depression, lined with grasses and weeds. The eggs are incubated for 27 days by both sexes. The precocial chicks fledge about 45 days after hatching. Nesting density was found to be one pair per square kilometer in eastern Washington (Fitzner 1978).

The long-billed curlew has declined from vast regions of its prairie and great plains breeding habitat because of large scale conversion of grasslands to agriculture. In the early 1900s it was also extirpated as a winter visitor from much of the Atlantic coast by over hunting (Terres 1980).

*Sterna elegans*

Elegant tern

USFWS: Candidate (Category 2)

CDFG: Species of Special Concern

The elegant tern is a colonial-nesting seabird whose world nesting sites are limited to one or two islands (including Isla Rosa) in the Gulf of California and two coastal sites in the United States (Bolsa Chica wetlands in Orange County and the Western Salt Company evaporator ponds in South San Diego Bay, San Diego County). This species winters on the Pacific Ocean coast of Central and South America. The San Diego County breeding colony was the first documented breeding site north of Baja California, it was first detected in 1959 and has steadily grown in size since discovery (Unitt 1984). This colony was probably established because of the destruction of other island colonies in the Gulf of California. Elegant terns arrive in San Diego in March from the southern wintering areas. Large numbers of post-breeding birds augment the local breeding population in late June. Elegant terns leave San Diego County by late December for southern wintering grounds.

For successful nesting, the species requires relatively undisturbed island-like habitats for dense colony sites (such as dikes enclosing salt evaporator ponds) adjacent to the ocean (Kirven 1969; Evans 1973). Also necessary are relatively undisturbed pre- and post-nesting roosting sites near the nesting area, typically extensive sandbars or mud flats such as Delta Beach in Coronado, the mouths of the Tijuana and San Diego rivers, and San Elijo Lagoon. Elegant terns begin to nest in mid-April, extending through June. They nest in

extremely dense colonies (up to 823 pairs total in 1981 at San Diego Bay, Schaffner 1986). Ready access to foraging areas is important both at the courtship and nesting sites because both females and young are fed extensively during the breeding period. Egg-laying, incubation, and hatching are highly synchronized, and many of the young are tended in a creché (ambulatory flock) adjacent to the immediate colony site.

Foraging is accomplished by plunge-diving for surface-swimming fish (primarily northern anchovy) in inshore oceanic habitats (as far as 15 mi from the nesting site but typically just beyond the breaking waves) or in embayments such as south San Diego Bay (Schaffner 1982, 1986).

The elegant tern is very sensitive to human disturbance (Remsen 1978). This species is also vulnerable to predation by terrestrial predators (e.g., raptors, dogs, cats, raccoons, skunks, opossums, foxes, etc.) during the nesting phase from early April through late July. They may gain some protection from predators by nesting with more aggressive species such as Caspian terns (Evans 1973). Because of the limited number of breeding colonies for this species, it is also vulnerable to catastrophic events, nest destruction from off-road vehicles, and loss of breeding habitat. Fluctuations in food supply caused by over-fishing, or seasonal and climatic weather changes may also affect the reproductive success and consequent population size of this species (Schaffner 1986).

*Sterna antillarum browni*

California least tern

USFWS: Endangered

CDFG: Endangered

Everett: Threatened

The California least tern breeds from San Francisco Bay south to Baja California. Historically this species nested in California in colonies of up to thousands of birds. Wintering areas for the least tern are thought to be along the Pacific coast of South America. The state population of least terns was estimated at less than 600 nesting pairs in the mid-1970s, but has since stabilized at about 1200 pairs (CDFG 1991). There was a moderate decline in population during the mid-1980s due to adverse oceanographic conditions caused by the El Niño current which affected tern food resources. The state population peaked at about 1700 pairs in 1990, with about 20 colonies supporting 20 or more pairs (Fancher 1992). In San Diego County, the California least tern is a fairly common to common but localized summer resident from early April through the end of

September (Unitt 1984). San Diego County supports a significant proportion of the state population of nesting least terns. The number of nesting pairs in San Diego County has fluctuated from a low of 416 pairs in 1978 to 800 in 1990 and 500 in 1991. Major nesting areas in the MSCP study area in 1991 include: Beacon Island (125 pairs) and Mariner's Point (125 pairs) in Mission Bay, Tijuana National Wildlife Refuge (63 pairs), Sweetwater National Wildlife Refuge (45 pairs), Delta Beach Naval Amphibious Base (35 pairs), and the Western Saltworks (31 pairs) in south San Diego Bay (Figure 2-13). There are also colonies on North Island, on the Chula Vista Wildlife Reserve, and at San Elijo and Baticuitos lagoons (California Least Tern Recovery Team unpub. data).

This small migratory tern nests colonially on undisturbed, sparsely vegetated, flat areas with loose, sandy substrate. Human disturbance has displaced the least tern from much of its traditional nesting habitat. Few beach nesting areas remain, and least terns are now found in varied habitats ranging from mudflats to airports. Experienced breeders begin nesting in mid-May, first time breeders begin later in June. Courtship may take place on a beach or mudflat away from the nesting site. Courtship has two distinct phases, the first phase consists of aerial flights in which fish-carrying males chase females. This activity continues for two to three weeks after arrival. The second phase is comprised of ground displays including courtship feeding, posturing, and parading. The least tern lays from one to four eggs, which are incubated 20 to 25 days by both adults. Eggs are laid on consecutive days. Young fledge 28 days after hatching, but are fed by the adults for an additional two weeks. Least terns usually abandon their nesting colonies by mid-August, and most terns have left California by mid-September. Banding returns of California least terns indicate they exhibit tenacity to the site where they first bred successfully. The least tern forages on small schooling fish in areas with water less than 60 ft in depth mostly within 2 mi of the breeding colony (Atwood and Minsky 1983). Forage fish include northern anchovy, topsmelt, killifish, mosquitofish, shiner surfperch, and mudflat gobies.

The major reason for the decline of the California least tern is loss of suitable nesting habitat. Predation and human disturbance have also become significant factors in nesting failures of the least tern (Garrett and Dunn 1981). Predators include but are not limited to feral dogs and cats, raptors, gulls, skunks, foxes, raccoons (*Procyon lotor*), loggerhead shrike (*Lanius ludovicianus*), gull-billed tern (*Sterna nilotica*), and common raven (*Corvus corax*). Perches (e.g., signs and posts greater than 2 feet high, tall fences, telephone poles, etc.) that can be used by foraging raptors should not be located near least tern colonies (Copper 1986). Heavy vegetative growth at nesting sites can reduce or eliminate its

suitability for breeding. Appropriate management techniques can counteract this by clearing much of the vegetation while leaving some islands of vegetation to shelter the chicks. Nesting substrates can also be enhanced where needed, through the addition of sand and shell fragments. Management techniques such as placing tern decoys (to attract prospective breeding adults) and chick shelters in colonies prior to the breeding season may enhance nesting success. Important least tern foraging areas near nesting colonies should be identified and preserved.

*Speotyto cunicularia hypugaea*

Burrowing owl

USFWS: Candidate (Category 2)

CDFG: California Species of Special Concern, second priority

Tate: Audubon Special Concern

Everett: Declining

The burrowing owl has recently undergone a scientific name change from *Athene cunicularia* to *Speotyto cunicularia* (AOU 1991). The genus *Athene* contains Old World owl species. Justification for placing the burrowing owl in a separate genus, is provided by recent biochemical evidence that suggests chromosome arrangements differ markedly between the burrowing owl and Old World species. There are two subspecies of burrowing owl in North America (Johnsgard 1988). The breeding range of the *Speotyto cunicularia hypugaea* extends south from southern Canada into the western half of the United States and down into Baja California and central Mexico (Johnsgard 1988). *Speotyto cunicularia floridana* occurs in Florida and nearby islands. Other subspecies of burrowing owl are found in Central and South America. Within California, burrowing owl occur primarily in the Central Valley, the Mojave and Sonoran deserts, and along the coastal slope.

Burrowing owls were once a common, even locally abundant, species throughout much of California, although a decline in abundance was notified by the 1940s (Grinnell and Miller 1944). This decline has rapidly continued throughout California (Remsen 1978; De Sante et al. 1992). An ongoing study of burrowing owls in the Central Valley, San Francisco, and central coast regions of California has shown a 61.7 percent decrease in burrowing owl population size between 1970 and 1991 (De Sante et al. 1992). In addition, burrowing owls were extirpated from four counties within this study area by 1991. Southern California populations of burrowing owls from Santa Barbara south along the coast to San Diego have also seriously declined since the 1980s (Bloom pers. comm.). In San Diego

County, burrowing owls are uncommon, declining residents over much of the coastal lowland (Unitt 1984). Locations for burrowing owls during the late 1970s included San Marcos, Camp Pendleton, Palomar Airport, Mission Bay, Lower Otay Lake, North Island Naval Air Station, and the Tijuana River Valley (Unitt 1984). Recent surveys have confirmed activity at only some of these locations and at additional locations on Otay Mesa (Ogden unpub. data) and east of Fairbanks Ranch (City of San Diego 1992). San Diego populations of burrowing owls are augmented by wintering birds from the north.

Burrowing owls inhabit open areas such as grasslands, pastures, coastal dunes, desert scrub, and the edges of agricultural fields (Unitt 1984; Ogden unpublished data). Burrowing owls use rodent burrows throughout the year for shelter from weather and predators. Burrowing owls also place their nests in burrows. In Southern California the most commonly used rodent burrow is that of the California ground squirrel (*Spermophilus beecheyi*; Collins 1979). Burrowing owls often add fecal and seed material to the entrances and chambers of the burrows, perhaps to insulate nests and mask odors which could be detected by mammalian predators (Collins 1979; Johnsgard 1988). Burrowing owls eat a variety of different prey items including *Microtus*, *Peromyscus* and other rodent species, frogs, small birds, invertebrates and carrion (Zarn 1974; Johnsgard 1988).

The burrowing owl nesting distribution is strongly correlated to local burrow distribution. Nesting densities vary from eight pairs per square kilometer in optimal habitat to one pair per 58 km<sup>2</sup> in poor quality habitat (Johnsgard 1988). Home ranges and foraging areas may overlap between different pairs with only the burrow being actively defended (Coulombe 1971; Johnsgard 1988). Burrowing owls form short term pair bonds with male territoriality peaking during pair formation and declining after egg laying (Martin 1973). Not all individuals capable of breeding do so every year. Clutches range in size from 1 to 11 eggs, with 7 to 9 eggs the most common (Murray 1976). Replacement clutches will be laid if the first clutch fails. Eggs are laid from late March to mid June and are incubated for 27 to 30 days by the female. Incubation begins with the first egg leading to asynchronous hatching and a wide variation in nestling ages (Henny and Blus 1981). The male provides food to the female and nestlings. Owlets fledge at 40 to 45 days with an average of approximately four fledglings per pair (Wedgewood 1976 in Johnsgard 1988).

Burrowing owls have declined through much of their range because of habitat loss due to urbanization, agricultural conversion, and destruction of ground squirrel colonies (Remsen 1978). The incidental poisoning of burrowing owls and the destruction of their burrows

during eradication programs aimed at rodent colonies has also been a large factor in their decrease (Collins 1979; Remsen 1978; Zarn 1974). Although burrowing owls are relatively tolerant of lower levels of human activity, there are human related impacts such as shooting and the introduction of non-native predators which are also causes of their decline (Zarn 1974). This species often nests and perches near roads where they are vulnerable to roadside shooting, being hit by cars, road maintenance operations, and general harassment (Remsen 1978). Artificially enhanced populations of native predators (e.g., gray foxes, and coyotes) and introduced predators (e.g., red foxes, cats, and dogs) near burrowing owl colonies have also adversely impacted this species (Bloom pers. comm., Zeiner et al. 1990).

*Empidonax traillii extimus*

Southwestern willow flycatcher

USFWS: Proposed endangered

CDFG: Endangered

Tate: Audubon Special Concern

Everett: Declining

In the western United States this species nests from southwest British Columbia south to northern Baja California and east to Texas and northern Mexico. It winters in Central and South America. Prior to the mid-20th century this species was considered common in spring and summer in riparian habitat throughout the state (Willett 1933; Grinnell and Miller 1944). Southern California's largest local population is on the south fork of the Kern River, Kern County, where numbers have slowly increased through the mid-1980s (Unitt 1987). About four pairs have been found in the Prado Basin, Riverside County, through the latter half of the 1980s (Hays in Unitt 1987; McCaskie 1986, 1987b, 1989c); this constitutes a recolonization of an area with no records for the preceding 30 years (Unitt 1987).

The willow flycatcher is currently an uncommon spring and fall migrant and rare summer resident in San Diego County. These birds were once common in major river and creek canyons in San Diego County from sea level to 5000 ft in the mountains (Willett 1933; Unitt 1984). The species' status during the 1950s and 1960s was largely undocumented, but a rapid decline had ensued, as evidenced by the very low number of birds found in the county during systematic surveys in the mid-1970s to early 1980s (Garrett and Dunn 1981; Unitt 1984). San Diego was one of only two areas in the southern California region where birds were found in the 1970s (Garrett and Dunn 1981). In San Diego County small

breeding populations of willow flycatcher persist in the major river valleys. The Santa Margarita has experienced a gradual increase to nearly 15 territorial birds through to 1991 (Griffith and Griffith 1992). A population of approximately 10 territorial birds were discovered on the upper San Luis Rey River in 1984 (Unitt 1987). Singing birds (no documented nesting) appeared sporadically on the Sweetwater and Tijuana rivers and on Jamul Creek in the 1980s (Unitt 1987). Singing territorial males have also been detected where Dulzura Creek enters lower Otay Reservoir and along Dairy Mart Road in the Tijuana River Valley (Unitt 1984). An adult feeding young on the San Dieguito River 2 mi above Lake Hodges in late summer of 1992 strongly suggests local breeding on this drainage with no previous records (Ogden unpub. data).

Unitt (1987) has proposed a revision of the subspecific taxonomy to include coastal southern California within the range of the southwestern race *E. t. extimus*. He notes differences between the phenologies and clutch sizes of coastal and desert birds, which further suggest genetic distinctness of the population in the MSCP area.

Most recent research on the biology of the willow flycatcher has been done in the Sierra Nevada (review by Sanders and Flett 1989). Differences in ecology between these high elevation birds and those in the arid southwest are probable, but no detailed accounting of the species exists for southern California. Willow flycatchers hunt insects in the air from exposed perches in willow thickets or from low perches in adjacent meadows (Zeiner et al. 1990). For nesting, willow flycatchers require large stands of low, dense, scattered willow growth on at least seasonally flowing riparian canyons and valleys (Garrett and Dunn 1981; Serena 1982; Unitt 1984; Sanders and Flett 1989). Extensive, continuous stands are avoided; interspersed open, wet habitat (e.g., meadow, marsh) is preferred (Sanders and Flett 1989). This species builds an open, cup nest usually fairly low to the ground (1.5 to 10 ft high; Stein 1963). Peak egg laying occurs in June with an incubation period of 12 to 13 days. Three to four eggs are cared for by both the male and female and the young fledge at 13 to 14 days. There is a lack of information on philopatry of the species with regard to specific drainages.

Willow flycatchers are small and somewhat nondescript, but nevertheless are vocally active in the early parts of the breeding season. Several behavioral features severely restrict the period of the year in which surveys may be appropriately conducted. Willow flycatchers are highly migratory and spend a relatively small proportion of the year (about 15-20 percent) on their breeding grounds. Birds may be on migration as late as the third week of

June and may depart in the fall as early as the end of July (Unitt 1987). The most effective method of survey detection is by locating singing males, which concentrate song behavior in the early phases of the nesting season. There is a steady decline in temporal song frequency as nesting progresses, and singing practically ceases after the young are fledged (Unitt 1987; Sanders and Flett 1989). A relatively high proportion (20-35 percent) of males in local populations remain unmated and continue to sing after mated males have become relatively quiet (Sanders and Flett 1989). Surveys solely by singing male counts can potentially overestimate the effective breeding population.

Several aspects of willow flycatcher biology have made the species particularly vulnerable to human-related habitat alterations, leading to its precipitous decline in the 20th century. Loss of suitable nesting habitat is the primary reason for the decline of this species. It has been estimated that southern California currently retains only about 5 percent of its historical extent of floodplain riparian habitats (Faber et al. 1989). Degradation of habitat has also affected the willow flycatcher. This species requires willow foliage near ground level for safe construction of nests (Sanders and Flett 1989). Grazing activities by livestock tend to remove much of the lower foliage in riparian thickets; a positive relationship between willow volume and number of flycatchers has been demonstrated in Oregon (Taylor and Littlefield 1986). Willow flycatchers have also declined as a result of frequent nest parasitism by brown-headed cowbirds (Remsen 1978). Cowbirds, absent from California prior to the late 19th century, became common in southern California by the 1920s as a result of the extensive, agriculturally-based food supply and wide availability of host species (Laymon 1987). Within the last 10 years the willow flycatcher has reappeared sporadically or has persisted undetected in widely separated riparian systems in arid southwestern California. This may have resulted from reduced disturbance and concomitant recovery of riparian habitat in some areas, but regional recovery may be hindered by other factors such as population productivity and habitat fragmentation. The recent instability of some local populations in southern California suggests that productivity and/or minimum population size may be insufficient, as has been postulated for some populations in the Sierra Nevada (Sanders and Flett 1989).

*Campylorhynchus brunneicapillus couesi*

Coastal cactus wren

USFWS: Candidate (Category 3b)

CDFG: Species of Special Concern

Everett: Declining

The coastal cactus wren is a permanent resident in southern California, and in San Diego County is restricted to coastal lowlands from Camp Pendleton south to the Tijuana River drainage basin (Rea and Weaver 1990). This species has a highly disjunct distribution within San Diego County, with small fragmented populations in five primary subregions (Camp Pendleton, Lake Hodges/San Diego Wild Animal Park, Santee/Lake Jennings, Sweetwater River, and Otay River/Otay Mesa) (Ogden 1993a). The San Diego County population is estimated to be less than 300 pairs. This species is found only in coastal sage scrub with extensive stands of tall prickly pear or cholla cacti. The ecology of the coastal population is relatively unstudied. The USFWS has received a petition to list this species as endangered.

Multiple nests are built and used for roosting and egg laying. Nests are built in cholla or prickly pear cactus patches. The nest is a woven cylinder consisting of grasses, weed stalks, leaves, mosses, feathers, and pieces of molted snakeskin. Breeding begins in March and continues through July. Three to seven eggs are laid, and are incubated 15 to 18 days by the female. The young fledge 17 to 23 days after hatching. Average home range size in Escondido, San Diego County, was reported to be 3.2 acres (Rea and Weaver 1990). Cactus wrens forage on insects, spiders, fruits, nectar, and seeds.

Once widespread in San Diego County, cactus wrens had been reduced to fewer than 400 pairs at about 55 localities by 1990 (Rea and Weaver 1990). The primary reason for this decline is destruction of habitat (Rea and Weaver 1990). Most of these are threatened by proposed developments and most have questionable viability, as they consist of only one to four pairs. The long-term viability of the coastal cactus wren in San Diego County is questionable because of habitat fragmentation and degradation (Ogden 1993a). Dispersal corridors are being reduced in number and quality due to development. Species known to prey on cactus wrens include feral cats, roadrunners, snakes, and loggerhead shrikes (Ogden 1993a).

*Polioprila californica*

California gnatcatcher

USFWS: Threatened

CDFG: Species of Special Concern

Everett: Declining

The California gnatcatcher was historically distributed along the coastal slope from Ventura County south into Baja California to a latitude of 30° North. This species is probably extirpated from Ventura County and is declining proportionately with the continued loss of coastal sage scrub habitat in the remaining southern California counties located within the coastal plain. In 1990, the California gnatcatcher population was estimated at about 1200 to 2000 pairs in the United States with less than 900 pairs remaining in San Diego County (Atwood 1990). The USFWS population estimate is 1800 to 2300 pairs, with 770 to 960 pairs in San Diego County (USFWS 1991b). Favorable weather in 1991 and 1992 has allowed for a significant increase in population size. Ogden estimated the gnatcatcher population within the MSCP area exceeded 900 pairs in 1992 (Ogden 1993b). Significant concentrations of California gnatcatchers within the MSCP study area are known at Lake Hodges, Black Mountain, Escondido/San Pasqual Valley, Los Peñasquitos Canyon, Poway, Mission Trails Park/East Elliot/Miramar/Santee, Lake Jennings, Dehesa/Sweetwater River/San Miguel Mountains, Jamul Mountains, and San Ysidro Mountains/Otay River/Otay Mesa.

The California gnatcatcher is an obligate resident of coastal sage scrub. Recent studies of the species' habitat preferences in San Diego County indicate that California sagebrush (*Artemisia californica*) and California buckwheat (*Eriogonum fasciculatum*) are the primary plants used by gnatcatchers when foraging for insects (RECON 1987; ERCE 1990d; Ogden 1992c). A strong negative preference has been observed for sage scrub dominated by black sage under drought conditions (*Salvia mellifera*; Bontrager 1991; Mock et al. 1990; Mock 1992).

Nests typically are constructed of grasses, bark, small leaves, and other materials and are usually placed less than 1 m from the ground in a shrub located on a flat to gentle slope (less than 40 percent slope, Ogden 1992c). Vegetation structure around the nest site is typically composed of shrubs about 1 m in height with a semi-open canopy. The breeding season begins in late February and can extend through August. Clutch size is 3 or 4 eggs and the incubation period lasts for 14 days. Nestlings fledge at 14 to 16 days of age, and

fledglings remain in their natal territory for 3 to 5 weeks. Juveniles have been documented to disperse from 0.5 to 6.1 mi from their natal territory (Ogden 1992c).

California gnatcatchers maintain year-round territories which range from 6 to 45 acres during the breeding season. The boundaries of the defended territory are usually sharply defined during the breeding season (late February to early August; Ogden 1992c). During fall and winter, the home range of an established pair expands to include areas not used or defended during the breeding season. These winter expansion areas are not actively defended, but are neutral areas often used simultaneously by neighboring pairs. Breeding territory boundaries are defended throughout the year, although the intensity of aggressive behavior fluctuates seasonally. The most intense period of territorial behavior is during the beginning of the breeding season and late summer and fall. Territory boundaries usually follow natural physical features such as ridges, roadways/trails, or where there is an abrupt change in vegetation composition.

The decline of the California gnatcatcher is due to the reduction of coastal sage scrub habitat throughout the range of the subspecies. Oberbauer (1978) estimated that less than 30 percent of the historical distribution of coastal sage scrub habitat remains in San Diego County, and little of what remains is protected in natural open space. Loss, degradation, and fragmentation of coastal sage scrub has occurred as the result of agricultural and urban development in southern California and northern Baja California (O'Leary 1990). The USFWS has estimated that coastal sage scrub has been reduced by 70 to 90 percent of its historical extent (USFWS 1991b). Potential adverse effects of brown-headed cowbird brood parasitism and human-subsidized predators on the reproductive output of breeding pairs may also contribute to a reduction in the long-term viability of California gnatcatcher populations adjacent to development. Initial studies suggest that the California gnatcatcher may be highly sensitive to the effects of habitat fragmentation and development activity (ERCE 1990d; Ogden unpub. data).

*Sialia mexicana*

Western bluebird

USFWS: Protected by the Migratory Bird Treaty Act and the Convention for the Protection of Migratory Birds and Animals

CDFG: none

The western bluebird is a common songbird of oak savannah and open pine forest. Within the MSCP study area, this species is a typical breeding bird of oak woodlands associated

with grasslands. While this species has no official sensitivity status, it is being watched by wildlife agencies because of a decline in oak woodlands, the species' breeding habitat in coastal areas of the county. The western bluebird occurs year round in San Diego County in the foothills, mountains, and more inland areas of the coastal lowlands such as in eastern Poway, Escondido, Santee, and the San Ysidro Mountains. Typical breeding habitat remains east of Lake Hodges, along the San Diego River, and in drainages east of Otay Reservoir. The resident bluebird population is greatly augmented in winter by individuals that breed at higher elevations and more northern localities. Bluebirds use a variety of habitats during winter.

The breeding biology of the western bluebird has been studied extensively in pine forest habitats (Herlugson 1980; Eltzroth 1983; Sims 1983; Mock 1990) and to a lesser extent in oak woodland habitats (Koenig, pers. comm.) Bluebirds nest in natural tree cavities and artificial nest boxes. Breeding begins in March and continues through July. Three to six eggs are laid in a grass nest placed in an existing tree cavity. The incubation and nestling periods extend 14 and 21 days, respectively. Some pairs successfully raise more than one brood within a season, but this is highly variable between years (Mock 1990).

Bluebirds forage in open grasslands adjacent to woodlands, feeding primarily on abundant insects, such as grasshoppers (Pitelka 1941; Herlugson 1982). Flycatching is a secondary foraging maneuver (Mock pers. observation). During winter, bluebirds rely extensively on fruits, such as mistletoe berries. Bluebirds breeding in mountain areas migrate to lower elevations during the winter.

Typical predators of bluebirds and their nests are snakes, woodland raptors, rodents, and ants (Mock 1990). Nesting bluebirds often must compete for scarce nest cavities with other secondary cavity nesting birds, including aggressive introduced species such as the European starling and house sparrow (McLaren 1963; Zeleny 1969; Patterson 1979). Retention of snags, cavity creation, and placement of artificial nest boxes have been important techniques to maintain/enhance bluebird breeding habitat (Kibler 1969; Cary and Sanderson 1981; DeGraff 1980; Cunningham et al. 1980; Brawn and Balda 1983; Gano and Mosher 1983; Zeleny 1977).

*Vireo bellii pusillus*

Least Bell's vireo

USFWS: Endangered

CDFG: Endangered

Tate: Audubon Special Concern

Everett: Threatened

Bell's vireos were considered common in lowland riparian habitat in central northern California and in coastal and desert southern California as recently as the mid 1940s (Grinnell and Miller 1944). However, nest parasitism by brown-headed cowbirds was recorded as early as 1915 and was believed responsible for a decline that began in the late 1920s and reached significant proportions by the mid-1930s (Grinnell and Miller 1944; Unitt 1984). By the 1970s the species was present on only 30 percent of 150 historical locations throughout the state, and by that time as much as 76 percent of the statewide population occurred in San Diego County (Franzreb 1987). Densities of extant populations in the 1970s (and perhaps currently) were probably lower than documented historical levels (Goldwasser et al. 1980). The current population of least Bell's vireos in southern California is approximately 500 pairs. Over 460 breeding pairs or territorial males were documented within San Diego County in 1991 (Salata pers. comm.), with about 25 percent occurring within the MSCP area. The subspecies received state endangered listing in 1980 and federal listing in 1986. Conditions of listing include population monitoring and the development of a Comprehensive Management Plan. Vireo populations are currently studied on five rivers in San Diego County: Tijuana, Sweetwater, San Diego, San Luis Rey, and Santa Margarita (Figure 2-13), although small populations occur on other drainages. The largest current population in San Diego County is on the Santa Margarita River, which is north of the MSCP area (Griffith and Griffith 1992). No recent population estimates are available. Records for the Sweetwater, San Diego, and San Luis Rey suggest a fairly stable population in 1990 and 1991, although fluctuations occur on the individual drainages; over 160 breeding pairs have been documented on these three rivers (Kus 1991a). The lower Tijuana River (west of Dairy Mart Road) and its tributary, Goat Canyon, supported 15 breeding pairs in 1991, which represents a 67 percent increase over 1990 (Kus 1991b). The same area supported 28 breeding pairs in 1992, and currently has the highest population growth rate in southern California (Kus 1992a, 1992b). Further, nest success in 1991 and 1992 was 86 percent, presumably due to low levels of cowbird parasitism (Kus 1991b). Small, unmonitored, and perhaps intermittent populations occur on the San Dieguito and Otay rivers, Jamul/Dulzura and Cottonwood creeks, and on upper reaches of the aforementioned rivers (Ogden unpub. data).

Data from banded birds have shown a high rate of dispersal between the major rivers in the county. The San Luis Rey has received dispersants from the Santa Margarita and San Diego rivers. Birds from the Santa Margarita, San Luis Rey, San Diego, and Sweetwater Rivers have been among those contributing to the expanding population on the Tijuana River (Kus 1991b; Griffith and Griffith 1992).

The least Bell's vireo arrives in San Diego County between late March and early April and departs on fall migration by late September. The pair defends a territory of from 1 to 4 acres, in which they nest about 1 m above the ground in dense riparian growth. Nests are often on external or internal edges of riparian thickets. Single nestings require about a month, but pairs can fledge as many as three broods in a season.

Least Bell's vireos are small and somewhat nondescript, but nevertheless are vocally active in the breeding season. Certain behavioral features restrict the period of the year in which surveys may be appropriately conducted. The most effective method of survey detection is by locating singing males, which concentrate song behavior in the early phases of the nesting season. There is a steady decline in temporal song frequency as nesting progresses. A relatively high proportion (4-35 percent) of males in local populations remain unmated and continue to sing after mated males have become relatively quiet (Franzreb 1987; Kus 1991b). Surveys solely by singing male counts can potentially overestimate the effective breeding population.

The ecology of the least Bell's vireo has made it particularly vulnerable to human-related habitat alterations. A principal reason for its decline is that it has a strict requirement for dense, young, lowland (below 2000 ft elevation) riparian vegetation on at least seasonally flowing drainages. Southern California is estimated to retain only about 5 percent of its historical extent of floodplain riparian habitats (Faber et al. 1989). Livestock over-grazing, the introduction of exotic plants into the riparian system, changes in water flow and water quality, and channelization or alteration of streams and river beds are potential causes of habitat degradation for this species. Another major factor in the decline of the least Bell's vireo is its vulnerability to nest parasitism by brown-headed cowbirds which can substantially reduce reproductive success of this species (Kus 1991a and 1991b). Cowbirds, absent from California prior to the late 19th century, became common in southern California by the 1920s as a result of the extensive, agriculturally-based food supply and wide availability of host species (Laymon 1987). The least Bell's vireo is also

vulnerable to predation by snakes and introduced domestic and feral cats. Noise levels in excess of 60 dB have also been suggested to negatively impact the singing behavior of territorial vireos.

*Aimophila ruficeps canescens*

Southern California rufous-crowned sparrow

USFWS: Candidate (Category 2)

CDFG: Species of Special Concern

This small, secretive, songbird is widespread in mid-elevational arid habitats throughout the southwest. The distribution of the non-migratory (Garrett and Dunn 1981) southern California subspecies, however, overlaps broadly with the zone of heaviest human settlement on the lower cismontane mountain slopes (Unitt 1984). The southern California subspecies ranges from Santa Barbara south along coastal California to the northwestern corner of Baja California. The birds range regularly from just above sea level, through the distribution of coastal sage scrub, to approximately 600 m elevation in the lower chaparral and transition zones (Grinnell and Miller 1944; Unitt 1984). Scattered locations and evidence of local breeding east of the desert divide suggest a sparse distribution in the high desert transition scrub (Unitt 1984, Lovio unpub. data). The bulk of the population, however, occurs in coastal sage scrub. In San Diego County this species is considered an uncommon to fairly common but localized resident. A partial listing of locations where large populations are found within the MSCP area includes Lake Hodges, San Pasqual Valley, Poway, Los Peñasquitos Canyon, Santee, Dehesa, Sweetwater River, and Otay Mesa.

Preferred habitat for this sparrow is steep, often exposed slopes with rock outcroppings and forb/grass cover, usually with sparse shrub growth. Distribution at higher elevations may be limited by the generally taller, more dense brush cover rather than by the actual composition of the vegetation (Lovio unpub. data). The rufous-crowned sparrow actually seems to thrive in areas where vegetation volume has been reduced by fire or moderate mechanical disturbance. However, these birds do not occur on denuded slopes or as suburban commensals.

Rufous-crowned sparrows remain near cover at all times, foraging on the ground for seeds, insects, spiders, and grass and forb shoots among vegetation and rocks. It demonstrates no need for open water, often occurring year-round on hot, south-facing slopes. Nests are very well concealed, built in small depressions flush with ground level

among dense herbaceous vegetation or in cracks between rocks. The nesting period seems to be correlated with the timing of rainfall and seasonal herbaceous growth (Harrison 1979). The birds concentrate their activities around low-relief topographical features, such as gullies and rock faces. They maintain year-round territories, and local density may be somewhat dependent on topographic complexity. A typical range of density in extensive habitat is 7 to 14 pairs per 100 acres (Lovio unpub. data and Weaver, Breeding Bird Census).

The substantial loss of coastal sage scrub habitat to development and agriculture in coastal southern California is a reason that this species may be declining.

*Passerculus sandwichensis beldingi*

Belding's savannah sparrow

USFWS: Candidate (Category 2)

CDFG: Endangered

Everett: Threatened

The range of the Belding's savannah sparrow extends from Goleta in Santa Barbara County south to El Rosario, Baja California, Mexico. This species is a permanent resident of coastal salt marshes in southern California, including San Diego County. The Belding's savannah sparrow declined considerably prior to the mid 1970s from loss of marsh habitat. Since 1977, the population has increased from 1610 pairs to 2274 pairs in 1986 and is currently thought to be stable. Approximately 930 pairs were identified in San Diego County in 1986 (Zembal et al. 1987). Areas within the MSCP study area that support significant Belding's savannah sparrow populations include Tijuana Marsh (225 pairs), Sweetwater Marsh (118 pairs), Los Peñasquitos Lagoon (156 pairs), San Eligo Lagoon (31 pairs), Western Saltworks (70 pairs), San Dieguito Lagoon (39 pairs), San Diego River Flood Control Channel (28 pairs), Paradise Marsh (19 pairs), E Street Marsh (8 pairs), South Bay Marine Reserve (15 pairs), and Kendall-Frost Marsh in Mission Bay (13 pairs) (Zembal et al. 1987) (Figure 2-13).

Belding's savannah sparrows nest in small, dense patches of pickleweed (*Salicornia* sp.) in the upper littoral zone of salt marshes. Males begin singing in late November or early December, and breeding season may last as long as seven or eight months. Males are highly site-tenacious and will attempt to reestablish the same territory year after year. Individual territories range from 250 to 375 square meters (Massey 1979). The nest is a round, shallow cup, consisting of grasses, sedges, pickleweed, and a lining of fine

grasses, rootlets, and hairs. Nest building begins in mid-March. About 10 days are required to complete a nest. Two to four eggs are laid on consecutive days. The eggs are incubated for 13 days and usually hatch on the same day. Young fledge 7 to 10 days after hatching. Typically, the female will renest after the first brood has fledged. Belding's savannah sparrows forage on the succulent growing tips of pickleweed, seeds, insects, snails, and spiders. They forage throughout the marsh, often far away from nesting sites.

Belding's savannah sparrow populations have declined because of destruction and degradation of salt marsh habitat. Existing saltmarshes are of a patchy distribution, and populations of Belding's savannah sparrows are fragmented and isolated from each other (Zemba et al. 1987). Degradation of habitat is caused by a reduction in the tidal regime in many of the salt marshes and trampling of vegetation by humans. It may be necessary to re-establish and maintain a strong ocean influence to provide quality habitat. However, this needs to be done with care, as some existing stands of pickleweed, which provide important nesting habitat, are at artificially low elevations. In these cases, pickleweed should be grown at proper elevations prior to re-establishing a tidal regime. Predation by domestic and exotic animals is a problem at some marshes. Management techniques to control introduced predators could involve a predator control program as well as establishing a balance between introduced and native predators (e.g., maintaining wildlife corridors which allow coyotes access to the marsh to help control introduced predator populations).

*Passerculus sandwichensis rostratus*

Large-billed savannah sparrow

USFWS: Candidate (Category 2)

CDFG: Species of Special Concern

This denizen of coastal marshes and beaches was considered common in fall and winter in the mid-1930s in southern California and was even routinely seen in beach towns (Willett 1933). This status was apparently unchanged from at least the middle of the 19th century (Grinnell and Miller 1944). Scant evidence of breeding along the central county coast at the turn of the century was never substantiated (Unitt 1984). The subspecies was last recorded as common in the mid-1950s, but had virtually disappeared from the Alta California coast by the 1970s (Unitt 1984). These birds have remained quite scarce into the 1980s, although since the middle of that decade small numbers have appeared intermittently along the south coast and at the Salton Sea, Imperial County (McCaskie 1985, 1988a, 1988b). It is uncertain whether the inland distribution was recently established or whether the lack of

earlier records is an artifact of low observer effort. A relatively large influx of approximately 20 birds occurred at the mouth of the Sweetwater River and west shore of San Diego Bay in the fall and winter of 1989 (McCaskie 1989a; Lovio unpub. data), but that surge in numbers has not persisted into the early 1990s (MacCaskie 1991, 1992). This species has also been recorded at Kendall-Frost Marsh (Konecny unpub. data).

The large-billed savannah sparrow's breeding grounds are in the marshes at the head of the Gulf of California and lowest reaches of the Colorado River, Baja California Norte, which have undergone severe habitat alteration through draining and filling (Unitt 1984; Wilbur 1987). Post-breeding migration extends to the south and northwest. The sharp decrease in non-breeding birds on the California coast probably reflects overall reduced population levels. Birds in the United States inhabit coastal areas that are largely protected. Little can be done to enhance the race's numbers in the MSCP area if breeding populations continue to decline.

*Ammodramus savannarum perpallidus*

Grasshopper sparrow

USFWS: Protected by the Migratory Bird Treaty Act and the Convention for the Protection of Migratory Birds and Animals

CDFG: none

Tate: Audubon Blue List

Everett: Sensitive

The grasshopper sparrow is an uncommon summer resident and rare winter resident in San Diego County, where it reaches the southwestern extreme of its continental distribution (Wilbur 1987). The distribution of the western race in California has never been well documented or understood. Grinnell and Miller (1944) considered the birds sparse and irregular in occurrence, although grassland, the species' required habitat, is abundant within the state. The reconstruction of the grasshopper sparrow's former status in coastal southern California is particularly difficult given the uncertainty surrounding the historical extent of grassland in this arid region. Its abundance in San Diego County in the early part of the century is likely not reflected in the scattered reports from near Escondido and San Diego (Grinnell and Miller 1944; Unitt 1984).

Grasshopper sparrows remain scattered in distribution in lowland San Diego County, although many more site records exist now (Unitt 1984). Regular locations include Proctor Valley, Otay Lakes vicinity, Johnson Canyon, Mother Miguel Mountain, lower San Ysidro

Mountains, Sweetwater Reservoir, Santa Fe Valley, Peñasquitos Canyon, and Lake Henshaw (Ogden unpub. data; McCaskie 1984). A small, but undetermined number of birds overwinter in the county.

Most of the population is migratory, arriving in late March and departing by August. This grassland species is generally inconspicuous, except when males sing in the breeding season. Grasshopper sparrows inhabit dense, dry or well-drained grassland, especially native grassland with a mixture of grasses and forbs, and scattered shrubs for singing perches (Zeiner et al. 1990). Large expanses of open grassland with or without widely scattered shrubs are usually not frequented by ornithologists, so the species' historical range in the county has probably been underestimated. Spring song on breeding grounds is probably concentrated within the months of May and June. In other populations nesting begins in early April. Nests are well-hidden on the ground and as many as three broods are produced in a season.

The amount of suitable grasshopper sparrow habitat has declined rapidly in San Diego County (Unitt 1984). The present extent of grassland in San Diego County is predominantly the result of human-related disturbance to other habitats and no truly native grassland exists. However, some grassland areas retain a native plant component. There is no information on the effects of a substantial decrease in native grassland habitat on the productivity and persistence of local populations. Active management of the grasshopper sparrow will be hindered by the lack of knowledge of historical grassland distribution.

*Agelaius tricolor*

Tricolored blackbird

USFWS: Candidate (Category 2)

CDFG: Species of Special Concern

The tricolored blackbird is a permanent resident from southern Oregon to northwestern Baja California. This distribution has remained relatively constant since the 1930s, but the overall population and colony size has declined dramatically in the last fifty years. In San Diego County, breeding tricolored blackbirds declined from 10,000 individuals in 1930 to less than 3000 individuals in 1980 (Beedy et al. 1991). Some recent nesting locations in the MSCP study area include: a small pond behind Rickey Dam at the south foot of Mother Miguel Mountain (30-50 nests in 1990); Otay River Valley (about 200 nests in tamarisks at the mouth of Johnson Canyon in 1991); Lindo Lakes (1992), Sweetwater River just above the reservoir (1991); Dairy Mart Ponds in the Tijuana River Valley; Santee Lakes; Old

Mission Dam; and the San Diego River in Mission Valley (Ogden unpub. data; Unitt 1984, pers. comm.; Beedy et al. 1991).

Tricolored blackbirds are the most intensely colonial of all North American passerine birds. Colonies of up to 20,000 nests were reported in the 1930s with nests placed within one foot of each other. Preferred breeding habitat consists of freshwater tule or cattail marsh. This habitat has been drastically reduced by draining of marshland in favor of agriculture and urbanization. Faced with the loss of marshland nesting areas, tricolors currently may be found nesting in willow and blackberry thickets, mustard, wildrose, tamarisk trees, and other unusual substrates. The 89 percent loss of tricolored blackbird populations since the 1930s indicates that they are not successfully adapting to nesting in fragmented and disturbed marshes or in non-marsh habitats (Beedy et al. 1991).

The breeding range is, for the most part, confined to coastal lowlands. The nesting area must be large enough to support a colony of at least 50 pairs (Grinnell and Miller 1944). Tricolors are highly nomadic, and individuals are unlikely to nest at the site where they hatched or at the same location from year to year. However, breeding colonies have some site fidelity, and areas of high quality habitat, which provide secure nesting substrate, water, and a plentiful insect food supply, may be used year after year. Tricolors forage on insects, spiders and seeds in wetlands, agricultural areas, and damp lawns (Unitt 1984).

Breeding is highly synchronized within the colony, with nesting usually beginning in April. The nest is composed of mud and plant materials. Two to six eggs are laid and are incubated for about 12 days. The young are fed by both adults and fledge about 13 days after hatching.

Tricolored blackbirds are declining because of the loss and fragmentation of wetland habitat, due to urban development and conversion to agriculture (Beedy et al. 1991). A widespread, substantial decrease in the size of individual breeding colonies may result in a higher incidence of predation and a decreased ability to compete with other species (e.g., red-winged blackbird) for limited wetland nesting habitat. Predators include foxes, skunks, opossums (*Didelphis virginiana*), raptors, American crows (*Corvus brachyrhynchos*), raccoons, feral cats, and snakes. Habitat degradation (e.g., loss of dense stands of tules and cattails) has also contributed to the decline of this species. Maintenance of water levels in marshes is important for successful reproduction by decreasing the risks of predation and the incidence of colony abandonment. Contamination

of wetlands with agricultural waters containing elevated concentrations of salts and elements (e.g., selenium) has been documented as causing mortality and reproductive failure in this species. The introduction of pesticides into foraging areas (wetlands, pastures, grasslands, agricultural fields) reduces the food supply and can cause direct mortality. The conversion of wetlands, grasslands, and other native habitats to urban and agricultural habitats also decreases the availability of preferred insect populations. Poisoning, incidentally or deliberately, historic shooting for market, and extermination as an agricultural pest are other factors that have contributed to the decline of this species. Human disturbance of nesting colonies, especially in disturbed and fragmented habitat, can cause nest colony abandonment.

## Mammals

### *Eumops perotis californicus*

California mastiff bat (sub-species of Western mastiff bat. *E. p. californicus* is the only sub-species occurring in North America)

USFWS: Candidate (Category 2)

CDFG: Species of Special Concern

The California mastiff bat ranges from central California southward to central Mexico. In California, mastiff bats have been recorded from the Sierra Nevada, but most reports are from lower-lying regions. This species is resident within the state throughout the year, but probably makes local seasonal movements. Historically, mastiff bats were widespread in the California central valley and coastal lowlands from the San Francisco Bay area southward to San Diego. Available information, though limited, suggests that populations have undergone significant declines in recent years. Williams (1986) conjectures that extensive loss of habitat due to urbanization of coastal basins, marsh drainage, and cultivation of major foraging areas are likely factors in the decline. Widespread use of insecticides may have reduced insect abundance and also poisoned some bats. In San Diego County, mastiff bats are found in areas of chaparral or live oaks and in more arid, rocky regions. Within the MSCP study area, they have been reported from Lake Hodges, Dulzura, and Otay (Bond 1977).

Mastiff bats favor rugged, rocky areas where suitable crevices are available for day-roosts. They inhabit crevices in cliff faces, high buildings, trees, and tunnels. The crevices must open downward, be at least 5 cm wide and 30 cm deep, and narrow to at least 2.5 cm at the upper end (Vaughan 1959). Mastiff bats are the largest bats native to the U.S., measuring

up to 185 mm (7.5 in) in length and weighing 100 g. Their wings are long and narrow which allows for rapid, sustained flight, but limits maneuverability. This manner of flight is adaptive to flying in open habitats. Because of their large size and long wings, these bats require considerable space to launch themselves into flight, so roosting sites are usually situated to permit a free downward fall for at least 2 to 3 m. Roosts are used throughout the year and may often be detected by the yellowish urine stains and large fecal droppings on rocks below the roost.

Mastiff bats are nocturnal and are active all year. They usually roost alone, or in small colonies of fewer than 100 bats. Generally they go into daily torpor from December through February, but resume activity each night to feed except when temperatures drop below 5°C (Leitner 1966). Mastiff bats emerge when the evening light has nearly disappeared. Vaughan (1959) reported that they have an exceptionally long foraging period, up to six or seven hours per night, and rarely use night-roosts as do other species. He estimated that they forage up to 15 mi from roost sites and as much as 2000 ft above the ground. Mastiff bats feed primarily on moths (80 percent of their diet), dragonflies, beetles, and hymenopterans, but may also eat ground-living crickets and grasshoppers. This is a very vocal bat that calls continuously while hunting. Unlike many species of bats, adults of both sexes can be found together throughout the year; young are born from early April through September. Females produce one young per year.

*Plecotus townsendii*

Townsend's western big-eared bat

CDFG: Species of Special Concern

Townsend's big-eared bats occur throughout the western United States. In California there are two sub-species: *P. t. townsendii* occupies the humid, coastal regions of northern and central California, and *P. t. pallescens* occurs in the remainder of the state. In the MSCP study area, *P.t. pallescens* has been reported from San Diego and Otay Mountain (Bond 1977). This species is relatively sedentary, making only short movements to hibernation sites. Of 1500 banded bats, the longest movement was 32.2 km (20 mi) (Pearson 1952). In California, Townsend's big-eared bats are found in all but higher elevation habitats, but are most abundant in mesic habitats. They live in a variety of plant communities, including conifer and broad-leaf forests, oak woodlands, grasslands, and deserts.

Habitat must provide appropriate roosting, maternity, and hibernating sites that are free from human disturbance. Roosting sites include caves, mines, tunnels, lava tubes,

buildings, and other man-made structures. In summer, females and young roost in a relatively warm site in tight clusters of up to 100 individuals. Maternity colonies are highly susceptible to disturbances by humans (Barbour and Davis 1969). Males usually roost singly or in small groups and are probably not affected as much as females by disturbances. From October to April, both sexes hibernate in cold buildings, caves and mine tunnels, either singly (males) or in small groups. Even in the coldest weather, these bats often move between caves; when removed, they have returned 28 mi to roost in 2 days (Burt and Grossenheider 1968). Colonies usually are at least 16 to 19 km (10 to 12 mi) apart. A density of 1 bat/126 ha (1/310 ac) was reported on Santa Cruz Island (Pearson 1952). These bats are not territorial, but show high site fidelity if undisturbed.

Townsend's long-eared bats are nocturnal, emerging late in the evening to forage near the roost. They are slow, maneuverable fliers, and capture prey in the air or by gleaning from foliage; they are capable of hovering. These bats feed almost exclusively on moths, but beetles and a variety of soft-bodied insects also are taken. These bats have relatively poor urine-concentrating ability in comparison to other southwestern bats and require drinking water.

Most mating occurs from November to February. Many females are inseminated before hibernation begins; sperm is stored until ovulation occurs in spring. Gestation lasts 56 to 100 days, depending on temperature, size of the hibernating cluster, and time in hibernation. Births occur in May and June, peaking in late May. Females usually produce one young per year. Young are weaned in six weeks and fly within three weeks of birth. Maternity groups begin to break up in August. Females mate in their first autumn, males in their first or second autumn. About half of young females return to their birth site after their first hibernation. Subsequent return rates are 70 to 80 percent. The maximum recorded age for this species is sixteen years.

Little specific information is available on population trends, although a marked decline in numbers appears to have occurred over the last 40 years. Desert populations in southeastern California are declining; none of the roosts used in the 1950s is still occupied (Williams 1986). Graham (1966) found no extant colonies in California's limestone caves, and speculated that all had been abandoned due to human activities. Williams (1986) notes that *P. t. pallescens* was common in central California into the 1960s, but by the early 1970s was rarely seen. Great care must be taken in gathering information; roosts should not be entered. This species is especially sensitive to injury by wing banding.

*Perognathus longimembris pacificus*

Pacific pocket mouse (Sub-species of the little pocket mouse)

USFWS: Endangered

CDFG: Species of Special Concern, first priority

The Pacific pocket mouse inhabits the narrow coastal plains from the vicinity of the Mexican border northward to El Segundo, Los Angeles County. Known areas of occupation within the MSCP study area are the Tijuana River Valley and the Tijuana River mouth (Williams 1986). These pocket mice have been reported from areas with fine soils or alluvial sands near the ocean and from open spaces in an otherwise dense, weedy area near San Diego (von Bloeker 1930). They were found in a coastal sage scrub community in a dry, rocky site in the San Joaquin Hills in Orange County (M'Closkey 1972), and more recently, a small population was discovered on Dana Point, Orange County, in 1993. One individual of the species may have been trapped in 1989 in Lux Canyon, Encinitas (USFWS 1994).

Pacific pocket mice are predominantly gaminivorous, eating mostly seeds of grasses and forbs found by searching under the shrub canopy. Some green vegetation is consumed in spring and occasionally soil-dwelling insects (Jameson and Peeters 1988). This species obtains sufficient water from food to be independent from drinking water. The Pacific pocket mouse remains in its plugged burrow during the day and is active only at night. Its peak activity tends to occur early in the night. During periods of food stress or low temperatures it becomes torpid. It is inactive above ground from October to January, depending on food reserves and minimum night temperatures. No data on territory size are available for the Pacific pocket mouse, but territory sizes may be comparable to those of the little pocket mouse. In Nevada, home ranges for the little pocket mouse averaged 0.7 to 4.7 acres for males and 1.2 to 7.6 acres for females (Maza et al. 1973).

Breeding occurs from January to August, peaking from March to May. Breeding phenology depends on temperature, food supply, and spring plant growth. Gestation is 21 to 31 days and litter size ranges from two to eight, with usually only one litter per year. The Pacific pocket mouse survives in the wild from three to five years (Whitaker 1980). Predators include snakes, owls, and predatory mammals, including grasshopper mice.

The Pacific pocket mouse population has declined markedly because of severe and continuing loss of habitat due to urbanization, highway construction, and off-road vehicle

activity. Predation by house cats has been identified as a potential threat to the one known extant population (USFWS 1994). Williams (1986) theorized that all populations north of the San Joaquin Hills are extinct. Sites with favorable habitat may be rare and may serve as the only reservoirs from which individuals disperse to areas of lower quality habitat (Williams 1986).

*Felis concolor*

Mountain lion

USFWS: None

CDFG: Protected Species

The mountain lion has no sensitive status under the USFWS or CDFG ratings. It is considered sensitive by the San Diego Non-game Wildlife Subcommittee for Vertebrates. There is presently a moratorium on hunting. Recent studies by the California Department of Fish and Game suggest that 2500 to 5000, or more, mountain lions currently live in California (Zeiner et al. 1990). Numbers appear to be increasing on a state-wide basis, but habitat fragmentation is threatening local populations (Beier 1993).

The mountain lion is the most widely distributed cat in the Americas, ranging throughout the West and also in southern Texas, Louisiana, Alabama, Tennessee and peninsular Florida. In California, it is a widespread, uncommon permanent resident ranging from sea level to alpine meadows, absent only from the Mojave and Colorado deserts and the croplands in the Central Valley. Mountain lions are found throughout most of the forested and brushy regions of the state. They prefer extensive areas of riparian vegetation or heavy brush interspersed with irregular terrain and rocky outcrops. Mountain lions den in any sheltered spot that is concealed. Maternity dens are in rock crevices, piles of rocks, thickets, caves or other protected places and are lined with moss or vegetation.

Mountain lions are chiefly nocturnal, but unlike most cats, may be abroad during the day in undisturbed areas. They are most at home on the ground, but climb trees, especially to evade dogs. They swim only if necessary. They are carnivorous; mule deer make up 60 to 80 percent of their diet throughout the year. They also eat rabbits, rodents, porcupines, skunks, coyotes, beavers, raccoons, mice, and occasionally domestic stock. Grouse, turkeys, fish, insects, grass, and berries also have been reported in the diet. Mountain lions are active throughout the year and will travel up to 25 mi (average of 5 mi) in a single night. Where deer are abundant, an adult mountain lion may kill an average of one deer per week. Uneaten portions of kills are often cached by covering with brush.

Male mountain lions in Orange County have home ranges in the order of 100 to 200 mi<sup>2</sup> (Beier and Barrett 1991; Beier 1993). Padley (1991) determined that the mean home range of eight female mountain lions in the Santa Ana Mountains was 42 mi<sup>2</sup>. Other investigators report male home ranges varying from 25 to 96 mi<sup>2</sup> and female home ranges from 5 to 20 mi<sup>2</sup> (Zeiner et al. 1990). Home ranges of females may overlap completely with those of other females, or with males. However, females with young usually occupy distinct areas. Males usually occupy non-overlapping areas. Mountain lions tend to mutually avoid each other. Young adults establish home ranges as vacancies occur.

Females may be in estrus at any time of the year, but in California, most births probably occur in spring. The gestation period is 82 to 97 days. Litter size is usually two to four, occasionally up to six. Weaning occurs in about eight weeks. Young become independent during the second year. Females first breed between their second and fourth year. Most females produce litters at two year intervals. Only established resident males breed with females whose home ranges overlap their home ranges. Transient males usually do not breed until a home range is established. Wild mountain lions probably do not often live longer than 8 to 12 years.

The mountain lion has few predators other than humans, although large hawks, eagles, and bears may take young kittens. Potential competitors, based on dietary overlap, include bobcats, coyotes, and bears.

Fragmentation of habitat by spread of human development restricts mountain lion movement and increases potential interaction with humans. Because of their large home ranges, mountain lions cannot survive in blocks of habitat less than 100 mi<sup>2</sup> without functional corridors to connect fragments (Beier 1993). Mountain lions are sensitive to human disturbance and are reluctant to cross heavily developed areas unless sufficient cover is present. They will pass through relatively narrow corridors around or through such development during evening hours.

Lions primarily use canyon bottoms for movement between disjunct areas of their home range and during juvenile dispersal (Beier and Barret 1991). Ridge lines are used secondarily (Padley 1991). To best function as a corridor, canyons should contain dense native vegetative cover in the bottom, provide a source of water, and have a well defined

trail to channel the lion through the corridor. Light, noise, and human activity visible from the corridor should be minimized.

Major roads crossing corridors must be fitted with suitable underpasses, preferably bridge-type structures (Ogden 1992a). Each year large numbers of lions are killed on highways. In the first two years of the Orange County study, 7 of the 35 radio-collared lions were killed by automobiles (Beier and Barret 1991). A study of the Florida panther documented 11 road kills in a small population (27 animals) between 1979 and 1988 (Logan and Evink 1988). To address this problem, bridge-type underpasses should be used which are at least 12 ft in height and at least half as wide as they are long. Fencing must be used along the highways to direct all crossings to the underpass (Ogden 1992a). Edelman (1990) monitored a single freeway underpass which was 16 ft high, 16 ft wide and over 160 ft long. During a one year period, there were a total of four possible mountain lion crossings. Edelman states that mountain lions in Florida commonly use near equivalent-sized structures under split highways with a total of four lanes.

*Taxidea taxus jeffersoni*

American badger

USFWS: None

CDFG: Species of Special Concern and Harvest Species

The badger is an uncommon resident of level, open areas in grasslands, agricultural areas, and open shrub habitats. It digs large burrows in dry, friable soils and feeds mainly on fossorial mammals: ground squirrels, gophers, rats, mice, etc. Two subspecies of badger are found in San Diego County. *T.t. jeffersoni* occurs west of the coastal ranges and *T.t. berlanieri* occurs in the desert regions of the county, east of the coastal mountains (Hall 1981). Badgers are primarily active during the day, but may become more nocturnal in close proximity to man. The home range of a badger has been measured at 1327-1549 acres for males and 338-751 acres for females in Utah (Lindzey 1978) and 400-600 acres in Idaho (Messick and Hornocker 1981). Mating occurs in late summer or early fall and 2-3 young are born 183-265 days later in March or April (Long 1973). Badgers are known to live at least 11-15 years (Messick and Hornocker 1981). Threats to badgers include urban and agricultural development of habitat and possibly excessive trapping and persistent poisons in prey in some areas (CDFG 1990a). Specimens at the San Diego Natural History Museum have been collected at Lakeside, Escondido, Ramona, San Marcos, Sweetwater Reservoir, Witch Creek and El Cajon (Bond 1977; Grinnell et al. 1937).

*Odocoileus hemionus*

Mule deer

USFWS: None

CDFG: None

The mule deer is not listed as a sensitive species by USFWS or CDFG. It is managed as a game species. Mule deer range from the Southern Yukon and Mackenzie south through the western U.S. to western Texas, and throughout Baja California and northern Mexico. In California, mule deer occur throughout the state with the exception of the San Joaquin Valley and some southeastern desert areas. Most of the California population is migratory, moving to lower elevations in the fall. However, mule deer in San Diego County are non-migratory and are found in most undeveloped areas with suitable habitat.

Locally, mule deer inhabit a variety of habitats, including riparian and oak woodlands, coniferous forest, coastal sage scrub and chaparral. Suitable habitat is a mosaic of vegetation, with clearings interspersed by dense brush or tree thickets. Brushy areas and thickets are important for cover and thermal regulation. Deer require sources of water throughout the year.

Mule deer are primarily active in mornings, evenings, and on moonlit nights, but may also be active at mid-day in winter. They browse, preferring tender new growth of various shrubs such as ceanothus, mountain mahogany, and bitterbrush. Forbs and grasses are important in spring. They feed heavily on acorns where available, primarily in autumn. They also dig out subterranean mushrooms and commonly frequent salt or mineral licks.

Mule deer are serially polygynous. Rutting season occurs in autumn. A dominant buck tends an estrous doe until matings are completed, or the buck is displaced by another buck. Gestation period is 195 to 212 days. Fawns are born from early April to midsummer. Males and females are mature sexually in their second year. Twins are common after the first or second fawning; triplets are rare. Mule deer may live more than ten years in the wild. Natural predators of deer include mountain lions, coyotes, and bobcats.

Local populations of mule deer are dispersed and seldom form herds. The usual groups consist of a doe with her fawn or a doe with twin fawns and a pair of yearlings. Bucks are usually solitary. Information on mule deer movements in Orange County indicate that typical home ranges are fairly small, about 1.9 mi<sup>2</sup> for males, and 0.6 mi<sup>2</sup> for females

(Padley pers. comm.). Does may defend small areas in late spring and early summer when caring for newborn fawns.

Deer populations can decline in response to fragmentation, degradation, or destruction of habitat. Corridors are instrumental in maintaining population continuity and allowing for the dispersal of juveniles. Although mule deer are distinctly wary of humans and human development, their tolerance is probably greater than that of mountain lions. Corridors designed to accommodate lions may serve deer as well. Deer use canyons as corridors as lions do, but in general, deer avoid canyon bottoms (Padley 1991). This may be to avoid predation by mountain lions which spend the majority of their time in the canyon bottoms. Canyon corridors for mule deer should include the canyon slopes and ridges.

Road mortality must be considered in corridor design. The use of road underpasses by mule deer has been studied in Colorado and San Diego (Reed 1981; Ogden 1992a). Deer were found to freely use bridge-type underpasses but rarely use culvert type underpasses. Some deer do use the long narrow underpass but appeared to display great anxiety in doing so. Edelman (1990) reported significant use by mule deer of an equestrian tunnel under Highway 118 in the Santa Monica Mountains. The tunnel was 16 ft high, 16 ft wide and over 160 ft long. During 52 weeks of monitoring, mule deer made 50 crossings. Fences designed to channel deer to underpasses must be at least 10 ft tall (Ogden 1992a).

Natural predators of deer have been reduced in numbers in most areas. Overpopulation with resultant winter die-offs occurs periodically in California. The most serious threats to local populations are illegal hunting and habitat destruction and fragmentation due to urbanization. Deer populations can respond rapidly to habitat management.

### **3.0 LAND USE AND URBANIZATION**

The major components of the land use analysis include existing and planned land uses, generalized land ownership, and categories of land protection based on ownership, planned land use, and existing land use regulations. This analysis, when combined with the biological data, is the foundation for identification and delineation of focused planning areas. The methodologies described herein are similar to those used for the North County MHCP.

#### **3.1 EXISTING LAND USES**

##### **3.1.1 Methodology**

Existing land uses within the MSCP study area were determined through the utilization of SANDAG's 1990 Generalized Land Use Inventory. This inventory depicted land use patterns in the region as they existed in summer 1990. Multi-date satellite images were used to detect land use changes between 1986 and 1990. New land use types were identified and categorized using infrared aerial photographs and secondary sources. Existing land uses were contained within 70 land use categories, which were collapsed to 9 generalized groups.

Twenty-four draft land use maps depicting the distribution of the nine land use categories were produced at a scale of 1:24,000 (1 in = 2000 ft). During 1991, these maps were reviewed with staffs of the twelve local jurisdictions in the MSCP study area, the County Water Authority, and Caltrans. After the maps were reviewed, SANDAG digitized revisions and generated updated land use data.

##### **3.1.2 Descriptions of Existing Land Use Categories**

###### **Active Parks**

Active Parks are developed parks with major recreation facilities and include most neighborhood and community parks. Active parks generally have limited potential as wildlife habitat, but may act as buffers between habitat and more dense and/or incompatible land uses (e.g., residential and commercial development).

## Agriculture

Agriculture is characterized as intensive (orchards, vineyards, nurseries, greenhouses, poultry, dairies, livestock) or extensive (field crops, pasture, fallow). Agriculture, like active parks, could be a buffer or corridor between habitat and incompatible land uses. Certain types of agriculture, such as pasture, some field crops, and fallow fields, often have some biological value as raptor foraging habitat, as a substrate for birds that eat seeds or invertebrates, as resting areas for migrating birds, and as denning and burrowing substrates for open habitat terrestrial species such as badgers, burrowing owls, and many rodents. If not continued for agricultural purposes, this category of land use has the potential to be restored to a natural community.

## Developed (Urban)

Developed includes areas under construction, single and multi-family residential (>1 dwelling unit[du]/acre), mobile homes, industrial (except extractive), commercial, office, transportation, communication, public services, commercial recreation, utilities, active military uses, schools, and hospitals. Developed uses generally provide very little habitat potential because of the presence of physical structures, humans, and pets.

## Extractive Industry

Extractive Industry includes existing sand, gravel, and other mining operations. Extractive land uses have potential for habitat conservation. Mined areas and quarries potentially can be restored to reasonably natural conditions to provide habitat. Such areas also may provide a buffer between natural habitat and incompatible land uses.

## Parks and Preserves

Parks and Preserves include passive parks and ecological or natural preserves. Parks and preserves have moderate to high potential for habitat conservation depending on the kinds of resources they support and their location, size, and connectivity with adjacent habitat.

### Low Density Residential

Low Density Residential includes residential land with densities less than or equal to 1 dwelling unit per acre (1 du/acre). Depending on location, use, and connectivity to other habitat, large estate-size lots may provide some habitat value if left in a natural state. However, spaced residential areas can also fragment and isolate habitat if not planned appropriately.

### Vacant

Vacant land includes all public and private vacant and undeveloped lands, unless specifically identified as a passive park or preserve. Vacant lands will comprise the core areas and habitat linkages of the preserve system because they contain most of the biological resources in the study area.

### Military

Military land uses are currently not mapped as a separate land use category by SANDAG, but rather are included in the ownership data base. Lands in military ownership are mapped primarily as either Developed or Vacant. NAS Miramar contains the greatest acreage of vacant lands of the military facilities in the study area.

### Inland Water

Inland Water includes ponds, channels, lakes, lagoons, reservoirs, and bays. Open water of most any size provides valuable biological resources for wildlife, including drinking, foraging, and resting habitat. Marsh habitat commonly found around the edges of open water also provides valuable resources for wildlife, including breeding habitat for a variety of sensitive species.

### Golf Courses

Golf courses that have extensive turf coverage have very limited value as wildlife habitat, but may provide drinking and resting resources and foraging habitat for some species (e.g., rabbits and birds). Links courses that limit turf to greens, tees and landing areas, but retain native habitat elsewhere, can have wildlife value. Species that do not require

vegetative cover may use golf courses as movement corridors (e.g., coyotes). Golf courses also can serve as buffers between natural habitat and incompatible land uses.

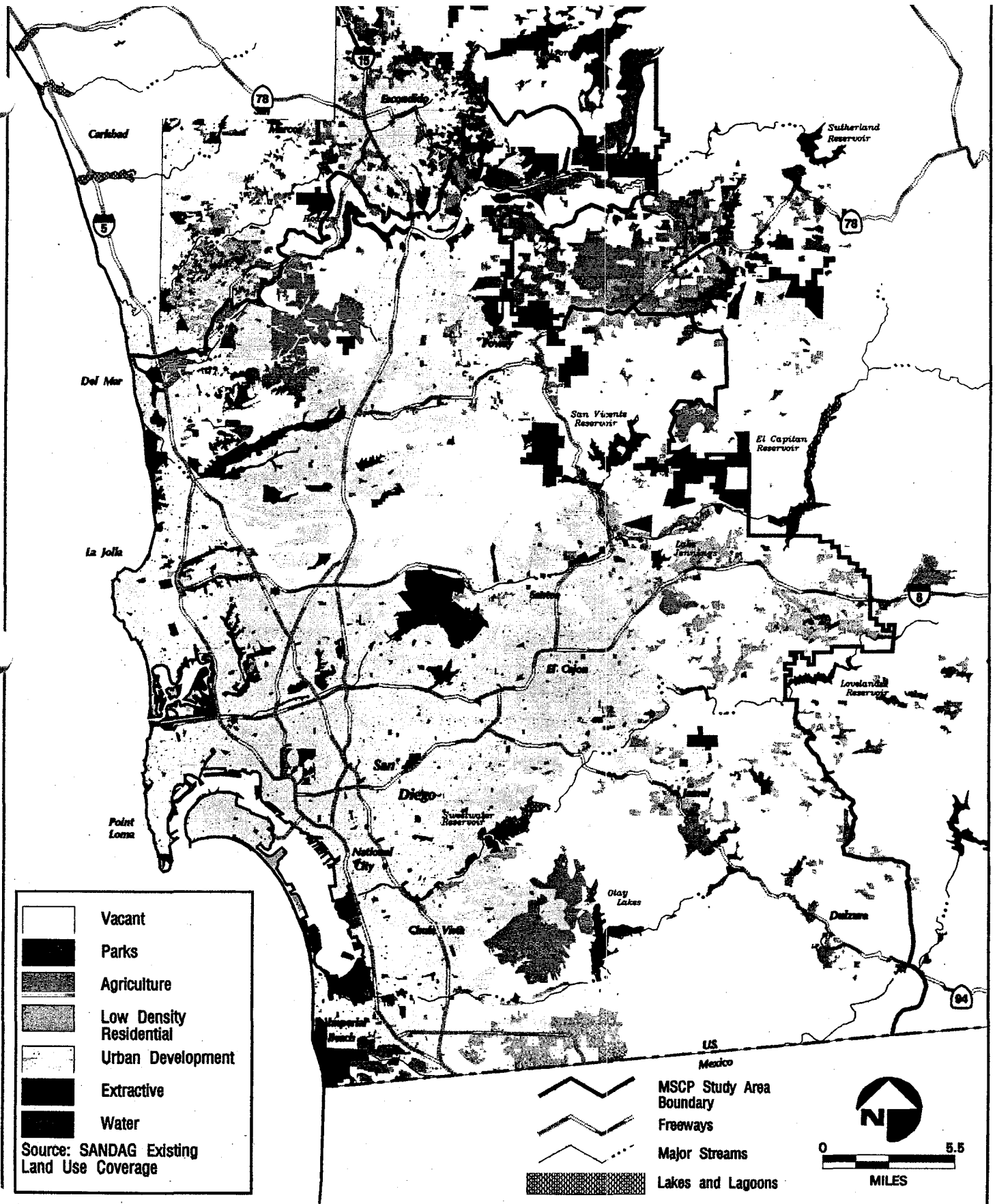
### **3.1.3 Distribution of Existing Land Use**

Table 3-1 and Figure 3-1 show the distribution of existing land use categories in the MSCP study area. Of the 581,649 acres in the study area, almost half (274,785, 47 percent) are comprised of vacant lands, and an additional 28,531 (5 percent) are parks and preserves. Naval Air Station (NAS) Miramar comprises 19,203 (7 percent) of the vacant category. The master plan for NAS Miramar is currently being revised. Efforts should be made to coordinate revisions to the plan with the MSCP process. Assuming that vacant land (with caveats for Military and land currently designated for urban land uses), parks and preserves, and extractive uses provide the "raw material" for building a preserve system, approximately 307,432 acres (53 percent of the total acreage) are available for building a preserve. If agriculture and low density residential lands are assumed to have some value as buffers between habitat and other land uses, approximately 57,729 acres exist for this potential use. In total, approximately 365,161 acres, 63 percent of the total, potentially could provide at least some habitat value in the study area.

## **3.2 PLANNED LAND USES**

### **3.2.1 Methodology**

The information on planned land uses was extracted by SANDAG from all the General and Community Plan Land Use Elements for the 12 jurisdictions in the MSCP study area. Since each jurisdiction's land use element employs different nomenclature and codes for land use designations, all were collapsed to a generalized common system using nine categories. The General and Community Plan land uses have been reviewed by staff from each jurisdiction through the Series 8 Regional Growth Forecast process. Planners reviewed the plans for completeness and accuracy and provided additional information on Specific Plan Areas or other site-specific development.



**Table 3-1**  
**EXISTING LAND USES**

Generalized Land Use	Acres	%
Active Parks	6,267	1%
Agriculture	41,001	7%
Developed	188,361	32%
Extractive	4,116	<1%
Parks and Preserves	28,531	5%
Low Density Residential	16,728	3%
Vacant (NAS Miramar = 19,203)	274,785	47%
Golf Courses	4,915	<1%
Water	16,945	3%
<b>Total</b>	<b>581,649</b>	<b>100%</b>

Source: SANDAG 1990 Generalized Land Use Inventory (Raster format).

### 3.2.2 Descriptions of Planned Land Uses

#### Parks, Preserves, and Planned Open Space

Parks, Preserves, and Planned Open Space include passive or natural parks and preserves and planned open space areas designated in General or Community plans to serve as a relief from continuous urbanization. These can include golf courses, planted greenbelts, or natural open space. Although the habitat value of the specific designations within this definition vary, the category itself does not distinguish between a golf course and a preserve.

#### Impact-Sensitive Areas

Impact-Sensitive Areas pertain only to the County of San Diego's Community Plans and include reservoirs and surrounding lands, flood areas or buffered stream paths, and some park sites. Impact sensitive areas may provide valuable wildlife habitat for foraging, drinking, resting, and breeding for a variety of wildlife species.

## Agriculture

Agriculture includes agriculture preserves (e.g., Williamson Act) or other intensive agriculture uses.

## Extractive Industry

Extractive Industry includes sand and gravel extraction and other mining operations.

## Public/Semi-Public

Public/Semi-Public includes NAS Miramar, the Bureau of Land Management (BLM), and other public lands. Miramar and BLM, which occupy the majority of this category, have independent resource management programs. Federal plans and/or programs for their use must be factored into the MSCP design process.

## Water

Water includes ponds, channels, lakes, lagoons, reservoirs, and bays.

## Urban

Urban includes all other land not included above, specifically, residential (>1 du/acre), industry, airports, commercial, shopping centers, commercial recreation, transportation, public facilities, utilities, schools, and hospitals.

## Low Density Residential

Low Density Residential includes primarily single-family residential homes located in rural areas with <1 du/acre. As discussed in Section 3.1.2, low density residential areas can provide some habitat value, depending on how the property is used, its topography, and location, and can serve as a buffer between habitat and incompatible land uses.

### 3.2.3 Distribution of Planned Land Uses

Table 3-2 and Figure 3-2 show the acreage and distribution of generalized planned land use. It is helpful to examine planned uses on a use-by-use basis in the context of existing land uses to assess development trends in the MSCP study area.

#### Parks, Preserves, and Open Space

Approximately 112,648 acres are designated for Parks, Preserves, and Open Space. This indicates almost a four-fold increase in the amount of land in this category compared to existing land use (28,531 acres). Many areas designated as Water under existing land use are designated as Parks, Preserves, and Open Space under planned land use. Golf courses are a separate category of existing land use but are combined with Parks, Preserves, and Open Space as a planned land use.

#### Agriculture

Based on planned land use categories, the amount of agriculture in the MSCP study area will decline from 41,001 acres (existing land use) to 28,048 acres (68 percent of existing) if the general plans are fully realized.

#### Low Density Residential

The biggest potential for change in future land use exists in the increase of low density residential land uses from a current level of 16,728 acres to 161,359 acres. Most of this acreage reflects a conversion from agriculture or vacant land, and indicates a significant consumption of land which may be needed to accommodate growth and/or conserve habitat. Preliminary findings reached in the Regional Growth Management process by SANDAG indicate that in order to provide land for housing the region's future growth, it may be necessary to convert some of this low density residential to urban residential densities.

**Table 3-2**  
**PLANNED LAND USES**

Generalized Planned Land Use	Acres	%
Parks/Preserves/Open Space	112,648	19%
Impact-Sensitive Areas	16,030	3%
Agriculture	28,048	5%
Extractive	1,649	<1%
Public/Semi-Public	3,581	<1%
Indian Reservation	639	<1%
Water	13,993	2%
Urban	243,703	42%
Low Density Residential	161,359	28%
0.5 to 1 du/acre	33,996	
0.25 to 0.49 du/acre	28,312	
0.125 to 0.24 du/acre	98,017	
0.05 to 0.124 du/acre	1,034	
<b>Total</b>	<b>581,649</b>	

Source: SANDAG Generalized and Community Land Use Elements

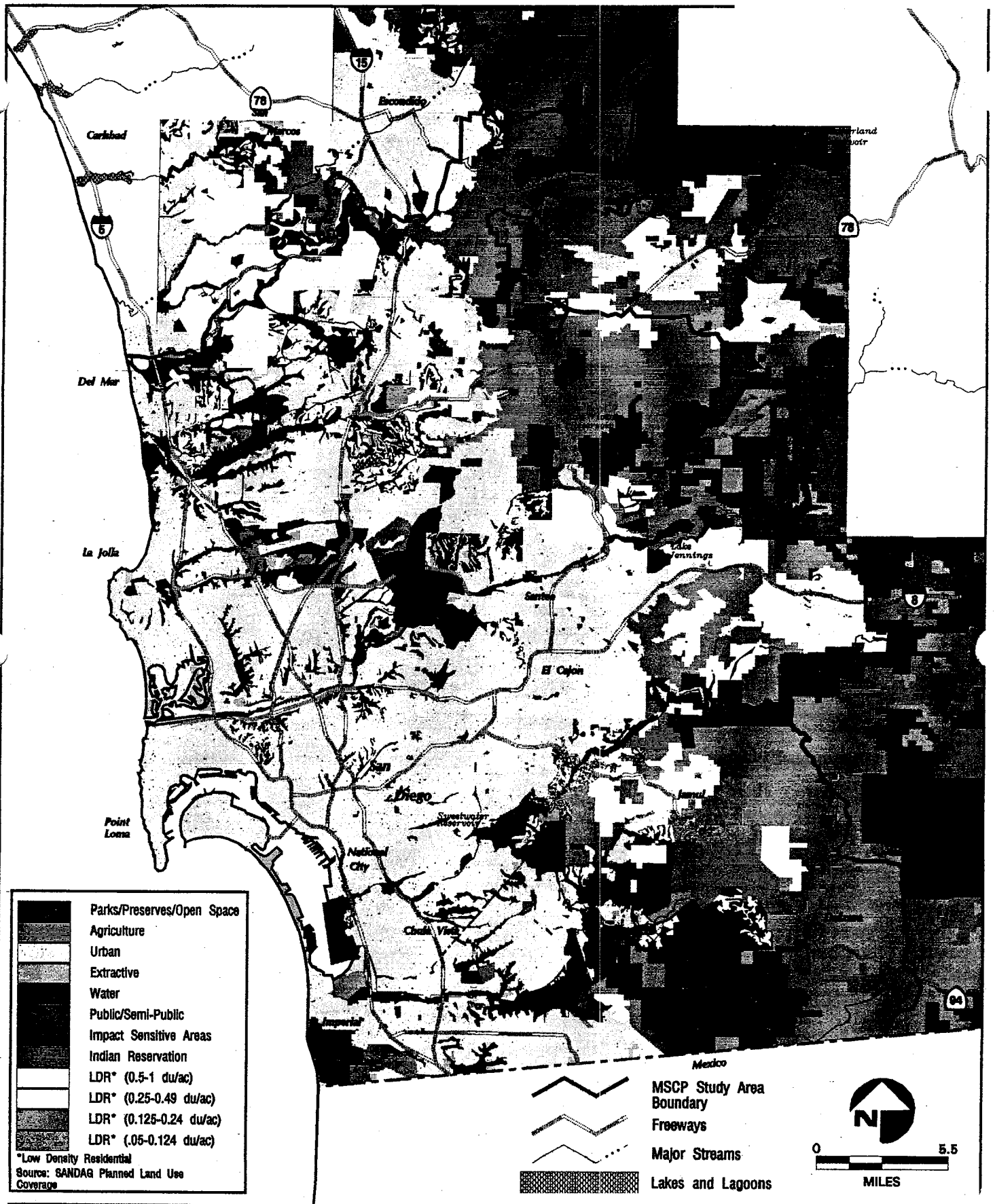
Note: Numbers may not sum to total as shown, due to rounding.

### 3.3 PUBLIC OWNERSHIP

#### 3.3.1 Methodology

Local, state, and federal sources were inventoried for existing information on lands currently owned, leased, or managed by government agencies. SANDAG collected data on public land ownership from the County of San Diego Tax Assessor Records. In order to enhance information for the MSCP, the existing baseline information was updated by local jurisdictions and other public and private agencies to include mapped information on known preserves, additional public lands acquired, and private dedicated open space or easements. All these land ownership categories are potential contributors to a preserve system.

Eleven categories of public ownership were created and correlated with the ownership data to form a current generalized land ownership data layer. These data were digitized and 24



maps (1 in = 2000 ft) were produced. Public agencies reviewed the maps to ensure mapped areas and ownership information were accurate, complete, and current.

### 3.3.2 Descriptions and Distribution of Public Ownership Categories

Eleven categories of public ownership were created, as defined in Table 3-3 and depicted in Figure 3-3. Approximately 29 percent of the land within the MSCP study area is in public ownership. Depending on proposed uses and habitat value of the property, public land may form a substantial building block for the preserve system.

### 3.4 CATEGORIES OF OWNERSHIP AND LAND USE

Public and privately owned habitat lands within the study area totals 314,890 acres, with an additional 51,578 acres in agriculture and disturbed but undeveloped lands. A land use policy analysis was conducted for each jurisdiction within the MSCP study area (Appendix B-1). The results of that analysis were applied to the vacant land to estimate the level of resource protection afforded vacant property through the land use process. For the purposes of this analysis, vacant land within the study area was placed in one of the following categories. The placement of land in categories was based on the level of protection afforded the property within a jurisdiction's general or community plan.

Category	Type of Land
I	Public or private lands that are permanently protected and managed for habitat purposes (e.g., Torrey Pines Preserve, Peñasquitos Canyon Preserve).
II	Public or private lands that are designated by the applicable general plan or community plan for passive park, preserve, or open space uses, but which have not been permanently dedicated for such uses. Not all open space areas are managed for habitat purposes. Some of these areas have or could have recreational uses or non-native landscape improvements.
III-A	Public or private lands that have general plan or community plan designations allowing some active use, but which are considered

**Table 3-3**  
**MSCP PUBLIC OWNERSHIP CATEGORIES**

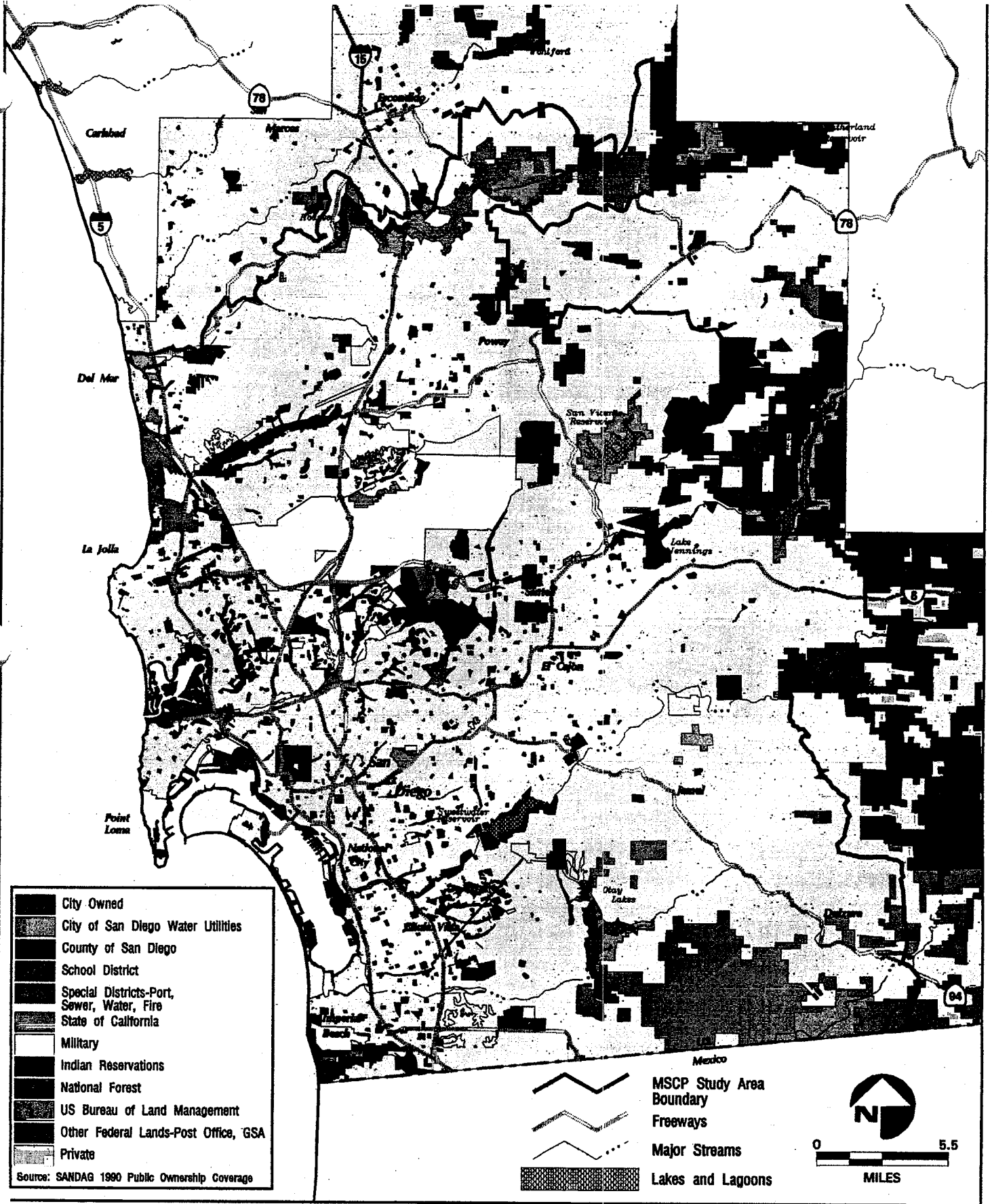
Category	Description	Acres	Percent of Public
City	Local jurisdictions	42,075	25%
Water Utilities	City of San Diego	22,040	13%
County	County of San Diego	11,682	7%
School District	All school districts within the study area	7,511	5%
Special District	Port, water, sewer, fire, utilities, sanitation	6,626	4%
State	Caltrans, parks, education	16,130	10%
Military	U.S. Department of Defense	32,925	20%
Indian Reservation	U.S. Bureau of Indian Affairs	727	<1%
National Forest	U.S. Forest Service	158	<1%
BLM	Bureau of Land Management	24,355	15%
Other Federal	Post Office, General Services Administration, National Guard	1,830	1%
Total Public		166,059	
Total Private		415,589	
<b>TOTAL</b>		<b>581,649</b>	

Note: Numbers may not sum to total as shown, due to rounding.

to be "constrained" by the local jurisdictions and subject to special planning review. Examples of constrained lands are wetlands, floodplains, and steep slopes.

**III-B** Public or private lands that have general plan or community plan designations for agricultural use only.

**III-C** Public or private lands that have general plan or community plan designations for low density residential use or public or semi-public use, including lands in Indian reservations. "Low density" is defined as <1 du/acre.



FIGURE

3-3

III-D Public or private lands that have general plan or community plan designations for urban or extractive uses. "Urban" uses include residential use at a density not less than 1 du/acre as well as commercial, industrial, and institutional uses.

The application of this analysis to public and private lands will be discussed in Sections 6.2 and 6.3.

### **3.5 HISTORICAL AND FORECAST URBANIZATION**

The pattern and rate of urbanization in the San Diego region are crucial factors affecting the ability to preserve habitat and the biodiversity in the region. By examining these factors, it is possible to assess the level and timing of risk to remaining habitat posed by development in the region.

#### **3.5.1 Historical and Forecast Growth in San Diego Region**

Between 1980 and 1990, the San Diego region experienced rapid growth in both population and employment, caused by large U.S. and foreign in-migration. During this period, the region's population increased by 647,100 persons and the total number of occupied housing by 217,100 units (Table 3-4). While population and housing increased by about one third, total employment increased by nearly one half. Furthermore, much of the growth, particularly in housing, was concentrated during the latter part of the decade. Before 1986, occupied housing units grew at an average annual rate of 1 percent per year. Between 1986 and 1990, the increase was 23 percent, or an average annual rate of nearly 6 percent per year. Since 1990, however, the extended recession in the U.S. and Southern California have reduced wage and salary employment, employment-related migration into the region, and the overall pace of development.

Like the national economy, the regional economy is expected to recover from the extended recession. However, new growth forecasts prepared by SANDAG are based more on internal growth, or the excess of births over deaths, than on employment-related migration. Under Series 8 forecasts, the region's population is expected to grow to 3.8 million by 2015, or an increase of 51 percent over the 1990 population. Occupied housing is expected to keep pace with this growth. However, employment in the region is anticipated to grow by only 31 percent during the same period.

Table 3-4  
**HISTORICAL AND FORECAST GROWTH OF SAN DIEGO REGION, 1980-2015**

	Historical		Forecast		Change 1980-1990	Change 1990-2015
	1980	1990	2000	2015		
Population	1,873,400	2,520,500	3,002,100	3,816,200	34.5%	51.4%
Occupied Housing	673,900	891,000	1,030,400	1,385,100	32.2%	55.5%
Civilian Employment	763,800	1,121,100	1,132,200	1,472,300	46.8%	31.3%

Source: SANDAG, Series 8 Regionwide Forecast.

Note: All figures, including those for 1980 and 1990, are based on SANDAG's Series 8 Demographic and Economic Forecasting Model (DEFM). Figures for 1980 and 1990 are for July 1 and do not match census figures.

### 3.5.2 Land Consumption Before 1990

The rapid growth of the region is reflected in the consumption of vacant land for development. Over 99 percent of the region's population resides in the urbanized, western third of the county, called the San Diego Cordon Area by SANDAG. The cordon area contains over 1.2 million acres. In this area, between 1980 and 1990, all developed land uses, excluding agriculture and vacant lands, increased approximately 91,000 acres to approximately 374,000 acres (Table 3-5). However, a part of this increase is due to the inclusion of additional land as parks and recreation in the 1990 survey. When parks are excluded, other developed uses increased by 60,000 acres in the ten-year period.

The accelerated pace of growth between 1986 and 1990 is also reflected in land consumption. Table 3-6 summarizes changes in land use acreage from 1980 to 1990. From 1980 to 1986, all developed uses increased by approximately 27,800 acres. Excluding parks, the increase was approximately 17,900 acres, or an average increase of 3,000 acres per year. From 1986 to 1990, however, developed uses increased by approximately 63,100 acres. Excluding parks, the increase was approximately 42,100 acres, or over 10,500 acres per year. This represents a very rapid rate of development, which is not likely to be repeated in the near future.

The MSCP study area occupies approximately 581,649 acres, or about one half of the San Diego Cordon Area. Between 1986 and 1990, approximately 29,300 acres were developed in the MSCP study area, representing 46 percent of the development in the cordon area. Excluding parks, developed land uses in the MSCP study area increased by 18,000 acres, or an average of 4,500 acres per year. In addition, approximately 10,800 acres were under construction in 1990, but not included among the developed uses.

Areas developed in the MSCP study area between 1986 and 1990, as well as land under construction in 1990, are shown in Figure 3-4. Most of the development was concentrated in the following areas: Carmel Valley-Fairbanks Ranch, Sorrento Mesa-Mira Mesa-Rancho Peñasquitos, Rancho Bernardo-Poway, Rancho San Diego, eastern Chula Vista, and eastern Otay Mesa.

**Table 3-5  
GENERALIZED LAND USE ACREAGE, SAN DIEGO CORDON AREA (Acres)**

<b>Land Use</b>	<b>1980</b>	<b>1986</b>	<b>1990</b>
Residential	183,645	193,385	226,515
Commercial and Office	14,641	19,646	21,271
Industrial	14,580	17,011	20,248
Public Facilities and Utilities	39,592	40,282	44,423
Parks and Recreation	30,611	40,534	61,520
<b>Total Developed Uses</b>	<b>283,069</b>	<b>310,858</b>	<b>373,977</b>
Agriculture	173,572	170,978	160,941
Water	9,959	7,627	8,469
Vacant	759,522	742,808	688,884
<b>Total Undeveloped Uses</b>	<b>943,053</b>	<b>921,413</b>	<b>858,294</b>
<b>Total All Uses</b>	<b>1,226,122</b>	<b>1,232,271</b>	<b>1,232,271</b>

Source: SANDAG.

Note: San Diego Cordon Area represents the urbanized, western area of San Diego County, approximately corresponding to the combined study areas of the MSCP and the MHCP.

**Table 3-6**

**CHANGE IN LAND USE ACREAGE, SAN DIEGO CORDON AREA AND  
MSCP STUDY AREA, 1980-1990 (Acres)**

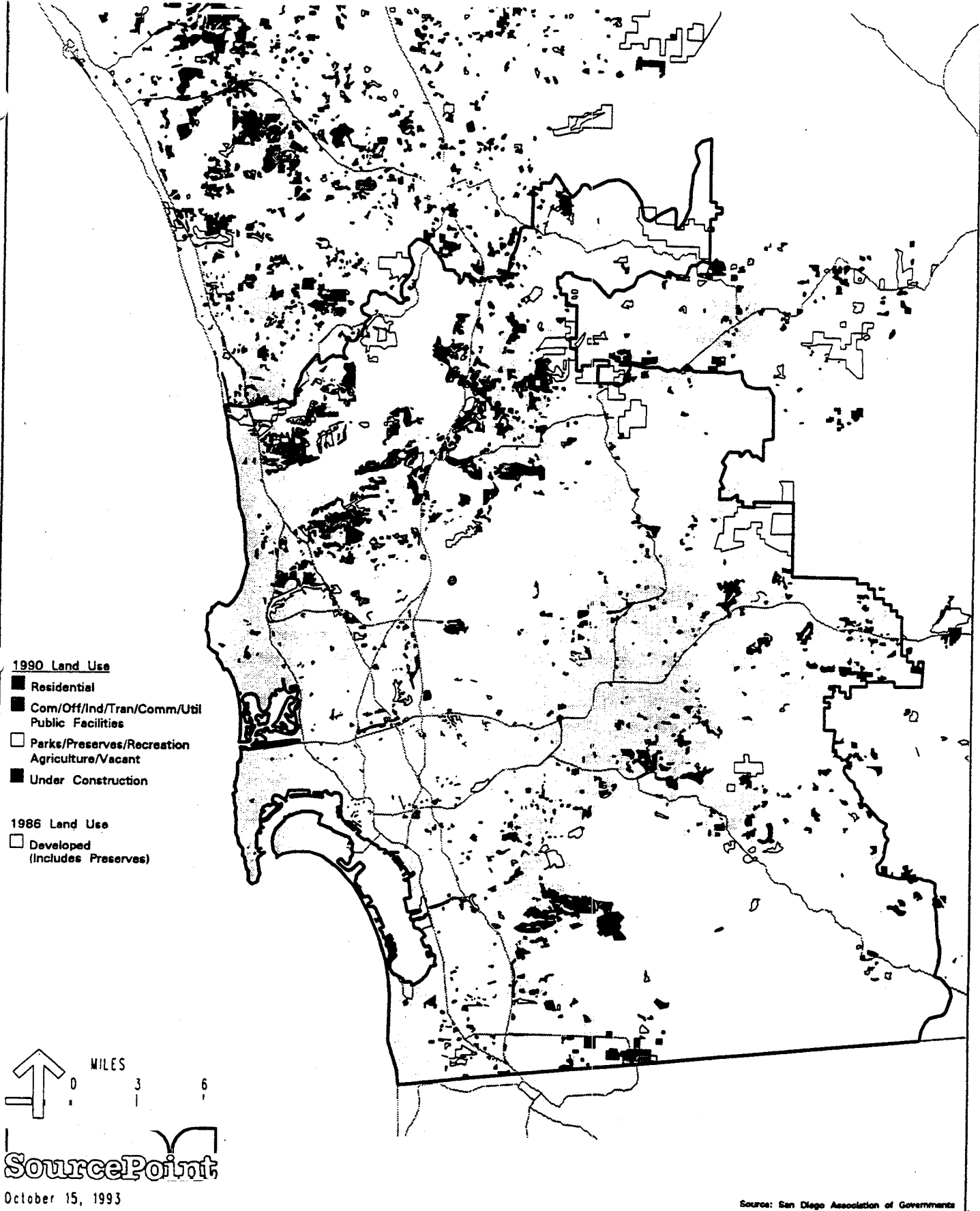
<b>Land Use</b>	<b>1980-1986 (SD)</b>	<b>1986-1990 (SD)</b>	<b>1986-1990 (MSCP)</b>
Residential	9,740	33,130	13,322
Commercial and Office	5,005	1,625	864
Industrial	2,431	3,237	3,029
Public Facilities and Utilities	690	4,141	794
Parks and Recreation	9,923	20,986	11,334
<b>Total Developed Uses</b>	<b>27,789</b>	<b>63,119</b>	<b>29,343</b> <sup>1</sup>
Agriculture	(2,594)	(10,037)	—
Water	(2,332)	842	—
Vacant	(16,714)	(53,924)	—
<b>Total Undeveloped Uses</b>	<b>(21,640)</b>	<b>(63,119)</b>	<b>(29,343)</b>
<b>Total All Uses</b>	<b>6,149</b> <sup>2</sup>	<b>0</b>	<b>0</b>

Source: SANDAG.

SD = San Diego Cordon Area

<sup>1</sup> In addition, 10,756 acres were under construction in 1990, but not included among developed uses.

<sup>2</sup> San Diego Cordon Area was redefined in 1986 to include additional land north of Camp Pendleton.



Land Use Change 1986 - 1990

07121

FIGURE

**3-4**

Long range plans currently under preparation for south Carmel Valley, the City of San Diego's Future Urbanizing Area, 4-S Ranch, and Otay Ranch indicate that a large part of the near-term development in the MSCP study area will continue the pattern established in the 1980s; that is, as the region emerges from the current recession, additional land consumption will likely occur in areas south and east of Carmel Valley, west of Rancho Bernardo, and the Otay Ranch-Otay Mesa area.

### **3.5.3 Alternative Forecasts of Land Consumption**

Habitat conservation under the MSCP would require that a substantial part of the currently undeveloped portion of the study area remain undeveloped. At the same time, population growth in the region is expected to continue, with additional demand for land consumption. Whether the conservation objectives and the requirements of regional growth can both be accommodated depends in large measure on the future pattern of land use in the MSCP study area.

As part of the Series 8 forecasts, SANDAG is currently evaluating alternative sets of land use policies and compatible transportation facilities. This is a departure from the Series 7 and previous forecasts, in which a single forecast was produced based on the existing general and community plans. As part of the preparation of a Regional Growth Management Strategy, the evaluation of different land use policies may result in recommendations for changes to existing plans.

The Series 8 forecast alternatives are designed to address Regional Growth Management Strategy issues, as well as to meet the environmental review requirements for the 1993 Regional Transportation Plan (RTP). Two alternatives have been simulated for use in these studies. For the MSCP, an important result from the forecast alternatives is the net amount of land absorbed by projected growth. The estimated results for each policy alternative are shown in Table 3-7. Land consumption under the Quality of Life alternative is anticipated to be about 88,900 acres, or 48,200 acres less than land consumption under a continuation of existing land use policy. The largest differences by land use category are reductions in low density residential (i.e., density less than one unit per acre), single family, and industrial acres and an increase in the absorption of multifamily acres. The Quality of Life alternative is based on the assumption that general and community plans would be modified to accommodate these differences.

**Table 3-7**

**SERIES 8 REGIONAL GROWTH FORECAST LAND USE CONSUMPTION  
IN THE MSCP STUDY AREA <sup>1</sup>**

Vacant Land Use	Existing Policy Alternative, 1990-2015	Quality of Life Alternative, 1990-2015
Low Density Residential <sup>2</sup>	104,788	57,494
Single Family	21,993	20,079
Multifamily and Mobile Home	5,243	7,144
<b>Total Residential</b>	<b>132,024</b>	<b>84,717</b>
Commercial/Services	1,286	902
Office	288	351
<b>Total Commercial and Office</b>	<b>1,574</b>	<b>1,253</b>
Industrial/Transportation/ Communication/Utilities	3,290	2,810
Schools	285	208
<b>Total Industrial and Public Facilities</b>	<b>3,575</b>	<b>3,018</b>
<b>Total All Uses</b>	<b>137,173</b>	<b>88,988</b>

Source: SANDAG.

<sup>1</sup> In 1992, there were 346,420 acres of vacant land in the MSCP study area.

<sup>2</sup> Density less than 1 unit per acre.

Simulations of land consumption under the existing land use policy indicate that:

- By the year 2015, all urban-density residential land would be developed in the cordon area.
- 238,500 acres of currently vacant, low density residential land would be required to meet a part of the projected housing demand.
- 8,400 acres of currently vacant employment land (commercial and industrial) would continue to be vacant in 2015.
- The region east of the cordon area would see an increase of 20,000 housing units.

The Quality of Life alternative proposes the intensification of development within walking distance around the region's rail transit stations and in major bus service corridors. A more extensive transit system is assumed, with additional rail transit corridors primarily serving major development areas in North County and South Bay. In addition, this alternative converts a portion of vacant and redevelopment areas from employment to residential use. Simulations of land consumption under this alternative indicate that:

- By the year 2015, all urban-density single family land would be developed in the cordon area. However, more than 4,000 acres of multifamily land would remain vacant in 2015.
- 112,200 acres of currently vacant, low density residential land would be required to meet a part of the projected housing demand.
- 6,600 acres of currently vacant employment land would continue to be vacant in 2015.
- North County would have 8,100 fewer jobs and 9,100 more dwelling units than in the existing land use policy alternative.

A lower rate of land consumption, such as would occur under the Quality of Life alternative, would substantially reduce the risk of habitat loss and increase the ability of the region to accommodate both future growth and habitat conservation.

## **4.0 BIOLOGICAL PRESERVE DESIGN CONSIDERATIONS**

### **4.1 BIOLOGICAL OBJECTIVES AND CRITERIA FOR PRESERVE DESIGN**

This section presents the biological objectives and criteria for identifying critical biological resource areas which will form the basis of a preserve system. It also outlines the ecological principles upon which the criteria are based.

The objectives and criteria presented herein were developed by Ogden in conjunction with the U.S. Fish and Wildlife Service, California Department of Fish and Game, members of the Natural Communities Conservation Planning Program Scientific Review Panel, and biologists involved in development of the San Diego County Wildlife and Open Space Program, the Carlsbad Habitat Management Plan, and the Multiple Habitat Conservation Program of the North County Wildlife Forum.

#### **4.1.1 Purpose of the MSCP**

The overall goal of the MSCP is to develop a preserve system that will maximize and enhance biological diversity in the region and to conserve viable populations of endangered, threatened, and key candidate species and their habitats within the MSCP study area, thereby preventing local extirpation and ultimate extinction.

Biological diversity is defined as the variety of life forms, the ecological roles that they perform, and the genetic variation they contain (Wilcox 1984). The maintenance of biological diversity has become an increasing concern as development and other land uses encroach upon and fragment native habitats. Those species that are most sensitive to changes in their environment, such as loss of habitat, isolation, and the introduction of non-native competitors and predators, will be extirpated locally and may ultimately go extinct. It is becoming apparent that an important aspect of managing for biological diversity is to focus on the management of ecosystems and a variety of native species and habitats, rather than focusing on single species or populations (Noss 1983). The goal of this management approach is to maintain ecosystems, complete with a representative sample of native species, habitats, and functioning natural ecological processes, over a long-term planning horizon as well as to maintain physical processes on a regional scale (e.g., hydrological cycles, fire regimes).

#### 4.1.2 Biological Objectives

The major biological objectives of the preserve system are presented below, in no order with regard to priority.

- **Maintain functional ecosystems within the MSCP study area.** The preserve network should be rich in regional biological diversity and preserve many native species in self-sustaining landscapes. The fundamental patterns and processes (e.g., connectivity, dispersion of habitats, disturbance-recovery processes, and vegetative succession) that are present or operate within each ecosystem should be maintained. Elements of structural diversity, such as topographical relief, vegetative cover and diversity, permanent water, and rock outcroppings, should occur in the conditions, amounts, and patterns that are found in existing regional ecosystems. A system of functional ecosystems will also minimize the local extirpation of species and prevent their ultimate extinction (Wright and Hubbell 1983).
- **Maintain viable populations of priority MSCP species.** Priority MSCP species include all federally-listed endangered and threatened species and certain target species not currently listed by resource agencies. To manage for the biological diversity of plants and wildlife, it is important to focus on those species that are most at risk, rather than simply managing for the total number of species. Species that are most at risk include species that are geographically rare, species that naturally occur at low population density, species that have large area requirements, species with specialized habitat requirements, and species adversely affected by their proximity to particular land uses (i.e., edge effects, Harris 1988).

Under this approach, those species that are most at risk will act as "umbrella species" (Noss 1990), under which many other sensitive species utilizing the same habitat will be protected. A goal of the preserve is to provide for the long-term survival of the species at risk, resulting in stable or increasing populations. The goal of the USFWS is to achieve a 95 percent probability of maintaining viable populations over a 200-year planning horizon.

- **Provide for the maintenance of viable populations of as many of the remaining target MSCP and other native species as possible.** Based on both conservation priority and feasibility, as many native species as possible should be included as viable populations in the preserve system. This will ensure that the preserve system includes a representative sample of the rich biological diversity of the region and minimizes the need for future listing of species under state and/or federal endangered species acts.
- **Maintain and enhance/restore functional wildlife corridors and habitat linkages between critical biological resource areas.** Wildlife habitat patches should be linked by functional corridors to minimize problems associated with habitat fragmentation (Dickman 1987; Saunders et al. 1991; Rolstad 1991). Whenever possible, corridors should be of high quality habitat and of the same habitat type as the areas they connect. These landscape linkages are essential as pathways for genetic and demographic interchange. They are also important for facilitating daily, annual, and seasonal movements and, for some species, permitting dispersal to breeding and foraging areas. The preserve system will also provide for wildlife corridors between areas of high species richness.
- **Maintain the full range of vegetation communities and successional phases in the preserve system, with a focus on habitats considered sensitive, rare, or declining.** Habitats that are rare or ecologically significant, such as riparian habitats, should receive special focus because of their value to a wide array of wildlife and plant species. The preserve system should also include a variety of successional stages and phases of native vegetation types, and disturbance patterns present in the region (Pickett and Thompson 1978).

#### **4.1.3 Biological Criteria For Preserve Planning Area Design**

The following biological criteria should be used to identify preserve planning areas (in no order with regard to priority). These criteria include the seven reserve design tenets listed in the NCCP Conservation Guidelines, which are:

## NCCP Conservation Guidelines – Tenets of Reserve Design

1. Conserve target species throughout the planning area.
2. Larger reserves are better.
3. Keep reserve areas close.
4. Keep habitat contiguous.
5. Link reserves with corridors.
6. Reserves should be diverse.
7. Protect reserves from encroachment.

These seven reserve design tenets, including the criteria below, are the standards which the focused planning areas and final preserve design within MSCP subareas must utilize to receive concurrence from the USFWS and CDFG.

### MSCP Biological Criteria for Preserve Design

- **The extent and richness of high quality habitat and corridors for target MSCP and other native species (NCCP tenets #1 and #6).** High quality habitat is defined as habitat that has a high abundance and productivity of target wildlife and plant species due to the availability of high quality forage, cover, or other essential needs. Quality of habitat includes consideration of structural elements. Important structural characteristics include height and structural diversity of vegetation, rock outcroppings, natural pools, permanent water, and caves. Soil types, elevational diversity, and slope diversity are important predictors of rare vascular plant species richness and should also be considered in the preserve design (Miller et al. 1987).
- **Density and richness of target MSCP and other native species (NCCP tenet #6).** The density and richness of priority MSCP species should be evaluated and considered in designing the preserve system (Margules and Usher 1981). The goal of the preserve system is to maximize the number of native species contained in the system at equilibrium, prioritizing those species that are most at risk. The largest reserves within a region should be located in areas that exhibit an ability to support a high density of the species of highest concern (Wilcox 1980).

- 3 • **Size of habitat area (NCCP tenet #2).** It is important to maintain native habitat in the amounts, sizes, and distribution that will ensure the continued existence of wildlife and plant species (Diamond 1975). Habitat fragmentation is the reduction and isolation of habitat patches and is generally considered to be the most serious threat to the maintenance of biological diversity (Noss 1983). Small, isolated wildlife habitat patches do not contain the full array of native species that could be expected in larger blocks of habitat (Wright and Hubbell 1983; Temple 1983; Soulé et al. 1988). Large, wide-ranging species such as mountain lions (Beier 1993) tend to require large habitat areas, and small habitat patches cannot support these species (Schaffer and Samson 1985). Some species are vulnerable to increased nest predation and parasitism and harsher microclimates associated with the increased edge effect of small habitat patches (Anderson and Robbins 1981; Whitcomb et al. 1981).

When populations are small due to decreased habitat area, the probability of extinction due to chance alone dramatically increases. Isolated populations associated with small, distinct patches of habitat are more vulnerable to catastrophic disturbances such as fire, disease epidemics, and severe weather conditions (Soulé 1983). Small populations are susceptible to demographic changes resulting from disturbances. If a population has a low number of reproductively active individuals, additional losses of reproductively active individuals often have a disproportionately adverse effect on the viability of the small population (Wilcove 1987). Additionally, genetic problems such as inbreeding may result in the expression of harmful recessive genes or the reduction in genetic variation in the isolated population (Lacy 1987). Maintaining genetic variation is important for the long-term viability of a population to allow for adaptation to changes in environmental conditions.

All other things being equal, the larger the preserve, the greater the species richness and the greater the chances of maintaining long-term viability of populations (MacArthur and Wilson 1967; Connor and McCoy 1979). However, species-area curves generally reach a plateau, where fewer additional species are added to the preserve in proportion to the increased area of the preserve (Wilcox 1980). The following size-related parameters should be considered in delineating preserve areas: ability to retain a diversity of microclimates and topographical features that include representative species and

habitat compositions; ability to accommodate natural disturbance without being completely destroyed; ability to minimize negative edge effects in the interior of the preserves; and large enough to maintain genetically and demographically viable populations of the species that are dependent on them.

Threshold size should be determined in part by species viability analyses. For example, coastal sage scrub habitat patches with the potential to be occupied by at least 50 pairs of gnatcatchers should be selected as core coastal sage scrub units. These core units of coastal sage scrub may not be contiguous patches of habitat, but should be sufficiently interconnected so that resident gnatcatchers will function as a metapopulation (Ogden 1993b).

- **Ability to add to plant and animal diversity of the overall preserve system (NCCP tenet #6).** While large habitat areas are of value for the reasons given above, some specialized habitat types are important to retain, even if they encompass a small amount of space and are unconnected to the overall preserve system. For example, a vernal pool may not require connection to the overall preserve system. In some circumstances, relatively small habitat patches are adequate to preserve small, functional populations of some plant and animal species. Small patches of high quality habitat may support large populations of certain species and relatively high species diversity.
- **Shape which minimizes the edge-to-area ratio of preserve blocks (NCCP tenets #2 and #7).** Where the possibility exists to design the shape of preserve areas, preserve areas should be somewhat circular in shape in order to minimize the ratio of edge to habitat area (Game 1980; Blouin and Connor 1985). Edges are defined as the interface between native plant communities and man-modified areas. Many wildlife species decrease along the edge of habitats due to adverse edge-effects, such as increased parasitism (by species such as the brown-headed cowbird), increased nest predation (by species such as jays, raccoons, opossums, and stray dogs and cats), and increased competition for nest cavities (by starlings and other non-native species) (Brettingham and Temple 1983; Gates and Gysel 1978; Noss 1983; Temple 1987). Disturbance by exotic plants, domestic animals, and off-road vehicles also increases along habitat edges (Noss 1983; Alberts et al. 1993; Sauvajot and Buechner 1993;

Scott 1993). In addition, habitat edges are locations where wildlife can exit the preserve area, often entering into areas associated with high mortality such as roadways and development.

- **Adequate distribution throughout the MSCP study area (NCCP tenets #1, #4, and #6).** Adequate distribution of preserves throughout the study area is important to retain appropriate representation of geologic, climatic, topographic, vegetative, and other characteristics. The network of preserves should be representative of the species and habitat composition throughout the region. Habitat types should be multiply represented in the set of preserves. Populations of target species should also be multiply represented in the preserve system, when possible. Replication of habitats and species populations will help to ensure that diversity can be maintained despite catastrophic disturbances or extreme environmental perturbations. Replicated habitat patches separated by spatial distance within a larger preserve network will tend to be exposed to independent and variable sets of environmental conditions, such as microclimate, fire history, and topography. Replicated habitat patches will also be exposed independently to pathogens, parasites, and natural and unnatural (e.g., predation by exotics) disturbance regimes.
- **Ability of preserve blocks to be buffered by areas of limited-intensity development (NCCP tenet #7).** Where possible, it is important to maintain one or more buffer zones around preserve areas and corridors that incorporate decreasing levels of intensity of land use with increasing proximity to the core preserve area. The nature of the surrounding habitat matrix is critical to the viability of the preserve area (Jensen 1987; Kushlan 1979; Schonewald-Cox and Bayless 1986; Kelly and Rotenberry 1993). It is preferable to establish preserve boundaries that minimize the interface between development and biological resources and maximize preserve manageability.
- **Ability of preserves to be managed for desired use (NCCP tenet #7).** Assessing the conservation value of natural areas includes evaluating the expected ability of the preserve system to maintain biological diversity. The selection of the preserve planning areas should consider management concerns such as enforcement and fire management. Preserve areas of sufficient size will

minimize encroachment and adverse edge effects and will require less intensive management per unit area. Where land use activities occur adjacent to the preserve system, care should be taken to minimize habitat fragmentation through environmentally sensitive project designs, management, and locations. Because the goal of the preserve system is to provide self-sustaining natural ecosystems, exotic species should be managed to avoid threats to the diversity of native species, natural communities, or processes (Murphy 1988). The preserve design should consider opportunities for enhancement and restoration of habitat and opportunities to reintroduce species that have been locally extirpated.

- **Ability of preserves to be connected by adequate corridors to adjacent habitat patches (NCCP tenets #4 and #5).** A wildlife corridor can be defined as a linear landscape feature that allows animal movement between two patches of habitat or between habitat and sources of essential resources. It is useful to differentiate between regional and local wildlife corridors. Regional corridors link two or more large areas of natural open space. Local corridors allow resident animals access to necessary resources which otherwise may be impeded by development.

There are two main categories of corridors as distinguished by Noss (1983). The first category is the line corridor, e.g., narrow lines of vegetation. Line corridors are of value in providing some security and shelter for travel by those wildlife species that will utilize them. Strip corridors are wider corridors that provide interior habitat conditions (as opposed to line corridors which are all edge). Where possible, strip corridors are preferred because they accommodate travel for a broader range of wildlife species, may provide limited habitat for foraging and reproduction for a number of wildlife species, and are less sensitive to edge effects and disturbance.

Animals use cover to conceal their presence; many species are reluctant to cross areas lacking cover, presumably because they are more visible and vulnerable to predators (Soulé and Gilpin 1991). Cover can be classified as vegetative or topographic cover. Vegetative cover is simply vegetation, native or landscaped, that the animal can use to screen itself from view. Topographic cover is provided by topographic relief such as ridges or cut banks which screen the

animals from view. Cover is especially important at the entrance to road underpasses because road crossings are apparently anxiety-producing events for wild animals (Reed 1981). Dense cover at the ends of the underpass will enable the animal to survey the underpass from a safe position while deciding whether to proceed.

Corridors should be drawn into the overall preserve design to take advantage of landscape features such as riparian habitats and canyon/ridge systems (Noss 1983; Soulé and Gilpin 1991). At least two corridors between each preserve should be identified, where available. Riparian habitat is used as movement corridors by a variety of wildlife species. The horizontal and vertical diversity of riparian habitats includes vegetative cover, an available water source, and a microclimate with less intense temperature fluctuations than the surrounding upland habitats (Doyle 1990; Roberts et al. 1977). Where existing corridors are insufficient to meet ecological needs or are lost due to catastrophic disturbances, at least the most important components of a corridor should be restored wherever possible (see Appendix A-9, Policy 2.1).

Corridors can be combined with buffer zones to design a landscape that provides high quality wildlife habitat intermingled with human land uses with a minimum of conflict (Noss 1983). This system involves having a core habitat area buffered by a zone of low-intensity land use. Beyond this first buffer would be an outer buffer zone of moderate-intensity land use providing an additional buffer from adjacent high-intensity land use areas.

The appropriate width of the corridor will depend on the wildlife species in question, the purpose of the corridor, and the quality of the habitat within and adjacent to the corridor. For instance, a corridor surrounded by natural vegetation may not need to be as wide to function as an appropriate travel corridor as it would need to be if the corridor were surrounded by development. Corridor dimensions should be based primarily on the needs of mountain lion, deer, California gnatcatcher, and cactus wren, four focal species believed to be least tolerant to adjacent development. However, smaller mammals and herps may require continuous undisturbed habitat to assure adequate linkage between large patches of native habitat, whereas gnatcatchers and wrens may only require islands of habitat as stepping stones for dispersal. Corridor width

should be determined by existing topography, vegetative cover, species-specific criteria developed by Ogden's current corridor studies and other studies pertinent to San Diego County (Beier and Barrett 1991; Beier and Loe 1993; Beier 1993; Ogden 1992d; Padley 1991). See also Appendix A-9, Policy 2.1.

- 10 • **Adequate connectivity with habitat patches outside the MSCP study area (NCCP tenets #4 and #5).** It is critical to the populations of species both within and outside of the MSCP study area that corridors are retained which serve to link the preserve system to open space and habitat areas outside of the study area. The overall viability of the preserve network is increased by this regional connectivity.
- 11 • **Ability to add large habitat areas to, or function as corridors between, areas of existing public lands or proposed open space (NCCP tenet #3).** Proximity to existing public lands and/or protected biological open space should be considered in identifying preserve planning areas in order to maximize preserve size and connectivity and to increase management feasibility and buffer areas.

#### **4.2 RARE PLANT AND ANIMAL PRESERVE DESIGN STRATEGY**

The goal of multiple species conservation is the preservation of viable populations of key sensitive species and their habitats. Short-term preservation can be achieved merely by protecting random populations. In order for preservation to be meaningful on a long-term basis, however, the viability of these populations must be considered. Long-term viability is achieved through preservation of genetic diversity. Therefore, to effectively preserve rare species populations, it is critical to understand the genetic structure of the species of concern; it is this structure that should dictate preserve design and species management. Unfortunately, little data exist regarding genetic structure for most of the species on the MSCP target list. However, some general assumptions may be made, based on current understandings of rare plant populations (Falk and Holsinger 1991) and animal populations (Allendorf and Leary 1986, and others). These assumptions are discussed below.

## 4.2.1 Plant Populations

### Preserve Design

Long-term viability is dependent on the amount of genetic variability a species population retains. In most cases, however, it is not necessary (or realistic) to capture all of the variation. The most adaptively significant variation is contained in alleles found in moderate to high frequencies, and adequate variation would be preserved by capturing a representative sample of these types of alleles (Holsinger and Gottlieb 1991). The key to effective rare plant conservation is to identify, on a species-specific basis, a preserve design that captures an adequate type and amount of genetic variation.

The type of preserve blocks in the system (e.g., small versus large, few versus many, etc.) required to adequately preserve genetic diversity will vary with each species, and will be dependent on factors such as distribution (current and historic), population size, and breeding system, in conjunction with genetic structure. Examples of the types of preserves that will likely be applicable in the MSCP area are presented below.

Large (Potentially Few) Preserves. Large populations of a relatively widespread species would be expected to be heterozygous, with low genetic variability between populations and high genetic variability within populations. This type of species would lend itself to preservation in large preserves that capture a representation of the major genetic groups within the species. Based on the distribution of extant populations, a relatively few preserves might be adequate to effectively conserve the species. Species that might fall into this category include *Ceanothus verrucosus*, *Ferocactus viridescens*, and *Tetracoccus dioicus*.

Numerous, Small Preserves. Highly disjunct, small, isolated populations would be expected to have high genetic variation between populations and low variation within a population. This type of species would necessarily need to be preserved and managed on a populational level in a number of smaller preserves (or as many preserves as possible in the case of species that remain extant in only one or a few localities) that try to capture as much genetic variability as possible. Species that appear to fall into this category, based on available information, include *Acanthomintha ilicifolia* (which may actually lend itself to preservation in larger preserves, based on locations within other important habitat areas), *Astragalus tener* var. *titi* (possibly extirpated), *Cordylanthus maritimus* ssp. *maritimus*,

*Pogogyne abramsii*, and *Navarretia fossalis*, among others. It should be cautioned that the current and historical distribution of the species needs to be considered, because some species that are seemingly comprised of a series of small, disjunct populations may have been too recently isolated to display significant intrapopulational variation. Some examples of species that might erroneously be placed into this category if one is not aware of their historical distributions include *Ferocactus viridescens*, *Ceanothus verrucosus*, and *Muilla clevelandii*. All three species have experienced high levels of habitat loss in the last few decades as a result of development of the coastal plain. Genetically, these species would better fit into the first preserve category (e.g., large, potentially few, preserves).

Another caution with small preserves is that the species therein will be more susceptible to adverse natural and human-induced events than species retained in large preserves. These short-term effects may influence the stability/survivability of the species far more than genetic considerations. For this reason, small, isolated preserves are not generally encouraged. Rather, small, isolated populations that are deemed important for preservation must include adequate buffers to minimize adverse edge effects and, preferably, be included in a larger matrix of preserved habitat. Depending on the reproductive biology of the species of concern, connectivity may also be an issue.

**Few, Small Preserves.** This type of preserve differs from the preceding category in being specific to species that have historically occurred in relatively small or regionally restricted populations in a very few locations. These species are apparently adapted to small population sizes, and are not expected to suffer from the effects of inbreeding and genetic drift as would a larger, heterozygous species that undergoes a rapid reduction in population numbers. For these species, preservation of existing populations is probably adequate to ensure long-term genetic viability, given that the preserve incorporates sufficient habitat for pollinators and/or dispersal agents, and is buffered from development or other threats. Small populations are most susceptible to extirpation from catastrophic events, however, particularly if there are no other sources of potential recolonization. As with the preceding preserve scenario, incorporation of adequate buffers into the preserve design is a key issue. Examples of species in this group include *Calochortus dunnii*, *Fremontodendron mexicanum*, *Lepechinia cardiophylla*, *Lepechinia ganderi*, *Nolina interrata*, *Pinus torreyana*, and *Senecio ganderi*. It should be noted that some of these species, such as *Calochortus dunnii* and *Lepechinia ganderi*, occur in areas where incorporation into larger preserves will likely be feasible, regardless of genetic considerations.

Mixed Preserves. Mixed preserves, or the combination of one or a few large source populations surrounded by more numerous small populations, may be an effective preserve design strategy for widespread species or species whose range has become fragmented relatively recently, and that may not persist in enough large populations to fit into the first preserve category (above). One species that might lend itself to this type of preserve design is *Hemizonia conjugens* in the Otay Mesa area. Providing the potential for the regular introduction of immigrants from a large source population to smaller populations through appropriate preserve design is one strategy to maintain acceptable levels of genetic diversity (and prevent high levels of inbreeding and loss of genetic variation due to drift).

### **Preserve Size**

Preserve size should be adequate to a) maintain conditions that allow natural evolutionary processes to continue, b) provide a buffer against adverse environmental processes (including random "natural catastrophes"), c) provide suitable habitat to accommodate spatial fluctuations and colonizing events, and d) allow for the maintenance of gene flow between populations (via pollinators and/or seed dispersal agents), where appropriate.

### **Population Size**

Population size is directly related to the short-term survival and viability of a species. Estimates of minimum population sizes necessary to maintain viability will vary depending on population structure, and are based on effective population size, or the size of an idealized population in which all individuals contribute equally to the gene pool. The effective population size can be estimated from the actual number of breeding individuals when factors such as mating system, sex ratio, and variation in fertility are known. The effective population size approximates (but is not necessarily equivalent to) the breeding population, and both are generally smaller than the total population size (Barrett and Kohn 1991). Calculations of effective population size are not available for the MSCP target plant species. Estimates of effective population size are therefore based on the following principles; however, effective population sizes recommended in the preservation policies may be modified through species-specific minimum viable population analyses.

1. For species whose distribution and abundance have been severely reduced, and which now occur in limited numbers, a minimum viable population size of 1,000-100,000 has been estimated as necessary to buffer environmental

stochasticity and natural catastrophes (Shaffer 1987). Furthermore, plant populations of this size effectively render genetic considerations secondary (Menges 1991). Conversely, genetic considerations become more important with a decrease in population size. Simulation models suggest that population sizes of 100 or fewer are ineffective in preventing the loss of genetic diversity, while 90 percent of the diversity can be retained in populations of about 500 individuals (Lacy 1987; Lesica and Allendorf 1992). It has also been noted that species with longer generation times will lose less variability over a given time period than species with shorter generation times (Lande 1992).

2. A small population size may be less important for a species whose distribution and abundance have not been historically altered (i.e., species which have likely existed in small, isolated, and/or disjunct populations for long periods of time), because these species are already adapted to the lower genetic diversity expected in small populations. For these species, demographic considerations (i.e., survivorship, growth, fecundity rates) rather than genetic considerations will determine population viability in the short-term. Species that may fall into this category include *Arctostaphylos otayensis*, *Baccharis vanessae*, *Calochortus dunnii*, *Ceanothus cyaneus*, and *Senecio ganderi*, among others. It should be cautioned, however, that populational information is incomplete for many of these species, and further studies may indicate that they are more widespread and/or occur in larger populations than previously thought. Where such uncertainties exist, preserve design should be contingent on further studies or include additional habitat to accommodate potentially larger populations.

Based on the information above, which is largely theoretical, the following guidelines were followed when recommending effective population size or minimum viable population size for species-specific preservation policies. For annual plants, a *minimum* effective population size of 1000 individuals is recommended, unless otherwise stated in the policies. (It has been suggested that actual populations of 500-100,000 may be required to retain population viability; Menges 1991; Lacy 1987; Lesica and Allendorf 1992). This is based on the greater susceptibility of annuals to environmental fluctuations/catastrophes. Smaller, *minimum* effective population sizes (e.g., 200-500 individuals) are generally recommended for herbaceous perennials, shrubs, and trees, based on longevity factors, breeding system, demographic history, and/or more (inherently) stable population sizes. Notable exceptions for both annuals and perennials include a) those species for which

observed (current and historical) population sizes do not approach the minimum numbers provided above, yet which appear to persist in stable populations, and b) species which currently exist in very large (albeit disjunct or restricted) populations, and for which preservation at the minimum effective population sizes recommended above might not be sufficient to maintain viability. It is worth re-emphasizing that effective population size is expected to be smaller than the total population size.

### **Additional Considerations In Preserve Design**

Annuals. Many annual plant populations fluctuate spatially on a yearly basis. An adequate preserve design for annuals should incorporate additional habitat to account for these yearly fluctuations. It should be noted that these fluctuations are not considered founder effects in the sense that previously unoccupied habitat is being exploited, but are related to patterns of seed dispersal and varying dormancy factors. In any given year, apparently unoccupied habitat within or adjacent to a rare plant population may, in fact, contain a viable seed bank of the species of concern.

Herbaceous perennials and shrubs. Populations of herbaceous perennials and shrubs will be more stable than annual species with respect to spatial distribution on a year-to-year basis. Like all plants, however, their ranges can increase, decrease, and/or shift over time as new individuals become established away from the parental plant and older individuals die. However, perennial species would not require additional habitat to allow for yearly fluctuations, as would annual plants. Large preserve size and incorporation of buffers would provide additional habitat to allow for long-term spatial fluctuations.

### **Reproductive Biology**

Plant species can be highly variable with respect to reproductive biology, and certain breeding systems may influence the size and/or structure of a preserve.

Selfing and Clonal/Asexual Reproduction. For species that reproduce primarily by selfing (e.g., *Navarretia fossalis*, Grant and Grant 1965) or asexual means (e.g., *Brodiaea filifolia*, ERCE 1990b), an adequate preserve design could potentially be smaller and/or more isolated than preserves for sexually reproducing, outcrossing species. In the case of species that reproduce primarily (but not entirely) by asexual means, only a very small

number of pollinator events would be required to maintain genetic diversity (Ellstrand 1992).

Mixed Breeding or Outcrossers. For species that have mixed (e.g., *Arctostaphylos glandulosa* ssp. *crassifolia*, Grant and Grant 1968; *Nolina interrata*, Dice 1988) or outcrossing (e.g., *Baccharis vannesae*, Beauchamp 1980; *Pogogyne abramsii*, Zedler 1987) breeding systems, it will be more important to maintain connectivity between populations in order to preserve genetic diversity. The distance between outcrossing populations should be dependent, to some degree, on population size. It has been demonstrated that smaller populations are more likely to mate with large populations as opposed to other small populations, even if the large population is further away. The probable cause for this is that larger populations broadcast more pollen (Ellstrand 1992). Other considerations in designing preserves for outcrossers are the dispersal ability of pollinators and the amount of suitable, intervening habitat to support those pollinators.

### **Pollination Biology**

For outcrossing species that rely upon specific animal vectors for pollination, effective preserve design should include appropriate habitat to accommodate the various life cycles of the pollinators. Information on actual or putative pollinators was derived from the literature (Grant and Grant 1965; Grant and Grant 1968; Dice 1988; Zedler 1987), or inferred from closely-related taxa (Grant and Grant 1965; Grant and Grant 1968; Jones and Luchsinger 1979) or an analysis of the floral syndromes of the species of concern (Wyatt 1983).

### **Dispersal Agents**

For species that rely upon animal vectors for seed dispersal, effective preserve design should include appropriate habitat to accommodate the various life cycles of the dispersal agents. The majority of target species appear to rely on self-dispersal (autochory) or wind-dispersal (anemochory), although there are several species (e.g., *Arctostaphylos glandulosa* var. *crassifolia*, *Fremontodendron mexicanum*, *Ferocactus viridescens*, *Rosa minutifolia*, *Solanum tenuilobatum*) that rely wholly or partially on animal dispersal (zoochory). Information on actual or putative dispersal modes was derived from the literature (Keeley 1991; Parker and Kelly 1989; Eriksson and Bremer 1992; Dunn 1986), or inferred from closely-related taxa (Keeley 1991) or seed morphology (i.e., fleshy versus

dry seed; unadorned seed versus seed specialized for animal dispersal via accessory structures that aid in attachment).

#### 4.2.2 Animal Populations

Much of the preceding discussion related to rare plant population genetics also applies to animals. Theoretical and empirical evidence suggests that demography is usually of more immediate importance than population genetics in determining the short-term viability of wild populations (Lande 1988). The long-term viability of a species involves both demography and population genetics. The basic assumption is that populations with relatively high levels of genetic diversity (heterozygosity) are less vulnerable to extinction than populations with relatively less genetic diversity (Allendorf and Leary 1986). Many of the animal species of concern have relatively large home range area requirements which limits the maximum population density of a species within a given area. For animals with very large home ranges (e.g., mountain lion), no one habitat patch is sufficient to support a viable population. Thus, a network of interconnected reserves is necessary to maintain viable populations of certain species.

Genetic diversity can be described at two scales: within population (local) diversity and between population (regional) diversity. Most natural populations possess some degree of discontinuity in spatial distribution and have some geographic structure across the species range. A species' distribution may be composed of geographically distinct patches of occupied (or potentially occupied) habitat, interconnected through patterns of gene flow via an exchange of individuals between local populations. This group of interacting populations is termed a metapopulation. The long-term conservation of a species must consider the influence of metapopulation structure on the maintenance of regional genetic diversity of a species that allows for adaptation to environmental change and maintenance of a species' evolutionary potential (Franklin 1980; Soulé 1980). Small isolated populations are expected to lose genetic variation more rapidly than large interconnected populations as a consequence of sampling error (i.e., genetic drift) being highly dependent on population size. The contribution of mutation is usually considered to be a negligible source of genetic variation for relatively small populations.

A species persistence within a given area is dependent on local demographic conditions through time (demographic stability) and connectivity of the population with other populations that may contribute immigrants and effectively "rescue" a population from local

extinction (Brown and Koderic-Brown 1977; Lande 1988). The local genetic diversity of a population is dependent on a species' mating system (e.g., monogamy vs. polygamy), generation time, dispersal capability, and population density. These factors influence the effective population size ( $N_e$ ), which is the ideal size of a population with regard to genetic structure and variation assuming a randomly mating population with no migration, mutation, or selection influencing genetic variation. The potential loss of regional genetic variation is greatest when a metapopulation is below the effective population size believed to be necessary to conserve genetic variation over the long term. Franklin (1980) recommended that in order to preserve genetic variation for complex traits, the effective population size should not be less than 500. The effective population size is smaller than the adult census population size ( $N_c$ ). For most vertebrate species, the adult census population size is typically two to five times larger than the effective population size (Nunney 1992). Thus, maintenance of an effective population size of 500 may require the conservation of 1000 to 2500 adult individuals within a regional network of interconnected preserves. The appropriate geographic scale of this preserve network is dependent on the dispersal capability of the species.

Exchange of individuals between populations should exceed one reproductively successful migrant per generation to maintain regional genetic diversity (Lacy 1987; Lande and Barrowclough 1987). Frequent extinctions and subsequent recolonization of populations within a regional metapopulation may lead to a reduction in regional genetic diversity over an extended time interval if colonization rates are not substantially higher than local extinction rates (Gilpin 1991). The larger populations of a metapopulation will be the most influential in maintaining regional genetic diversity since they contribute proportionately more immigrants than smaller populations (Gilpin 1991). If the metapopulation functions with source-sink dynamics (Pulliam 1988), source populations will contribute to regional genetic diversity more than sink populations. The number, type (e.g., large vs. small, source vs. sink) and geographic distribution of populations will influence the pattern of genetic diversity of the metapopulation. For many species of concern, a preserve network of several relatively large populations that are sufficiently interconnected would maintain genetic diversity at both local and regional scales.

For both short- and long-term population viability, demographic, environmental, and spatial variation are considered to be of more practical significance than genetics for management of species with populations larger than the threshold effective population size (Lande 1988). Demographic variation is concerned with the probabilistic nature of survival

and reproduction, especially when populations become small. Since populations consist of a finite, integer number of individuals with age and sex structure, sampling error in small populations results in relatively high levels of uncertainty in the annual rate of survival and productivity (Shaffer 1981). This uncertainty must be considered when estimating viable population size.

Environmental variation is unpredictable variation in environmental conditions through time. For example, even though we may know precisely the long-term average annual rainfall for a location, it is difficult to predict the rainfall pattern in the future. Environmental variation results in fluctuations in population levels because environmental factors (e.g., rainfall, cold temperatures) affect survival and reproduction. Catastrophic events are the extreme example of environmental variation. Drought, floods, fire, or epidemics can result in severe declines in population size. Small populations are highly vulnerable to extinction when extreme catastrophic events occur.

Spatial variation is the variation in environmental conditions between spatially distinct patches of habitat, which corresponds to variation between populations rather than variation within each population. Most species consist of an assemblage of populations (a metapopulation) that occur in spatially discrete patches of habitat. Due to the spatial structure of the metapopulation, each population may experience significantly different environmental conditions. The correlation of annual environmental conditions experienced by different populations is usually related to the distance between the populations. Conditions for adjacent populations will be more similar than for populations that are much farther apart. A preserve network that has a spatial distribution appropriately scaled to potential catastrophic events will protect species distributed as several populations that function as semi-independent entities in relation to environmental events (i.e., environmental correlation between preserve areas is relatively low).

#### **4.3 SUMMARY OF POPULATION VIABILITY ANALYSES**

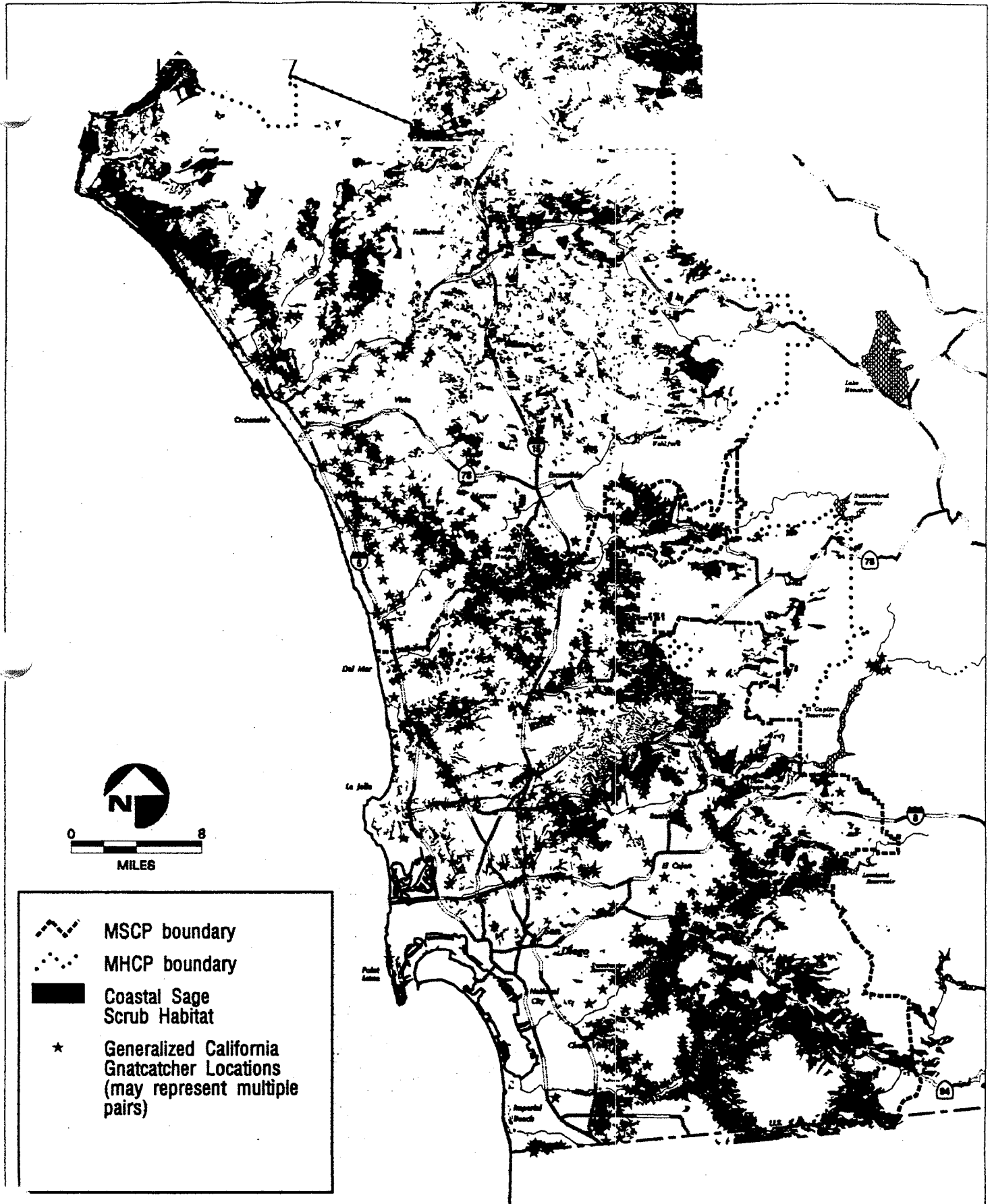
Population viability analysis (PVA) is a process that entails evaluation of data and models for a population or group of populations to anticipate the likelihood that a particular population will persist for a given planning horizon and extinction threshold (Shaffer 1981, Soulé 1987; for review, see Boyce 1992 and Burgman et al. 1993). While PVAs should not be used as a definitive measure of preserve adequacy, they can be used as a tool in comparing various preserve configurations. Ogden prepared PVAs for populations of

California gnatcatchers and coastal cactus wrens within San Diego County and the MSCP study area (see Appendices A-7 and A-8). As with most PVAs performed recently, such as for the northern spotted owl (Lande 1988; McKelvey et al. 1992), the MSCP analyses are computer simulation studies. For the gnatcatcher and wren PVAs, the criterion for viability was defined by the USFWS as 95 percent probability for metapopulation persistence for at least 200 years.

The gnatcatcher and wren PVAs used RAMAS/space (Applied Biomathematics, Setauket, New York), a commercially available metapopulation simulation program, to evaluate the viability of the gnatcatcher and wren metapopulations with potential preserve designs. The model simulates metapopulations as consisting of multiple, discrete, potentially interacting populations. The model assumes density-dependent population dynamics (logistic population growth) with randomization functions for population parameters and migration rates. Demographic and environmental stochasticity and spatially-dependent environmental correlation between populations are also included. Between-population migration is modeled as a density- and distance-dependent process with stochastic sampling. Source-sink metapopulation dynamics were assumed for the gnatcatcher simulations (Pulliam 1988). Source and sink populations were categorized relative to climate zones. Populations within the Transitional Climate Zone were assumed to be sink populations due to greater annual variation in weather conditions.

Extensive sensitivity analyses of the various input parameters were conducted. RAMAS/space is most sensitive to the value of the maximum discrete population growth rate ( $R_{max}$ ). The coefficient of variation of  $R$  (CV of  $R$ ), survival rate ( $S$ ), and migration rate ( $M$ ) were moderately sensitive parameters.

The current California gnatcatcher metapopulation within the MSCP study area likely exceeds 900 pairs (Figure 4-1). The results of the metapopulation simulations suggest that the current MSCP population is probably viable. The viability of the MSCP metapopulation is likely due to the existence of five major concentrations (Otay, Sweetwater, Mission Trails/Miramar/Santee, Poway, and Lake Hodges) which act as source populations to the relatively smaller intervening populations (Figure 4-1). During periods of low population abundance, these source populations likely rescue smaller or less productive habitat patches that temporarily become unoccupied (Pulliam 1988; Gilpin 1990). Many of the smaller populations positioned between source populations likely act



FIGURE

California Gnatcatcher Sightings (1985-1992)  
in Western San Diego

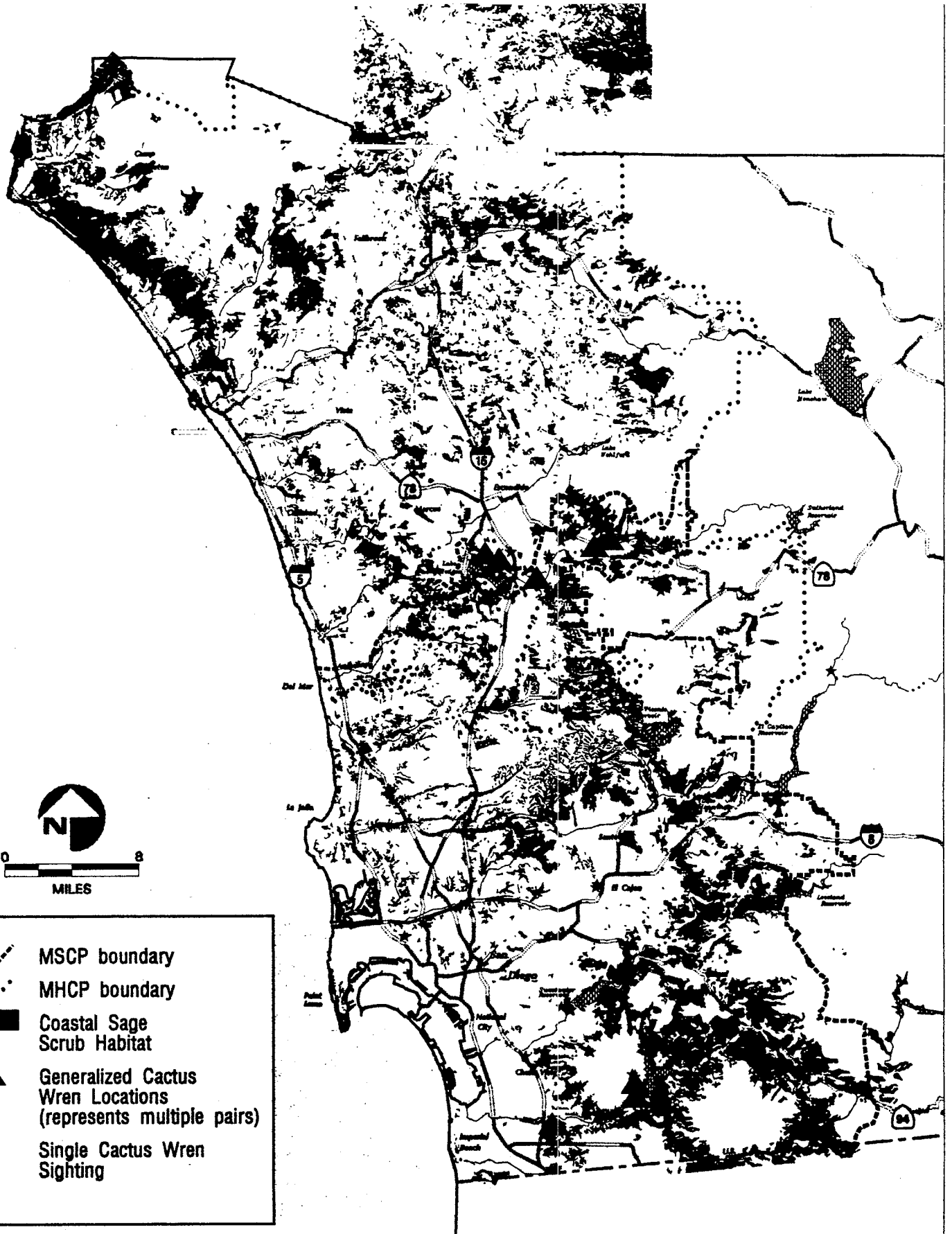
C7145 4-1

as steppingstone populations, enhancing inter-population connectivity and contributing substantially to the size and viability of the metapopulation.

Various potential preserve designs were evaluated with the PVA model simulations. Conserving only the coastal sage scrub habitat considered to have Very High biological value by the MSCP Habitat Evaluation Model (Section 4.4) produced results with an extinction probability of about 13.5 percent. Adding three coastal north county source populations to this preserve design (San Elijo Lagoon, Carlsbad, Camp Pendleton) reduced the extinction probability to well below the 5 percent threshold over 200 years. The PVA indicated that an economically feasible preserve design within the MSCP study area appears to be dependent on its connectivity with key source populations located in the North County Wildlife Forum MHCP study area. Retaining interconnections of the metapopulation is crucial to the viability of each gnatcatcher population. Without functional dispersal corridors to link populations, the viability of the metapopulation will likely be low. See Section 5.3.5 for a discussion of computer simulations of example Focused Planning Area scenarios for the gnatcatcher metapopulation.

The coastal cactus wren metapopulation for San Diego County and the MSCP study area was also analyzed with regard to its long-term viability. Methods were similar to those used for the gnatcatcher PVA. Based on a recent status review by Rea and Weaver (1990), the current wren metapopulation within San Diego County consists of less than 270 pairs distributed primarily in five disjunct populations (Camp Pendleton, Lake Hodges/San Pasqual Valley, Santee/Lake Jennings, Sweetwater Reservoir, and Otay River/Mesa; Figure 4-2). This metapopulation does not appear to be currently viable using the criteria of 95 percent probability of persistence over 200 years. This lack of viability is due to small population size, severe fragmentation, and isolation by distance between populations. Specific information on the demographics and dispersal capacity of coastal cactus wren populations, as well as the genetic status of the populations, will be needed to refine this population viability assessment.

Most cactus wren populations with more than five pairs are located within core gnatcatcher populations; hence, conserving these populations of cactus wrens will not necessarily require additional areas beyond that needed for a viable gnatcatcher preserve network. The Rancho del Rey population in Chula Vista is the only wren population that may not be viable due to severe habitat fragmentation. The remainder of the populations are accessible via large patches of vegetation, but they may be isolated by distance. Creating new patches



of suitable habitat between these populations will minimize this current situation by adding new populations and allowing for increased demographic exchange between populations. Orange County has the majority of the known wren populations (1600 pairs), and presumably the Orange County concentration is more likely to be viable than wren populations in any of the other counties.

#### **4.4 PRESERVATION PRIORITIES**

##### **4.4.1 Summary of MSCP GIS Habitat Evaluation Model**

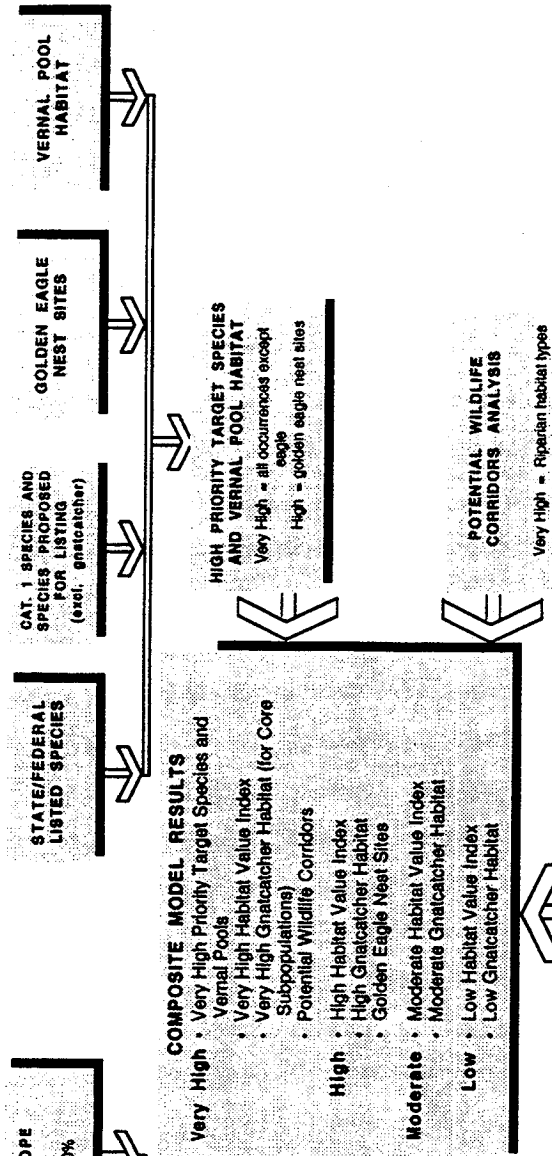
To accomplish stated MSCP biological objectives (Section 4.1.2), a model was developed to aid in prioritizing critical biological resource areas within the 581,649-acre study area in southwestern San Diego County. In the absence of adequate and systematically-collected biological data for the entire study area, the model uses biological and physical data relating to the potential presence of 93 target species (listed, rare, and/or indicator species) and to factors that contribute to high biodiversity. Four habitat evaluation procedures were performed, using GRID GIS software (Figure 4-3). The first procedure identifies key habitat areas for California gnatcatchers by categorizing coastal sage scrub with regard to patch size, elevational distribution, and slope gradient. The second procedure evaluates areas with rare habitats, high species richness, and other physical parameters that may affect biodiversity. The third procedure maps the distribution of all federal and state listed species, category 1 candidate species, and species proposed for listing (excluding the gnatcatcher, which is addressed in the first procedure). The fourth analysis identifies potential wildlife corridors. See Appendix A-10 for a detailed description of the MSCP Habitat Evaluation Model.

Individual components of the model were combined for each of the procedures to produce four maps:

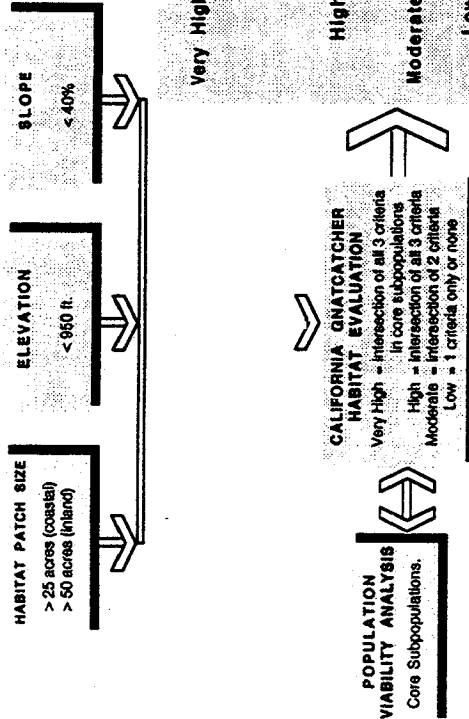
1. priority gnatcatcher habitat (Figure 4-4);
2. biological diversity/species richness (habitat value index, Figure 4-5);
3. high priority target species and vernal pool habitat (Figure 4-6); and
4. potential wildlife corridors (Figure 4-7).

These four maps were then combined to produce an overall Habitat Evaluation Map (Composite Model Results, Figure 4-8). The final map shows the distribution of critical

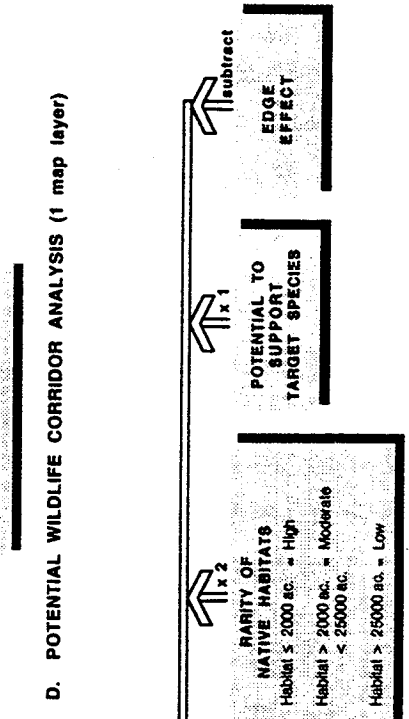
**C. HIGH PRIORITY TARGET SPECIES AND VERNAL POOL HABITAT (4 map layers)**



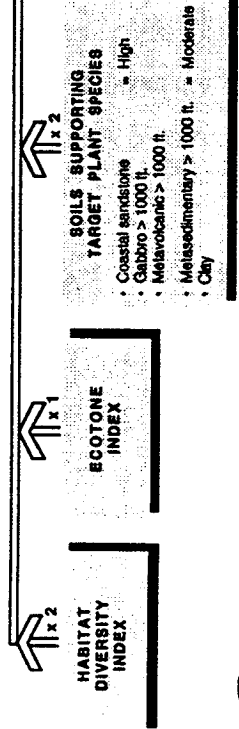
**A. CALIFORNIA GNATCATCHER HABITAT EVALUATION (3 map layers)**



**D. POTENTIAL WILDLIFE CORRIDOR ANALYSIS (1 map layer)**



**B. HABITAT VALUE INDEX (7 map layers)**



GIS Habitat Evaluation Model for the MSCP Study Area

FIGURE

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biological resource areas that serve as the biological basis for the gap analysis and for prioritizing lands for preservation and management. In general and at a regional level, the consensus opinion of the Biological Task Force and other biologists who reviewed the model is that the resulting map adequately represents critical centers of biological resource values throughout the study area and the spatial distribution of relative biological habitat value within the study area.

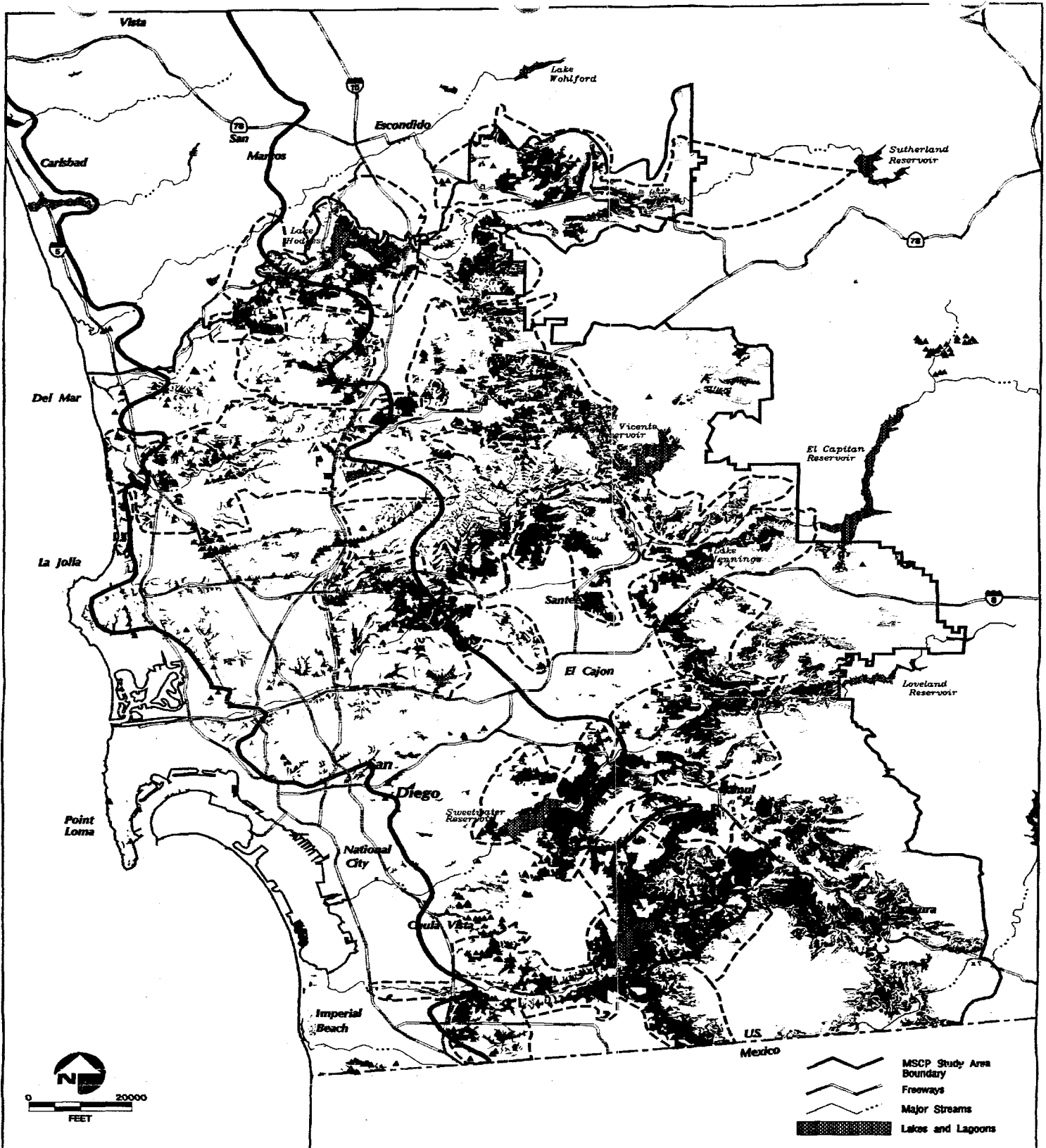
The model results serve as a tool for use in regional planning and for delineating core biological resource areas (Section 4.4.2). However, the model results are not intended to replace site-specific field survey data and evaluations. Rather, they provide a regional perspective for site-specific biological assessments. Site-specific verification of biological resources (or lack of biological resources) is needed before land use decisions for sites are finalized.

The distribution of vegetation communities within the four habitat evaluation rankings (Very High, High, Moderate, and Low) is included in Table 4-1. Of all the habitats evaluated in the study area (314,890 acres), approximately 42 percent were ranked Very High and 22 percent were ranked High in habitat value. Approximately 57 percent of the coastal sage scrub in the study area was ranked Very High and 21 percent ranked High. The majority of the rarer communities were ranked Very High (e.g., saltpan, southern foredunes, coastal bluff scrub, maritime succulent scrub, southern maritime chaparral, saltmarsh, Torrey pine forest, and Tecate cypress). The four riparian communities in the study area are ranked entirely as Very High because of their role as potential wildlife corridors in the habitat evaluation model.

#### **4.4.2 Core Biological Resource Areas**

The Habitat Evaluation Maps along with the extensive MSCP database of target species information, vegetation communities, field survey results, and other parameters were used to identify biologically important areas (core areas) and habitat linkages between them. Core areas are defined as areas supporting a high concentration of sensitive biological resources which, if lost or fragmented, could not be mitigated elsewhere. Core areas should be the basis for designing the preserve system boundaries, i.e., inclusion of unfragmented core resource areas should be maximized within the final preserve boundaries to the extent possible. Core populations of least Bell's vireos, California gnatcatchers, and coastal cactus wrens are defined as habitat areas that support relatively



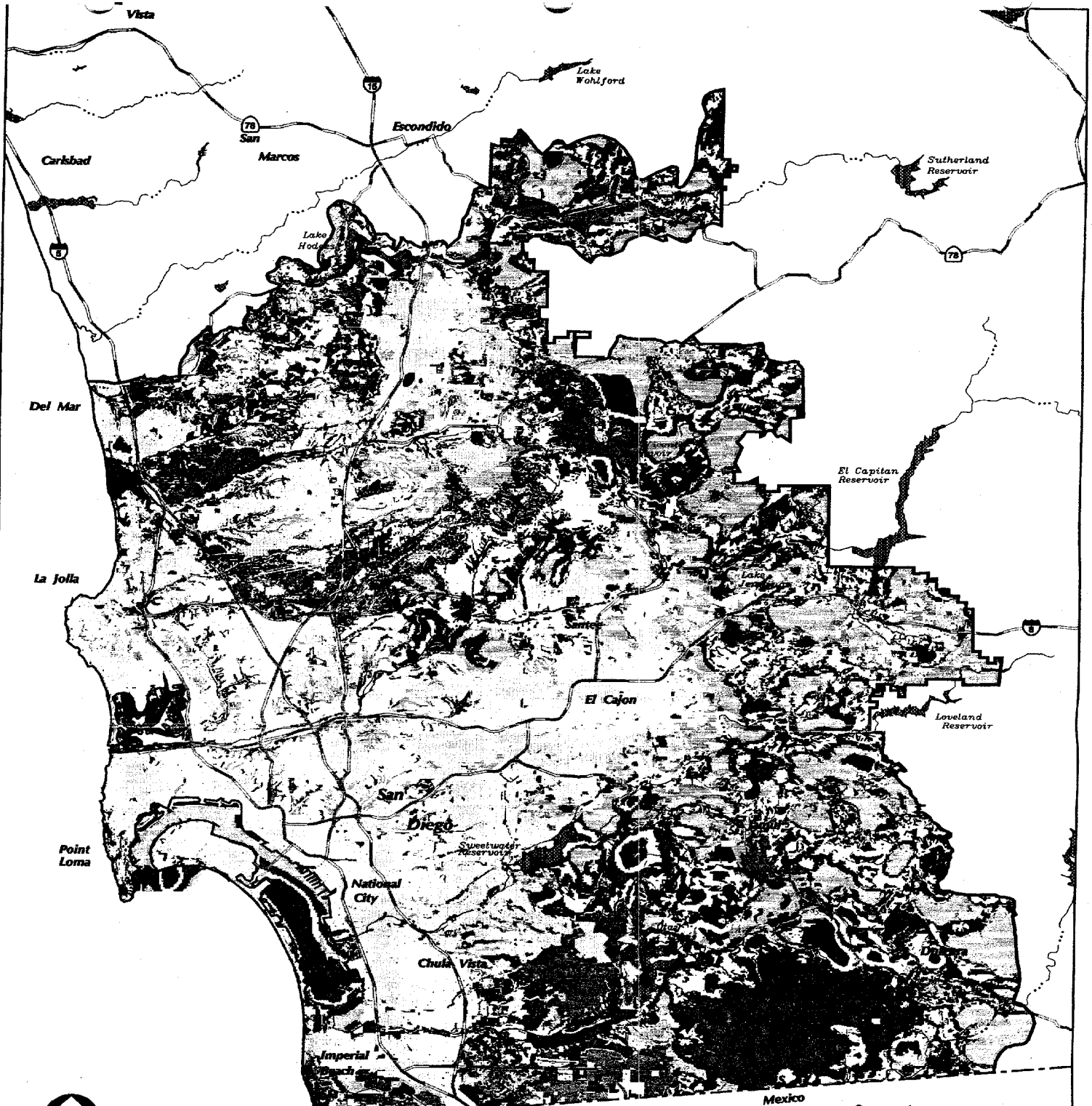


**Habitat Value**

- Low
- Moderate
- High
- Very High

- Gnatcatcher sightings
- Core Gnatcatcher Subpopulation areas
- Plant climate boundaries

4-27

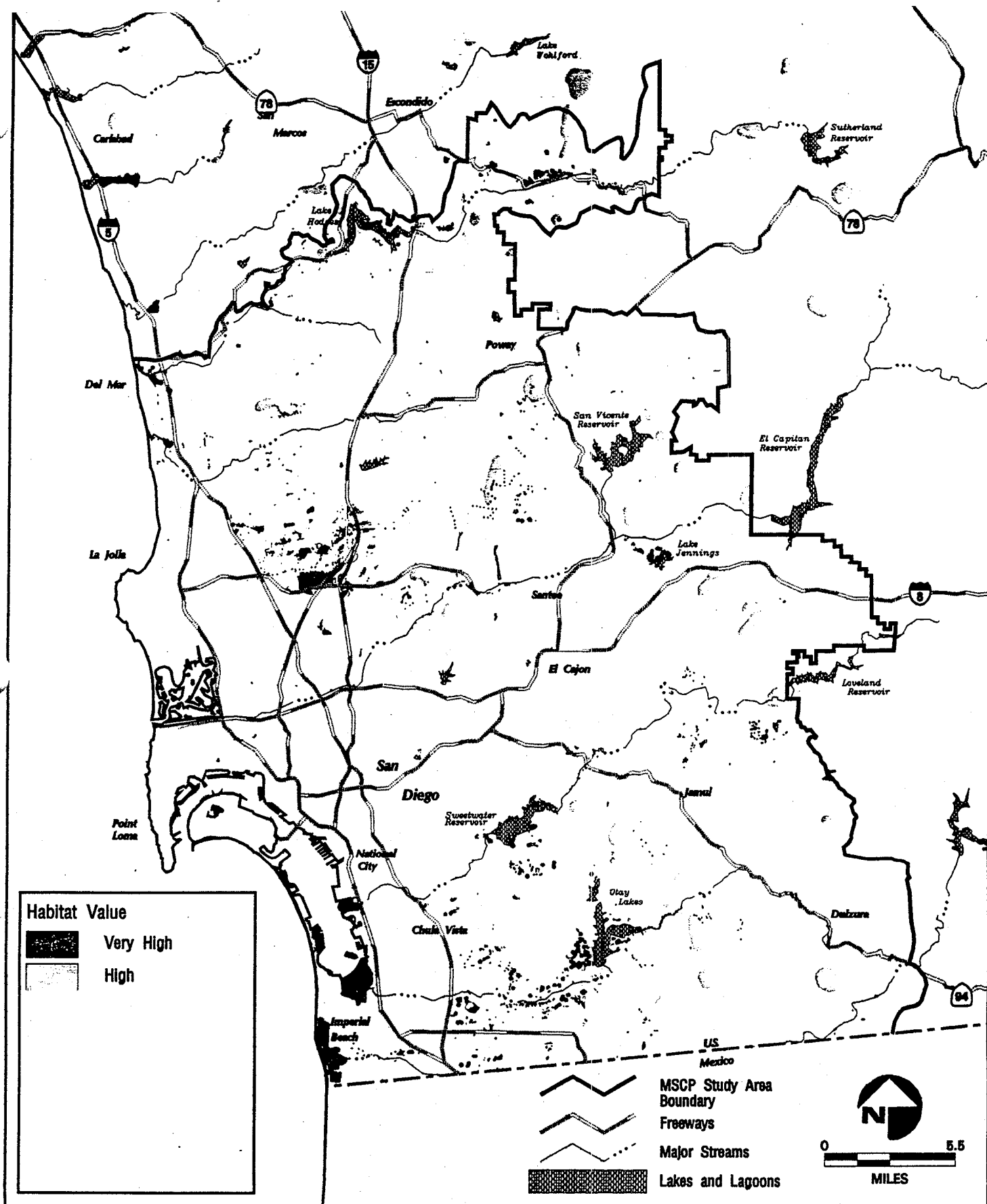


**Habitat Value**

- |  |           |  |             |
|--|-----------|--|-------------|
|  | Low       |  | Developed   |
|  | Moderate  |  | Agriculture |
|  | High      |  | Disturbed   |
|  | Very High |  |             |

- MSCP Study Area Boundary
- Freeways
- Major Streams
- Lakes and Lagoons

4-29



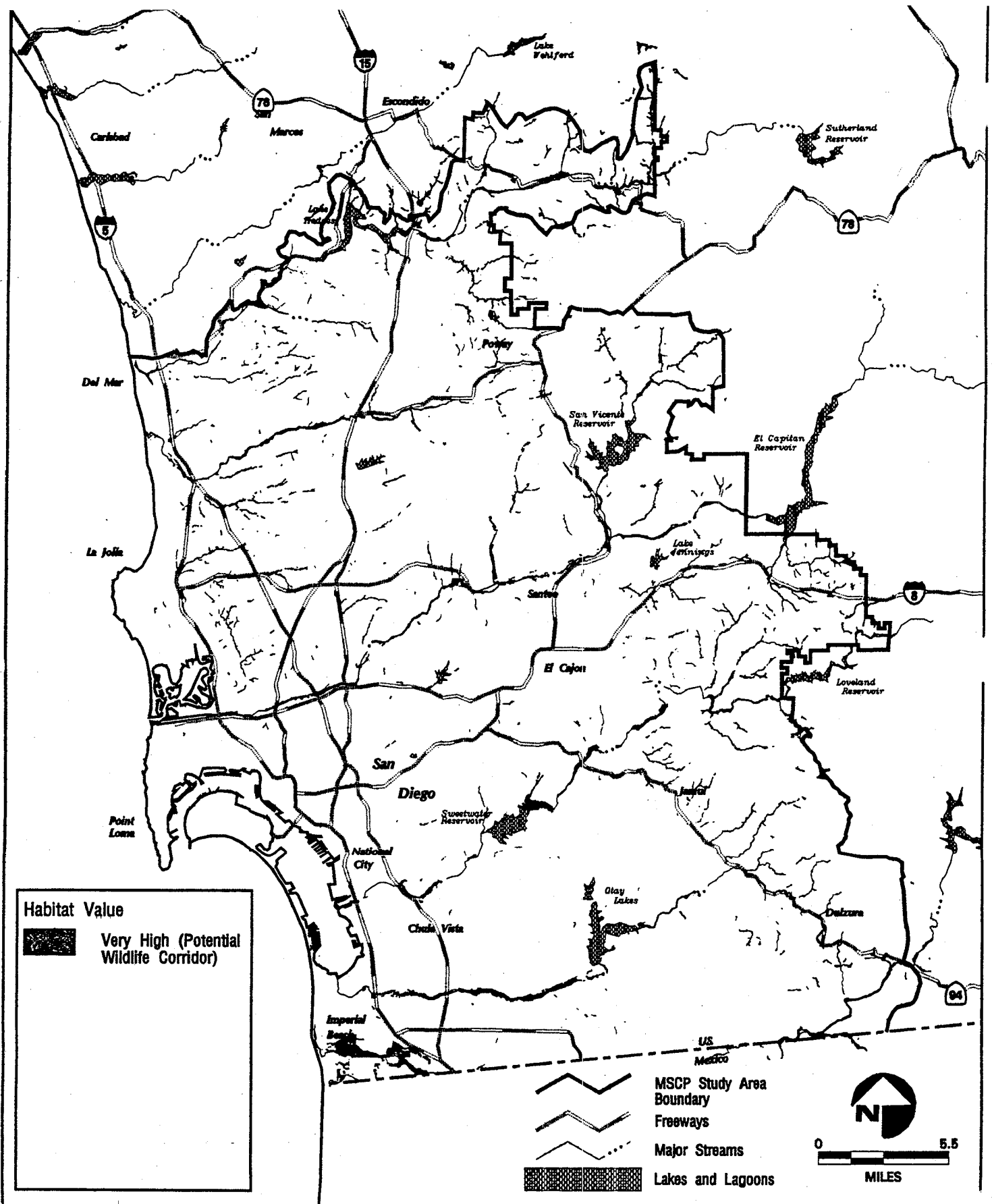
**Target Species and Vernal Pools**

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FIGURE

**4-6**





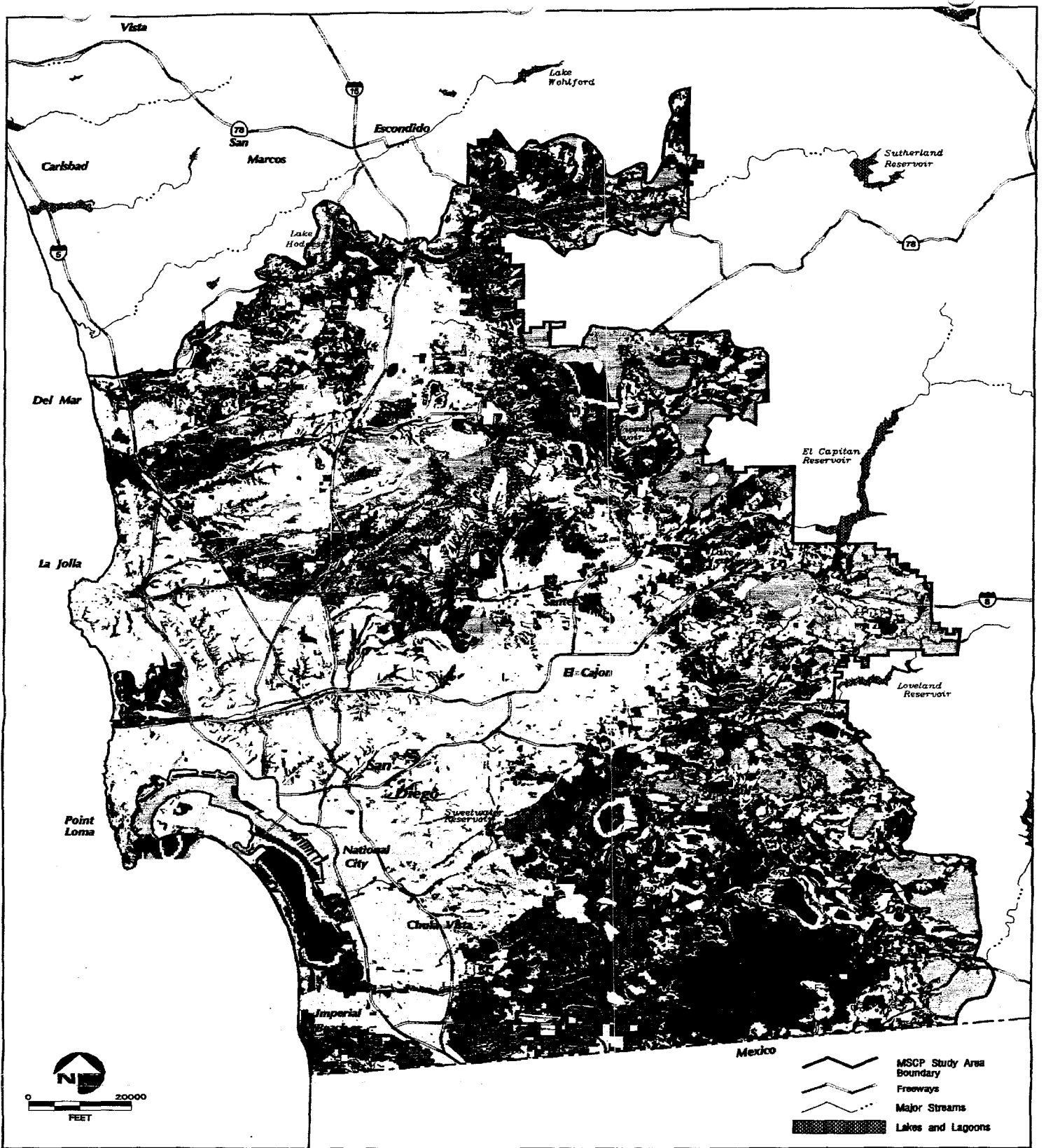
**OGDEN**  
■■■■■

**Potential Wildlife Corridors**

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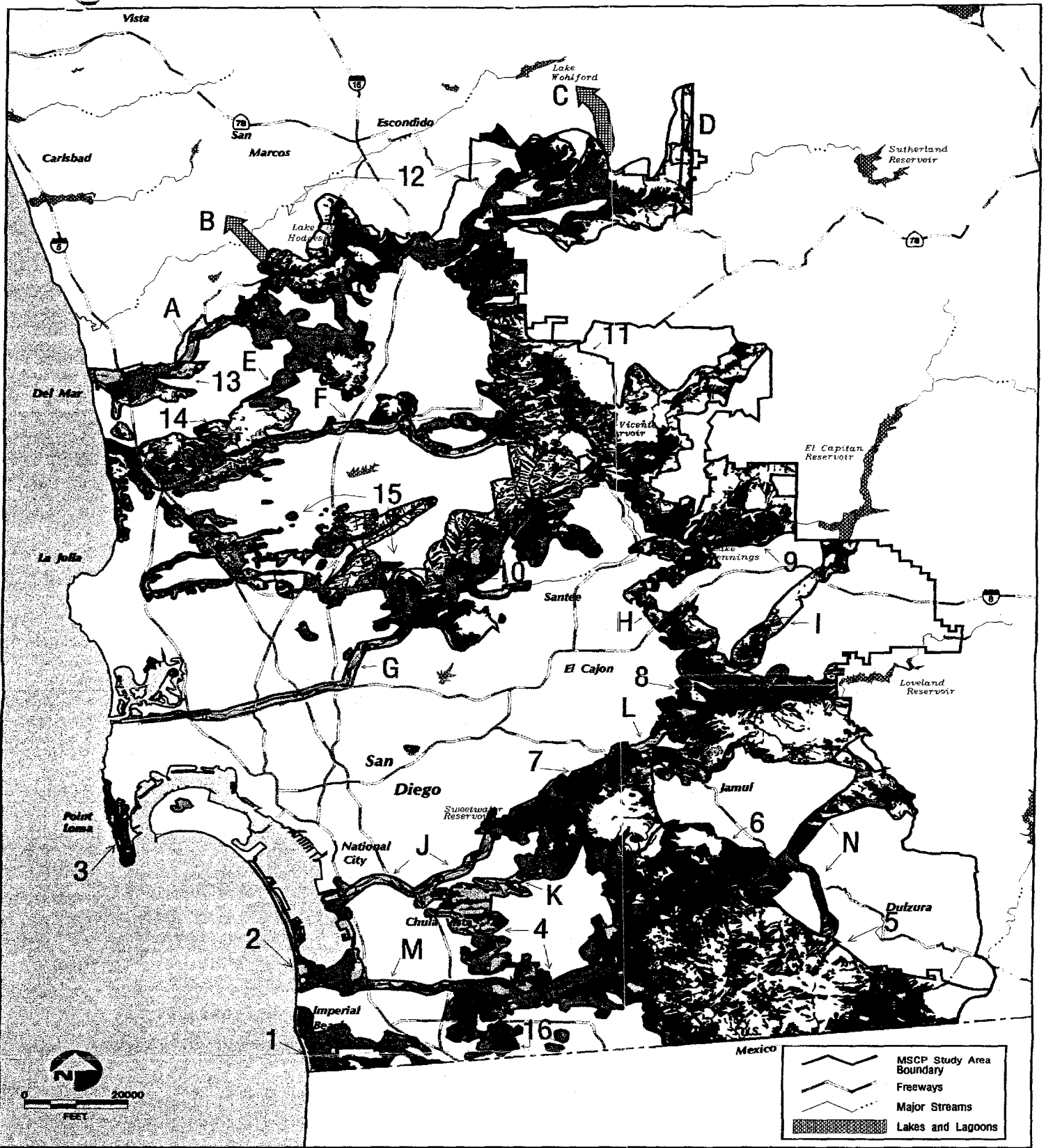
**4-7**

FIGURE



**Habitat Value**

- |  |           |  |             |
|--|-----------|--|-------------|
|  | Low       |  | Developed   |
|  | Moderate  |  | Agriculture |
|  | High      |  | Disturbed   |
|  | Very High |  |             |



- |                              |                   |                     |             |
|------------------------------|-------------------|---------------------|-------------|
| Coastal Sage Scrub           | Grassland         | Beach/Foredunes     | Developed   |
| Chaparral                    | Riparian/Wetlands | Eucalyptus Woodland | Agriculture |
| Coastal Sage Scrub Chaparral | Oak Woodland      | Disturbed Habitat   |             |
|                              | Coniferous Forest | Shallow Bay         |             |

Numbers indicate core areas. Letters indicate constrained linkages.

FIGURE

Core Biological Resource Areas and Linkages

4-9

4-37



07157

high concentrations of these species. These areas and habitat linkages between these areas and to areas outside the MSCP study area are listed in Table 4-2 and generally depicted on Figure 4-9. Acreages of core areas by vegetation community and by jurisdiction are given in Tables 4-3 and 4-4, respectively. Species represented in core areas and in jurisdictions are listed in Tables 4-5 and 4-6, respectively. Figure 4-9 and Tables 4-2 through 4-6 reflect revisions suggested by the USFWS and CDFG, who commented on an earlier version of the core areas map (correspondence from Larry Eng and Gail Kobetich to David Flesh, June 7, 1994).

The following sections describe the core resource areas, indicate the target species they support, and discuss why these areas are important to the biodiversity and long-term conservation of biological resources in San Diego County and southern California. Note that Table 4-2, Figure 4-9, and the following descriptions do not actually define preserve boundaries or imply that the entirety of a named or circled area should be preserved. It is hoped that these descriptions will assist planners in visualizing a framework for a regional preserve system. If the biological integrity of the 16 core resource areas is preserved and adequate linkages established, the program goals will be attained.

## **1. Tijuana Estuary/Tijuana River Valley**

The Tijuana Estuary and adjacent Tijuana River Valley comprise one of the largest (if not the largest) and most important wetland systems in the MSCP study area, and in San Diego County. This system supports high-quality and diverse wetland habitats and numerous wetland-dependent MSCP target plant and animal species. The slopes of Spooner's Mesa, east of the estuary and south of the river, provide an upland buffer to these wetlands. Nineteen target species occur in the wetland and upland portions of this core area, including five federally and state-endangered species, one federally-threatened species, and two state-endangered species.

### **Tijuana Estuary**

The Tijuana Estuary is situated in the southwesternmost corner of the study area. It extends from the U.S.-Mexican border northward to about Imperial Boulevard in Imperial Beach, and lies largely within Border Field State Park. Navy lands situated in and adjacent to the northern portion of the estuary are included in this core area. Although a number of wetland habitats occur in the estuary, this area is probably most valuable for its extensive

Table 4-2

**CORE BIOLOGICAL RESOURCE AREAS AND HABITAT LINKAGES**

**Core Resource Areas -- high concentration of sensitive biological resources which, if lost, could not be mitigated elsewhere**

1. Tijuana Estuary/River Valley
2. South San Diego Bay/Silver Strand
3. Point Loma
4. Otay Lakes/Otay Mesa/Otay River Valley
5. Otay Mountain/Marron Valley
6. Jamul Mountains
7. Sweetwater Reservoir/San Miguel Mountain/Sweetwater River
8. McGinty Mountain/Sequan Peak-Dehesa
9. Lake Jennings/Wildcat Canyon-El Cajon Mountain
10. Mission Trails/Miramar/East Elliott/Santee
11. Central Poway/San Vicente Reservoir/North Poway
12. Lake Hodges/San Pasqual Valley
13. San Dieguito Lagoon
14. Los Peñasquitos Lagoon/Del Mar Mesa/Peñasquitos Canyon
15. Vernal Pools, Miramar
16. Vernal Pools, Otay Mesa

**Habitat Linkages -- linkages between core resource areas (constrained linkages are followed by a letter, which corresponds to their location on Figure 2-3)**

Linkages between core resource areas within study area

1. San Dieguito River Valley between Del Mar and Santa Fe Valley (A)
2. Del Mar Mesa - Black Mountain (E)
3. Los Peñasquitos Creek west of Poway (F)
4. Central Poway - San Dieguito River Valley
5. Central Poway - Mission Trails/Santee
6. San Diego River west of Mission Trails (G)
7. Interstate 8 at Lakeside (H)
8. Sweetwater River west of the Sweetwater Reservoir (J)
9. San Miguel Mountain - Rancho Del Rey (K)
10. Sweetwater River between San Miguel Mountain and McGinty Mountain (L)
11. Otay River west of Interstate 805 (M)
12. Otay Lakes - Sweetwater/San Miguel Mountain
13. Otay Mountain/Jamul Mountains to Sequan Peak (N)

Linkages to areas outside study area

1. Lake Hodges north to La Costa/Carlsbad (B)
2. San Pasqual Valley east and south
3. San Pasqual Valley to San Luis Rey River (C)
4. Boden Canyon (San Pasqual Valley north to Rancho Guejito) (D)
5. San Vicente Reservoir northeast through San Vicente River Valley and Long's Gulch
6. Lake Jennings northeast through San Diego River Valley and Wildcat Canyon
7. Dehesa to El Capitan Reservoir (I)
8. Sweetwater River Valley east
9. Dulzura Creek east
10. Lyons Valley east (southeast of Sequan Peak)
11. Marron Valley east through Cottonwood Creek

NOTE: All of the areas identified above are primarily in the "Very High" category on the Habitat Evaluation Map. While this list does not actually define preserve boundaries or imply that the entirety of a named area or a "Very High" area should be preserved, it is hoped that this list will assist planners in visualizing a framework for a regional preserve network. These areas have not been ranked or prioritized.

Table 4-3

## ACREAGES OF CORE BIOLOGICAL RESOURCE AREAS BY VEGETATION COMMUNITY

Vegetation Communities	Core 1	Core 2	Core 3	Core 4	Core 5	Core 6	Core 7	Core 8	Core 9
Beach	140	286	12	0	0	0	0	0	0
Saltpan	93	132	0	0	0	0	0	0	0
Southern Foredunes	89	86	0	0	0	0	0	0	0
Southern Coastal Bluff Scrub	0	0	44	0	0	0	0	0	0
Coastal Sage Scrub	465	0	113	10,218	8,219	6,162	6,458	7,848	4,564
Maritime Succulent Scrub	0	34	399	763	0	0	0	0	0
Chaparral	0	0	0	1,310	13,483	1,585	2,967	6,230	3,679
Southern Maritime Chaparral	0	0	96	0	0	0	0	0	0
Coastal Sage/Chaparral Scrub	0	0	34	37	114	0	0	69	285
Grassland	35	123	0	2,708	238	237	2,203	320	167
Southern Coastal Saltmarsh	659	365	0	0	0	0	0	0	0
Freshwater Marsh	6	5	0	114	3	63	83	0	0
Riparian Forest	0	0	0	88	104	37	271	8	0
Oak Riparian Forest	0	0	0	0	207	<1	33	857	178
Riparian Woodland	0	0	0	0	8	0	0	0	0
Riparian Scrub	1,222	16	0	640	124	2	207	32	178
Oak Woodland	0	0	0	0	79	160	77	368	570
Torrey Pine Forest	0	0	<1	0	0	0	0	0	0
Tecate Cypress Forest	0	0	0	131	5,565	0	0	0	0
Eucalyptus Woodland	<1	0	<1	20	0	0	20	12	2
Open Water	193	966	0	953	0	<1	570	25	178
Disturbed Wetlands	144	0	0	16	37	38	49	4	0
Natural Floodchannel/Streambed	1	0	0	157	36	0	26	149	29
Other <sup>1</sup>	1	304	0	0	0	0	0	48	<1
Disturbed Habitat	227	214	80	1,171	147	118	329	414	131
Developed	287	837	212	3,426	104	39	695	1,328	1,161
Shallow Bay	0	<1	3	0	0	0	0	0	0
Pacific Ocean	0	0	9	0	0	0	0	0	0
Agriculture	246	109	0	760	167	77	118	244	626
TOTAL	3,810	3,477	1,002	22,513	28,633	8,520	14,106	17,957	11,749

Note: Numbers may not sum to total as shown, due to rounding.

<sup>1</sup> Disturbed Habitat, Agriculture, and Developed areas with habitat value.

Table 4-3 (Continued)

ACREAGES OF CORE BIOLOGICAL RESOURCE AREAS BY VEGETATION COMMUNITY

Vegetation Communities	Core 10	Core 11	Core 12	Core 13	Core 14	Core 15	Core 16	Linkages	TOTAL
Beach	0	0	0	14	69	0	0	27	548
Saltpan	0	0	0	0	0	0	0	9	234
Southern Foredunes	0	0	0	1	0	0	0	10	186
Southern Coastal Bluff Scrub	0	0	0	2	138	0	0	0	184
Coastal Sage Scrub	9,354	11,134	11,963	192	2,101	1,860	645	4,412	85,708
Maritime Succulent Scrub	0	0	0	0	429	0	0	3	1,628
Chaparral	5,602	12,596	7,122	0	2,539	3,714	0	4,075	64,902
Southern Maritime Chaparral	0	0	7	338	852	0	0	0	1,293
Coastal Sage/Chaparral Scrub	125	162	135	8	41	135	0	571	1,716
Grassland	1,884	1,160	3,576	87	1,747	1,978	234	1,183	17,880
Southern Coastal Saltmarsh	0	0	0	232	417	0	0	79	1,752
Freshwater Marsh	4	1	169	101	53	50	5	34	691
Riparian Forest	113	9	163	0	103	23	0	179	1,098
Oak Riparian Forest	157	815	503	0	0	27	0	583	3,360
Riparian Woodland	51	0	9	4	231	305	0	48	656
Riparian Scrub	188	72	620	41	230	81	1	569	4,223
Oak Woodland	34	726	334	0	46	39	0	870	3,303
Torrey Pine Forest	0	0	0	20	134	0	0	0	154
Tecate Cypress Forest	0	0	0	0	0	0	0	0	5,696
Eucalyptus Woodland	2	45	341	2	5	34	0	55	538
Open Water	42	945	649	113	29	19	0	208	4,890
Disturbed Wetlands	3	156	233	63	23	4	0	21	791
Natural Floodchannel/Streambed	69	27	281	0	0	21	0	21	817
Other	<1	<1	9	60	18	0	0	213	643
Disturbed Habitat	360	1,195	1,180	310	595	1,555	611	830	9,467
Developed	1,080	2,000	1,734	943	1,660	1,420	10	5,693	22,629
Shallow Bay	0	0	0	0	0	0	0	0	3
Pacific Ocean	0	0	0	0	0	0	0	0	9
Agriculture	2	717	2,083	588	132	0	356	590	6,815
TOTAL	19,071	31,762	31,111	3,118	11,591	11,264	1,863	20,283	241,830

Note: Numbers may not sum to total as shown, due to rounding.

Disturbed Habitat, Agriculture, and Developed areas with habitat value.

Table 4-4

ACREAGES OF CORE BIOLOGICAL RESOURCE AREAS  
BY JURISDICTION

Jurisdiction	Core 1	Core 2	Core 3	Core 4	Core 5	Core 6	Core 7	Core 8	Core 9
CHULA VISTA	0	843	0	5,086	0	0	823	0	0
CORONADO	0	1,320	0	0	0	0	0	0	0
DEL MAR	0	0	0	0	0	0	0	0	0
EL CAJON	0	0	0	0	0	0	0	0	0
ESCONDIDO	0	0	0	0	0	0	0	0	0
IMPERIAL BEACH	1,227	51	0	0	0	0	0	0	0
LA MESA	0	0	0	0	0	0	0	0	0
LEMON GROVE	0	0	0	0	0	0	0	0	0
NATIONAL CITY	0	279	0	0	0	0	0	0	0
POWAY	0	0	0	0	0	0	0	0	0
SAN DIEGO	2,583	985	1,002	2,527	0	0	<1	0	0
SANTEE	0	0	0	0	0	0	0	0	0
UNINCORPORATED *	0	0	0	14,899	28,633	8,520	13,282	17,957	11,749
NAS MIRAMAR	0	0	0	0	0	0	0	0	0
<b>TOTAL</b>	<b>3,810</b>	<b>3,477</b>	<b>1,002</b>	<b>22,513</b>	<b>28,633</b>	<b>8,520</b>	<b>14,106</b>	<b>17,957</b>	<b>11,749</b>

Table 4-4 (Continued)

ACREAGES OF CORE BIOLOGICAL RESOURCE AREAS  
BY JURISDICTION

Jurisdiction	Core 10	Core 11	Core 12	Core 13	Core 14	Core 15	Core 16	Linkages	TOTAL
CHULA VISTA	0	0	0	0	0	0	0	1,058	7,810
CORONADO	0	0	0	0	0	0	0	161	1,481
DEL MAR	0	0	0	453	<1	0	0	0	454
EL CAJON	<1	0	0	0	0	0	0	46	47
ESCONDIDO	0	0	885	0	0	0	0	0	885
IMPERIAL BEACH	0	0	0	0	0	0	0	0	1,278
LA MESA	0	0	0	0	0	0	0	0	0
LEMON GROVE	0	0	0	0	0	0	0	0	0
NATIONAL CITY	0	0	0	0	0	0	0	268	547
POWAY	0	14,410	25	0	0	0	0	2	14,437
SAN DIEGO	8,988	1,482	13,682	2,639	11,590	3,095	1,863	5,023	55,459
SANTEE	3,613	0	0	0	0	0	0	0	3,613
UNINCORPORATED *	2,570	15,871	16,518	25	0	4	0	13,725	143,752
NAS MIRAMAR	3,900	0	0	0	0	8,165	0	0	12,065
<b>TOTAL</b>	<b>19,071</b>	<b>31,762</b>	<b>31,111</b>	<b>3,118</b>	<b>11,591</b>	<b>11,264</b>	<b>1,863</b>	<b>20,283</b>	<b>241,830</b>

\* Includes City of San Diego lands around San Vicente Reservoir, Otay Lakes, and Marron Valley (approx. 7120 acres).  
Note: Numbers may not sum to total as shown, due to rounding.

Table 4-5

MSCP TARGET SPECIES OCCURRENCES BY CORE BIOLOGICAL RESOURCE AREAS

COMMON NAME	SCIENTIFIC NAME	CORE AREA <sup>1,2</sup>																	
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	L	
Plants																			
San Diego thorn-mint	<i>Acanthomintha ilicifolia</i>	.																	
Shaw's agave	<i>Agave shawii</i>			.															
San Diego ambrosia	<i>Ambrosia pumila</i>			.	.	.													
Aphanisma	<i>Aphanisma bitoides</i>	E	E																
Del Mar manzanita	<i>Arctostaphylos glandulosa</i> var. <i>crassifolia</i>																		
Otay manzanita	<i>Arctostaphylos oleyensis</i>			.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	E
Dean's milk vetch	<i>Astragalus deanei</i>																		
Coastal dunes milk vetch	<i>Astragalus tener</i> var. <i>titi</i>																		
Encinitas baccharis	<i>Baccharis vanessae</i>																		E
Thread-leaved brodiaea	<i>Brodiaea filifolia</i>																		
Orcutt's brodiaea	<i>Brodiaea orcuttii</i>			.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	E
Dunn's mariposa lily	<i>Calochortus dunnii</i>			.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	E
Slender-pod jewelflower	<i>Caulanthus stenocarpus</i>			.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	E
Lakeside ceanothus	<i>Ceanothus cyaneus</i>			.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	E
Wart-stemmed ceanothus	<i>Ceanothus verrucosus</i>	.		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	E
Orcutt's spineflower	<i>Chorizanthe orcuttiana</i>																		E
Salt marsh bird's-beak	<i>Cordylanthus maritimus</i> ssp. <i>maritimus</i>	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	E
Orcutt's bird's-beak	<i>Cordylanthus orcuttianus</i>	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	E
Del Mar Mesa sand aster	<i>Corethrogyne flaginifolia</i> var. <i>linifolia</i>			.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	E
Tecate cypress	<i>Cupressus forbesii</i>			.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	E
Short-leaved dudleya	<i>Dudleya brevifolia</i>			.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	E
Variegated dudleya	<i>Dudleya variegata</i>			.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	E
Sticky dudleya	<i>Dudleya viscida</i>			.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	E
Palmer's ericameria	<i>Ericameria palmeri</i> ssp. <i>palmeri</i>			.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	E
San Diego button-celery	<i>Eryngium aristatum</i> var. <i>parishii</i>			.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	E
Coast wallflower	<i>Erysimum amphilum</i>			.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	E
San Diego barrel cactus	<i>Ferocactus viridescens</i>			.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	E
Mexican flannelbush	<i>Fremontodendron mexicanum</i>			.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	E
Mission Canyon bluecup	<i>Githopsis diffusa</i> ssp. <i>filiaculis</i>			.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	E
Otay tarplant	<i>Hemizonia corjugens</i>			.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	E
Tecate tarplant	<i>Hemizonia floribunda</i>			.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	E

Table 4-5 (Continued)  
 MSCP TARGET SPECIES OCCURRENCES BY CORE BIOLOGICAL RESOURCE AREAS

COMMON NAME	SCIENTIFIC NAME	CORE AREA <sup>1,2</sup>																
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	L
Heart-leaved pitcher sage	<i>Lepechinia cardiophylla</i>																	
Gander's pitcher sage	<i>Lepechinia ganderi</i>																	
Nuttall's lotus	<i>Lotus nuttallianus</i>																	
Willow monkeyardella	<i>Monardella linoidea</i> ssp. <i>viminea</i>																	
San Diego goldenstar	<i>Mutilla cleavelandii</i>																	
Little mouse-tail	<i>Myosurus minimus</i> ssp. <i>apus</i>																	
Prostrate navaretia	<i>Navarretia fossalis</i>																	
Dehesa beargrass	<i>Nolina interrata</i>																	
Snake cholla	<i>Opuntia parryi</i> var. <i>serpentina</i>																	
California orcutt grass	<i>Orcuttia californica</i>																	
Torrey pine	<i>Pinus torreyana</i> ssp. <i>torreyana</i>																	
San Diego mesa mint	<i>Pogogyne abramsii</i>																	
Otay Mesa mint	<i>Pogogyne nudiuscula</i>																	
Small-leaved rose	<i>Rosa minutifolia</i>																	
Gander's butterweed	<i>Senecio ganderi</i>																	
Narrow-leaved nightshade	<i>Solanum tenuilobatum</i>																	
Parry's tetraococcus	<i>Tetracoccus dioicus</i>																	
<b>Animals</b>																		
<b>Invertebrates</b>																		
Hermes copper butterfly	<i>Lycaena hermes</i>																	
Salt marsh skipper	<i>Panoquina errans</i>																	
Quino checkerspot butterfly	<i>Euphydryas editha quino</i>																	
Riverside fairy shrimp	<i>Streptocephalus wootteni</i>																	
Thorne's hairstreak butterfly	<i>Mitoura thornei</i>																	
Harbison's dun skipper	<i>Euphyes vestris harbisoni</i>																	
<b>Amphibians and Reptiles</b>																		
Arroyo toad	<i>Bufo microscaphus californicus</i>																	
California red-legged frog	<i>Rana aurora draytonii</i>																	
Western pond turtle	<i>Clemmys marmorata pallida</i>																	



Table 4-5 (Continued)

MSCP TARGET SPECIES OCCURRENCES BY CORE BIOLOGICAL RESOURCE AREAS

COMMON NAME	SCIENTIFIC NAME	CORE AREA <sup>1,2</sup>																
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	L
Mammals																		
Pacific little pocket mouse	<i>Perognathus longimembris pacificus</i>	E											E	E				
California mastiff-bat	<i>Eumops perotis californicus</i>				E	E	E	E	E	E	E	E	E	E	E	E	E	E
Townsend's western big-eared bat	<i>Plecotus townsendii</i>				E	E	E	E	E	E	E	E	E	E	E	E	E	E
Mule deer	<i>Odocoileus hemionus</i>				.	.	.	.	.	.	.	.	.	.	.	.	.	.
Mountain lion	<i>Felis concolor</i>				.	.	.	.	.	.	.	.	.	.	.	.	.	.
Badger	<i>Taxidea taxus</i>				.	E	E	E	E	E	E	E	E	E	E	E	E	E

<sup>1</sup> Number refers to core area number in text and on Figure 4-9; L = Linkage.  
<sup>2</sup> • = Known occurrence; \* = Known occurrence, major and/or large population; E = Expected occurrence based on known locations in proximity, historical information, or reported but unverified data.

Table 4-6

MSCP TARGET SPECIES OCCURRENCES BY JURISDICTION

SCIENTIFIC NAME	COMMON NAME	JURISDICTION <sup>1,2</sup>
		CV CD DM EC IB LG NC PO SD SN CO NA
<i>Acanthomintha ilicifolia</i>	San Diego thorn-mint	
<i>Agave shawii</i>	Shaw's agave	
<i>Ambrosia pumila</i>	San Diego ambrosia	
<i>Aphanisma bitroides</i>	Aphanisma	
<i>Arctostaphylos glandulosa</i> var. <i>crassifolia</i>	Del Mar manzanita	
<i>Arctostaphylos otayensis</i>	Otay manzanita	
<i>Astragalus deanei</i>	Dean's milk vetch	
<i>Astragalus tener</i> var. <i>fitii</i>	Coastal dunes milk vetch	
<i>Baccharis vanessae</i>	Baccharis baccharis	
<i>Brodiaea filifolia</i>	Thread-leaved brodiaea	
<i>Brodiaea orcuttii</i>	Orcutt's brodiaea	
<i>Calochortus dumii</i>	Dunn's mariposa lily	
<i>Caulanthus stenocarpus</i>	Slender-pod jewelflower	
<i>Ceanothus cyaneus</i>	Lakeside ceanothus	
<i>Ceanothus verrucosus</i>	Wart-stemmed ceanothus	
<i>Chorizanthe orcuttiana</i>	Orcutt's spineflower	
<i>Cordylanthus maritimus</i> ssp. <i>maritimus</i>	Salt marsh bird's-beak	
<i>Cordylanthus orcuttianus</i>	Orcutt's bird's-beak	
<i>Corethrogyne filaginifolia</i> var. <i>linifolia</i>	Del Mar Mesa sand aster	
<i>Cupressus forbesii</i>	Leate cypress	
<i>Dudleya brevifolia</i>	Short-leaved dudleya	
<i>Dudleya variegata</i>	Variegated dudleya	
<i>Dudleya viscida</i>	Sticky dudleya	
<i>Ericameria palmeri</i> ssp. <i>palmeri</i>	Palmer's ericameria	
<i>Eryngium aristulatum</i> var. <i>parishii</i>	San Diego button-celery	
<i>Erysimum ammphilum</i>	Coast wallflower	
<i>Ferocactus viridescens</i>	San Diego barrel cactus	
<i>Fremontodendron mexicanum</i>	Mexican flannelbush	
<i>Guthopsis diffusa</i> ssp. <i>filicaulis</i>	Mission Canyon bluecup	

Table 4-6 (Continued)

MSCP TARGET SPECIES OCCURRENCES BY JURISDICTION

SCIENTIFIC NAME	COMMON NAME	JURISDICTION <sup>1,2</sup>													
		CV	CD	DM	EC	IB	IM	LG	NC	PO	SD	SN	CO	NA	
<i>Hemizonia conjugens</i>	Utay tarplant	.													
<i>Hemizonia floribunda</i>	Tecate tarplant														
<i>Lepechinia cardiophylla</i>	Heart-leaved pitcher sage													E	
<i>Lepechinia ganderi</i>	Gander's pitcher sage								.					E	
<i>Lotus nuttallianus</i>	Nuttall's lotus	.	.	E				E						.	
<i>Monardella linoides ssp. viminea</i>	Willow monardella								.					.	
<i>Muilla clevelandii</i>	San Diego goldenstar	E							E					.	
<i>Myosurus minimus ssp. apus</i>	Little mouse-tail	E												.	
<i>Navarretia fossalis</i>	Prostrate navarretia	E												.	
<i>Notina interrata</i>	Denesa bear-grass													.	
<i>Opuntia parryi var. serrentina</i>	Snake cholla	.							.					.	
<i>Orcuttia californica</i>	California orcutt grass	E												.	
<i>Pinus torreyana ssp. torreyana</i>	Torrey pine			.										.	
<i>Posogyne abramsii</i>	San Diego mesa mint													.	
<i>Posogyne nudiuscula</i>	Utay Mesa mint	E												.	
<i>Rosa minutifolia</i>	Small-leaved rose													E	
<i>Senecio ganderi</i>	Gander's butterweed													.	
<i>Solanum tenuilobatum</i>	Narrow-leaved nightshade													.	
<i>Tetradococcus dioicus</i>	Ferry's tetradococcus													.	
<b>ANIMALS</b>															
<i>Euphydryas editha quino</i>	quino checkerspot butterfly	E													
<i>Euphyes vestris harbisoni</i>	Harbison's dun skipper butterfly			E	E			E						E	
<i>Lycæna hermes</i>	Hermes copper butterfly	E							E					E	
<i>Mitoura thornei</i>	Thorne's hairstreak butterfly													.	
<i>Panoquina errans</i>	salt marsh skipper butterfly	.	E											E	
<i>Sireptocephalus woottoni</i>	Riverside fairy shrimp	.												.	
<i>Bufo microscaphus californicus</i>	arroyo southwestern toad	E			E			E						.	
<i>Clemmys marmorata pallida</i>	southwestern pond turtle	.												.	
<i>Rana aurora draytoni</i>	California red-legged frog	E												E	
<i>Cnemidophorus hyperviridus beldingi</i>	orange-throated whiptail	.												.	
<i>Phrynosoma coronatum blainvillei</i>	San Diego horned lizard	.												.	
<i>Accipiter cooperii</i>	Cooper's hawk	.												.	

Table 4-6 (Continued)

MSCP TARGET SPECIES OCCURRENCES BY JURISDICTION

SCIENTIFIC NAME	COMMON NAME	JURISDICTION <sup>1,2</sup>												
		CV	CD	DM	EC	IB	LM	LG	NC	PO	SD	SN	CO	NA
<i>Areolais tricolor</i>	tricolored blackbird	.	.	.	.	.	.	.	.	.	.	.	.	.
<i>Aimophila ruficeps canescens</i>	California rufous-crowned sparrow	.	.	.	.	.	.	.	.	.	.	.	.	.
<i>Ammodramus savannarum</i>	grasshopper sparrow	.	.	.	.	.	.	.	.	.	.	.	.	.
<i>Aquila chrysaetos</i>	golden eagle	.	.	.	.	.	.	.	.	.	.	.	.	.
<i>Buteo regalis</i>	terrigenous hawk	.	.	.	.	.	.	.	.	.	.	.	.	.
<i>Buteo swainsoni</i>	Swainson's hawk	.	.	.	.	.	.	.	.	.	.	.	.	.
<i>Campylorhynchus brunneicapillus couesi</i>	coastal cactus wren	.	.	.	.	.	.	.	.	.	.	.	.	.
<i>Charadrius alexandrinus nivosus</i>	western snowy plover	.	.	.	.	.	.	.	.	.	.	.	.	.
<i>Charadrius montanus</i>	mountain plover	.	.	.	.	.	.	.	.	.	.	.	.	.
<i>Circus cyaneus</i>	northern harrier	.	.	.	.	.	.	.	.	.	.	.	.	.
<i>Ereeta rutescens</i>	reddish egret	.	.	.	.	.	.	.	.	.	.	.	.	.
<i>Empidonax traillii eximius</i>	southwestern willow flycatcher	.	.	.	.	.	.	.	.	.	.	.	.	.
<i>Falco peregrinus anatum</i>	American peregrine falcon	.	.	.	.	.	.	.	.	.	.	.	.	.
<i>Haliaeetus leucocephalus</i>	bald eagle	.	.	.	.	.	.	.	.	.	.	.	.	.
<i>Numenius americanus</i>	long-billed curlew	.	.	.	.	.	.	.	.	.	.	.	.	.
<i>Passerculus sandwichensis belangi</i>	Belding's Savannah sparrow	.	.	.	.	.	.	.	.	.	.	.	.	.
<i>Passerculus sandwichensis rostratus</i>	large-billed Savannah sparrow	.	.	.	.	.	.	.	.	.	.	.	.	.
<i>Pelecanus occidentalis californicus</i>	California brown pelican	.	.	.	.	.	.	.	.	.	.	.	.	.
<i>Plegadis chihi</i>	white-faced ibis	.	.	.	.	.	.	.	.	.	.	.	.	.
<i>Poliopitila californica californica</i>	coastal California gnatcatcher	.	.	.	.	.	.	.	.	.	.	.	.	.
<i>Rallus longirostris levides</i>	light-footed clapper rail	.	.	.	.	.	.	.	.	.	.	.	.	.
<i>Sialia mexicana</i>	western bluebird	.	.	.	.	.	.	.	.	.	.	.	.	.
<i>Speotyto cucularia hypugaea</i>	burrowing owl	.	.	.	.	.	.	.	.	.	.	.	.	.
<i>Sterna antillarum browni</i>	California least tern	.	.	.	.	.	.	.	.	.	.	.	.	.
<i>Sterna elegans</i>	elegant tern	.	.	.	.	.	.	.	.	.	.	.	.	.
<i>Vireo bellii pusillus</i>	least Bell's vireo	.	.	.	.	.	.	.	.	.	.	.	.	.
<i>Eumops perotis californicus</i>	California mastiff bat	.	.	.	.	.	.	.	.	.	.	.	.	.
<i>Felis concolor</i>	mountain lion	.	.	.	.	.	.	.	.	.	.	.	.	.
<i>Odocoileus hemionus fuliginata</i>	southern mule deer	.	.	.	.	.	.	.	.	.	.	.	.	.
<i>Perognathus longimembris pacificus</i>	Pacific pocket mouse	.	.	.	.	.	.	.	.	.	.	.	.	.
<i>Plecotus townsendii</i>	Townsend's western big-eared bat	.	.	.	.	.	.	.	.	.	.	.	.	.
<i>Taxidea taxus</i>	American badger	.	.	.	.	.	.	.	.	.	.	.	.	.

Table 4-6 (Continued)

**MSCP TARGET SPECIES OCCURRENCES BY JURISDICTION**

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- 1 CV = Chula Vista; CD = Coronado; DM = Del Mar; EC = El Cajon; IB = Imperial Beach; LM = La Mesa; LG = Lemon Grove; NC = National City; PO = Poway; SD = City of San Diego; SN = Santee; CO = County of San Diego (i.e., within MSCP study area); NA = Navy-owned lands (Miramar, Pt. Lorna).
  - 2 • = Verified occurrence (not all verified occurrences are depicted on MSCP sensitive species maps); E = Expected occurrence and/or reported but unverified occurrence.
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southern coastal saltmarsh, particularly in conjunction with the open water habitat and mudflats of the larger channels and tidal sloughs. It has been estimated that over 87 percent of the southern coastal saltmarsh in San Diego County has been lost to development (Oberbauer and Vanderwier 1991), and much of what remains occurs in the Tijuana Estuary. The estuary also supports the most extensive saltpan habitat within the MSCP area, and small areas of southern foredunes occur adjacent to this system at Monument Beach.

Although the number of target species found within the estuary is not particularly high compared with other core areas, the estuary may support one of the highest concentrations of endangered species in the study area. For example, one of the few MSCP target plant species documented within the estuary is the federally and state-endangered salt marsh bird's beak. The estuary constitutes one of only three known locations in the county for this species. Salt marsh habitat in the estuary also supports one of the largest populations in the study area of the federally and state-endangered light-footed clapper rail and a significant population of the state-endangered Belding's savannah sparrow. The federal candidate plant species, Nuttall's lotus, is known to occur on foredune habitat adjacent to the estuary. Shaw's agave, a candidate for federal listing, occurs on bluffs adjacent to the estuary; this location is one of only three known occurrences in the county for this species and perhaps the only natural (versus planted) occurrence. The Tijuana Slough National Wildlife Refuge is a major nesting area for the federally and state-endangered California least tern. Breeding western snowy plovers are known from the mouth of the river, and the federally endangered Pacific pocket mouse has been documented from the river valley and river mouth. In addition, the estuary probably provides habitat for the salt marsh skipper, which is a candidate species for federal listing.

#### Tijuana River Valley

The Tijuana River extends eastward from the mouth of the Tijuana Estuary, dipping into Mexico just west of Interstate 5 (I-5), and reappearing in the U.S. in Marron Valley, approximately 11 mi to the east. The river is channelized south of the border. The Tijuana River is the southernmost, major drainage in the study area. In the region west of I-5, the Tijuana River Valley is noteworthy for its high-quality riparian habitat and concentration of riparian-obligate bird species. The river may also provide some value as a habitat linkage to undeveloped habitat to the east. Well-developed riparian forest and freshwater marsh occur along the Tijuana River, and one of the larger stands of riparian scrub in the MSCP

area, including both mulefat and willow-dominated associations, occurs along the western Tijuana River near the estuary. Disturbed wetlands, which may be considered potential restoration areas, lie within the floodplain of the Tijuana River. Slopes surrounding the river support coastal sage scrub habitat. Agricultural areas along the river and disturbed areas are not included in this core area.

MSCP target plant species associated with the Tijuana River Valley include wart-stemmed ceanothus, Orcutt's bird's beak, and San Diego barrel cactus; these species are found on slopes above the river. Target animals in the river valley include least Bell's vireo (23 territories), peregrine falcon, reddish egret, white-faced ibis, and willow flycatcher. California gnatcatchers and coastal cactus wrens are known from adjacent scrub habitat; however, these populations may be isolated by development from populations in the Otay Mesa area.

Spooner's Mesa is located east of the Tijuana Estuary and south of the Tijuana River, and is situated along the U.S. - Mexican border. Goat Canyon borders the mesa to the west, and Smuggler Gulch borders the mesa to the east. Lands directly north of the mesa are currently in agriculture. The mesa top is dominated by agricultural lands, whereas vegetation on the slopes is primarily disturbed and undisturbed coastal sage scrub. Target species found on Spooner's Mesa (including slopes) are wart-stemmed ceanothus, Orcutt's bird's-beak, San Diego barrel cactus, California gnatcatcher, orange-throated whiptail, and northern harrier.

## **2. South San Diego Bay/Silver Strand**

The South San Diego Bay and Silver Strand core resource area supports wetland and dune habitat types that are rare in the study area and in the county. San Diego Bay is one of the largest naturally protected bays on the west coast. Although the northern half of the bay is a deepwater harbor and the shoreline is largely developed, the southern half of the bay is relatively shallow and has retained many of its natural features. The south bay provides valuable habitat for waterbirds and saltmarsh species. The Silver Strand is most notable for the presence of southern foredune habitat, an extremely rare and declining association in the region. Seventeen target species occur in the wetland and upland portions of this area, including three federally and state-endangered species, one federally-endangered species, one federally-threatened species, and two state-endangered species.

## South San Diego Bay

San Diego Bay is located along the coast in the southwestern portion of the study area. The bay is roughly bounded by Imperial Beach and Palm Avenue to the south, the Silver Strand, Coronado, and Point Loma to the west and northwest, Harbor Island to the north, and I-5 to the east. That portion of the bay identified within the core resource area lies largely south of the Sweetwater River, and includes the estuary at the mouth of the river and the Chula Vista Wildlife Reserve. The bay is fully open to tidal influence and offers large surfaces of water that are attractive to many waterbirds (Unitt 1984). Other habitats of importance in the south bay are tidal mudflats and saltpan habitat associated with the salt evaporating ponds near the mouth of the Otay River. Small patches of southern coastal salt marsh remain along the shoreline and at the mouth of the Otay River.

The south bay provides important shallow water wintering and foraging habitat for a high diversity of waterbirds, including the federally-endangered brown pelican. A variety of tern species, including the California least tern and elegant tern, forage over the south bay in the summer months. California least tern nesting colonies occur at a number of locations where suitable habitat exists. Elegant terns, along with several other sensitive tern species, nest at the salt evaporating ponds. Reddish egrets also occur on the salt flats. Target species in the remnant saltmarsh habitat include two of the three known populations (including the largest population) of salt marsh bird's beak in the county, light-footed clapper rail, Belding's savannah sparrow, and large-billed savannah sparrow. San Diego barrel cactus and snake cholla occur in upland habitat adjacent to the saltmarsh.

## Silver Strand

The Silver Strand is a very narrow northwest-southeast oriented peninsula that lies along the west side of San Diego Bay and terminates to the north at the City of Coronado. Navy lands (i.e., the Naval radio receiving facility at Imperial Beach) situated at the south end of the strand are included in the core area, and the Pacific Ocean bounds the strand to the west. The Silver Strand is important primarily for its long stretches of relatively undisturbed sandy beach habitat, that include some of the few remaining examples of southern foredune habitat in the study area. Small areas of salt marsh and tidal flats are also present along the bay side of the strand. Additional habitats present in the vicinity of the radio receiving facility include patches of maritime succulent scrub, grassland, and salt- and freshwater marsh.

The Silver Strand is one of the few known locations for the state-endangered plant, coastal dunes milk vetch, and possibly supports the only extant population of this species in the county. Although this plant has not been observed in recent years, the foredunes on the strand may provide valuable habitat should a recovery program be undertaken for this species. Additional target plant species found on the strand or on adjacent habitat near the radio receiving facility include one of the few populations in the MSCP area of aphanisma, one of the few populations of Nuttall's lotus, variegated dudleya, and San Diego barrel cactus. Target animal species include the California least tern, western snowy plover, northern harrier, and burrowing owl.

### 3. Point Loma

The Point Loma area is unique in both its geographic position and retention of a relatively large amount of native habitat in an otherwise urbanized area. Although Point Loma is isolated from other areas of native vegetation, it supports prime examples of a number of regionally rare plant associations. It also supports a high concentration of sensitive plant species. Particularly notable are the large stands of wart-stemmed ceanothus, the only county location for coast wallflower, and an exceptionally large population of snake cholla. Point Loma is also important for a number of birds, and is a popular area for bird-watchers who are interested in sighting the many vagrant species of birds that use the Point during the winter and during migration. Ten target species occur in this core area, including one federally and state-endangered species and one federally threatened species.

The Point Loma peninsula is located in the southwestern portion of the study area, due west of Coronado, on the west side of the entrance to San Diego Bay. The portion of the peninsula included in the core area is bounded to the south and west by the Pacific Ocean, to the north by Point Loma Nazarene College and the urbanized (residential) portion of Point Loma, and to the east by San Diego Bay. All of the land in the core area is publicly owned. The Navy is the major landowner; other landowners include the National Park Service (Cabrillo National Monument), Coast Guard, and City of San Diego.

Point Loma is characterized by relatively flat terrain on the top of the point, and steeply eroded bluffs and slopes that drop to the ocean or bayside, respectively. The primary vegetative associations onsite are maritime succulent scrub and southern maritime chaparral, both of which are sensitive and highly restricted in distribution. Also present are

the regionally rare southern foredunes, southern coastal bluff scrub, and Diegan sage scrub.

Target plant species present in the core area include Shaw's agave (only one of three occurrences in the county), a major population of wart-stemmed ceanothus, San Diego barrel cactus, a large population of snake cholla, Torrey pine, and coast wallflower. Point Loma is an important corridor and landmark for migrating birds, a roosting area for seabirds, and a nesting area for great blue and black-crowned night herons. Target wildlife species known from Point Loma include orange-throated whiptail, brown pelican, and southern rufous-crowned sparrow. Recent sightings of California gnatcatchers have been limited to single individuals, suggesting that Point Loma is primarily isolated by distance from the nearest gnatcatcher population in the La Jolla area. Gnatcatchers are historically known from Point Loma, but isolation by development may have precluded the long-term maintenance of a breeding population.

#### 4. Otay Lakes/Otay Mesa/Otay River Valley

This core area, situated in the south-central and southwestern portions of the MSCP area, supports large expanses and prime examples of sensitive habitats of the coastal lowlands, such as high-quality coastal sage scrub, maritime succulent scrub, wetlands, and vernal pools. In addition, some of the most extensive stands of grassland habitat in the MSCP study area are found in this area. This area is noteworthy for its high concentration of target species, including California gnatcatcher, and the presence of seasonal and permanent water in the lakes, drainages, and vernal pools enhance this area for wildlife use. This area also comprises the major distribution of the state-endangered Otay tarplant, supports large populations of the federally endangered San Diego button-celery, and supports the only U.S. occurrence of small-leaved rose. It is directly adjacent to and contiguous with other core areas (e.g., Otay Mountain/Marron Valley). Thirty-one target species occur in the Otay core area, including four federally and state-endangered species, one federally-threatened species, two state-endangered species, and one state-rare species.

##### Otay Lakes

The Otay Lakes region is centered around upper and lower Otay reservoirs, which are owned and maintained by the City of San Diego. These lakes are located in the south-central portion of the MSCP study area, and are surrounded by the Jamul and San Ysidro

mountains and Otay Mesa. This region is characterized primarily by coastal sage scrub, maritime succulent scrub, and chaparral on slopes surrounding the lakes, grassland and vernal pools in flatter areas surrounding the lake, and wetland (i.e., riparian forest and freshwater marsh) and open water habitat adjacent to or within the lakes. A significant riparian forest occurs where Dulzura Creek empties into Lower Otay Lake.

Target plant species found in this area include San Diego thornmint, San Diego ambrosia, Orcutt's brodiaea, Orcutt's bird's-beak, variegated dudleya, a large population of San Diego button-celery, San Diego barrel cactus, a large population of Otay tarplant, large populations of snake cholla, and narrow-leaved nightshade. Although a large number of sensitive animal species are associated with this area, it is particularly noteworthy as a core area for the California gnatcatcher; over 40 pairs of gnatcatchers have been documented in this area. Additional target animal species include Quino checkerspot butterfly, San Diego horned lizard, orange-throated whiptail, least Bell's vireo, coastal cactus wren, southern rufous-crowned sparrow, golden eagle, Cooper's hawk, northern harrier, mule deer, and mountain lion. The latter two species use the lakes as a water source. Raptors are abundant in the large expanses of grassland and open sage scrub around Otay Lakes. Least Bell's vireos (9 territories) nest in riparian habitat at the northeastern end of Lower Otay Lake. Undeveloped lands around the lake, particularly on the eastern side, allow for wildlife movement between the San Ysidro and Jamul mountains.

#### Otay Mesa

The Otay Mesa portion of this preserve area extends from the Otay River Valley to just north of Otay Mesa Road, and from the western base of the San Ysidro Mountains west to I-805. Much of the mesa has been disturbed due to agricultural practices; however, substantial areas of the sensitive coastal sage scrub and maritime succulent scrub habitats persist in the west Otay Mesa area and in East Otay Mesa, just south of the Otay River. Large expanses of grasslands and agricultural fields provide prime foraging habitat for raptor species. Significant vernal pool complexes also occur on Otay Mesa. Pools on the mesa that are directly south of the river are included in this core area, whereas disjunct and/or isolated pools to the south are included in a separate core area (see below).

Target plants (including vernal pool species) in the Otay Mesa area include a major population of San Diego ambrosia, Orcutt's brodiaea, variegated dudleya, a small stand of Palmer's ericameria, San Diego button-celery, large populations of San Diego barrel

cactus, Otay tarplant, and San Diego goldenstar, little mousetail, prostrate navarretia, snake cholla, and Otay Mesa mint. Dunn's mariposa lily occurs in this area on the lower slopes of Otay Mountain; these plants represent the lower limits of the Otay Mountain population. Significant core populations of California gnatcatchers (approximately 110 pairs) and coastal cactus wrens (20 pairs) occur in coastal sage scrub on the mesa. Populations of cactus wrens inhabit thickets of cholla in maritime succulent scrub. Additional target animal species include Riverside fairy shrimp, Quino checkerspot butterfly, San Diego horned lizard, orange-throated whiptail, southern rufous-crowned sparrow, tricolored blackbird, golden eagle, Cooper's hawk, northern harrier, and burrowing owl. Mountain lion and mule deer occur in the eastern portion of the mesa which is less disturbed.

#### Otay River Valley

The Otay River is the primary drainage west of Lower Otay Lake, carrying water from the Jamul and San Ysidro mountains, and Otay Mesa, to south San Diego Bay. En route to the bay, the Otay River transects the broad floodplain of the Otay River Valley. The Otay River Valley is particularly significant for its wetland habitats, including well-developed stands of freshwater marsh and riparian forest. This area also includes upland habitat on the slopes of the valley, and in the side drainages of Wolf, Poggi, Salt Creek, O'Neal, and Johnson canyons. Upland areas are primarily vegetated by maritime succulent scrub and coastal sage scrub; some grassland habitat occurs north of the river valley.

Target plant species found along the Otay River Valley and adjacent canyons include San Diego ambrosia, the major proportion of Orcutt's bird's-beak, San Diego button-celery, and Otay tarplant in the valley, and variegated dudleya and large populations of San Diego barrel cactus and snake cholla on slopes. Target animal species in and along the river valley include least Bell's vireo (2 territories), tricolored blackbird, California gnatcatcher (approx. 140 pairs), coastal cactus wren (25 pairs), southern rufous-crowned sparrow, and mule deer. A number of resident and wintering target raptor species are also present along the river valley, including golden eagle, Cooper's hawk, and northern harrier.

#### 5. Otay Mountain/Marron Valley

Otay Mountain and the adjacent Marron Valley encompass much of the San Ysidro Mountains in the southeastern portion of the MSCP study area. This core area comprises one of the largest continuous tracts of land in southwestern San Diego County, and much

of it was designated as Very High biological value by the MSCP habitat evaluation model. This area is particularly valuable for its floristic elements, including sensitive habitats and a high concentration of sensitive plant species. For example, this area is one of only four locations in the U.S. for tecate cypress, and comprises 84 percent of the U.S. distribution of that species. Furthermore, it supports the only documented location in the study area for Mexican flannelbush; it is one of only three major populations in the study area of Otay manzanita, Dunn's mariposa lily, and Gander's pitcher sage; and it supports two of the four major populations of willowy monardella in the county. Marron Valley, in particular, also supports a high diversity of wildlife. Overall, this area supports the greatest concentration of target species in the study area. The large drainages through this area (e.g., upper portions of O'Neal Canyon, the Tijuana River, and Cottonwood Creek) function as major wildlife corridors. Twenty-seven target species occur in this core area, including one federally and state-endangered species, one federally-threatened species, one state-endangered species, and two state-rare species.

#### Otay Mountain

Otay Mountain comprises one of the largest blocks of undeveloped habitat in the MSCP study area, and is continuous with undeveloped lands in the Otay Lakes region to the north and public and private lands to the east. This area extends from the U.S.-Mexican border northward to the slopes just southeast of Otay Lakes. Little Cedar Canyon and Cedar Canyon are both included in this area. Vegetation on Otay Mountain consists primarily of chaparral and southern interior (tecate) cypress forest. This latter association is a sensitive community that occurs in only four locations in the U.S., with the greatest portion of its U.S. distribution (84 percent) on Otay Mountain. Approximately 89 percent of this acreage is currently on public lands (owned primarily by the BLM).

MSCP target plant species on Otay Mountain include Otay manzanita, the state-rare Dunn's mariposa lily, the major U.S. distribution of tecate cypress, one occurrence of Palmer's ericameria, the state-rare Mexican flannelbush, Gander's pitcher sage, the state-endangered willowy monardella, and a large population of narrow-leaved nightshade. Target animal species include Thorne's hairstreak butterfly, which is dependent on tecate cypress, San Diego horned lizard, orange-throated whiptail, Townsend's western big-eared bat, California mastiff bat, mule deer, and mountain lion. Golden eagle nesting locations occur in the San Ysidro Mountains and on the adjacent Tecate Peak, and these pairs likely utilize all or a portion of Otay Mountain for foraging and/or nesting. California gnatcatchers

utilize coastal sage scrub habitat that occurs at lower elevations along the northern and western margins of this preserve area. For the most part, however, these gnatcatcher populations are included in the Otay Lakes/Otay Mesa/Otay River Valley core area.

### Marron Valley

Marron Valley lies adjacent to and east of Otay Mountain, along the U.S.-Mexican border. The lower south-facing slopes of Little Tecate Peak occupy the northeast portion of this area, and Tecate Peak occurs just offsite to the east. Bee Canyon lies within this area, as do portions of several drainages. Coastal sage scrub is the major vegetative association on slopes, whereas habitat in the valley along the Tijuana River and Cottonwood Creek is comprised largely of wetlands (e.g., riparian forest, riparian scrub, disturbed wetlands) and oak woodlands. The stands of riparian scrub along Cottonwood Creek are particularly well-developed. Although the coastal sage scrub in Marron Valley does not support many gnatcatchers, this area does support a large number of other target and non-target sensitive species. Bird species diversity is particularly high in the valley due to high habitat diversity. Twenty-four non-target sensitive plant and animal species were documented in this area, in addition to the target species listed below.

Target plant species occurring in Marron Valley include very large populations of variegated dudleya and San Diego goldenstar, moderately-sized populations of San Diego barrel cactus, willowy monardella, and narrow-leaved nightshade, and small populations of slender-pod jewelflower and tecate cypress. Target animal species detected in Marron Valley include San Diego horned lizard, orange-throated whiptail, least Bell's vireo (one territory), California gnatcatcher, southern rufous-crowned sparrow, grasshopper sparrow, western bluebird, golden eagle, Cooper's hawk, northern harrier, mule deer, and mountain lion.

### **6. Jamul Mountains**

This core area supports a wide diversity of species, including many of the MSCP target species, and is an important stepping-stone linkage for wildlife movement between the Otay Mountain and Otay Lakes areas and San Miguel Mountain. This area supports some of the best-developed stands of coastal sage scrub in the study area. Pockets of metavolcanic soils throughout the area support endemic plant species. A core gnatcatcher population is located on the southern and western sides of this mountain range, and the area also

supports a large number of reptile species (10). The Jamul Mountains support one of only three major populations in the study area of Otay manzanita, Dunn's mariposa lily, and Gander's pitcher sage. Twenty target species occur in this core area, including one federally-threatened species, one state-endangered species, and three state-rare species.

The Jamul Mountains lie adjacent to and northeast of lower Otay Lake. This core area is roughly bounded to the south by the hills just east of Lower Otay Lakes Road, Proctor Valley Road to the west, northwest, and north, and Highway 94 to the northeast. Jamul Creek transects the eastern portion of the area, while Dulzura Creek runs along the southeast boundary. Vegetative associations in the Jamul Mountains include coastal sage scrub, chaparral, grassland, and small stands of oak woodland.

Target plant species in the Jamul Mountains include a large population of San Diego thornmint, Otay manzanita, Dunn's mariposa lily, slender-pod jewelflower, Palmer's ericameria, San Diego barrel cactus, possibly the state-rare Mexican flannelbush (unverified occurrence), Gander's pitcher sage, and a large population of narrow-leaved nightshade. California gnatcatchers are common (approx. 100 pairs) in the coastal sage scrub in this area. Additional target animal species include the San Diego horned lizard, orange-throated whiptail, southern rufous-crowned sparrow, grasshopper sparrow, western bluebird, ferruginous hawk, golden eagle, northern harrier, mule deer, and mountain lion. This core area serves as an important stepping-stone linkage between the Otay Mountain and San Miguel Mountain/Sweetwater Reservoir areas.

#### **7. Sweetwater Reservoir/San Miguel Mountain/Sweetwater River**

The Sweetwater Reservoir/San Miguel Mountain/Sweetwater River core area is situated in the south-central portion of the MSCP study area. The area supports a diversity of habitats, including open water in the reservoir, wetlands along the edge of the reservoir and in the river, high-quality coastal sage scrub and grasslands at lower elevations adjacent to the reservoir, and chaparral on the peak of San Miguel Mountain. Its complexity of habitats and proximity to other large blocks of undeveloped land add to the sensitivity of this area. This area also supports one of the highest concentrations of target species in the study area, including core populations of least Bell's vireos, California gnatcatchers, and coastal cactus wrens. Thirty-six target species occur in this core area, including two federally and state-endangered species, one federally-threatened species, two state-endangered species, and one state-rare species.

## Sweetwater Reservoir

The Sweetwater Reservoir, which lies northwest of Mother Miguel Mountain, is an impoundment on the Sweetwater River used to supply potable water to the surrounding community. The core area encompasses the reservoir and surrounding lands east to the base of San Miguel Mountain and north towards Highway 94. Some of the best-developed stands of coastal sage scrub in the MSCP study area occur on slopes east of the reservoir; smaller stands of scrub are found to the north and northwest. A large stand of grassland lies south of the reservoir, and smaller patches occur to the north and west. Freshwater marsh is found around the edge of the reservoir.

The only target plant species in this area are large populations of San Diego barrel cactus, Otay tarplant, and prostrate navarretia. Coastal sage scrub around the reservoir supports large and significant populations of California gnatcatchers (approx. 70 pairs) and coastal cactus wrens (25 pairs). The riparian woodland at the northern end of the reservoir supports a substantial number of least Bell's vireos (26 territories). Other target animals include San Diego horned lizard, orange-throated whiptail, tricolored blackbird, southern rufous-crowned sparrow, northern harrier, and burrowing owl. The reservoir provides valuable waterbird habitat and is a permanent water source for many wildlife species.

## San Miguel Mountain

San Miguel Mountain is located on the eastern shore of the Sweetwater Reservoir, and is a prominent landmark in the study area. This core area extends north just past Highway 94, and includes Proctor Valley along its eastern margin. It abuts the Jamul Mountains core area and the Otay Lakes core area to the southeast and south, respectively. It is most valuable for its large area of undisturbed chaparral habitat and good-quality coastal sage scrub on the lower slopes of the mountain. Other habitats present in lesser amounts include oak woodlands on slopes and grassland at lower elevations. This core area is also one of only three known locations in the study area for Otay manzanita, Dunn's mariposa lily, and Gander's pitcher sage.

Target plant species found on San Miguel Mountain include Otay manzanita, Dunn's mariposa lily, variegated dudleya, San Diego barrel cactus, a large population of Otay tarplant (lower slopes), Gander's pitcher sage, San Diego goldenstar, and narrow-leaved

nightshade. Large populations of San Diego button-celery, Orcutt's brodiaea, and little mousetail are found in Proctor Valley, at the eastern edge of this area. Target animal species known from this area include San Diego horned lizard, orange-throated whiptail, California gnatcatcher, coastal cactus wren, southern rufous-crowned sparrow, grasshopper sparrow, golden eagle, northern harrier, burrowing owl, mule deer, and mountain lion. The large, continuous expanse of natural open space on and adjacent to the mountain provides suitable habitat for species that require large home ranges, such as foraging raptors, mule deer, and mountain lion.

#### Sweetwater River

The Sweetwater River, with its headwaters in the Cuyamaca Mountains, has formed a series of canyons and valleys that stretch from the eastern edge of the study area to the Sweetwater Marsh and San Diego Bay. The Sweetwater River is the primary drainage in the study area that functions as a regional wildlife corridor. The portion of the Sweetwater River that extends from the eastern end of the Sweetwater Reservoir just past Steele Canyon is included in this core area. Wetland associations within the river include well-developed stands of riparian forest and riparian scrub at the east end of the reservoir, riparian scrub continuing up the river, then large stands of riparian forest on both sides of Highway 94.

Target plant species along the Sweetwater River include Palmer's ericameria and snake cholla. Target animal species include southwestern pond turtle, southwestern willow flycatcher, and least Bell's vireo (25 territories). In addition, populations of the San Diego horned lizard, orange-throated whiptail, California gnatcatcher (approx. 40 pairs), and southern rufous-crowned sparrow occur on slopes adjacent to the Sweetwater River.

#### **8. McGinty Mountain/Sequan Peak-Dehesa**

McGinty Mountain, Sequan Peak, and the undeveloped land north to Dehesa comprise this core area, which is notable for its high quality habitats, including coastal sage scrub, chaparral, and wetlands (i.e., along the Sweetwater River), and large concentrations of sensitive species, including several plant species that are endemic to gabbro and clay soils. This area supports the only populations in the MSCP area of Dean's milk-vetch, as well as the entire distribution of Dehesa beargrass. This area also provides a continuum between habitat in the Sweetwater Reservoir/Sweetwater River Valley and undeveloped lands in the

Cleveland National Forest to the east. Twenty-two target species occur in this core area, including one federally-threatened species, two state-endangered species, and three state-rare species.

### McGinty Mountain

McGinty Mountain is a long, east-west oriented ridge that lies directly north of Jamul and south of the Sweetwater River. This area is roughly bounded on the north and west by Dehesa Road, Campo Road, and Willow Glen Drive, on the east by Sequan Peak, and on the south by the Jamul core area. The lower, north-facing slopes of McGinty Mountain border the Sweetwater River Valley, forming a low area known as The Mesa. The primary vegetative associations on McGinty Mountain are coastal sage scrub, chaparral, and native grassland; wetland associations occur in the Sweetwater River to the north.

Gabbro soils on the mountain support gabbro-endemic plant species such as Dunn's mariposa lily, one of the few populations in the county of Gander's butterweed, and Dehesa beargrass. Other target plant species include San Diego thornmint, Otay manzanita, Dean's milk-vetch, Palmer's ericameria, Gander's pitcher sage, narrow-leaved nightshade, and a large population of Parry's tetracoccus. Target wildlife species include Hermes copper butterfly, San Diego horned lizard, orange-throated whiptail, California gnatcatcher (approx. 45 pairs), southern rufous-crowned sparrow, mule deer, and mountain lion.

### Sequan Peak-Dehesa

This area lies adjacent to and east of McGinty Mountain and includes Sequan Peak and portions of Lawson Creek to the east and Wood Valley to the south. It also includes the Sweetwater River and habitat to the north past Dehesa towards Crest. Vegetation on slopes directly north and south of the river is dominated by coastal sage scrub and chaparral, whereas the river supports riparian woodland, riparian oak woodland, and freshwater marsh habitat, and a series of rock pools. Vegetation on Sequan Peak is dominated by chaparral, although smaller areas of coastal sage scrub, oak woodlands, and wetlands (i.e., along drainages) also occur.

Gabbro soils on Sequan Peak and near Dehesa Peak support large populations of Dehesa beargrass. Additional target plant species found in this area include slender-pod jewelflower, Lakeside ceanothus, variegated dudleya, Gander's pitcher sage, San Diego

goldenstar, narrow-leaved nightshade, and a large population of Parry's tetracoccus. Target animal species include San Diego horned lizard, orange-throated whiptail, California gnatcatcher (approx. 20 pairs), southern rufous-crowned sparrow, golden eagle, and mule deer. Unconfirmed sightings of southwestern pond turtle in the river have been reported. This area forms an important continuum between the Cleveland National Forest to the east, the linkage between the Jamul area and habitat to the east, and natural areas to the north and west, including a connection to the only remaining habitat linkage to the Lake Jennings area.

#### **9. Lake Jennings/Wildcat Canyon-El Cajon Mountain**

This core area supports many of the sensitive wildlife resources found in other nearby core areas, but is particularly important because it supports a large population of coastal cactus wrens and is the probable "receptor" site for any wildlife species (including California gnatcatcher) dispersing between the southern and northern portions of the MSCP study area (i.e., north and south of I-8). Preservation of this area is critical to maintaining the regional metapopulation of gnatcatchers and other sensitive wildlife species. This core area also supports a significant population of Lakeside ceanothus, and is one of the few known locations for Mission Canyon bluecup. Fifteen target species occur in this core area, including two federally and state-endangered species, one federally-threatened species, and one state-rare species.

##### Lake Jennings

Lake Jennings is located in Lakeside, just north of I-8 and east of Lake Jennings Park Road. This core area includes the reservoir and surrounding land, including native habitat in Cactus County Park. The primary vegetative association in this area is coastal sage scrub, including stands of scrub that support extensive thickets of prickly pear and cholla cactus.

Key target species in the area include San Diego horned lizard, orange-throated whiptail, California gnatcatcher (approx. 60 pairs), coastal cactus wren (20 pairs), southern rufous-crowned sparrow, mule deer, and mountain lion. The lake provides wintering habitat for waterbirds and a permanent water source for wildlife.

## **Wildcat Canyon-El Cajon Mountain**

This area includes the undeveloped lands east of Wildcat Canyon and largely west of El Cajon Mountain (the lower slopes of El Cajon Mountain are included in this core area), including habitat within the Silverwood Wildlife Sanctuary, Moreno Valley, and the San Diego River Valley. Vegetation on the slopes includes coastal sage scrub, chaparral, a coastal sage scrub/chaparral mix, grassland, and oak woodland. The river valley has been disturbed by sand mining and agricultural activities, but supports riparian and oak woodlands, freshwater marsh, and aquatic habitats.

Target plant species in this area include a major population of Lakeside ceanothus, slender-pod caulanthus, and possibly, Mission Canyon bluecup. Target animal species include California gnatcatcher, western bluebird, peregrine falcon, and golden eagle in upland habitats, and southwestern pond turtle and least Bell's vireo (two territories) in the river. This area provides a habitat continuum between undeveloped land in the Cleveland National Forest to the east and the Poway core area to the northwest.

## **10. Mission Trails/East Elliott/Miramar/Santee**

The Mission Trails/East Elliott/Miramar/Santee core resource area encompasses a large block of native habitat from Miramar to Tierrasanta to Santee and northward towards Poway. It also includes a portion of the San Diego River. This area is important for its assemblage of coastal sage scrub species, and includes a large core population of California gnatcatchers (over 150 pairs). Riparian habitat in the San Diego River supports a large population of the federally and state-endangered least Bell's vireo (27 territories). Twenty target species occur in this core area, including two federally and state-endangered species, one federally-threatened species, two state-endangered species, and one state-rare species.

### **Mission Trails**

The Mission Trails area includes Mission Trails Regional Park (including Cowles and Fortuna mountains) and undeveloped lands to the west towards Tierrasanta. It also includes a portion of Mission Gorge and the San Diego River. Vegetative associations in the area include coastal sage scrub, chaparral, and oak woodlands in upland areas, and riparian habitat in the river.

Target plant species in this area include a large population of San Diego thornmint, a major population of San Diego ambrosia, Orcutt's brodiaea, slender-pod jewelflower, variegated dudleya, a large population of San Diego barrel cactus, willowy monardella, a large population of San Diego goldenstar, and San Diego mesa mint. Key wildlife species include San Diego horned lizard, orange-throated whiptail, least Bell's vireo, California gnatcatcher, southern rufous-crowned sparrow, grasshopper sparrow, mule deer, and probably mountain lion.

#### East Elliott

The East Elliott area lies northeast and adjacent to Mission Trails. It includes Spring Canyon, Little Sycamore Canyon, Quail Canyon, and West Sycamore Canyon, which are north-south wildlife corridors. This area is bordered to the north by large expanses of undeveloped habitat on NAS Miramar, to the south by the San Diego River, and to the east by Santee Lakes. Coastal sage scrub and chaparral are the dominant habitats in this area, forming a complex mosaic with native grasslands. Riparian and freshwater marsh habitats occur in some of the larger drainages.

Target plant species in this area include Orcutt's brodiaea, variegated dudleya, San Diego barrel cactus, and a large population of San Diego goldenstar; target animal species include San Diego horned lizard, orange-throated whiptail, California gnatcatcher, southern rufous-crowned sparrow, mule deer, and mountain lion. Hollins Lake in the San Diego River provides habitat for wintering waterbirds; habitat surrounding the lake and in its vicinity supports significant nesting populations of least Bell's vireos.

#### NAS Miramar

Regionally important resources on NAS Miramar include California gnatcatchers, vernal pools and associated species, willowy monardella, and habitat linkages for the central area of the coastal county. Vernal pools on Miramar are discussed as a separate core area (15). The northern portions of Quail and West Sycamore canyons and surrounding lands serve as north-south wildlife corridors through Miramar. The easternmost extension of San Clemente Canyon supports coastal sage scrub where the greatest concentration of gnatcatchers occurs on Miramar.

## Santee

The East area is situated east of and adjacent to the East Elliott area. This area includes a portion of the San Diego River and the undeveloped hills and drainages surrounding the City of Santee. Prominent landmarks in the area include Sycamore Canyon and Ward Mountain. The southern boundary of this core resource area is formed by the City of Santee, and Sycamore Canyon and Santee Lakes lie along its western edge. This area extends past Eucalyptus Hills towards Slaughterhouse Canyon; the eastern boundary is roughly formed by the City of Lakeside. This area is similar to the other areas in this core with respect to habitat and sensitive species. Coastal sage scrub and chaparral are the dominant associations; grassland is present in disturbed areas, and oak and riparian woodland and freshwater marsh occur in the larger drainages.

Target plant species include variegated dudleya, San Diego barrel cactus, and one of only four major populations in the MSCP study area for willowy monardella. Significant populations of California gnatcatchers occur in the sage scrub north and east of the Santee Lakes, and this species is scattered throughout sage scrub habitat in the remainder of this area. Additional target animal species include San Diego horned lizard, orange-throated whiptail, coastal cactus wren, southern rufous-crowned sparrow, Cooper's hawk, northern harrier, and mule deer.

### **11. Central Poway/San Vicente Reservoir/North Poway**

The Poway/San Vicente Reservoir/North Poway core area encompasses a large block of habitat in the east-central portion of the MSCP study area. This core area includes a high diversity of habitats and key populations of sensitive species, including California gnatcatcher (approx. 120 pairs). It is one of two "centers of distribution" in the MSCP study area for the state-rare Encinitas baccharis, and supports the only known population in the county of heart-leaved pitcher sage. Large bodies of water such as Lake Poway and San Vicente Reservoir provide aquatic habitat that is lacking in neighboring core areas. Twenty-one target species occur in this core area, including one federally and state-endangered species, one federally-threatened species, one state-endangered species, and two state-rare species.

### Central Poway

This area includes the undeveloped portions of Poway from the western foothills of Iron Mountain and Highway 67 westward to I-15 via Beeler Creek. This area is adjacent to and contiguous with the Santee core area, with Sycamore and Clark canyons forming the primary linkage between these two core areas. Chaparral dominates slopes in the eastern part of this area, while coastal sage scrub is found in the western and central portions. Oak woodland, native and nonnative grasslands, riparian scrub, and a coastal sage scrub-chaparral mix are also present.

Target plant species in this area include a large population of San Diego thornmint, the state-rare Encinitas baccharis, Orcutt's brodiaea, slender-pod jewelflower, variegated dudleya, San Diego barrel cactus, and Palmer's ericameria. Target animal species include San Diego horned lizard, orange-throated whiptail, California gnatcatcher, southern rufous-crowned sparrow, golden eagle, northern harrier, mule deer, and mountain lion. Lake Poway provides wintering habitat for waterbirds and a year-round water source for wildlife.

### San Vicente Reservoir

The San Vicente Reservoir area lies adjacent to and east of the Poway area. Major topographical features in the area include the reservoir (used to supply potable water to the surrounding community), San Vicente Creek and adjacent uplands to the eastern edge of the study area, Kimball Valley, a mesa in the Irving's Crest area, and the peak of Iron Mountain. This area is roughly bounded by the northern edge of Moreno Valley to the south, Highway 67 to the west and northwest, Boulder Oaks Ranch and San Vicente Road to the north and northeast, respectively, and the Barona Indian Reservation and Wildcat Canyon Road to the east. This area provides important north-south and east-west connections, and supports a rich assemblage of sensitive plant and wildlife species. Important habitats in this area include coastal sage scrub, chaparral, oak and riparian woodlands, grasslands, freshwater marsh, and the aquatic habitat of the reservoir.

Target plant species include San Diego thorn-mint, Encinitas baccharis, Orcutt's brodiaea, one of the few major populations of Lakeside ceanothus, heart-leaved pitcher sage, San Diego goldenstar, and narrow-leaved nightshade. Target animal species include San Diego horned lizard, orange-throated whiptail, California gnatcatcher, peregrine falcon, golden

eagle, northern harrier, mule deer, and mountain lion. Least Bell's vireos could potentially occur in high-quality riparian woodlands found in Kimball Valley. The reservoir provides a large aquatic habitat for the region that is used as a year-round water source by wildlife and as a wintering habitat for waterbirds and bald eagles.

#### North Poway

This area lies adjacent to and north of Lake Poway, and extends north to the San Dieguito River and the San Pasqual Valley. It includes Thompson Creek and Starvation Mountain. The majority of the vegetation in this area is coastal sage scrub, although small areas of chaparral, grasslands, and oak woodlands occur. Riparian habitats are found along the drainages.

The only target plant species documented in this area is Palmer's ericameria. Target animal species include San Diego horned lizard, a core population of California gnatcatchers, and golden eagle. This area is an important link between the coastal and inland open spaces of the northern portion of the MSCP study area.

## 12. Lake Hodges/San Pasqual Valley

The Lake Hodges/San Pasqual Valley core area represents one of the largest continuous blocks of habitat in the MSCP study area, and serves as a major east-west corridor. This core area includes core gnatcatcher (approx. 235 pairs) and cactus wren (90 pairs) populations, one of the two "centers of distribution" for Encinitas baccharis in the MSCP study area, the only occurrence of sticky dudleya in the study area, large expanses of grassland that provide valuable raptor foraging habitat, a major aquatic feature (Lake Hodges), and valuable wetland habitat in the San Dieguito River and San Pasqual Valley. Twenty-seven target species occur in this core area, including one federally and state-endangered species, one federally-threatened species, two state-endangered species, and two state-rare species.

#### Lake Hodges

This area includes several large, interconnected blocks of habitat: Black Mountain to the south, Santa Fe Valley, Lusardi Creek, and the San Dieguito River to the west, and Lake Hodges and the surrounding undeveloped lands to the north and east. Black Mountain is a

chaparral-covered peak surrounded by low rolling hills. High-quality coastal sage scrub exists at the northern and western base of the mountain and grasslands are present on the adjacent mesa. Many of the mesas in the Santa Fe Valley are converted to agricultural uses; however, some of the fallow fields have converted back to coastal sage scrub or grassland. Areas not suitable for plowing (e.g., drainages, slopes) have retained native vegetation. A disturbed riparian/eucalyptus woodland has replaced the native riparian community along the San Dieguito River; low- to medium-quality riparian scrub occurs along the heavily grazed Lusardi Creek. Lake Hodges is a deep reservoir that extends eastward from the dam to the western end of the San Pasqual Valley. Upland vegetation surrounding the lake includes coastal sage scrub and grassland in the lowlands and chaparral on steep, north-facing slopes. High-quality riparian woodland and freshwater marsh habitats occur at the upper end of the lake and drawdown area, and extend as a fringe around much of the shoreline.

Target plant species in this area include one of the largest known populations of San Diego thornmint, aphanisma, Del Mar manzanita, numerous stands of Encinitas baccharis, slender-pod jewelflower, a major population of wart-stemmed ceanothus, variegated dudleya, sticky dudleya, San Diego barrel cactus, and San Diego goldenstar. Target wildlife species include southwestern pond turtle (Lusardi Creek and San Dieguito River), San Diego horned lizard, orange-throated whiptail, white-faced ibis, California gnatcatcher, coastal cactus wren, southern rufous-crowned sparrow, grasshopper sparrow, western bluebird, golden eagle, Cooper's hawk, northern harrier, mule deer, and mountain lion. Lake Hodges supports a high wildlife species diversity and is an important wintering site for waterbirds. It also provides an important regional water source.

#### San Pasqual Valley

The San Pasqual Valley area extends eastward from the Lake Hodges dam spillway elevation to Boden Canyon, and includes surrounding slopes to the north and south. Included in this area are slopes north of the Wild Animal Park, and Cranes Peak and portions of Clevenger and Bandy canyons to the south. The western portion of the valley is currently an intensively farmed agricultural preserve. This area has apparently been cultivated since before this century. With the exception of some sand mining areas, the San Dieguito/Santa Ynez River supports intact riparian woodland and wetland communities along most of its length. Coastal sage scrub, interspersed with smaller patches of

chaparral, is the dominant habitat on lower slopes of the valley. Extensive thickets of prickly pear cactus occur on some of the west-facing slopes.

The only target plant species in this area are Palmer's ericameria and San Diego barrel cactus. The extensive riparian woodland habitat east of I-15 supports a wide diversity of bird species, including least Bell's vireo (13 territories), willow flycatcher, white-faced ibis, and Cooper's hawk. Significant populations of California gnatcatchers and coastal cactus wrens inhabit the coastal sage scrub and cactus thickets. Additional target animal species include San Diego horned lizard, orange-throated whiptail, southern rufous-crowned sparrow, western bluebird, golden eagle, mule deer, and mountain lion.

### **13. San Dieguito Lagoon**

The San Dieguito Lagoon core area includes the lagoon, portions of the San Dieguito River to the east, and surrounding uplands. The lagoon system is particularly valuable for its wetland and open water habitats, whereas upland areas support prime examples of sensitive habitats not well-represented elsewhere in the MSCP study area or the county, such as southern maritime chaparral. That portion of the San Dieguito River that lies within this core area is largely surrounded by agricultural areas. However, the river supports wetland habitat and functions as part of an important east-west regional wildlife corridor. Seventeen target species occur in this core area, including three federally and state-endangered species, two federally-threatened species, and one state-endangered species.

The San Dieguito Lagoon is situated along the coastline in the northwestern portion of the study area, just south of the Del Mar fairgrounds. Upland areas extend to and include the undeveloped portions of Del Mar Heights and the mesa south of Gonzales Canyon. The lagoon is a major estuarine system that receives drainage primarily from the San Dieguito River Valley. The primary wetland habitat in the lagoon is southern coastal saltmarsh. Disturbed wetlands and open water are also present, as well as a small amount of southern foredune habitat near the mouth of the lagoon. Upland habitats surrounding the lagoon include beach, southern coastal bluff scrub, coastal sage scrub, southern maritime chaparral, grassland, and Torrey pine forest.

That portion of the San Dieguito River (and surrounding valley) that extends upstream from the lagoon for approximately 1.25 mi is also included in this core area. This area is most

valuable for its wetland habitat in the river and its corridor function. Surrounding upland areas of the San Dieguito River Valley are largely agricultural and/or developed.

Target plant species associated with this core area include significant stands of Del Mar manzanita and Torrey pine, one of the few county populations of aphanisma, large populations of wart-stemmed ceanothus, Del Mar sand-aster, one of the few extant populations of short-leaved dudleya, and San Diego barrel cactus. Nuttall's lotus has been reported from remnant dunes near the lagoon. Target animal species include light-footed clapper rail and Belding's savannah sparrow in the salt marsh. Other target species that occur around the lagoon are California least tern, western snowy plover, foraging/roosting brown pelicans, and wintering reddish egrets. The California gnatcatcher occurs in upland habitats, and the San Diego horned lizard and orange-throated whiptail are expected here, as well. This core area is tenuously linked to the Santa Fe Valley area along the San Dieguito River and nearby canyons.

#### **14. Los Peñasquitos Lagoon/Del Mar Mesa (and surrounding lands)/Los Peñasquitos Canyon**

This core resource area encompasses one of the few intact natural open space areas in coastal San Diego County that is still linked to larger expanses of habitat to the east. A number of regionally significant resources, such as wetland habitat in the lagoon, are represented in this area. This area also contains prime examples of sensitive and distributionally restricted habitats, as well as a number of target plant species not well-represented in other core resource areas. This area supports the major distribution in the study area of the regionally rare southern maritime chaparral, and major distributions of several of the sensitive plants associated with this habitat, such as Del Mar manzanita, wart-stemmed ceanothus, Del Mar Mesa sand-aster, and Torrey pine. One of only two naturally occurring Torrey pine populations in the world is found in this core area, as is the majority of the known distribution of the state-endangered short-leaved dudleya. Los Peñasquitos Canyon is a regional corridor linking coastal habitats to Poway and Black Mountain. Twenty-five target species occur in this core area, including three federally and state-endangered species, one federally-threatened species, and three state-endangered species.

## Los Peñasquitos Lagoon

Los Peñasquitos Lagoon is a relatively large estuarine system that is situated along the coastline just north of Torrey Pines State Reserve. The lagoon is bordered by Carmel Valley Road to the north, North Torrey Pines Road to the west and south, and Sorrento Valley Road to the east. Sorrento Valley, Poway, and Los Peñasquitos creeks carry water from the foothills and coastal terraces into the lagoon. This area is most valuable for its large extent of wetland and open water habitats. Wetlands are represented primarily by southern coastal saltmarsh, although well-developed stands of riparian scrub occur along the eastern edge of the lagoon and freshwater marsh becomes more common towards Sorrento Valley. Coastal sage scrub and chaparral occur in upland areas surrounding the lagoon.

MSCP target species associated with the lagoon include light-footed clapper rail and Belding's savannah sparrow in the salt marsh, and orange-throated whiptail and California gnatcatcher in upland areas. Mule deer are common in the area and mountain lions have occasionally been reported in recent years.

## Del Mar Mesa and Surrounding Lands

The Del Mar Mesa area and surrounding lands extend from the San Dieguito River Valley south to Los Peñasquitos Canyon and include the coastal mesas of Torrey Pines (including Torrey Pines State Reserve and the northern extension) and La Jolla, as well as Carmel Mountain. This area is most notable for its floristic elements. It supports the majority of the remaining acreage of the highly restricted southern maritime chaparral habitat in the study area. Southern maritime chaparral supports a number of narrowly distributed plant species due to unique geologic formations and resultant soils (e.g., marine sediments, sandstones, and shales), in conjunction with the maritime climatic influence. Other habitats include a mosaic of coastal sage scrub and open chamise chaparral on the eastern portion of Carmel Mountain, and vernal pools or other wetland habitat on the mesa.

Target plant species that are partially or wholly restricted to southern maritime chaparral, and that occur in large populations in the Del Mar Mesa area include Del Mar manzanita, wart-stemmed ceanothus, Del Mar Mesa sand-aster, and Torrey pine. Additional target plant species known from this area include one of only three known occurrences of Shaw's agave in the study area, Orcutt's brodiaea, most of the extant stands of short-leaved

dudleya, a major population of San Diego button-celery (Carmel Mountain), coast wallflower, large populations of San Diego barrel cactus, San Diego goldenstar, little mousetail, and San Diego mesa mint. Target animal species include San Diego horned lizard, orange-throated whiptail, California gnatcatcher, northern harrier, mule deer and mountain lion. Mule deer are common on the mesa and surrounding open lands, and mountain lions occasionally visit the area. Both mammals are also known from Torrey Pines State Reserve, although the reserve is probably too small to support viable populations of these species. Del Mar Mesa is an important wildlife corridor. It is linked to Torrey Pines State Reserve to the west, borders Los Peñasquitos Canyon Preserve to the south, and is linked to the Santa Fe Valley area to the north via McGonigle Canyon.

### Los Peñasquitos Canyon

The Los Peñasquitos Canyon area is largely included in open space as part of the Los Peñasquitos Canyon Preserve. This canyon extends from east of I-5 and north of Mira Mesa, eastward towards Poway. Los Peñasquitos Creek, which runs along the canyon bottom, extends both west- and eastward from the preserve. Although the westernmost portion of the creek is preserved in Torrey Pines State Reserve, there are sections of the creek between the canyon and the reserve that are not currently included in preserved open space. Vegetative associations in the canyon include wetland habitat (i.e., freshwater marsh, riparian scrub, riparian forest) and oak woodlands along the canyon bottom, and chaparral, coastal sage scrub, and grasslands on the canyon slopes.

The canyon supports a variety of target species, and is considered an important regional wildlife corridor. Target plant species found in the canyon include San Diego thornmint, Del Mar manzanita, and San Diego barrel cactus. Target animal species include San Diego horned lizard, orange-throated whiptail, a core population of California gnatcatchers (approx. 45 pairs), southern rufous-crowned sparrow, grasshopper sparrow, western bluebird, and mountain lion.

### **15. Miramar Vernal Pools**

Vernal pools are a highly restricted, unique wetland habitat type that has been reduced by an estimated 97 percent in San Diego County. Vernal pools contain high numbers of endangered, sensitive, and endemic plant and animal species. This habitat is considered sensitive and declining by the ACOE, USFWS, CDFG, and the City and County of San

Diego. Vernal pools in the Miramar area represent one of the two major remaining complexes of pools in the MSCP study area. The Miramar vernal pool core resource area encompasses the highest quality vernal pool habitat in this area, and includes pools and their associated watershed and mima mounds. Much of this area is owned and managed by NAS Miramar. Thirteen target species occur in this core area, including three federally and state-endangered species, one federally-threatened species, and one state-endangered species.

The Miramar vernal pool core area lies entirely on NAS Miramar, and is situated primarily north of SR-52, west of I-15, east of I-805, and south of Rose Canyon. It also includes, however, the easternmost extension of San Clemente Canyon, which lies east of I-15, and surrounding upland areas which extend north towards Carroll Canyon and south to Highway 52. Vegetation in this area is dominated by chaparral, with nonnative grassland in openings in the chaparral. Other associations present in lesser amounts include coastal sage scrub and disturbed habitat. Vernal pools in this area are classified as San Diego Mesa hardpan vernal pools. These pools are characterized by a cemented iron-silica hardpan, and soils that are coarser and redder than pools in the southern part of the MSCP study area (Holland 1986).

A number of target species occur in this core area, including but not restricted to, vernal pool endemics. Target vernal pool plant species include major populations of San Diego button-celery and little mousetail, one of two major populations of California Orcutt grass in the study area, and most of the distribution of San Diego mesa mint. Additional target plants include a particularly large population of Orcutt's brodiaea, wart-stemmed ceanothus, San Diego barrel cactus, one of only four major populations of willowy monardella (San Clemente Canyon) in the county, and San Diego goldenstar. Target animal species include San Diego horned lizard, orange-throated whiptail, California gnatcatcher (approx. 13 pairs), and mule deer. In addition, these pools serve as breeding habitat for amphibians, and as a water source for waterfowl and other wildlife species.

#### **16. Otay Mesa Vernal Pools**

Vernal pools in the Otay Mesa area represent the other major remaining vernal pool complex in the MSCP study area. The Otay Mesa vernal pool core resource area encompasses the highest quality vernal pool habitat in this area that is not already included in another core (e.g., Otay Lakes/Otay Mesa/Otay River Valley), and includes pools and

their associated watershed and mima mounds. In addition, this core area includes *Stipa* grassland near Spring Canyon (not shown on vegetation map). Eleven target species occur in this core area, including four federally and state-endangered species and one federally-threatened species.

The Otay Mesa vernal pool core area lies north of the U.S.-Mexican border, and primarily west of the border crossing, south of Otay Mesa Road, and east of I-805. Vegetation in this area is dominated by coastal sage scrub and grassland. Vernal pools in this area are classified as San Diego Mesa claypan vernal pools. These pools lack the cemented iron-silica hardpan found in the Miramar pools, and the soils are finer-textured and grayer than those to the north (Holland 1986).

Target vernal pool endemic plant species in this area include San Diego button-celery, little mousetail, a major population of prostrate navarretia, one of only two major populations of California Orcutt grass in the study area, and nearly the entire distribution of Otay mesa mint (exclusive of those plants that occur in adjacent habitat in the Otay Mesa core preserve area). Additional target plants include variegated dudleya, San Diego barrel cactus, and snake cholla. Target animal species include Riverside fairy shrimp, San Diego horned lizard, California gnatcatcher, and northern harrier. In addition, these pools serve as breeding habitat for amphibians, and as a water source for waterfowl and other wildlife species.

#### 4.4.3 Linkage Constraints within the MSCP Study Area

Within the MSCP study area, connectivity between core habitat areas is already constrained by existing development. Linkages constrained by development within the MSCP study area are shown on Figure 4-9 and described below. Maintaining these linkages is critical to the long-term viability of the core habitat areas. Therefore, habitat within these linkages should be maximized within the final preserve boundaries.

- A. **San Dieguito River between Del Mar and Santa Fe Valley** - This linkage is highly degraded and/or developed. If a functional linkage between Del Mar and Santa Fe Valley is deemed necessary, substantial habitat restoration would be required.

- B. Lake Hodges to Carlsbad** - There is a relatively narrow band of coastal sage scrub between Lake Hodges and Carlsbad. This linkage will be crucial in keeping the Carlsbad California gnatcatcher population connected to the MSCP metapopulation.
- C. San Pasqual Valley to San Luis Rey River** - This landscape linkage will be important for linking Camp Pendleton with the MSCP study area.
- D. Boden Canyon (San Pasqual Valley North to Rancho Guejito)** - This habitat linkage is constrained due to lack of conservation on either side of the linkage.
- E. Del Mar Mesa to Black Mountain** - This grassland habitat linkage is considered a steppingstone in terms of nongrassland habitat.
- F. Los Peñasquitos Creek West of Poway** - This is the primary linkage between Los Peñasquitos Canyon Preserve and Beeler Canyon/Van Dam Peak in Poway.
- G. San Diego River West of Mission Trails** - The San Diego River is the primary semi-natural drainage that links Mission Trails/Santee to coastal wetlands in/near Mission Bay (Zemba 1993).
- H. Interstate 8 at Lakeside** - Habitat fragmentation due to development around Lakeside necessitates that a landscape linkage is included to ensure adequate connectivity between Lake Jennings and Dehesa.
- I. Dehesa to El Capitan Reservoir** - This linkage connects the Dehesa area to the eastern study area boundary below El Capitan Reservoir via Harbison Canyon and Chocolate Canyon.
- J. Sweetwater River West of the Sweetwater Reservoir** - The Sweetwater River is a primary semi-natural drainage linking the San Miguel Mountains and the Upper Sweetwater River watershed to the coastal wetlands of National City.

- K. San Miguel Mountain to Rancho Del Rey** - This upland habitat linkage is considered a steppingstone linkage in terms of nongrassland habitat.
- L. Sweetwater River between San Miguel Mountain and McGinty Mountain** - The habitat linkage between Rancho San Diego and McGinty Mesa is constrained by existing development.
- M. Otay River West of Interstate 805** - The Otay River is a primary semi-natural drainage linking Otay Mountain and Otay Lakes to the coastal wetlands of Chula Vista.
- N. Otay Mountain/Jamul Mountains to Sequan Peak** - This relatively natural but constrained eastern habitat linkage connects three large core areas.

#### **4.5 SUMMARY OF BIOLOGICAL GOALS, STANDARDS, AND GUIDELINES**

The Biological Goals, Standards, and Guidelines for Preserve Design (Guidelines) are included in Appendix A-9 of this report. The Guidelines address preservation of vegetation communities, habitat linkages, and individual species of plants and animals. However, the general concepts of regional preserve design are addressed in Sections 4.1 and 4.2 of this report; these should be considered the founding principles upon which the species-specific guidelines are based.

##### **4.5.1 Purpose and History Behind Preparation of the Biological Goals, Standards, and Guidelines**

The Guidelines were prepared by a Biological Task Force that was formed in September 1992 as an alternative to prematurely drawing preserve boundaries prior to completion of the plan. The goal of the Guidelines is to allow flexibility in establishing preserve boundaries based on specific surveys, land use, ownership, and economic information. To provide a planning context for conservation standards, a broader understanding of the importance and extent of the region's habitats and target species was needed. The Guidelines are a set of biological goals, standards, and criteria to guide both the preparation of the MSCP Plan and subsequent subarea plans. The Guidelines are intended to provide a way to measure the success of the incremental building of a preserve system and to assist in

future management and maintenance decisions once the preserve, or portions of it, have been established.

#### **4.5.2 Contents**

The Guidelines address three areas:

1. Protection of vegetation communities with a focus on habitats considered sensitive, rare, or declining;
2. Maintenance of functional wildlife corridors and habitat linkages between critical biological resources areas; and
3. Maintenance of viable populations of target plant and animal species.

Information is provided on the present status of the habitat types and target species, the general extent or minimum locations needed to maintain the habitats or species (if known), and specific measures that should be considered during implementation of the preserve system and future management. The list of target species was recommended by the USFWS, based on the assumption that the standards would be the biological basis for the future and incremental delineation of a self-sustaining habitat preserve.

#### **4.5.3 Emphasis on Multi-Habitat and Multi-Species Approach**

Several points should be kept in mind in using the Guidelines. First, they are a synopsis of the scientific information available on the region's habitats and sensitive species. However, in many cases, it is not known how much of a habitat or species will need to be preserved in order to ensure viable, self-sustaining populations and habitat areas. By preserving multiple habitats and targeting the most critical species, it is expected that many other species will be protected, even though specific data and research may not be available on all the species. Therefore, the emphasis of the Guidelines is to preserve sufficient varieties of habitat types in large enough areas and with sufficient linkages, wildlife corridors, and buffers to create a regional, interconnected system. The consequence of reaching this primary objective will be to preserve our region's biodiversity and maximize our ability to preserve endangered, threatened, and other targeted species and preclude the need for future listings under the state and federal Endangered Species Acts.

To illustrate the interrelationships of habitats and species, the attached Summary Chart (Table 4-7) has been prepared. This table summarizes the standards for conservation of the habitats and lists the target species that are predominant in each habitat. The Summary Chart also serves as an example of how the many targeted species can be addressed in a manageable way. By placing a priority on preserving some targeted species, such as the ones indicated by an \* in the table, many of the other species will also be protected. However, by providing guidelines on all of the targeted species, the selection of so-called "umbrella" species can be carefully made and compared to the geographic extent and needs of the other species.

#### **4.5.4 Multiple Factors Will Determine Location and Extent of Preserve**

Biological factors alone cannot be the only factors considered in setting aside lands for conservation. Land use needs and fiscal and socioeconomic considerations will also be key factors in reaching decisions on the extent and location of the preserve system. It is recognized that there are economic constraints to habitat preservation, and non-biological objectives and needs must be addressed for both public and private lands that contain biological resources. However, it must be recognized that if the biological standards and criteria are not met, future listings of some species as endangered or threatened may become necessary as more information becomes available. The goal of the MSCP is to maximize the number of habitats and species protected in viable preserves in the most cost effective manner possible. Success will mean protection of the region's biodiversity and greater certainty in the development process.

#### **4.5.5 Setting Research and Management Priorities**

For each targeted species, the Guidelines describe the type of scientific studies and management techniques needed to ensure that each species maintains a viable, self-sustaining population. The Guidelines recognize that many species will likely persist without implementation of all of the recommended measures. Available resources for conducting studies may also be limited. Therefore, the Guidelines provide three priority levels for directing research and active management efforts. The Guidelines can serve as an important source book; as management plans are developed for established habitat preserves and as research funds become available, the Guidelines provide direction on where scientific information and management attention are needed.

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**Table 4-7**  
**SUMMARY CHART OF BIOLOGICAL STANDARDS**

Habitat and Associated Target Species <sup>1</sup>	Acres in MSCP Area	Standards for Conservation
Southern Foredunes Coastal dunes milk vetch C1/CE Nuttall's lotus C2 * Least tern FE/CE * Snowy plover FT/SSC	188 ac. Mostly State and Navy owned 56% preserved or planned open space	All
Southern Coastal Bluff Scrub Coast wallflower C2 Shaw's agave C2	198 ac. Mostly State and Navy Owned 69% preserved or planned open space	All
Torrey Pine Forest * Torrey pine C2	169 ac. 93% State owned 93% preserved open space	All
Southern Maritime Chaparral Short-leaved dudleya PE/CE * Del Mar manzanita PE * Wart-stemmed ceanothus C2 Orcutt's spineflower PE/CE Del Mar Mesa sand aster PT	1,777 ac. 66% preserved or planned open space	100% unless isolated, <50 ac, disturbed, & no sensitive species
Maritime Succulent Scrub Orcutt's bird's beak C2 San Diego barrel cactus C2 Snake cholla C2	1,804 ac. 44% preserved or planned open space	100% unless isolated, <50 ac, disturbed, & no sensitive species
Vernal Pool Habitat * 7 plant species documented, 4 FE/CE, 1 PT; 2 C2 Riverside fairy shrimp FE	3,230 ac. 76% publicly owned 60% preserved or planned open space	98% to be in dedicated managed preserves
Salt Marsh Habitat Salt marsh bird's beak FE/CE Salt marsh skipper (invertebrate) C2 * Clapper rail FE/CE * Belding's savannah sparrow C2/CE Reddish egret C2 Elegant tern C2 Least tern FE/CE Large-billed savannah sparrow C2	1,870 ac. 88% preserved or planned open space	No net loss

Table 4-1

## HABITAT VALUE BY VEGETATION COMMUNITY

Vegetation Community	Acres								Total
	Very High	(%)	High	(%)	Mod.	(%)	Low	(%)	
Beach	487	(40)	249	(21)	223	(19)	246	(20)	1,206
Saltpan	217	(92)	12	(5)	5	(2)	<1	(<1)	235
Southern Foredunes	126	(67)	54	(29)	5	(3)	3	(1)	188
Coastal Bluff Scrub	140	(71)	45	(23)	12	(6)	<1	(<1)	198
Coastal Sage Scrub	65,510	(57)	24,376	(21)	24,298	(21)	1,452	(1)	115,636
Maritime Succulent Scrub	1,581	(88)	215	(12)	8	(<1)	0	(0)	1,804
Chaparral	21,630	(20)	26,840	(24)	26,967	(24)	34,754	(32)	110,191
Southern Maritime Chaparral	1,247	(70)	358	(20)	119	(7)	53	(3)	1,777
CSS/Chaparral	506	(13)	1,848	(48)	877	(22)	646	(17)	3,878
Grassland	12,582	(44)	8,362	(30)	4,931	(17)	2,526	(9)	28,400
Southern Coastal Saltmarsh	1,559	(83)	171	(9)	94	(5)	46	(3)	1,870
Freshwater Marsh	424	(52)	312	(38)	61	(8)	20	(2)	817
Riparian Forest	1,326	(100)	<1	(<1)	<1	(0)	0	(<1)	1,328
Riparian Woodland	731	(100)	0	(0)	0	(0)	0	(0)	731
Riparian Scrub	5,395	(100)	0	(0)	0	(0)	0	(0)	5,395
Oak Riparian Forest	5,382	(100)	0	(0)	0	(0)	0	(0)	5,382
Oak Woodland	1,731	(31)	1,902	(34)	1,476	(26)	514	(9)	5,622
Torrey Pine Forest	157	(93)	11	(7)	1	(<1)	0	(0)	169
Tecate Cypress	5,674	(100)	20	(<1)	1	(<1)	0	(0)	5,696
Eucalyptus	81	(5)	210	(13)	534	(33)	806	(49)	1,631
Open Water	2,690	(47)	1,470	(26)	1,206	(21)	360	(6)	5,726
Disturbed Wetlands	458	(49)	311	(34)	120	(13)	39	(4)	928
Natural Floodchannel	363	(42)	359	(42)	95	(11)	44	(5)	860
Shallow Bays	1,652	(17)	2,102	(22)	5,470	(57)	357	(4)	9,581
Pacific Ocean	12	(<1)	17	<1	851	(17)	4,007	(82)	4,888
Other <sup>1</sup>	756	(100)	0	(0)	0	(0)	0	(0)	756
<b>TOTAL</b>	<b>132,417</b>	<b>(42)</b>	<b>69,245</b>	<b>(22)</b>	<b>67,354</b>	<b>(21)</b>	<b>45,874</b>	<b>(15)</b>	<b>314,890</b>

Note: Numbers may not sum to total as shown, due to rounding.

<sup>1</sup> Disturbed Habitat, Agriculture, and Developed areas with habitat value.

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**Table 4-7 (Continued)**  
**SUMMARY CHART OF BIOLOGICAL STANDARDS**

Habitat and Associated Target Species <sup>1</sup>	Acres in MSCP Area	Standards for Conservation
Wetlands Habitat California red-legged frog PE Western pond turtle Brown pelican FE/CE Bald eagle FE/CE Western snowy plover FT/SSC * California least tern FE/CE Southern willow flycatcher PE/CE Willow monardella C2/CE Palmer's ericameria <sup>2</sup> C2 Tri-colored blackbird C2 * Least Bell's vireo FE/CE White-faced ibis C2	15,441 ac. 48% preserved or planned open space	No net loss
Tecate Cypress Forest * Tecate cypress C2 Mexican flannelbush C2/CR * Thorne's hairstreak PE	5,696 ac. San Ysidro Mountains 84% preserved or planned open space (BLM)	Conserve all above 1500 ft. or if sensitive species
Oak Woodland * Cooper's hawk SSC Western bluebird	5,622 ac. 24% preserved or planned open space	Conserve if important for wildlife, linkages, buffers, etc.
Coastal Sage Scrub & Coastal Sage Scrub/Chaparral Variegated dudleya C2 San Diego barrel cactus C2 Quino checkerspot butterfly PE (if host plant) Hermes copper butterfly C2 (if host plant) Arroyo toad FE/SSC (near washes) * San Diego horned lizard C2 * Orange-throated whiptail C2 * Cactus wren C3B * California gnatcatcher FT/SSC Rufous-crowned sparrow C2	115,636 ac. 3,878 ac. 34% and 19%, respectively, preserved or planned open space	Conserve according to species guidelines, esp. gnatcatcher

**Table 4-7 (Continued)**  
**SUMMARY CHART OF BIOLOGICAL STANDARDS**

Habitat and Associated Target Species <sup>1</sup>	Acres in MSCP Area	Standards for Conservation
Chaparral (Southern mixed, chamise, disturbed) Dunn's mariposa lily (gabbro soils) C2/CR Dehesa beargrass (gabbro soils) C1/CE Parry's tetracoccus (gabbro soils) C2 Hermes copper butterfly (if host plant) C2 Arroyo toad (near washes) FE/SSC Orange-throated whiptail C2 Golden eagle, mule deer, mountain lion (all in multiple habitats)	110,191 ac. 32% preserved or planned open space	Conserve according to species guidelines & where serves as linkages, wildlife corridors, buffers, etc.
Grasslands (native, nonnative) San Diego thornmint (clay soils) C1/CE Orcutt's brodiaea (clay soils) C2 San Diego goldenstar C2 Peregrine falcon FE/CE Ferruginous hawk C2 Mountain plover C2 Swainson's hawk CT * Grasshopper sparrow * Northern harrier SSC (breeding, wintering) * Burrowing owl C2/SSC Badger SSC	28,400 ac. 32% preserved or planned open space	Conserve per species guide- lines, focusing on larger patches & where serves as linkages, wildlife corridors, buffers, etc. Can restore
Beach * Least tern FE/CE * Snowy plover FT/SSC Brown pelican FE/CE Elegant tern C2	1,206 ac. 28% preserved or planned open space	Conserve per species guidelines
Saltpan * Least tern FE/CE * Snowy plover FT/SSC Elegant tern C2	235 ac. 81% in planned open space	Conserve per species guidelines

1 Species are only listed under predominant habitat except for Townsend's and California mastiff bats, which use multiple habitats.

2 Species is also commonly occurring in other habitat types, and would not be adequately preserved in this association alone.

\* Priority/umbrella or indicator species (for illustrative purposes)

Note: See footnote to Table 2-3 for explanation of status codes.

#### **4.5.6 Subarea Planning or Multi-Species Plans on Smaller Geographic Units**

The MSCP Plan recommends the preparation of subarea plans or equivalent local plans to delineate specific preserve boundaries (Section 7.4). The extent of the habitat preserves needed and the specific boundaries will be subject to much discussion by land owners, community organizations, conservation groups, the resource agencies, and the local decision-makers. The MSCP Plan provides a depiction of the overall habitat preserve recommended for the study area. The regional preserve is described by a regional map and/or a description of the extent and types of habitats and species that are expected to be preserved. The subarea plan proposals will then be compared to the regional preserve plan and the Guidelines, and also compared to adjacent lands to ensure the quantities and connectivity needed are provided. The MSCP Plan and the Guidelines (which are a part of the overall plan) have been designed to permit flexibility in local decision-making, to the extent possible, while not compromising the survival of species.

#### **4.6 RECOMMENDATIONS FOR FUTURE STUDIES**

Appendix A-9 discusses research needs for individual species, habitats, and linkages, and Table 4-8 prioritizes studies for target species by the amount of basic biological information available for each species. Following is a summary of recommendations for future studies that would advance our knowledge and improve our ability to manage for sensitive species and their habitats. Some of the population and distribution studies could aid in the characterization and prioritization of areas for preservation or the refinement of preserve planning area boundaries in subarea planning, while others will help in managing preserve areas and individual target species, once preserves are established. It is assumed that some of these studies will be conducted as part of future subarea and project planning efforts, while others will be the focus of longer-term research projects.

1. Conduct reconnaissance level surveys of large representative subplots (~300 acres in size) within larger areas of the MSCP study area where biological resource information is considered insufficient to assess the results of the Habitat Evaluation Model (e.g., much of the easternmost areas of the study area).

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Table 4-8

RESEARCH/ACTIVE MANAGEMENT PRIORITY LEVELS  
FOR TARGET SPECIES

Priority Level 1	Priority Level 2	Priority Level 3
<b>Plants</b> <i>Ambrosia pumila</i> <sup>H</sup> <i>Aphanisma blitoides</i> <sup>H</sup> <i>Astragalus tener</i> var. <i>titii</i> <sup>H/C</sup> <i>Chorizanthe orcuttiana</i> <sup>H/C</sup> <i>Cordylanthus maritimus</i> ssp. <i>maritimus</i> <i>Dudleya brevifolia</i> <i>Erysimum ammophilum</i> <i>Louisa nuttallianus</i> <i>Monardella tinoides</i> ssp. <i>viminea</i> <sup>H</sup> <i>Myosurus minimus</i> var. <i>apus</i> <i>Navarretia fossalis</i> <i>Orcuttia californica</i> <i>Pogogyne nudiuscula</i>	<i>Acanthomintha ilicifolia</i> <i>Agave shawii</i> <i>Astragalus deanei</i> <i>Brodiaea filifolia</i> <sup>H</sup> <i>Cordylanthus orcuttianus</i> <sup>H</sup> <i>Corethrogyne filaginifolia</i> var. <i>linifolia</i> <sup>H</sup> <i>Dudleya variegata</i> <i>Eryngium aristulatum</i> var. <i>parishii</i> <i>Githopsis diffusa</i> ssp. <i>filicaulis</i> <sup>H</sup> <i>Opuntia parryi</i> var. <i>serpentina</i> <i>Pinus torreyana</i> <i>Pogogyne abramsii</i>	<i>Arctostaphylos glandulosa</i> var. <i>crassifolia</i> <sup>H</sup> <i>Arctostaphylos otayensis</i> <i>Baccharis vanessae</i> <sup>H</sup> <i>Brodiaea orcuttii</i> <sup>H</sup> <i>Calochortus diunii</i> <i>Caulanthus stenocarpus</i> <sup>H</sup> <i>Ceanothus cyaneus</i> <i>Ceanothus verrucosus</i> <i>Cupressus forbesii</i> <i>Dudleya viscida</i> <i>Ericameria palmeri</i> var. <i>palmeri</i> <i>Ferocactus viridescens</i> <i>Fremontodendron mexicanum</i> <i>Hemizonia conjugens</i> <sup>H</sup> <i>Hemizonia floribunda</i> <i>Lepechinia cardiophylla</i> <i>Lepechinia ganderi</i> <i>Mulla clevelandii</i> <sup>H</sup> <i>Nolina interrata</i> <i>Rosa minutifolia</i> <i>Senecio ganderi</i> <i>Solanum tenuilobatum</i> <sup>H</sup> <i>Tetracoccus dioicus</i>

Table 4-8 (Continued)

RESEARCH/ACTIVE MANAGEMENT PRIORITY LEVELS  
FOR TARGET SPECIES

Priority Level 1	Priority Level 2	Priority Level 3
<p><b>Animals</b>                      arroyo southwestern toad<sup>H</sup>                      California red-legged frog<sup>H/C</sup>                      southwestern pond turtle                      golden eagle<sup>H</sup>                      northern harrier<sup>H</sup>                      western snowy plover                      elegant tern                      burrowing owl<sup>H</sup>                      willow flycatcher<sup>H</sup>                      coastal cactus wren<sup>H</sup>                      California gnatcatcher<sup>H</sup>                      tricolored blackbird                      Pacific pocket mouse<sup>H/C</sup>                      mountain lion<sup>H</sup></p>	<p>Harbison's dun skipper<sup>H</sup>                      salt marsh skipper                      Thorne's hairstreak butterfly<sup>H</sup>                      Hermes copper butterfly<sup>H</sup>                      quino checkerspot butterfly<sup>H</sup>                      San Diego horned lizard                      orange-throated whiptail                      peregrine falcon                      light-footed clapper rail                      California least tern                      least Bell's vireo                      southern California rufous-crowned sparrow                      grasshopper sparrow<sup>H</sup>                      Belding's Savannah sparrow                      California mastiff bat<sup>H</sup>                      Townsend's western big-eared bat<sup>H</sup>                      American badger<sup>H</sup></p>	<p>Riverside fairy shrimp<sup>H</sup>                      brown pelican                      reddish egret                      white-faced ibis<sup>H</sup>                      Canada goose                      Cooper's hawk<sup>H</sup>                      ferruginous hawk                      Swainson's hawk                      bald eagle                      mountain plover                      long-billed curlew                      western bluebird                      large-billed Savannah sparrow                      southern mule deer</p>

H = Highest priority for research efforts within a given level, based on lack of existing data and imminent threats to species' survival. Species that receive some degree of protection through existing regulations and/or occur in existing preserves are not given the highest priority designation. This designation is *not* intended to imply that research/management efforts are not required for the other species, but only to provide some direction on the initial allocation of research funds. In general, all species in Priority Level 1 will have a higher research priority than species in levels 2 and 3.

H/C = Highest priority for research efforts, subject to agency consultation. This designation is applied to species that may be extinct or extirpated within the MSCP area.

Priority Level:

- 1 = Vulnerable. Formerly occurred in large numbers and/or several populations but now occurs in only one or a few small populations.
- 2 = One or more plant populations may require enhancement to remain or become viable.
- 3 = Species that historically occurred in small populations; species that are relatively widespread, occurring in several (often large) populations with relatively stable population fluctuations; species of marginal occurrence within MSCP study area.

2. Using vegetation and topography, identify potential alternative wildlife corridors and habitat linkages between proposed biological preserves. Assess relative use of potential linkages by tracking focal target species (see Appendix A-9, Objective 2, methodologies for conducting corridor studies). Identify opportunities to enhance degraded linkages (e.g., retrofit existing roads with wildlife undercrossings, restore disturbed vegetation, use fencing, etc.).
3. Develop and implement watershed management plans for coastal drainages and their estuaries.
4. Develop and implement fire management and emergency access plans for preserve areas. For some species, small-scale experimental burns may be conducted and monitored to determine the effectiveness (and appropriate methodology) of fire as a management tool.
5. Monitor the status of plant populations and determine their life histories and ecological and management requirements. This information could be used to determine preserve boundaries and the adequacy of a preserve for long-term preservation of viable populations. It would also supply the practical information necessary to enhance or establish populations. Specific studies might focus on:
  - Inter- and intrapopulation genetic analyses;
  - Reproductive, pollination, and seed dispersal strategies;
  - Seed and pollen viability studies;
  - Germination requirements;
  - Seedbank ecology;
  - Seedling mortality studies;
  - Specific habitat requirements; and
  - Management techniques (e.g., controlled burning) for maintaining viable populations.
6. For those plant species for which the data base is so incomplete that preservation strategies cannot be formulated, additional surveys should be conducted to initially determine the species' distribution and/or extent in a given area (e.g., *Astragalus tener* var. *titi*, *Aphanisma blitoides*, *Chorizanthe orcuttiana*). Based on this survey

information, these species may then be subject to some or all of the recommended studies listed above, as appropriate.

7. Establish seedbanks in conjunction with recognized institutions (refer to Appendix A-9, Policy 3.1 for species for which this measure would be appropriate) as a guarantee against extinction and as a possible source of research and enhancement/establishment material.
8. Monitor representative populations of focal target animal species (California red-legged frog, California gnatcatcher, coastal cactus wren, willow flycatcher, burrowing owl, golden eagle, northern harrier, Pacific pocket mouse, mountain lion) to estimate variance in demographic parameters and dispersal capability.
9. Conduct genetic studies of representative populations of coastal cactus wren and willow flycatcher to assess relative levels of genetic variation within and between populations. Use tissue from museum specimens (DNA analysis) to the greatest extent practicable.

These recommendations are consistent with the research agenda recommended by the Scientific Review Panel for the State's NCCP program, which include:

1. Map the extent and distribution of coastal sage scrub vegetation and its constituent species for each subregion.
2. Monitor trends in biodiversity, including determining the effect of reserve size and adjoining land uses on biodiversity, monitoring selected indicator taxa, and determining the relationships between species richness/composition and habitat patch size and the effects of isolation.
3. Research dispersal characteristics and landscape corridor use.
4. Test the potential effectiveness of reserve systems by conducting population viability analyses of target species.
5. Obtain basic information on the location, abundance, distribution, and natural history of target species.

6. Conduct genetic studies to detect the degree of genetic variation within target species' populations.

#### **4.7 GAP ANALYSIS -- EXISTING NEEDS FOR PROTECTION**

Any analysis of preserve design should consider and build upon important biological resource areas that are already protected or planned for protection. The GIS allows us to overlay data layers of vegetation communities (Section 2.4), habitat value (Section 4.4), core biological resource areas (Section 4.4), ownership (Section 3.3), and protection category (Section 3.4), in various combinations, to examine where resources are currently protected and where there are gaps in conservation protection. This technique, termed "gap analysis," is a frequently used and accepted methodology in conservation biology studies (Scott et al. 1993). Our gap analysis is habitat-based, rather than species-based, due to the lack of sufficient distribution data on most target species in the MSCP study area. Inferences can be drawn regarding the current level of a species' protection based on the percent of its habitat, the percent of Very High and High value habitats, and the percent of the biological core resource areas and linkages preserved in biological open space. This analysis, therefore, uses the results of the vegetation mapping, the Habitat Evaluation Model, and the core and linkage areas map.

Table 4-9 and 4-10 show the results of the gap analysis using the Habitat Evaluation Model overlaid with the protection categories. Approximately 71 percent (80,388 acres) of all public lands with habitat are in Categories I and II (Table 4-9), while less than one-fourth (47,401 acres) of all private lands with habitat are in Categories I and II (Table 4-10). Only 12 percent are currently preserved (approx. 93 percent, 36,033 acres, are public and 7 percent, 2,520 acres, are private Category I lands). While only 41 percent of all habitat in the study area is in Category I and II (public and private combined), 72 percent (92,128 acres) of these protected lands are categorized as Very High and High value habitat.

Table 4-11 shows that saltpan (81 percent), saltmarsh (88 percent), Torrey pine forest (93 percent), Tecate cypress forest (84 percent), and riparian woodland (84 percent) receive the highest levels of current and planned protection. Almost all of the Torrey pine forest is state-owned, and the majority of Tecate cypress forest is on Otay Mountain, which is owned by BLM and is proposed as a Wilderness Area. This area represents over

Table 4-9

**PUBLIC LANDS BY PROTECTION CATEGORY AND HABITAT VALUE\***

Category	Total Habitat Acres	Acres with Very High Quality Habitat	Acres with High Quality Habitat
I Preserves	36,033	18,302	8,557
II Open Space	44,355	24,348	5,829
III-A Constrained Land	22,518	6,910	6,478
III B-D Low Density Residential, Indian, Planned Urban	10,092	4,668	2,883
<b>Total</b>	<b>112,998</b>	<b>54,228</b>	<b>23,747</b>

\*For acreage rated Low, Moderate, High, and Very High (314,890 acres).

Note: Numbers may not sum to total as shown, due to rounding.

**Table 4-10**

**PRIVATE LANDS BY PROTECTION CATEGORY AND HABITAT VALUE\***

Category	Total Habitat Acres	Acres with Very High Quality Habitat	Acres with High Quality Habitat
I Preserves	2,520	709	683
II Open Space	44,881	23,972	9,728
III-A Constrained Land	93,002	30,513	21,211
III B-D Low Density Residential, Indian, Planned Urban	61,489	22,995	13,875
<b>Total</b>	<b>201,892</b>	<b>78,189</b>	<b>45,498</b>

\*For acreage rated Low, Moderate, High, and Very High (314,890 acres).

Note: Numbers may not sum to total as shown, due to rounding.

Table 4-11

VEGETATION COMMUNITY ACRES CURRENTLY  
PROTECTED OR PLANNED FOR OPEN SPACE

Vegetation Communities	Total MSCP Area	Preserved <sup>1</sup>	Planned <sup>2</sup>	Total Protected (%) <sup>3</sup>
Beach	1,206	248	88	(28)
Saltpan	235	89	101	(81)
Southern Foredunes	188	104	2	(56)
Southern Coastal Bluff Scrub	198	77	60	(69)
Coastal Sage Scrub	115,636	11,774	27,950	(34)
Maritime Succulent Scrub	1,804	253	549	(44)
Chaparral	110,191	13,908	21,758	(32)
Southern Maritime Chaparral	1,777	622	556	(66)
CSS/Chaparral Scrub	3,878	261	463	(19)
Grassland	28,400	2,509	6,566	(32)
Southern Coastal Saltmarsh	1,870	1,477	168	(88)
Freshwater Marsh	817	128	328	(56)
Riparian Forest	1,328	355	483	(63)
Oak Riparian Forest	5,382	559	805	(25)
Riparian Woodland	731	426	186	(84)
Riparian Scrub	5,395	1,200	2,140	(62)
Oak Woodland	5,622	774	550	(24)
Torrey Pine Forest	169	157	0	(93)
Tecate Cypress Forest	5,696	253	4,513	(84)
Eucalyptus Woodland	1,631	125	182	(19)
Open Water	5,726	2,727	1,301	(70)
Disturbed Wetlands	928	351	106	(49)
Natural Flood Channel	860	29	379	(47)
Shallow Bays	9,581	41	6,618	(70)
Pacific Ocean	4,888	0	4,383	(90)
Other <sup>4</sup>	756	106	77	(24)
<i>Subtotal</i>	<i>314,890</i>	<i>38,553</i>	<i>80,312</i>	<i>(38)</i>
Disturbed Habitat	22,984	999	4,713	(25)
Agriculture	28,594	133	2,917	(11)
Developed	215,181	1,454	11,252	(6)
<i>Subtotal</i>	<i>266,759</i>	<i>2,585</i>	<i>18,882</i>	<i>(8)</i>
<b>TOTAL</b>	<b>581,649</b>	<b>41,139</b>	<b>99,194</b>	<b>(24)</b>

<sup>1</sup> Preserved = Category I lands (100 percent preserved).

<sup>2</sup> Planned = Category II lands (90 percent preserved -- numbers reflect 90 percent of actual Category II acreages).

<sup>3</sup> Percent of total MSCP study area currently protected or planned for open space.

<sup>4</sup> Disturbed Habitat, Agriculture, and Developed areas with habitat value.

80 percent of the known distribution of tecate cypress. Saltpan, saltmarsh, and riparian woodland are also largely preserved in various public ownerships.

Many of the other coastal habitats are planned for protection, especially on public lands. Approximately 69 percent of southern coastal bluff scrub, 66 percent of southern maritime chaparral, and 28-56 percent of other coastal communities (beach, southern foredunes, maritime succulent scrub) are preserved or planned for protection (Table 4-11). The coastal communities, along with riparian woodland and some other wetland habitats, are among the rarest in the region, ranging from 169 to 1870 acres in the MSCP study area. Thus, all or nearly all of these rare habitat types would need to be protected to satisfy preserve design objectives (see Biological Standards and Guidelines, Section 4.5 and Appendix A-9). Of the habitats noted above, it is likely that only three, Torrey pine forest, Tecate cypress forest, and possibly saltmarsh, have adequate acreage in open space to ensure long-term viability, assuming adequate preserve management.

Of the more abundant habitats, slightly over 30 percent of chaparral, coastal sage scrub, and grassland are currently protected or planned for preservation. The adequacy of this acreage in meeting preserve design objectives depends on the location and resource value of these areas. The distribution of these habitats within protected areas is currently fragmented and would require significant acreages of additional habitat in order for this level of protection to be adequate. The majority of core cactus wren and gnatcatcher populations in coastal sage scrub (Figures 4-2 and 4-4) is not within Category I and II lands; therefore, these species are currently not adequately protected.

Table 4-12 shows the percent of core biological resource areas in Category I and II habitat lands, and Figure 4-10 shows the distribution of protected lands within the biological core and linkage areas. Approximately 45 percent (91,623 acres) of the total core and linkage habitat areas is currently dedicated open space or designated as planned open space in Community/General Plans. Cores #5 (Otay Mountain/Marron Valley) and #4 (Otay Lakes/Otay Mesa/Otay River Valley) contain the largest acreages of protected lands, with 17,751 acres (63 percent) and 9,631 acres (56 percent), respectively, of these areas in Category I and II lands. Over half of Cores #1, 6, 9, 10, 13, and 14 are currently protected or planned for protection. Of the linkages (13,166 acres), about one-fifth are protected.

Table 4-12

**PERCENT OF CORE BIOLOGICAL RESOURCE AREAS CURRENTLY  
PROTECTED OR PLANNED FOR OPEN SPACE**

Core	Total Acres	Preserved <sup>1</sup> Acres	Planned <sup>2</sup> Acres	Total Protected Acres (%) <sup>3</sup>
1. Tijuana Estuary/River Valley	3,051	1,835	393	2,228 (73)
2. S. San Diego Bay/Silver Strand	2,317	313	390	703 (30)
3. Point Loma	710	0	0	0 (0)
4. Otay Lakes/Mesa/River Valley	17,156	2,458	7,173	9,631 (56)
5. Otay Mtn/Marron Valley	28,216	987	16,764	17,751 (63)
6. Jamul Mtns	8,285	950	3,783	4,733 (57)
7. Sweetwater/San Miguel Mtn	12,963	953	5,099	6,052 (47)
8. McGinty Mtn/Sequan Peak- Dehesa	15,922	1,967	3,178	5,145 (32)
9. Lake Jennings/Wildcat Cyn-El Cajon Mtn	9,830	3,561	1,496	5,057 (51)
10. Mission Trails/Miramar/East Elliott/Santee	17,629	5,639	3,462	9,101 (52)
11. Central Poway/San Vicente Res./N. Poway	27,849	6,781	868	7,649 (27)
12. Lake Hodges/San Pasqual	26,104	4,352	5,027	9,379 (36)
13. San Dieguito Lagoon	1,278	516	538	1,054 (82)
14. Los Peñasquitos Lagoon/Cyn/ Del Mar Mesa	9,188	3,555	2,934	6,489 (71)
15. Vernal Pools, Miramar	8,289	694	2,955	3,649 (44)
16. Vernal Pools, Otay Mesa	885	0	352	352 (40)
Subtotal Cores	189,670	34,561	54,411	88,972 (47)
Linkages	13,166	468	2,183	2,651 (20)
<b>TOTAL</b>	<b>202,837</b>	<b>35,029</b>	<b>56,594</b>	<b>91,623 (45)</b>

<sup>1</sup> Preserved = Category I lands with habitat (100 percent preserved).

<sup>2</sup> Planned = Category II lands with habitat (90 percent preserved -- numbers reflect 90 percent of actual Category II acreages).

<sup>3</sup> Percent of total core area currently protected or planned for open space.

Note: Numbers may not sum to total as shown, due to rounding. All acreages are habitat lands, excluding Disturbed Habitat, Agriculture, and Developed.



To summarize the results of the gap analysis, current and planned levels and patterns of habitat protection in the MSCP study area are insufficient to ensure the long-term viability of most habitats, and therefore, most species populations. However, the region has significant acreages of Very High and High value lands that are preserved or planned for protection, and 45 percent of the most critical biological resource areas are preserved or planned for protection. These lands serve as appropriate building blocks for designing a preserve network.

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## **5.0 BIOLOGICAL ANALYSIS OF PRESERVE SCENARIOS**

### **5.1 INTRODUCTION**

#### **5.1.1 Focused Planning Area Scenarios**

Four sample focused planning area (FPA) configurations were developed for the purposes of analyzing and comparing land dedication acreages, land acquisition costs, and biological conservation. Economic and financial analyses were also conducted on two of the four scenarios. These example FPAs define general areas within which viable preserves could be delineated. While none of the four scenarios represents the MSCP Working Group's final recommended FPA, the Working Group has acknowledged that delineation of a focused planning area is needed to serve the following functions:

- Identify the geographic area in which the ultimate preserve system would be contained.
- Identify areas of focus for subarea planning (Section 7.0).
- Provide greater assurance to the USFWS/CDFG about where conservation planning will be undertaken.
- Define areas where jurisdictions would apply interim protection to habitat lands (Section 7.0).
- Identify areas potentially suitable for off-site mitigation.
- Define an area boundary for the payment of in-lieu mitigation fees (Sections 6.4 and 6.7).

The Coastal Sage Scrub (CSS) scenario was developed to meet the minimum criteria for satisfying the NCCP Conservation Guidelines for coastal sage scrub target species (California gnatcatcher, coastal cactus wren, and orange-throated whiptail) and to consume less than 100,000 acres total. The Multiple Habitats (MH) scenario was developed to meet preserve design objectives for multiple habitats and species and also meet the acreage criterion recommended by members of the Implementation Strategy Committee (approx. 150,000 acres). Analyses of biological conservation (Section 5.3), land dedication and acquisition costs (Section 6.0), financing (Section 6.7), and economic impacts (Section 9.0) were conducted for these two scenarios.

The Biologically Preferred (BP) scenario includes most of the core biological resource areas and linkages identified in Section 4.4.2, as well as all public lands supporting biologically important habitat. The Public Lands (PL) scenario includes all public land containing habitat. The approach for developing the PL alternative differed from the other three by using the premises of minimum disruption to existing General Plans and lowest cost of land acquisition. Analyses of biological conservation (Section 5.3) and land dedication and acquisition costs (Section 6.0) were conducted for the BP and PL scenarios, but financing and economic impacts were not addressed.

The four alternative designs represent different weightings or rankings of preserve design criteria. The major categories of criteria are:

- biological priorities as defined by the Habitat Evaluation Map, core areas and linkages, Biological Standards and Guidelines for habitats and target species in the study area, and basic principles of conservation biology (Section 4.0)
- land use and ownership (Sections 3.0 and 6.0)
- acquisition costs, financing, and economic constraints (Sections 6.0 and 9.0)

### 5.1.2 Summary of Conservation Analysis

The four alternative focused planning areas were analyzed for their effectiveness in meeting the biological objectives and criteria for preserve design discussed in Section 4.1:

1. Maintain functional ecosystems within the MSCP study area;
2. Maintain viable populations of priority MSCP species;
3. Provide for the maintenance of viable populations of as many of the remaining target MSCP and other native species as possible;
4. Maintain functional wildlife corridors and habitat linkages between critical biological resource areas;
5. Maintain the full range of vegetation communities and successional phases in the preserve system, with a focus on habitats considered sensitive, rare, or declining.

Biological processes and functions are not easily measurable at the ecosystem level because of the inherent complexity and variability of biological systems and because of the paucity of quantifiable data. Thus, our analyses must rely on indicators or characteristics of

functional systems, corridors, and viable populations (Sections 4.1-4.5). These include, but are not limited to:

- extent and richness of high quality habitat and corridors for target MSCP and other native species
- density and richness of target MSCP and other native species
- size of habitat area
- plant and animal diversity
- shape which minimizes the edge-to-area ratio of preserve blocks
- adequate distribution throughout the MSCP study area
- buffer areas of limited-intensity development
- adequate corridors between adjacent habitat patches
- adequate connectivity with habitat patches outside the MSCP study area
- size and number of species' populations
- reproductive biology and habitat affinities of individual species
- genetic diversity

Analyses of preserve design at the subregional level are necessarily general, while analyses at the subarea level are expected to address these criteria more specifically. The Habitat Evaluation Model (Section 4.4.1) and core areas and linkages (Section 4.4.2) were developed using many of these criteria.

Table 5-1 summarizes the results of the regional analyses of the alternative focused planning areas, which are discussed in detail in the text and tables of Section 5.3. While the analyses cannot definitively answer the question "How much is enough?," the four scenarios address the biological objectives and criteria to varying degrees and provide varying levels of assurance that species richness and long-term viability of target and non-target species' populations can be maintained. The MH and BP scenarios support a similar number of priority target species (31 and 33, respectively) and other target species (32 and 40, respectively), the same number of rare habitats (7 of 14 adequately protected) and other habitats (24), and high biodiversity (80 percent and 86 percent, respectively, of all the Very High value habitats in the study area); however, the BP scenario provides greater assurances of long-term viability and ecosystem functionality by virtue of its larger buffers, wider, shorter linkages, and greater number of coastal/inland linkages and linkages to areas outside the MSCP study area.

Table 5-1

SUMMARY OF BIOLOGICAL ANALYSIS FOR THE FOCUSED PLANNING AREAS

Biological Objectives/Criteria	CSS Scenario	MH Scenario	BP Scenario	PL Scenario
<p>1) <b>Maintain functional ecosystems.</b></p> <p>a) Adequate distribution in study area</p> <p>b) Biodiversity (habitat, species, geology, soils, climate, topography, slope) (% of Very High - see Table 5-3 &amp; App. A-10)</p> <p>c) Buffers</p> <p>d) Size (minimize habitat fragmentation &amp; edge effects) (% of cores - see Table 5-14)<sup>1</sup></p>	<p>a) Focuses on coastal patches of CSS; limited other habitats</p> <p>b) Limited biodiversity (49%)</p> <p>c) No buffers</p> <p>d) Small (43%)<sup>1</sup>; 14% of polygons less than 50 ac.; mean polygon size = 3817 ac.</p>	<p>a) Focuses on CSS &amp; all rare habitats; limited inclusion of extreme inland areas, oak woodland, &amp; grassland</p> <p>b) Good biodiversity (80%)</p> <p>c) Minimal buffers</p> <p>d) Larger blocks of core habitat (74%)<sup>1</sup>; 33% of polygons less than 50 ac.; mean polygon size = 2543 ac.</p>	<p>a) Good distribution of all habitats</p> <p>b) Greater biodiversity (86%)</p> <p>c) Larger buffers</p> <p>d) Larger blocks of core habitat (84%)<sup>1</sup>; 23% of polygons less than 50 ac.; mean polygon size = 2523 ac.</p>	<p>a) Limited inclusion of extreme inland areas; fragmented elsewhere</p> <p>b) Moderate biodiversity (61%)</p> <p>c) No buffers</p> <p>d) Portions of core areas not included (63%)<sup>1</sup>; fragmented, smaller patches included; 62% of polygons less than 50 ac.; mean polygon size = 546 ac.</p>
<p>2) <b>Maintain viable populations of priority species.<sup>2</sup></b> (23 plants, 20 animals)</p> <p>a) Plant species adequately protected</p> <p>b) Plant species at low risk (see text)</p> <p>c) Animal species adequately protected</p> <p>d) Animal species at low risk (see text)</p> <p>e) TOTAL</p>	<p>a) 2 plants protected</p> <p>b) 2 plants at low risk</p> <p>c) 3 animals protected</p> <p>d) 5 animals at low risk</p> <p>e) 12</p>	<p>a) 12 plants protected</p> <p>b) 6 plants at low risk</p> <p>c) 12 animals protected</p> <p>d) 1 animal at low risk</p> <p>e) 31</p>	<p>a) 14 plants protected</p> <p>b) 6 plants at low risk</p> <p>c) 13 animals protected</p> <p>d) 0 animals at low risk</p> <p>e) 33</p>	<p>a) 2 plants protected</p> <p>b) 6 plants at low risk</p> <p>c) 7 animals protected</p> <p>d) 3 animals at low risk</p> <p>e) 18</p>
<p>3) <b>Maintain viable populations of other target species.</b> (25 plants, 25 animals)</p> <p>a) Plant species adequately protected</p> <p>b) Plant species at low risk (see text)</p> <p>c) Animal species adequately protected</p> <p>d) Animal species at low risk (see text)</p> <p>e) TOTAL</p>	<p>a) 4 plants protected</p> <p>b) 3 plants at low risk</p> <p>c) 4 animals protected</p> <p>d) 3 animals at low risk</p> <p>e) 14</p>	<p>a) 16 plants protected</p> <p>b) 4 plants at low risk</p> <p>c) 12 animals protected</p> <p>d) 0 animals at low risk</p> <p>e) 32</p>	<p>a) 20 plants protected</p> <p>b) 5 plants at low risk</p> <p>c) 14 animals protected</p> <p>d) 1 animal at low risk</p> <p>e) 40</p>	<p>a) 6 plants protected</p> <p>b) 4 plants at low risk</p> <p>c) 7 animals protected</p> <p>d) 0 animals at low risk</p> <p>e) 17</p>

Table 5-1 (Continued)  
**SUMMARY OF BIOLOGICAL ANALYSIS FOR THE FOCUSED PLANNING AREAS**

Biological Objectives/Criteria	CSS Scenario	MH Scenario	BP Scenario	PL Scenario
<p>4) <b>Maintain functional wildlife corridors and habitat linkages.</b></p> <p>a) Linkages between cores (% - Table 5-14)<sup>1</sup></p> <p>b) Wide, short landscape linkages</p> <p>c) Steppingstone preserves</p> <p>d) Linkages between coastal/inland areas</p> <p>e) Linkages to outside MSCP</p> <p>f) Redundancy in linkages</p>	<p>a) Linkages b/t gnatcatcher &amp; wren cores (13%)<sup>1</sup></p> <p>b) Narrow, long movement corridors</p> <p>c) No steppingstones</p> <p>d) One link to coast</p> <p>e) Minimal links to outside</p> <p>f) Minimal redundancy</p>	<p>a) Linkages b/t cores (24%)<sup>1</sup></p> <p>b) Narrow, long movement corridors</p> <p>c) Some steppingstones</p> <p>d) Some links to coast</p> <p>e) Some links to outside</p> <p>f) Some redundancy</p>	<p>a) Linkages b/t cores (33%)<sup>1</sup></p> <p>b) Landscape linkages</p> <p>c) Some steppingstones</p> <p>d) Links to coast along all major drainages</p> <p>e) Greater links to outside</p> <p>f) Greater redundancy</p>	<p>a) Certain core areas isolated (16%)<sup>1</sup></p> <p>b) Narrow, long movement corridors; some regional links not included</p> <p>c) Some steppingstones</p> <p>d) Some links to coast</p> <p>e) Three links to outside</p> <p>f) Minimal redundancy</p>
<p>5) <b>Maintain the full range of vegetation communities, with a focus on rare habitats.</b></p> <p>a) All habitats represented (24)</p> <p>b) Rare habitats<sup>3</sup> adequately protected (14)</p> <p>c) Other habitats adequately protected</p> <p>d) Other habitats at low risk</p>	<p>a) 21 habitats</p> <p>b) 0 rare habitats<sup>3</sup> protected</p> <p>c) 2 other habitats protected</p> <p>d) 2 habitats at low risk</p>	<p>a) 24 habitats</p> <p>b) 7 rare habitats<sup>3</sup> protected</p> <p>c) 2 other habitats protected</p> <p>d) 0 habitats at low risk</p>	<p>a) 24 habitats</p> <p>b) 7 rare habitats<sup>3</sup> protected</p> <p>c) 2 other habitats protected</p> <p>d) 0 habitats at low risk</p>	<p>a) 24 habitats</p> <p>b) 6 rare habitats<sup>3</sup> protected</p> <p>c) 0 other habitats protected</p> <p>d) 0 habitats at low risk</p>

<sup>1</sup> Percent of total study area core and/or linkage areas within each FPA; see Section 4.4.2 and Table 5-14.

<sup>2</sup> Priority species include federally and state listed species, species proposed for listing, Category 1 candidate species, and NCCP target species.

<sup>3</sup> Rare habitats are based on acreage regionally and/or in the MSCP study area and include: beach, saltpan, southern foredunes, coastal bluff scrub, maritime succulent scrub, southern maritime chaparral, saltmarsh, freshwater marsh, riparian woodland, disturbed wetland, flood channel, riparian forest, Torrey pine forest, Tecate cypress forest.

See text for discussion.

The PL scenario protects slightly more than half of the species protected by the MH scenario (18 priority species, 17 other target species), adequately protects 6 of 14 rare habitats, and has moderate biodiversity (61 percent of all the Very High value habitats in the study area). This scenario includes a large amount of habitat that is severely fragmented, thus providing no appreciable value to a regional preserve system.

The CSS scenario protects less than half the number of species protected by the MH scenario (12 priority species, 14 other target species), does not adequately protect rare habitats, and has limited biodiversity (49 percent), smaller core areas, no buffers, and fewer linkages than the MH and BP scenarios. While the CSS and PL scenarios may adequately protect some species, the longer-term maintenance of ecosystem-level processes is questionable. Because of edge effects, smaller population sizes, and the increased severity of catastrophic environmental events in smaller systems, proportionately more intensive management and monitoring activities would likely be required for the PL and CSS scenarios to be successful. It is also not clear to what extent movements or interactions of species outside of coastal sage scrub habitat are crucial for long-term viability of the CSS scenario.

Implementation of the BP or MH scenarios would protect more listed and candidate species than the CSS and PL scenarios, as well as more non-target species, and therefore provide greater and longer-term assurances for development planning. The increasing level of assurance (both biological and development potential) provided by the CSS, PL, MH, and BP scenarios, respectively, must be weighed against economic and land use benefits and costs.

## **5.2 ASSUMPTIONS AND METHODOLOGY FOR BIOLOGICAL ANALYSIS**

The FPA designs were prepared without specific or detailed input from the USFWS/CDFG or local jurisdictions, who may have a greater familiarity with specific parcels and linkages. It is acknowledged that many areas with important biological resources are not included in any of the four scenarios and that future planning efforts may develop additional data to warrant different configurations or priorities. Also, specific project design will be needed to capture some narrowly occurring species and resources. These FPA configurations are not intended to limit the subarea planning efforts of local jurisdictions, if biological justification can be provided for additional, or alternative, and functionally equivalent

configurations. It should also be noted that the locations of future Natural Resource Management Areas on NAS Miramar were not known at the time of this writing.

The analyses of the four alternative FPA configurations are based primarily on habitat as an indicator of potential species occurrence. However, analysis of species conservation is one way to test whether adequate habitat has been preserved. It is acknowledged that complete distributional data are lacking for many species, and the available data are not fully consistent in the way they were collected by many different observers. Therefore, the analysis of species conservation where limited locality data are available involved making assumptions about a species' presence based on historic range, habitat affinities, and known distribution. For other species, the analysis involved combining several types of species locality data. Some data are simply point locations for a species occurrence. Other point data also include information on the number of individuals sighted at that location. Other data for selected species (e.g., clapper rails, snowy plovers, Del Mar manzanita, Tecate cypress, vernal pool plant species) are mapped as polygons encompassing the area where one or several individuals of the same species were sighted; some of these polygon data include numbers of individuals sighted while others do not. Polygon data can also be tabulated as acreages encompassed by the polygon(s).

Because of the inconsistency in data collection for some species, and the lack of data for others, data analysis differed for different species. Therefore, estimation of species conservation is quantitative for some species (e.g., gnatcatcher, cactus wren) and qualitative for others (e.g., orange-throated whiptail, aphanisma, Lakeside ceanothus, Mission Canyon blue-cup, Tecate tarplant, Nuttall's lotus), based on the location and percent of that species' habitat conserved.

Tables were developed to summarize the adequacy of protection of MSCP target species within each FPA as well as the degree of risk for each species. For each target species, these tables provide the percentage of point locations and polygon locations in the MSCP database that are captured with each scenario. However, population size information is lacking for many species and locational data are lacking for other species. Consequently, the point and polygon data are not always representative of the most important populations for preservation. Therefore, an estimate of the percentage of "major" populations (as defined in Appendix A-9, Biological Standards and Guidelines) captured in the scenario is also provided. Alternatively, for many species, adequacy of the preserve was assessed by the proportion of a given species' potential habitat that was included in the scenario. It is

this last number that is measured against the Biological Standards and Guidelines to assess the adequacy of the preserve for individual species. For a small group of species (e.g., aphanisma, slender-pod jewelflower, narrow-leaved nightshade, southwestern pond turtle, bats), the distributional limits or range within the study area are not well known. A small or nonexistent database and/or detection of populations in unexpected geographic regions in recent years are evidence that insufficient data exist to determine whether or not the standards and guidelines have been met.

Because of arbitrary acreage constraints placed on the focused planning areas, not all public lands or habitats regulated by federal and state laws (e.g., wetlands) are included in all scenarios. However, it is recognized that most of these lands will be protected and provide some resource value. The conservation analysis tables acknowledge this protection by estimating the level of risk for each species within the MSCP study area. The risk of impacts to a species' population is considered low if the majority of the population is within the FPA and/or on protected lands outside the FPA. Conversely, the risk is considered high if the majority of the species' population is on private lands outside the FPA.

The analyses are based on the conservative assumption that only areas within the FPAs will be protected, even though some additional habitat outside the FPAs will likely remain as natural habitat as a result of development constraints (e.g., floodplains, steep slopes). Because we do not know the exact locations or habitats of future areas to be conserved outside the FPAs, the analyses presented herein are necessarily conservative.

For purposes of the CSS, MH, and BP analyses, it is assumed that approximately 90 percent of the habitats in each FPA will be preserved for biological resources; that is, it is assumed that development will consume approximately 10 percent of the habitats within the FPA, primarily in low quality coastal sage scrub, chaparral, CSS/chaparral, oak woodland, non-native grassland, and eucalyptus woodland. Development could also occur in disturbed habitat and agricultural areas. All other habitat types would be preserved within the FPA.

For the PL analysis, it is assumed that 100 percent of the habitats on public lands and dedicated open space will be preserved for biological resources, while 50 percent of each habitat type and 50 percent of each species' population will be preserved within selected "linkage" areas.

The CSS, MH, and BP scenarios were evaluated using the 1993 GIS database while the PL scenario was evaluated using the 1994 GIS database, which included corrections made as a result of public comments received on the vegetation and sensitive species maps. The 1994 database also includes acreages for San Diego Bay and Mission Bay, and portions of the marine habitat (Pacific Ocean) important to the MSCP target species. The CSS, MH, and BP scenarios were not re-evaluated using the 1994 database. Thus, while the first three scenarios are not directly comparable (acre by acre) with the PL scenario, the analyses are comparable based on percentage or proportion of the study area preserved.

### **5.3 BIOLOGICAL CONSERVATION ANALYSIS**

#### **5.3.1 Coastal Sage Scrub Scenario**

The following resources were prioritized for inclusion within this scenario:

1. Core California gnatcatcher population areas as identified by the Biological Task Force and shown on the California Gnatcatcher Habitat Evaluation map (Figure 4-4);
2. Core cactus wren populations considered viable, as identified by the cactus wren PVA, Figure 4-2 (one south county population was not included due to extensive habitat fragmentation, isolation, and edge effects);
3. Viable populations of other CSS-dependent target species;
4. Spatially representative (e.g., coastal vs. inland) examples of extensive patches of CSS that were ranked in the Very High and High biological value by the MSCP Habitat Evaluation Model (Figure 4-4); and
5. Key linkage areas between core gnatcatcher and wren populations (e.g., Lakeside area at Interstate-8).

The lands supporting these resources are shown in Figure 5-1 and acreages tabulated in Table 5-2. The planning area for this scenario encompasses approximately 110,600 acres. Of this total, approximately 94,900 acres are habitats and the rest are developed, disturbed, and agricultural areas. It is assumed that approximately 84,900 acres of habitats within the FPA would be preserved for biological resources. Additional habitat outside the FPA would likely be conserved, for example, on Otay Mountain, Cowles Mountain, Tijuana Estuary, Torrey Pines State Reserve, San Dieguito and Los Peñasquitos lagoons, City

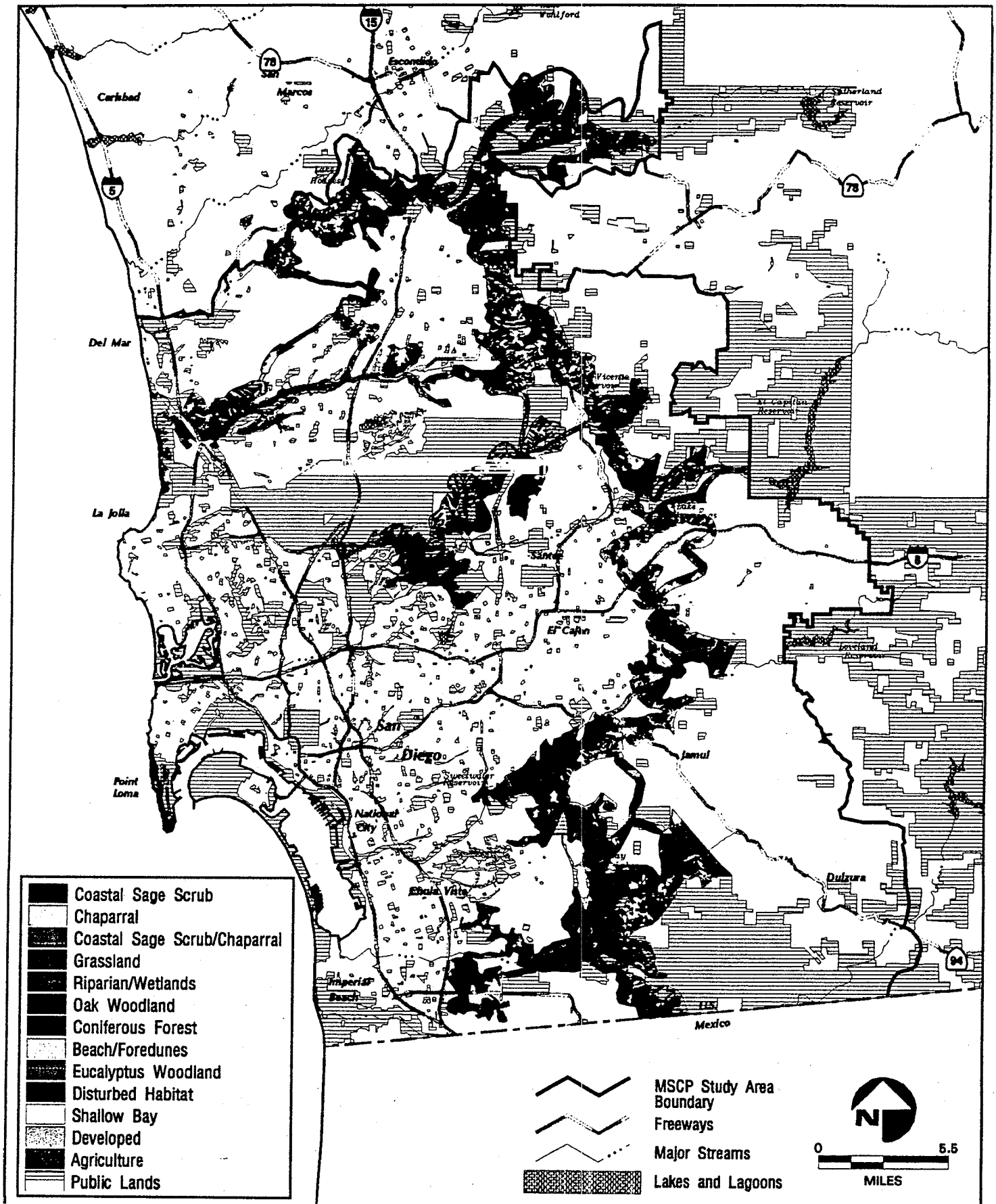
open space parks, etc. Thus, species in these areas outside the FPA are considered to be at low risk of future impacts.

## **Habitats**

Almost two-thirds of the habitat acres in the CSS scenario is comprised of coastal sage scrub. Over half of all the coastal sage scrub in the study area is included in this design, and the majority of it is ranked Very High. Almost half of all Very High value lands in the study area are included in the CSS design; almost two-thirds of the habitats in this alternative are ranked Very High (Table 5-3).

By definition, the CSS scenario focuses on the preservation of a single habitat, coastal sage scrub; however, other habitats are also preserved as part of the CSS mosaic and in forming appropriate linkages. Approximately 53 percent of the coastal sage scrub in the MSCP study area would be preserved by this scenario. Greater than 80 percent of southern coastal bluff scrub and maritime succulent scrub, two very rare and sensitive habitats, would also be preserved under this scenario; however, the existing acreages of these habitats are very small and require almost 100 percent protection (see Section 4.5 and Appendix A-9). Over 60 percent of open water and natural flood channel habitats occur within the CSS scenario. Both of these habitats are protected to some degree by state and federal wetlands regulations. Less than half of other habitats are included in the CSS scenario, including 0-3 percent of beach, saltpan, southern foredunes, and saltmarsh, 25 percent of Torrey pine forest, and 4 percent of Tecate cypress forest; all of these are considered sensitive communities by the CDFG. Much of these areas are in public ownership and/or receive some protection due to existing local, state, and federal regulations. Less than one-fourth of all grasslands, 14 percent of oak woodlands, and 13 percent of all chaparral in the study area are included in the CSS scenario; an even smaller percentage of native grasslands would be preserved. Thus, under this scenario, there is considerable risk of future listings for grassland and chaparral species and little protection for oak woodlands.

The CSS scenario has narrow, long habitat linkages, without any "steppingstone" preserve areas to enhance these linkages. In many cases, the linkages have not been tested to ensure they are functional (see Appendix A-9, Policy 2.1). Also, extreme inland areas of the study area are not adequately represented (e.g., Marron Valley, Hollenbeck Canyon, upper reaches of San Diego and Sweetwater river drainages), because these areas are not known



**Coastal Sage Scrub Focused Planning Area**

FIGURE 5-1  
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Table 5-2

## VEGETATION COMMUNITY ACRES WITHIN CSS SCENARIO.

Vegetation Communities	Total MSCP Area	CSS Scenario	Percent of Total MSCP
Beach	976	32	3%
Saltpan	235	0	0%
Southern Foredunes	185	0	0%
Southern Coastal Bluff Scrub	171	151	88%
Coastal Sage Scrub	113,735	60,528	53%
Maritime Succulent Scrub	1,990	1,615	81%
Chaparral	112,312	15,126	13%
Southern Maritime Chaparral	1,624	400	25%
CSS/Chaparral Scrub	1,457	716	49%
Grassland	28,323	6,587	23%
Southern Coastal Saltmarsh	1,753	52	3%
Freshwater Marsh	703	326	46%
Riparian Forest	1,269	440	35%
Oak Riparian Forest	5,444	1,446	27%
Riparian Woodland	751	322	43%
Riparian Scrub	5,537	1,529	28%
Oak Woodland	5,210	745	14%
Torrey Pine Forest	166	42	25%
Tecate Cypress Forest	5,711	211	4%
Eucalyptus Woodland	1,588	194	12%
Open Water	5,563	3,460	62%
Disturbed Wetlands	771	321	42%
Natural Flood Channel	1,040	659	63%
Shallow Bays	71	0	0%
Pacific Ocean	3	0	0%
Other *	871	1	0%
<i>Subtotal</i>	<i>297,461</i>	<i>94,900</i>	<i>32%</i>
Disturbed Habitat	20,941	3,474	17%
Agriculture	28,017	3,309	12%
Developed	219,497	8,943	4%
<i>Subtotal</i>	<i>268,455</i>	<i>15,725</i>	<i>6%</i>
<b>TOTAL</b>	<b>565,917</b>	<b>110,626</b>	<b>20%</b>

\* Disturbed Habitat, Agriculture, and Developed areas with habitat value.

Note: Numbers may not sum to total as shown, due to rounding.

Source: 1993 MSCP GIS database.

Table 5-3

HABITAT EVALUATION MODEL RANKINGS WITHIN  
EACH SCENARIO

Ratings	CSS		MH		BP		PL	
	Scenario (acres)	(%)*	Scenario (acres)	(%)*	Scenario (acres)	(%)*	Scenario (acres)	(%)*
Very High	61,043	49%	99,931	80%	106,728	86%	80,746	61%
High	19,058	30%	34,419	54%	40,709	64%	31,950	46%
Moderate	12,685	22%	20,614	35%	27,129	47%	24,146	36%
Low	2,114	4%	7,173	14%	11,171	22%	10,180	22%
TOTAL	94,900	32%	162,136	55%	185,738	62%	147,022	47%

\* Percent of total MSCP study area habitats evaluated. CSS, MH, and BP numbers are based on the 1993 database; PL numbers are based on the 1994 database.

Note: Numbers may not sum to total as shown, due to rounding.

to support gnatcatcher-occupied coastal sage scrub. Due to acreage constraints, this scenario does not automatically include already constrained lands, such as wetlands, although it is assumed that wetlands will continue to be protected under state and federal regulations. This scenario also does not automatically include other public and private lands planned for open space. While these lands will certainly contribute to biological open space, the amount of sage scrub on these lands is relatively small and of limited potential for supporting gnatcatchers and cactus wrens.

## Target Species

Table 5-4 summarizes the adequacy of protection of MSCP target species within the CSS scenario as well as the degree of risk for each species. The CSS scenario would adequately conserve 6 of the 48 target plant species per the Biological Standards and Guidelines, and 5 additional plant species are not adequately conserved within the CSS scenario but are currently considered at low risk of habitat loss because they occur in preserved open space and/or public lands:

Adequately Protected Plants  
Dean's milk-vetch (NCCP)  
Sticky dudleya (NCCP)\*  
Palmer's ericameria  
Coast wallflower  
San Diego barrel cactus (NCCP)  
Small-leaved rose (NCCP)\*

Other Plants at Low Risk  
Shaw's agave (NCCP)  
Slender-pod jewelflower\*  
Salt marsh bird's beak\*  
Snake cholla (NCCP)  
Torrey pine

\*Federal or state listed, category 1 candidate, or proposed for listing

Six of these species are coastal sage scrub NCCP species. Four of the adequately protected species are represented by only one location each within the MSCP study area. Large populations of two additional species (wart-stemmed ceanothus and variegated dudleya) are included in this FPA; however, the conservation of these populations alone would not be adequate to retain the long-term viability of the species due to the exclusion of key populations that would likely result in genetically isolated populations. Three species (thread-leaved brodiaea, Orcutt's spineflower, and Tecate tarplant) have not been reported within the MSCP study area; however, an assessment of the amount of suitable habitat present for each species under this scenario indicates that none of these would be adequately conserved, if present. Finally, a large proportion of the known occurrences of the state-rare plant, slender-pod jewelflower, is also included in this preserve scenario. However, insufficient distributional data exist to make a definitive assessment regarding the

Table 5-4

ADEQUACY OF PROTECTION AND DEGREE OF RISK FOR MSCP TARGET SPECIES  
WITHIN THE COASTAL SAGE SCRUB FOCUSED PLANNING AREA (FPA)

SCIENTIFIC NAME COMMON NAME STATUS	% OF POINTS <sup>1</sup> IN FPA	% OF POLYGONS <sup>2</sup> IN FPA	% MAJOR POPULATIONS <sup>3</sup> IN FPA	STANDARDS & GUIDELINES <sup>4</sup>	MEETS S&G	RISK <sup>5</sup> /COMMENTS
<i>Acanthomintha ilicifolia</i> San Diego thorn-mint C1/CE	39	29	12.5	Preserve adequate amount of major populations plus additional important populations.	No	High/Most major populations on private lands outside FPA.
<i>Agave shawii</i> Shaw's agave C2/	67	No polygons	25	Preserve 100% of extant populations.	No	Low/All on public lands.
<i>Ambrosia pumila</i> San Diego ambrosia C2/	36	11	15	Preserve 100% of major populations plus additional important populations.	No	High/Most major populations on private lands.
<i>Aphanisma bitoides</i> Aphanisma C2/	Site-specific data not mapped.	Site-specific data not mapped.	0	Preserve 100% of extant populations plus additional important populations.	Insufficient data	High/Potential habitat not included in FPA.
<i>Arctostaphylos glandulosa</i> var. <i>crassifolia</i> Del Mar manzanita PE/	23	19	38	Preserve adequate amount of major populations.	No	High/Majority of major populations on private lands.
<i>Arctostaphylos otayensis</i> Otay manzanita	19	100	20	Preserve adequate amount of major populations plus additional important populations.	No	High/Most major populations on private lands.
<i>Astragalus deanei</i> Dean's milk vetch C2/	100	100	100	Preserve 100% of extant populations plus additional important populations.	Yes	Low/Only 1 population documented in study area; this population would be adequately protected in the CSS FPA. Species' range is largely outside (east of) study area.
<i>Astragalus tener</i> var. <i>titi</i> Coastal dunes milk vetch C1/CE	Site-specific data not mapped.	Site-specific data not mapped.	0	Preserve 100% of extant populations plus 100% of any new populations.	No	High/Known to occur in coastal strand, which is not included in FPA.
<i>Baccharis vanessae</i> Encinitas baccharis PE/CE	61	0	42	Preserve adequate amount of major populations plus additional important populations.	No	High/Significant proportion of largest major populations on private lands outside FPA.
<i>Brodiaea filifolia</i> Thread-leaved brodiaea PT/CE	No points	No polygons	6	Preserve 100% of extant populations plus additional important populations.	No	High/FPA does not include adequate grassland or vernal pool habitat to support this species, if present.

Table 5-4 (Continued)

ADEQUACY OF PROTECTION AND DEGREE OF RISK FOR MSCP TARGET SPECIES  
WITHIN THE COASTAL SAGE SCRUB FOCUSED PLANNING AREA (FPA)

SCIENTIFIC NAME COMMON NAME STATUS	% OF POINTS <sup>1</sup> IN FPA	% OF POLYGONS <sup>2</sup> IN FPA	% MAJOR POPULATIONS <sup>3</sup> IN FPA	STANDARDS & GUIDELINES <sup>4</sup>	MEETS S&G	RISK <sup>5</sup> /COMMENTS
<i>Brodiaea orcuttii</i> Orcutt's brodiaea C2/	22	69	20 <sup>7</sup>	Preserve and manage 100% of vernal pool complexes that support this species.	No	Moderate/Would receive some protection per federal wetland regulations.
<i>Calochortus dumii</i> Dunn's maniposa lily C2/CR	55	0	17	Preserve 100% of extant populations plus additional important populations.	No	High/Major populations on private lands outside FPA.
<i>Caulanthus stenocarpus</i> Slender-pod jewelflower C3/CR	86	91	75	Preserve adequate amount of major populations plus additional important populations.	Insufficient data	Low/Adequate known occurrences in FPA, but relatively small amount of preferred habitat.
<i>Ceanothus cyaneus</i> Lakeside ceanothus C2	0	0	0	Preserve adequate amount of major populations plus additional important populations.	No	High/Major populations on private lands outside FPA.
<i>Ceanothus verrucosus</i> Wart-stemmed ceanothus C2/	10	79	53	Preserve adequate amount of major populations plus additional important populations.	No	High/1 of 4 major populations (Carmel Valley) is not included in FPA; less than adequate amounts of other major populations included in FPA.
<i>Chorizanthe orcuttiana</i> Orcutt's spineflower PE/CE	Site-specific data not mapped.	Site-specific data not mapped.	25 <sup>6</sup>	Preserve 100% of extant populations plus additional important populations.	No	High/FPA does not include adequate southern maritime chaparral habitat to support this species, if present.
<i>Cordylanthus maritimus</i> ssp. <i>maritimus</i> Salt marsh bird's-beak PE/CE	0	0	0	Preserve 100% of extant populations plus 100% of any new populations.	No	Low/Would receive some protection per federal wetland regulations and in public ownership.
<i>Cordylanthus orcuttianus</i> Orcutt's bird's-beak C2/	33	50	0	Preserve adequate amount of major populations plus additional important populations.	No	High/Most populations on private lands outside FPA.
<i>Corethrogyne filaginifolia</i> var. <i>linifolia</i> Del Mar Mesa sand aster PT/	28	40	50	Preserve adequate amount of major populations plus additional important populations.	No	Moderate/Of the 2 major populations, only a portion of one (Carmel Mtn.-Del Mar Mesa) is included and the other (Torrey Pines State Park) is not included in FPA, but may receive some protection.
<i>Cupressus forbesii</i> Tecate cypress C2/	81	0	<5	Preserve 100% of extant population on Olaj Mountain above 1500 feet elevation.	No	Moderate/May receive some protection per BLM policies.

Table 5-4 (continued)

ADEQUACY OF PROTECTION AND DEGREE OF RISK FOR MSCP TARGET SPECIES WITHIN THE COASTAL SAGE SCRUB FOCUSED PLANNING AREA (FPA)

SCIENTIFIC NAME COMMON NAME STATUS	% OF POINTS <sup>1</sup> IN FPA	% OF POLYGONS <sup>2</sup> IN FPA	% MAJOR POPULATIONS <sup>3</sup> IN FPA	STANDARDS & GUIDELINES <sup>4</sup>	MEETS S & G	RISK <sup>5</sup> /COMMENTS
<i>Dudleya brevifolia</i> Short-leaved dudleya PE/CE	11	75	20	Preserve 100% of extant populations plus additional important populations.	No	High/3 of 5 extant populations on private lands outside FPA.
<i>Dudleya variegata</i> Variegated dudleya C2/	72	66	53	Preserve adequate amount of major populations plus additional important populations.	No	High/3 of 11 major populations not included in FPA; 4 other major populations are inadequately preserved.
<i>Dudleya viscida</i> Sticky dudleya C1/	100	100	100	Preserve 100% of extant populations plus additional important populations.	Yes	Low/Only 1 population documented in study area, this population would be adequately protected in the CSS FPA.
<i>Ericameria palmeri</i> ssp. <i>palmeri</i> Palmer's ericameria C2/	92	50	90	Preserve adequate amount of major populations plus additional important populations.	Yes	Low
<i>Eryngium aristulatum</i> var. <i>parishii</i> San Diego button-celery FE/CE	70	13	277	Preserve 100% of vernal pool complexes and grasslands that support major populations plus additional important populations.	No	Moderate/Would receive some protection per federal wetland regulations.
<i>Erysimum amnophilum</i> Coast wallflower C2/	33	No polygons	50	Preserve adequate amount of major populations plus additional important populations.	Yes	Low/Taxonomic status uncertain; adequate habitat on Point Loma included in FPA.
<i>Ferocactus viridescens</i> San Diego barrel cactus C2/	73	71	60	Preserve adequate amount of major populations plus additional important populations.	Yes	Low/One major population (Marion Valley) not included in FPA.
<i>Fremontodendron mexicanum</i> Mexican flannelbush C2/CR	14	No polygons	0	Preserve 100% of extant populations plus additional important populations.	No	High/Majority of population on private lands or BLM land outside FPA.
<i>Guthopsis digitata</i> ssp. <i>jilicaulis</i> Mission Canyon bluecup C2/	Site-specific data not mapped.	Site-specific data not mapped.	0	Preserve 100% of extant populations plus additional important populations.	Insufficient data	High/Habitat supporting known occurrences or in proximity to known occurrences is not included in FPA.
<i>Hemizonia conjugens</i> Olney tarplant C2/CE	63	25	68	Preserve adequate amount of major populations plus additional important populations.	No	High/50% or less of 3 of 7 major populations (Wolf Canyon, Salt Creek, San Miguel Mountain) are included in FPA.

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Table 5-4 (Continued)

ADEQUACY OF PROTECTION AND DEGREE OF RISK FOR MSCP TARGET SPECIES WITHIN THE COASTAL SAGE SCRUB FOCUSED PLANNING AREA (FPA)

SCIENTIFIC NAME COMMON NAME STATUS	% OF POINTS <sup>1</sup> IN FPA	% OF POLYGONS <sup>2</sup> IN FPA	% MAJOR POPULATIONS <sup>3</sup> IN FPA	STANDARDS & GUIDELINES <sup>4</sup>	MEETS S&G	RISK <sup>5</sup> /COMMENTS
<i>Hemizonia floribunda</i> Tecate tarplant C2/	No points	No polygons	---	Preserve adequate amount of major populations plus additional important populations.	No	High/FPA does not include an adequate amount of chaparral in southeast portion of study area to support viable populations, if present.
<i>Lepechinia cardiophylla</i> Heart-leaved pitcher sage C2/	0	No polygons	0	Preserve 100% of extant populations plus additional important populations.	No	High/Only population in study area is on private lands outside FPA.
<i>Lepechinia ganderi</i> Gander's pitcher sage C2/	36	0	20	Preserve adequate amount of major populations plus additional important populations.	No	High/Most major populations on private lands outside FPA.
<i>Lotus nuttallianus</i> Nuttall's lotus C2/	Site-specific data not mapped.	Site-specific data not mapped.	0	Preserve 100% of extant populations plus additional important populations.	No	Moderate/Most populations on public lands outside FPA.
<i>Monardella tinoides</i> ssp. <i>viminala</i> Willow monkeyflower C2/CE	42	40	45	Preserve 100% of extant populations on Olay Mountain and Marmon Valley plus additional important populations.	No	Moderate/Receive some protection on public lands outside FPA.
<i>Muhlia clevelandii</i> San Diego goldenstar C2/	71	73	42	Preserve adequate amount of major populations plus additional important populations.	No	High/Majority of major populations on private lands outside FPA.
<i>Myosurus minimus</i> ssp. <i>apus</i> Little mousetail C2/	15	67	317	Preserve 100% of extant populations plus additional important populations.	No	Moderate/Would receive some protection per federal wetland regulations.
<i>Navaretia fossalis</i> Prostrate navaretia PT/	0	0	487	Preserve 100% of extant populations plus additional important populations.	No	Moderate/Would receive some protection per federal wetland regulations.
<i>Nolina inierata</i> Dehesa bear-grass C1/CE	40	60	50	Preserve a minimum of 90% of major populations.	No	High/Major populations on private lands outside FPA.
<i>Opuntia parryi</i> var. <i>serpentina</i> Snake cholla C2/	60	25	28	Preserve 100% of selected populations and an adequate amount of major populations plus additional important populations.	No	Low/2 of 3 major populations (Border Field State Park, Sweetwater Marsh) are not included in FPA, but would receive some protection per State policies.

Table 5-4 (continued)

ADEQUACY OF PROTECTION AND DEGREE OF RISK FOR MSCP TARGET SPECIES WITHIN THE COASTAL SAGE SCRUB FOCUSED PLANNING AREA (FPA)

SCIENTIFIC NAME COMMON NAME STATUS	% OF POINTS <sup>1</sup> IN FPA	% OF POLYGONS <sup>2</sup> IN FPA	% MAJOR POPULATIONS <sup>3</sup> IN FPA	STANDARDS & GUIDELINES <sup>4</sup>	MEETS S&G	RISK <sup>5</sup> /COMMENTS
<i>Orcuttia californica</i> California orcutt grass FE/CE	13	0	13 <sup>7</sup>	Preserve 100% of extant populations plus 100% of any new populations.	No	Moderate/Would receive some protection per federal wetland regulations.
<i>Pinus torreyana</i> Torrey pine C2/	25	No polygons	25	Preserve 100% of extant populations plus additional important populations.	No	Low/Receives protection in Torrey Pines State Park.
<i>Pogogyne abramisii</i> San Diego mesa mint FE/CE	7	0	15 <sup>7</sup>	Preserve 100% of extant populations plus additional important populations.	No	Moderate/Would receive some protection per federal wetland regulations.
<i>Pogogyne nudiuscula</i> Olaj Mesa mint FE/CE	8	100	67 <sup>7</sup>	Preserve 100% of extant populations plus 100% of any new populations.	No	Moderate/Major population on Olaj Mesa not included in preserve; would receive some protection per federal wetland regulations.
<i>Rosa minutifolia</i> Small-leaved rose -/CE	100	100	100	Preserve 100% of extant population(s).	Yes	Low/Only 1 population documented in study area; this population would be adequately protected in the CSS FPA.
<i>Senecio ganderi</i> Gander's butterweed C2/CR	No points	0	0	Preserve 100% of extant populations plus additional important populations.	No	Moderate/McGinty Mtn population in public open space outside FPA.
<i>Solanum tenuilobatum</i> Narrow-leaved nightshade C2/	53	60	30	Preserve adequate amount of major populations plus additional important populations.	Insufficient data	High/Majority of known populations on private lands outside FPA.
<i>Tetradococcus dioicus</i> Parry's tetradococcus C2/	63	75	47	Preserve adequate amount of major populations plus additional important populations.	No	High/Of the 3 major populations, 1 (Ramona/Barona Valley) is not in FPA, 1 (McGinty Mountain) has only 40% of population in FPA, and both are wholly or partially on private lands.
<b>ANIMALS</b> <i>Euphyes vestris harbisoni</i> Harbison's dun skipper PE	Site-specific data not mapped.	Site-specific data not mapped.	May occur in oak woodland riparian habitat north of San Pasqual Valley	Preserve adequate amount of major populations.	Insufficient data	Unknown/Potential habitat not included in FPA; dependent on other regional plans.

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Table 5-4 (Continued)

ADEQUACY OF PROTECTION AND DEGREE OF RISK FOR MSCP TARGET SPECIES  
WITHIN THE COASTAL SAGE SCRUB FOCUSED PLANNING AREA (FPA)

SCIENTIFIC NAME COMMON NAME STATUS	% OF POINTS <sup>1</sup> IN FPA	% OF POLYGONS <sup>2</sup> IN FPA	% MAJOR POPULATIONS <sup>3</sup> IN FPA	STANDARDS & GUIDELINES <sup>4</sup>	MEETS S&G	RISK <sup>5</sup> /COMMENTS
<i>Panoquina errans</i> Salt marsh skipper C2	Site-specific data not mapped.	Site-specific data not mapped.	3% of saltmarsh	No net loss of existing occupied salt marsh habitat to retain 100% of populations. Preserve adequate amount of major populations.	No	Low/Would receive some protection per federal wetland regulations and public ownership.
<i>Lycaena hermes</i> Hermes copper butterfly C2	50	No polygons	53% of CSS	Preserve adequate amount of major populations.	Insufficient data	Unknown/2 of 4 point localities not included in FPA.
<i>Mitoura thomei</i> Thome's hairstreak butterfly PE	No points	4	4% of tecate cypress	Preserve adequate amount of major populations.	No	Moderate/Most potential habitat within proposed BLM wilderness area.
<i>Euphydryas editha quino</i> Quino checkerspot butterfly C1/	50	No polygons	50% of historical localities	Preserve adequate amount of potential habitat to allow for reintroduction.	Insufficient data	Unknown/Believed to be extirpated from MSCP study area.
<i>Sireptocephalus woottoni</i> Riverside fairy shrimp FE/	33	No polygons	21% of vernal pool habitat	Preserve adequate amount of major populations plus additional potential habitat.	No	Moderate/Would receive some protection per federal wetland regulations.
<i>Bufo microscaphus californicus</i> Arroyo southwestern toad FE/SSC	Site-specific data not mapped.	Site-specific data not mapped.	30% of riparian habitats and freshwater marsh	Preserve adequate amount of major populations plus additional potential habitat.	Insufficient data	Unknown/Would receive some protection per federal and state wetland regulations.
<i>Rana aurora draytoni</i> California red-legged frog PE/SSC	No data	No data	29% of riparian habitats	Preserve adequate amount of potential habitat to allow for reintroduction.	Insufficient data	Unknown/Possibly extirpated from San Diego County; would receive some protection per federal and state wetland regulations.
<i>Clemmys marmorata pallida</i> Southwestern pond turtle C2/SSC	40	No polygons	30% of riparian habitats and freshwater marsh	Preserve adequate amount of major populations plus additional potential habitat.	Insufficient data	Unknown/Would receive some protection per federal and state wetland regulations.
<i>Phrynosoma coronatum blainvilliei</i> San Diego horned lizard C2/	52	No polygons	34% of CSS and chaparral habitats and riparian scrub	Preserve adequate amount of major populations plus additional potential habitat.	Yes	Moderate/Habitat management important in assessing potential risk.
<i>Cnemidophorus hyperythrus beldingi</i> Orange-throated whiptail C2/	51	No polygons	34% of CSS and chaparral habitats and riparian scrub	Preserve adequate amount of major populations plus additional potential habitat.	Yes	Moderate/Habitat management important in assessing potential risk.
<i>Pelecanus occidentalis californicus</i> California brown pelican FE/CE	0	No polygons	0	Preserve adequate amount of roosting and foraging habitat.	No	Low/Would receive some protection per federal wetland regulations and public lands.
<i>Egretta rufescens</i> Reddish egret C2/	0	No polygons	0	Utilized habitat already protected.	Yes	Low/Primary use area is Tijuana Estuary.

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Table 5-4 (continued)

ADEQUACY OF PROTECTION AND DEGREE OF RISK FOR MSCP TARGET SPECIES WITHIN THE COASTAL SAGE SCRUB FOCUSED PLANNING AREA (FPA)

SCIENTIFIC NAME COMMON NAME STATUS	% OF POINTS <sup>1</sup> IN FPA	% OF POLYGONS <sup>2</sup> IN FPA	% MAJOR POPULATIONS <sup>3</sup> IN FPA	STANDARDS & GUIDELINES <sup>4</sup>	MEETS S&G	RISK <sup>5</sup> /COMMENTS
<i>Plegadis chihi</i> White-faced ibis C2/	67	No polygons	100	Preserve all of major populations plus important roosting and foraging habitat.	Yes	Low
<i>Brania canadensis</i> Canada goose none	Site-specific data not mapped.	Site-specific data not mapped.	34% of marshes, open water, some ag.	Preserve adequate amounts of roosting and foraging habitats.	No	Moderate/Would receive some protection per federal and state wetland regulations.
<i>Haliaeetus leucocephalus</i> Bald eagle FT/CE	100	No polygons	100	Preserve primary wintering habitat.	Yes	Low
<i>Circus cyaneus</i> Northern harrier --/SSC	41	No polygons	47% of CSS, grassland, and marsh habitats.	Preserve adequate amount of major populations plus additional roosting and foraging habitat.	No	Moderate/Dependent on habitat management and other regional programs; would receive some protection per federal and state wetland regulations.
<i>Accipiter cooperii</i> Cooper's hawk --/SSC	60	No polygons	21% of oak habitats	Preserve adequate amount of major populations plus additional roosting and foraging habitat.	No	High/Insufficient habitat included in FPA.
<i>Buteo swainsoni</i> Swainson's hawk --/CT	No site-specific data	No site-specific data	47% of grassland and CSS	Preserve primary wintering habitat.	No	High/Insufficient foraging habitat.
<i>Buteo regalis</i> Ferruginous hawk C2/	Site-specific data not mapped.	Site-specific data not mapped.	47% of grassland and CSS	Preserve primary wintering habitat.	No	High/Insufficient foraging habitat.
<i>Aquila chrysaetos</i> Golden eagle BEP/SSC	55 (nesting localities)	No polygons	55 - about 47% of potential foraging habitat preserved (CSS and grassland)	Preserve adequate amount of major populations plus additional roosting and foraging habitat.	No	High/Insufficient foraging habitat.
<i>Falco peregrinus anatum</i> American peregrine falcon FE/CE	0 (nesting localities)	No polygons	0	Preserve existing populations and additional potential habitat.	No	High/Nest site management is primary issue for this species.
<i>Rallus longirostris levipes</i> Light-footed clapper rail FE/CE	0	0	0	Preserve existing populations and additional potential habitat.	No	Low/Would receive some protection per federal wetland regulations and public lands.
<i>Charadrius alexandrinus nivosus</i> Western snowy plover FT/SSC	0	0	0	Preserve existing populations and additional potential habitat.	No	Moderate/Would receive some protection per federal wetland regulations.
<i>Charadrius montanus</i> Mountain plover C2/	Site-specific data not mapped.	Site-specific data not mapped.	0	Preserve adequate amount of primary use area.	No	High

Table 5-4 (Continued)

ADEQUACY OF PROTECTION AND DEGREE OF RISK FOR MSCP TARGET SPECIES  
WITHIN THE COASTAL SAGE SCRUB FOCUSED PLANNING AREA (FPA)

SCIENTIFIC NAME COMMON NAME STATUS	% OF POINTS <sup>1</sup> IN FPA	% OF POLYGONS <sup>2</sup> IN FPA	% MAJOR POPULATIONS <sup>3</sup> IN FPA	STANDARDS & GUIDELINES <sup>4</sup>	MEETS S&G	RISK <sup>5</sup> /COMMENTS
<i>Numenius americanus</i> Long-billed curlew C3/SSC	0	0	0	Preserve adequate amount of primary use area.	No	Moderate/Would receive some protection per federal wetland regulations.
<i>Sterna elegans</i> Elegant tern C2/	0	No polygons	0	Preserve existing populations and sufficient foraging habitat.	No	Low/Would receive some protection per federal wetland regulations and public lands.
<i>Sterna antillarum brownii</i> California least tern FE/CE	No points	0	0	Preserve existing populations and sufficient foraging habitat.	No	Low/Would receive some protection per federal wetland regulations and public lands.
<i>Speotyto cunicularia hypugaea</i> Burrowing owl C2/SSC	56	No polygons	23% of grassland	Preserve existing populations and sufficient foraging habitat.	No	High
<i>Empidonax traillii eximius</i> Southwestern willow flycatcher PE/CE	Site-specific data not mapped.	Site-specific data not mapped.	38% of riparian habitats	Preserve existing populations and sufficient potential habitat.	No	Moderate/The majority of sightings occur on private lands. Would receive some protection per federal and state wetland regulations.
<i>Campylorhynchus brunneicapillus couesi</i> Coastal cactus wren C3/SSC	85	No polygons	83% of major populations	Preserve existing viable populations and create sufficient potential habitat.	Maybe	Moderate/Dependent on habitat management and other regional programs.
<i>Poliophtila californica californica</i> California gnatcatcher FT/SSC	72	No polygons	100	Preserve core populations plus additional important satellite populations.	Yes	Moderate/Dependent on other regional programs.
<i>Sialia mexicana</i> Western bluebird none	7	No polygons	21% of oak habitats	Preserve adequate amount of potential habitat.	No	Moderate/Most habitat is on public lands east of study area.
<i>Vireo bellii pusillus</i> Least Bell's vireo FE/CE	54	No polygons	50 - 38% of riparian habitats	Preserve existing populations and additional potential habitat.	No	Low/Would receive some protection per federal and state wetland regulations.
<i>Aimophila ruficeps canescens</i> California rufous-crowned sparrow C2/	78	No polygons	53% of CSS	Preserve adequate amount of major populations plus additional important populations.	Yes	Low
<i>Passerculus sandwichensis beldingi</i> Belding's savannah sparrow C2/CE	0	No polygons	0	Preserve existing populations and additional potential habitat.	No	Low/Would receive some protection per federal wetland regulations and public lands.
<i>Passerculus sandwichensis rostratus</i> Large-billed savannah sparrow C2/	0	No polygons	0	Preserve adequate amount of major populations plus additional important populations.	No	Low/Would receive some protection per federal wetland regulations and public lands.

Table 5-4 (continued)

ADEQUACY OF PROTECTION AND DEGREE OF RISK FOR MSCP TARGET SPECIES  
WITHIN THE COASTAL SAGE SCRUB FOCUSED PLANNING AREA (FPA)

SCIENTIFIC NAME COMMON NAME STATUS	% OF POINTS <sup>1</sup> IN FPA	% OF POLYGONS <sup>2</sup> IN FPA	% MAJOR POPULATIONS <sup>3</sup> IN FPA	STANDARDS & GUIDELINES <sup>4</sup>	MEETS S&G	RISKS/COMMENTS
<i>Ammodramus savaianum</i> Grasshopper sparrow none	41	No polygons	23% of grassland	Preserve adequate amount of major populations and additional potential habitat.	No	High/Insufficient habitat included in FPA.
<i>Agelaius tricolor</i> Tricolored blackbird C2/	46	No polygons	30% of freshwater marsh & riparian scrub habitats	Preserve existing major populations and additional potential habitat.	No	Moderate/Would receive some protection per federal wetland regulations.
<i>Plecotus townsendii</i> Townsend's western big-eared bat C2/SSC	Site-specific data not mapped.	Site-specific data not mapped.	A portion of the only known occupied area in MSCP study area is in FPA.	Preserve adequate amount of major populations and additional potential habitat.	Insufficient data	Unknown
<i>Eumops perotis californicus</i> California masuff bat C2/SSC	Site-specific data not mapped.	Site-specific data not mapped.	Portions of the 3 known occupied areas are included in FPA.	Preserve adequate amount of major populations and additional potential habitat.	Insufficient data	Unknown
<i>Perognathus longimembris pacificus</i> Pacific little pocket mouse FE/SSC	Site-specific data not mapped.	Site-specific data not mapped.	0	Preserve existing populations and additional potential habitat.	No	High/May be extirpated from San Diego County
<i>Taxidea taxus</i> American badger --/SSC	Site-specific data not mapped.	Site-specific data not mapped.	47% of CSS and grassland habitats.	Preserve adequate amount of major populations plus additional important populations.	Insufficient data	Unknown
<i>Felis concolor</i> Mountain lion --/see text	34	No polygons	32% of CSS, oak, chaparral, and riparian habitats	Preserve adequate amount of major populations and additional potential habitat.	No	High
<i>Odocoileus hemionus fuliginata</i> Southern mule deer --/game species	33	No polygons	32% of CSS, oak, chaparral, and riparian habitats	Preserve adequate amount of major populations and additional potential habitat.	No	High

Table 5-4 (Continued)

**ADEQUACY OF PROTECTION AND DEGREE OF RISK FOR MSCP TARGET SPECIES  
WITHIN THE COASTAL SAGE SCRUB FOCUSED PLANNING AREA (FPA)**

- 1 % of points = percentage of point locations in the GIS database that are captured in this preserve scenario; "no points" indicates no known localities in the study area for this species; "site-specific data not mapped" indicates locations exist, but we don't have specific locations mapped.
- 2 % of polygons = percentage of polygons in the GIS database that are captured in this preserve scenario; "no polygons" indicates no known localities in the study area for this species; "site-specific data not mapped" indicates locations exist, but we don't have specific locations mapped.
- 3 % of major populations = percentage of major populations (as defined in Biological Standards and Guidelines) that are captured in this preserve scenario. Not all major populations are in the GIS database, i.e., if specific locality data are lacking. In these cases, the percentage of major populations preserved is determined or estimated from the percentage of associated habitat in the focused planning area (e.g., if 0% of southern foredunes are preserved, then it is assumed that 0% of coastal dunes milk vetch will be preserved).
- 4 Standards and Guidelines. Refer to the text and Appendix A-9 (Biological Standards and Guidelines) for a full discussion of preservation standards and identification/delimitation of major populations.
- 5 Risk = risk of impacts to populations within the MSCP study area; analysis assumes populations within FPA are protected. (Note - viability of species may still be at risk.)  
Low = little or no risk because species is adequately protected within FPA or majority of population is on protected lands outside the FPA.  
Moderate = species viability not ensured by FPA, but species would receive additional protection per federal and state wetland regulations, public ownership, and/or implementation of other regional conservation programs and habitat management.  
High = species is not adequately protected.  
Unknown = data insufficient to determine risk.
- 6 No occurrences documented in study area; number (if given) refers to percentage of appropriate habitat in preserve alternative.
- 7 Includes vernal pool complexes, and species points and polygons outside complexes (if present).

**Status (Federal/State)**

- FE = Federally endangered
- PE = Proposed for federal listing as endangered
- FT = Federally threatened
- PT = Proposed for federal listing as threatened
- C1 = Category 1 candidate for federal listing
- C2 = Category 2 candidate for federal listing
- C3 = Category 3 candidate for federal listing
- BEPA = Bald Eagle Protection Act
- CE = State endangered
- CR = State rare
- CT = State threatened
- SSC = State Species of Special Concern

Note: Shading indicates priority species (federally and state listed species, species proposed for listing, Category 1 candidate species, and NCCP target species).

Source: 1993 MSCP GIS database.

adequacy of this preserve for this species. Furthermore, the preferred habitat of this species is chaparral, which is not well-represented in the CSS scenario.

Seven vernal pool species also would receive some protection per federal wetland or endangered species regulations (Orcutt's brodiaea, San Diego button celery, little mousetail, prostrate navarretia, California Orcutt grass, San Diego mesa mint, and Otay Mesa mint).

The CSS scenario would adequately conserve 7 of the 45 target animal species per the Biological Standards and Guidelines, and 8 additional animals are considered at low risk because they are somewhat protected under current regulatory constraints on wetlands and/or because they occur primarily on public lands (Table 5-4):

Adequately Protected Animals  
San Diego horned lizard (NCCP)  
Orange-throated whiptail (NCCP)\*  
Reddish egret  
White-faced ibis  
Bald eagle\*  
California gnatcatcher (NCCP)\*  
California rufous-crowned sparrow (NCCP)

Other Animals at Low Risk  
Salt marsh skipper  
California brown pelican\*  
Light-footed clapper rail\*  
Elegant tern  
California least tern\*  
Least Bell's vireo\*  
Belding's savannah sparrow\*  
Large-billed savannah sparrow

\* Federal or state listed, category 1 candidate, proposed for listing, or NCCP target species

The California gnatcatcher, orange-throated whiptail, San Diego horned lizard, and California rufous-crowned sparrow are coastal sage scrub (NCCP) species. The coastal cactus wren, also a coastal sage scrub (NCCP) species, may be adequately conserved by the CSS scenario due to conservation of most major populations considered viable. The viability of this species is dependent on habitat management and the outcome of other regional preserve planning programs.

Wetland species that require upland habitats or functioning watersheds to complete their life cycles would not be adequately protected by wetlands regulations alone. For several other animal species, there are insufficient distributional data to assess their viability; these include three butterfly species, two amphibians, southwestern pond turtle, American badger, and two bat species.

Note that several other sensitive species associated with coastal sage scrub are listed in the NCCP conservation guidelines (e.g., California horned lark, Bell's sage sparrow, coastal rosy boa, sea dahlia, western dichondra, San Diego County viguiera, and many others). These species were not specifically addressed as part of the MSCP study but presumably would benefit from the preservation of coastal sage scrub communities.

### 5.3.2 Multiple Habitat Scenario

The following resources were prioritized for inclusion in this scenario:

1. All criteria for the CSS scenario plus the following additional criteria:
2. All or most localities of federally and state-endangered and threatened species, species proposed for listing, candidate category 1 species (priority species), and NCCP target species;
3. Viable populations of category 2 species not represented elsewhere in the study area (e.g., Del Mar Mesa sand aster, heart-leaved pitcher sage, Gander's pitcher sage, Nuttall's lotus, Torrey pine, saltmarsh skipper, Quino checkerspot butterfly, Thorne's hairstreak butterfly, some raptors);
4. Representation of sensitive habitats, as specified by the Biological Standards and Guidelines (Appendix A-9);
5. Large interconnected blocks of habitat that contribute to the preservation of wide-ranging species such as the golden eagle, mule deer, and mountain lion;
6. High-quality vernal pools (primarily but not exclusively supporting sensitive species);
7. Major linkages between identified core areas;
8. Most large blocks of public and private lands preserved or planned for open space that also have biologically significant resources.

The lands supporting these resources are shown in Figure 5-2 and acreages tabulated in Table 5-5. The planning area for this scenario encompasses approximately 190,500 acres. Of this total, approximately 162,000 acres are habitats and the rest is developed, disturbed, and agricultural areas. It is assumed that approximately 147,000 acres of habitat within the FPA would be preserved for biological resources.



Table 5-5

**VEGETATION COMMUNITY ACRES WITHIN  
MULTIPLE HABITAT SCENARIO**

Vegetation Communities	Total MSCP Area	MH Scenario	Percent of Total MSCP
Beach	976	458	47%
Saltpan	235	233	99%
Southern Foredunes	185	179	97%
Southern Coastal Bluff Scrub	171	166	97%
Coastal Sage Scrub	113,735	73,349	64%
Maritime Succulent Scrub	1,990	1,770	89%
Chaparral	112,312	46,551	41%
Southern Maritime Chaparral	1,624	1,129	70%
CSS/Chaparral Scrub	1,457	1,189	82%
Grassland	28,323	13,381	47%
Southern Coastal Saltmarsh	1,753	1,667	95%
Freshwater Marsh	703	571	81%
Riparian Forest	1,269	836	66%
Oak Riparian Forest	5,444	2,389	44%
Riparian Woodland	751	582	77%
Riparian Scrub	5,537	3,696	67%
Oak Woodland	5,210	1,468	28%
Torrey Pine Forest	166	152	92%
Tecate Cypress Forest	5,711	5,632	99%
Eucalyptus Woodland	1,588	363	23%
Open Water	5,563	4,669	84%
Disturbed Wetlands	771	539	70%
Natural Flood Channel	1,040	861	83%
Shallow Bays	71	5	7%
Pacific Ocean	3	0	0%
Other *	871	301	35%
<i>Subtotal</i>	297,461	162,136	55%
Disturbed Habitat	20,941	6,388	31%
Agriculture	28,017	5,329	19%
Developed	219,497	16,637	8%
<i>Subtotal</i>	268,455	28,354	11%
<b>TOTAL</b>	<b>565,917</b>	<b>190,490</b>	<b>34%</b>

\* Disturbed Habitat, Agriculture, and Developed areas with habitat value.

Note: Numbers may not sum to total as shown, due to rounding.

Source: 1993 MSCP GIS database.

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## Habitats

Less than half of the habitat acres in the MH scenario are comprised of coastal sage scrub, although 64 percent of all the coastal sage scrub in the study area is included in this design. Approximately 80 percent of all Very High value lands and 54 percent of all High value lands in the study area are included in the MH design; almost two-thirds of the habitats in this scenario are ranked Very High (Table 5-3).

The MH scenario includes 95 percent or greater of several rare and sensitive habitats, including saltpan, southern foredunes, southern coastal bluff scrub, southern coastal saltmarsh, and Tecate cypress forest, and over 90 percent of Torrey pine forest. Other rare and sensitive habitats that are less well represented include beach (47 percent), maritime succulent scrub (89 percent), and southern maritime chaparral (70 percent). Beach areas known to support target species such as least terns and snowy plovers are included in the design. Maritime succulent scrub and southern maritime chaparral habitats are small and patchily distributed in the coastal region of the study area; approximately half of the total acreages of these two habitats occur on private lands. The great majority (>95 percent) supports sensitive species and/or functions as part of a larger mosaic of connected habitat; therefore, preservation of <90 percent of these habitats is not considered sufficient to meet the Biological Standards and Guidelines.

Almost half of all grassland and 41 percent of all chaparral in the study area are included in the MH scenario. These two habitats, along with coastal sage scrub, have the greatest potential to support the greatest number of target species in the study area. However, grassland occupies only about 28,000 acres in the entire study area; half of this acreage is considered a relatively small amount, depending on individual species' habitat requirements (e.g., golden eagle), and native grasslands are severely reduced in extent. It is expected that preservation of larger percentages of these two habitats must rely on other regional conservation programs, especially the County's open space program. Similarly, oak woodlands are inadequately represented (28 percent) in this scenario, but occur in larger patches to the east of the MSCP study area.

In addition to those noted above, other potential short-comings of this design include:

1. Sacrifices potential genetic diversity by excluding high-quality populations or concentrations of sensitive species;

2. Excludes one core cactus wren population in the south county area;
3. Low representation of extreme inland areas of the study area, including a large expanse of coastal sage scrub along Highway 94, and the highly diverse areas northeast of San Vicente Reservoir;
4. Few connections to habitat outside the MSCP area;
5. Narrow, relatively long linkages, most of which have not been tested to ensure they are functional (see Appendix A-9, Policy 2.1);
6. Insufficient north-south linkages along the eastern border of the study area;
7. Excludes two corridors to coastal wetlands (San Diego River, Sweetwater River);
8. Minimal buffer around core areas;
9. Some habitat indicator species may not be adequately represented in the preserve (e.g., raptors, grasshopper sparrow, burrowing owl);
10. Oak woodland and grassland communities may not be adequately represented.

Due to acreage limitations, this scenario does not automatically include already constrained lands, such as wetlands, although it is assumed that wetlands will continue to be protected under state and federal regulations. This scenario also does not automatically include all public and private lands planned for open space (e.g., portions of Cowles Mountain, some City-owned lands in San Pasqual Valley, planned open space in the upper Sweetwater River drainage, Silverwood Wildlife Sanctuary, Tecalote Canyon, Lake Murray). Based on the criteria for inclusion in the focused planning area, and the constraints on preserve size, these lands were of lower priority, but some of these lands almost certainly would be included in biological open space. Thus, estimates of conservation included herein are conservative. The MH scenario, as currently configured, also does not contain lands within the City of San Diego jurisdiction that the City Planning Department (Ann Hix pers. comm.) considers important for preservation, e.g., linkages in the Future Urbanizing Area, approved open space on the Black Mountain Ranch property, the delta area of South San Diego Bay, Spooner's Mesa, and native grasslands on west Otay Mesa. These areas should be considered in the subarea planning process.

### **Target Species**

Table 5-6 summarizes the adequacy of protection of MSCP target species within the MH scenario as well as the degree of risk for each species. The MH scenario would adequately

Table 5-6

ADEQUACY OF PROTECTION AND DEGREE OF RISK FOR MSCP TARGET SPECIES WITHIN THE MULTIPLE HABITAT FOCUSED PLANNING AREA (FPA)

SCIENTIFIC NAME COMMON NAME STATUS	% OF POINTS <sup>1</sup> IN FPA	% OF POLYGONS <sup>2</sup> IN FPA	% MAJOR POPULATIONS <sup>3</sup> IN FPA	STANDARDS AND GUIDELINES <sup>4</sup>	MEETS S&G	RISK <sup>5</sup> /COMMENTS
<b>PLANTS</b>						
<i>Acanthomintha ilicifolia</i> San Diego thorn-mint C1/CE	61	57	66	Preserve adequate amount of major populations plus additional important populations.	No	Moderate/2 of 5 major populations (Lake Hodges and south of El Capitan) are not included in FPA.
<i>Agave shawii</i> Shaw's agave C2/	100	No polygons	100	Preserve 100% of extant populations.	Yes	Low
<i>Ambrosia pumila</i> San Diego ambrosia C2/	90	44	85	Preserve 100% of major populations plus additional important populations.	Yes	Low
<i>Aphanisma blitoides</i> Aphanisma C2/	Site-specific data not mapped	Site-specific data not mapped	100	Preserve 100% of extant populations plus additional important populations.	Insufficient data	Low/Potential habitat included in FPA.
<i>Arctostaphylos glandulosa</i> var. <i>crassifolia</i> Del Mar manzanita PE/	97	86	87.5	Preserve adequate amount of major populations.	Yes	Low
<i>Arctostaphylos otayensis</i> Otay manzanita C2/	73	100	77	Preserve adequate amount of major populations plus additional important populations.	No	Moderate/i of 3 major populations (Jamul Mtns.) largely outside FPA on private lands.
<i>Astragalus deanei</i> Dean's milk vetch C2/	100	100	100	Preserve 100% of extant populations plus additional important populations.	Yes	Low/Only 1 population documented in study area; this population adequately protected under this alternative.
<i>Astragalus tener</i> var. <i>titi</i> Coastal dunes milk vetch C1/CE	Site-specific data not mapped	Site-specific data not mapped	100	Preserve 100% of extant populations plus 100% of any new populations.	Yes	Low
<i>Baccharis vanessae</i> Encinitas baccharis PE/CE	79	33	90	Preserve adequate amount of major populations plus additional important populations.	Yes	Low
<i>Brodiaea filifolia</i> Thread-leaved brodiaea PT/CE	No points	No polygons	6	Preserve 100% of extant populations plus additional important populations.	No	Moderate/Would receive some protection per federal and state wetland regulations.

Table 5-6 (Continued)

ADEQUACY OF PROTECTION AND DEGREE OF RISK FOR MSCP TARGET SPECIES WITHIN THE MULTIPLE HABITAT FOCUSED PLANNING AREA (FPA)

SCIENTIFIC NAME COMMON NAME STATUS	% OF POINTS <sup>1</sup> IN FPA	% OF POLYGONS <sup>2</sup> IN FPA	% MAJOR POPULATIONS <sup>3</sup> IN FPA	STANDARDS AND GUIDELINES <sup>4</sup>	MEETS S&G	RISK <sup>5</sup> /COMMENTS
<i>Brodiaea orcuttii</i> Orcutt's brodiaea C2/	78	88	81 <sup>7</sup>	Preserve and manage 100% of vernal pool complexes that support this species.	No	Low/Would receive some protection per federal wetland regulations.
<i>Calochortus dunnii</i> Dunn's maniposa lily PT/CR	100	100	100	Preserve 100% of extant populations plus additional important populations.	Yes	Low
<i>Caulanthus stenocarpus</i> Slender-pod jewelflower C3/CR	93	91	82.5	Preserve adequate amount of major populations plus additional important populations.	Insufficient data	Low/Known populations and potential habitat included in FPA.
<i>Ceanothus cyaneus</i> Lakeside ceanothous C2/	29	0	50	Preserve adequate amount of major populations plus additional important populations.	No	High/2 of 4 major populations (Barona Valley-Wildcat Canyon, Crest-Harbrison Canyon) are not included in FPA.
<i>Ceanothus verrucosus</i> Wart-stemmed ceanothous C2/	92	87	87.5	Preserve adequate amount of major populations plus additional important populations.	Yes	Low
<i>Chorizanthe orcuttiana</i> Orcutt's spineflower PE/CE	Site-specific data not mapped	Site-specific data not mapped	70 <sup>6</sup>	Preserve 100% of extant populations plus additional important populations.	No	High/Species, if present, would probably need the majority of available habitat for viability.
<i>Cordylanthus maritimus</i> ssp. <i>maritimus</i> Salt marsh bird's-beak FB/CE	100	100	100	Preserve 100% of extant populations plus 100% of any new populations.	Yes	Low
<i>Cordylanthus orcuttianus</i> Orcutt's bird's-beak C2/	67	100	50	Preserve adequate amount of major populations plus additional important populations.	No	Moderate/Portions of the major population (Otay River Valley) are not included in the FPA.
<i>Corethrogyne flaginifolia</i> var. <i>linifolia</i> Del Mar Mesa sand aster PT/	81	70	75	Preserve adequate amount of major populations plus additional important populations.	Yes	Low
<i>Cupressus forbesii</i> Tecate cypress C2/	100	50	>95	Preserve 100% of extant population on Otay Mountain above 1500 feet elevation.	No	Low/The majority of the population is within FPA and the remainder may receive some protection per BLM policies.

Table 5-6 (Continued)

ADEQUACY OF PROTECTION AND DEGREE OF RISK FOR MSCP TARGET SPECIES WITHIN THE MULTIPLE HABITAT FOCUSED PLANNING AREA (FPA)

SCIENTIFIC NAME COMMON NAME STATUS	% OF POINTS <sup>1</sup> IN FPA	% OF POLYGONS <sup>2</sup> IN FPA	% MAJOR POPULATIONS <sup>3</sup> IN FPA	STANDARDS AND GUIDELINES <sup>4</sup>	MEETS S&G	RISKS/COMMENTS
<i>Dudleya brevifolia</i> Short-leaved dudleya PE/CE	89	100	95	Preserve 100% of extant populations plus additional important populations.	No	Low/All but one isolated population south of Torrey Pines State Park is included in FPA.
<i>Dudleya variegata</i> Variegated dudleya C2/	93	94	85	Preserve adequate amount of major populations plus additional important populations.	Yes	Low
<i>Dudleya viscidula</i> Sticky dudleya C1/	100	100	100	Preserve 100% of extant populations plus additional important populations.	Yes	Low/Only 1 population documented in study area; this population adequately protected under this alternative.
<i>Ericameria palmeri</i> ssp. <i>palmeri</i> Palmer's ericameria C2/	100	50	100	Preserve adequate amount of major populations plus additional important populations.	Yes	Low
<i>Eryngium aristulatum</i> var. <i>parishii</i> San Diego button-celery FE/CE	87	63	89	Preserve 100% of vernal pool complexes and grasslands that support major populations plus additional important populations.	No	Low/Would receive some protection per federal wetland regulations.
<i>Erysimum ammophilum</i> Coast wallflower C2/	67	No polygons	50	Preserve adequate amount of major populations plus additional important populations.	Yes	Low/Taxonomic status uncertain; adequate habitat on Point Loma included in FPA.
<i>Ferocactus viridescens</i> San Diego barrel cactus C2/	90	98	92.5	Preserve adequate amount of major populations plus additional important populations.	Yes	Low
<i>Fremontodendron mexicanum</i> Mexican flannelbush C2/CR	29	No polygons	29	Preserve 100% of extant populations plus additional important populations.	No	High/Majority of population on private lands and BLM land outside FPA.
<i>Githopsis difflusa</i> ssp. <i>filicaulis</i> Mission Canyon bluecup C2/	Site-specific data not mapped	Site-specific data not mapped	0	Preserve 100% of extant populations plus additional important populations.	Insufficient data	High/Habitat supporting known occurrences or in proximity to known occurrences is not included in FPA.

Table 5-6 (Continued)

ADEQUACY OF PROTECTION AND DEGREE OF RISK FOR MSCP TARGET SPECIES WITHIN THE MULTIPLE HABITAT FOCUSED PLANNING AREA (FPA)

SCIENTIFIC NAME COMMON NAME STATUS	% OF POINTS <sup>1</sup> IN FPA	% OF POLYGONS <sup>2</sup> IN FPA	% MAJOR POPULATIONS <sup>3</sup> IN FPA	STANDARDS AND GUIDELINES <sup>4</sup>	MEETS S&G	RISK <sup>5</sup> /COMMENTS
<i>Hemizonia conjugens</i> Otay tarplant C2/CE	91	93	96	Preserve adequate amount of major populations plus additional important populations.	Yes	Low
<i>Hemizonia floribunda</i> Tecate tarplant C2/	No points	No polygons	...	Preserve adequate amount of major populations plus additional important populations.	Yes	Low/Adequate potential habitat in FPA.
<i>Lepechinia cardiophylla</i> Heart-leaved pitcher sage C2/	100	No polygons	100	Preserve 100% of extant populations plus additional important populations.	Yes	Low
<i>Lepechinia ganderi</i> Gander's pitcher sage C2/	80	67	87	Preserve adequate amount of major populations plus additional important populations.	Yes	Low
<i>Lotus nuttallianus</i> Nuttall's lotus C2/	Site-specific data not mapped	Site-specific data not mapped	100	Preserve 100% of extant populations plus additional important populations.	Yes	Low
<i>Monardella inoides</i> ssp. <i>viminea</i> Willow monardella C2/CE	90	100	100	Preserve 100% of extant populations on Obay Mountain and Maroon Valley plus additional important populations.	Yes	Low
<i>Muhlia clevelandii</i> San Diego goldenstar C2/	83	77	75	Preserve adequate amount of major populations plus additional important populations.	Yes	Low
<i>Myosurus minimus</i> ssp. <i>apus</i> Little mousetail C2/	77	100	77	Preserve 100% of extant populations plus additional important populations.	No	Moderate/Would receive some protection per federal wetland regulations.
<i>Navarretia fossalis</i> Prostrate navarretia PT/	80	100	91	Preserve 100% of extant populations plus additional important populations.	No	Low/Would receive some protection per federal wetland regulations.
<i>Nolina interrata</i> Dehesa bear-grass C1/CE	85	80	58	Preserve a minimum of 90% of major populations.	No	Moderate/1 of 3 major populations (Sequan Peak) not included in FPA.

Table 5-6 (Continued)

ADEQUACY OF PROTECTION AND DEGREE OF RISK FOR MSCP TARGET SPECIES WITHIN THE MULTIPLE HABITAT FOCUSED PLANNING AREA (FPA)

SCIENTIFIC NAME COMMON NAME STATUS	% OF POINTS <sup>1</sup> IN FPA	% OF POLYGONS <sup>2</sup> IN FPA	% MAJOR POPULATIONS <sup>3</sup> IN FPA	STANDARDS AND GUIDELINES <sup>4</sup>	MEETS S&G	RISK <sup>5</sup> /COMMENTS
<i>Opuntia parryi</i> var. <i>serpentina</i> Snake cholla C2/	72	25	79	Preserve 100% of selected populations and an adequate amount of major populations plus additional important populations.	Yes	Low
<i>Urcuttia californica</i> California orcutt grass FE/CE	88	100	89 <sup>7</sup>	Preserve 100% of extant populations plus 100% of any new populations.	No	Low/Would receive some protection per federal wetland regulations.
<i>Pinus torreyana</i> Torrey pine C2/	67	No polygons	100	Preserve 100% of extant populations plus additional important populations.	Yes	Low
<i>Pogogyne abramsii</i> San Diego mesa mint FE/CE	74	100	84 <sup>7</sup>	Preserve 100% of extant populations plus additional important populations.	No	Low/Would receive some protection per federal wetland regulations.
<i>Pogogyne nudiuscula</i> Otay Mesa mint FE/CE	99	100	100 <sup>7</sup>	Preserve 100% of extant populations plus 100% of any new populations.	Yes	Low
<i>Rosa minutifolia</i> Small-leaved rose --/CE	100	100	100	Preserve 100% of extant population(s).	Yes	Low/Only 1 population in study area.
<i>Senecio ganderi</i> Gander's butterweed C2/CR	No points	100	100	Preserve 100% of extant populations plus additional important populations.	Yes	Low
<i>Solanum tenuilobatum</i> Narrow-leaved nightshade C2/	91	60	60	Preserve adequate amount of major populations plus additional important populations.	Insufficient data	Low/known populations and potential habitat included in FPA.
<i>Tetracoccus dioicus</i> Parry's tetracoccus C2/	69	88	75	Preserve adequate amount of major populations plus additional important populations.	Yes	Low

Table 5-6 (Continued)

ADEQUACY OF PROTECTION AND DEGREE OF RISK FOR MSCP TARGET SPECIES WITHIN THE MULTIPLE HABITAT FOCUSED PLANNING AREA (FPA)

SCIENTIFIC NAME COMMON NAME STATUS	% OF POINTS <sup>1</sup> IN FPA	% OF POLYGONS <sup>2</sup> IN FPA	% MAJOR POPULATIONS <sup>3</sup> IN FPA	STANDARDS AND GUIDELINES <sup>4</sup>	MEETS S&G	RISK <sup>5</sup> /COMMENTS
<b>ANIMALS</b>						
<i>Euphyes vestris harbisoni</i> Harbison's dun skipper PE	Site-specific data not mapped	Site-specific data not mapped	May occur in oak woodland riparian habitat north of San Pasqual Valley.	Preserve adequate amount of major populations.	Insufficient data	Unknown/Potential habitat not included in FPA; dependent on other regional plans.
<i>Panoquina errans</i> Salt marsh skipper C2	Site-specific data not mapped	Site-specific data not mapped	95	No net loss of existing occupied salt marsh habitat to retain 100% of populations.	Yes	Low/Likely to occupy coastal salt marshes in San Diego County (most on public lands).
<i>Lycaena hermes</i> Hermes copper butterfly C2	50	No polygons	64% of CSS	Preserve adequate amount of major populations.	Insufficient data	Unknown/2 of 4 point localities not included in FPA.
<i>Mitoura thornei</i> Thorne's hairstreak butterfly PE	No points	99	99	Preserve adequate amount of major populations.	Yes	Low
<i>Euphydryas editha quino</i> Quino checkerspot butterfly C1/	100	No polygons	100% of historical localities are within FPA.	Preserve adequate amount of potential habitat to allow for reintroduction.	Insufficient data	Unknown/Believed to be extirpated from MSCP study area.
<i>Streptocephalus woottoni</i> Riverside fairy shrimp FE/	33	No polygons	33 - About 90% of vernal pool habitat	Preserve adequate amount of major populations plus additional potential habitat.	Yes	Low
<i>Bufo microscaphus californicus</i> Arroyo southwestern toad FE/SSC	Site-specific data not mapped	Site-specific data not mapped	59% of riparian habitats and freshwater marsh	Preserve adequate amount of major populations plus additional potential habitat.	Insufficient data	Unknown/Would receive some protection per federal and state wetland regulations.
<i>Rana aurora draytoni</i> California red-legged frog PE/SSC	Site-specific data not mapped	Site-specific data not mapped	58% of riparian habitats	Preserve adequate amount of potential habitat to allow for reintroduction.	Insufficient data	Unknown/Possibly extirpated from San Diego County; would receive some protection per federal and state wetland regulations.
<i>Clemmys marmorata pallida</i> Southwestern pond turtle C2/SSC	40	No polygons	59% of riparian habitats and freshwater marsh	Preserve adequate amount of major populations plus additional potential habitat.	Insufficient data	Unknown/Would receive some protection per federal and state wetland regulations.
<i>Phrynosoma coronatum blainvillei</i> San Diego horned lizard C2/	72	No polygons	54% of CSS and chaparral habitats and riparian scrub	Preserve adequate amount of major populations plus additional potential habitat.	Yes	Low

Table 5-6 (Continued)

ADEQUACY OF PROTECTION AND DEGREE OF RISK FOR MSCP TARGET SPECIES WITHIN THE MULTIPLE HABITAT FOCUSED PLANNING AREA (FPA)

SCIENTIFIC NAME COMMON NAME STATUS	% OF POINTS <sup>1</sup> IN FPA	% OF POLYGONS <sup>2</sup> IN FPA	% MAJOR POPULATIONS <sup>3</sup> IN FPA	STANDARDS AND GUIDELINES <sup>4</sup>	MEETS S&G	RISK <sup>5</sup> /COMMENTS
<i>Cnemidophorus hyperythrus beldingi</i> Orange-throated whiptail C2/	67	No polygons	54% of CSS and chaparral habitats and riparian scrub	Preserve adequate amount of major populations plus additional potential habitat.	Yes	Low
<i>Pelecanus occidentalis californicus</i> California brown pelican FE/CE	No site-specific data	No site-specific data	80% of potential roosting habitat	Preserve adequate amount of roosting and foraging habitat.	Yes	Low
<i>Egretta rufescens</i> Reddish egret C2/	100	No polygons	100	Utilized habitat already protected.	Yes	Low
<i>Plegadis chihii</i> White-faced ibis C2/	100	No polygons	100	Preserve all of major populations plus important roosting and foraging habitat.	Yes	Low
<i>Branita canadensis</i> Canada goose none	Site-specific data not mapped.	Site-specific data not mapped.	55% of marshes, open water, some ag.	Preserve adequate amounts of roosting and foraging habitats.	Yes	Moderate/Would receive some protection per federal and state wetland regulations.
<i>Haliaeetus leucocephalus</i> Bald eagle FT/CE	100	No polygons	100	Preserve primary wintering habitat.	Yes	Low
<i>Circus cyaneus</i> Northern harrier --/SSC	76	No polygons	61% of CSS, grassland, and marsh habitats.	Preserve adequate amount of major populations plus additional roosting and foraging habitat.	Maybe	Moderate/Dependent on habitat management and other regional programs; would receive some protection per federal and state wetland regulations.
<i>Accipiter cooperii</i> Cooper's hawk --/SSC	77	No polygons	36% of oak habitats	Preserve adequate amount of major populations plus additional roosting and foraging habitat.	Maybe	Moderate/Larger patches of potential habitat included in FPA.
<i>Buteo swainsoni</i> Swainson's hawk --/CT	Site-specific data not mapped	Site-specific data not mapped	61% of grassland and CSS.	Preserve primary wintering habitat.	Yes	Moderate/Dependent on other regional programs.
<i>Buteo regalis</i> Ferruginous hawk C2/	Site-specific data not mapped	Site-specific data not mapped	61% of grassland and CSS.	Preserve primary wintering habitat.	Yes	Moderate/Dependent on other regional programs.
<i>Aquila chrysaetos</i> Golden eagle BEP/SSC	86 (nesting localities)	No polygons	86 - 61% of potential foraging habitat preserved (grassland and CSS).	Preserve adequate amount of major populations plus additional roosting and foraging habitat.	Maybe	Moderate/Additional foraging habitat may be needed.

Table 5-6 (Continued)

ADEQUACY OF PROTECTION AND DEGREE OF RISK FOR MSCP TARGET SPECIES WITHIN THE MULTIPLE HABITAT FOCUSED PLANNING AREA (FPA)

SCIENTIFIC NAME COMMON NAME STATUS	% OF POINTS <sup>1</sup> IN FPA	% OF POLYGONS <sup>2</sup> IN FPA	% MAJOR POPULATIONS <sup>3</sup> IN FPA	STANDARDS AND GUIDELINES <sup>4</sup>	MEETS S&G	RISK <sup>5</sup> /COMMENTS
<i>Falco peregrinus anatum</i> American peregrine falcon FE/CE	0 (nesting localities)	No polygons	0 - only known nesting site is not in FPA.	Preserve existing populations and additional potential habitat.	No	High/Nest site management is primary issue for this species.
<i>Rallus longirostris levisipes</i> Light-footed clapper rail FE/CE	100	100	100	Preserve existing populations and additional potential habitat.	Yes	Low
<i>Charadrius alexandrinus nivosus</i> Western snowy plover FT/SSC	100	100	100	Preserve existing populations and additional potential habitat.	Yes	Low
<i>Charadrius montanus</i> Mountain plover C2/	Site-specific data not mapped	Site-specific data not mapped	100	Preserve adequate amount of primary use area.	Yes	Low
<i>Numenius americanus</i> Long-billed curlew C3/SSC	73	0	Primary wintering habitat is included in FPA.	Preserve adequate amount of primary use area.	Yes	Low
<i>Sterna elegans</i> Elegant tern C2/	100	No polygons	100	Preserve existing populations and sufficient foraging habitat.	Yes	Low
<i>Sterna antillarum browni</i> California least tern FE/CE	No points	80	100	Preserve existing populations and sufficient foraging habitat.	Yes	Low
<i>Speotyto cunicularia hypugaea</i> Burrowing owl C2/SSC	78	No polygons	47% of grassland	Preserve existing populations and sufficient foraging habitat.	Maybe	Moderate/Dependent on other regional programs.
<i>Empidonax traillii eximius</i> Southwestern willow flycatcher PE/CE	Site-specific data not mapped	Site-specific data not mapped	70% of riparian habitats	Preserve existing populations and sufficient potential habitat.	Maybe	Low/Areas historically occupied included in FPA, would receive some protection per federal and state wetland regulations.
<i>Campylorhynchus brunneicapillus coxeni</i> Coastal cacicus wren C3/SSC	85	No polygons	83% of major populations.	Preserve existing viable populations and create sufficient potential habitat.	Maybe	Moderate/Dependent on habitat management and other regional programs.

Table 5-6 (Continued)

ADEQUACY OF PROTECTION AND DEGREE OF RISK FOR MSCP TARGET SPECIES  
WITHIN THE MULTIPLE HABITAT FOCUSED PLANNING AREA (FPA)

SCIENTIFIC NAME COMMON NAME STATUS	% OF POINTS <sup>1</sup> IN FPA	% OF POLYGONS <sup>2</sup> IN FPA	% MAJOR POPULATIONS <sup>3</sup> IN FPA	STANDARDS AND GUIDELINES <sup>4</sup>	MEETS S&G	RISK <sup>5</sup> /COMMENTS
<i>Poliophtila californica</i> California gnatcatcher FT/SSC	83	No polygons	100	Preserve core populations plus additional important satellite populations of potential habitat.	Yes	Moderate/Dependent on other regional programs.
<i>Sialia mexicana</i> Western bluebird none	50	No polygons	36% of oak habitats	Preserve adequate amount of potential habitat.	No	Moderate/Large populations occur on public lands east of study area; dependent on other regional programs.
<i>Vireo bellii pusillus</i> Least Bell's vireo FE/CE	100	No polygons	100 - 70% of riparian habitats	Preserve existing populations and additional potential habitat.	Yes	Low
<i>Aimophila ruficeps canescens</i> California rufous-crowned sparrow C2/	90	No polygons	64% of CSS	Preserve adequate amount of major populations plus additional important populations.	Yes	Low
<i>Passerculus sandwichensis beldingi</i> Belding's savannah sparrow C2/CE	100	No polygons	100	Preserve existing populations and additional potential habitat.	Yes	Low
<i>Passerculus sandwichensis rostratus</i> Large-billed savannah sparrow C2/	100	No polygons	100	Preserve adequate amount of major populations plus additional potential habitat.	Yes	Low
<i>Ammodramus savannarum</i> Grasshopper sparrow none	66	No polygons	47% of grassland	Preserve adequate amount of major populations and additional potential habitat.	Maybe	Moderate/Dependent on other regional programs.
<i>Agelaius tricolor</i> Tricolored blackbird C2/	69	No polygons	68% of freshwater marsh and riparian scrub	Preserve existing major populations and additional potential habitat.	Yes	Low/Would receive some protection per federal and state wetland regulations.
<i>Plecotus townsendii</i> Townsend's western big-eared bat C2/SSC	Site-specific data not mapped	Site-specific data not mapped	The only known occupied area in MSCP study area is included in FPA.	Preserve adequate amount of major populations and additional potential habitat.	Insufficient data	Unknown
<i>Eumops perotis californicus</i> California mastiff-bat C2/SSC	Site-specific data not mapped	Site-specific data not mapped	Large portions of the 3 known occupied areas are included in FPA	Preserve adequate amount of major populations and additional potential habitat.	Insufficient data	Unknown

Table 5-6 (Continued)

ADEQUACY OF PROTECTION AND DEGREE OF RISK FOR MSCP TARGET SPECIES  
WITHIN THE MULTIPLE HABITAT FOCUSED PLANNING AREA (FPA)

SCIENTIFIC NAME COMMON NAME STATUS	% OF POINTS <sup>1</sup> IN FPA	% OF POLYGONS <sup>2</sup> IN FPA	% MAJOR POPULATIONS <sup>3</sup> IN FPA	STANDARDS AND GUIDELINES <sup>4</sup>	MEETS S&G	RISK <sup>5</sup> /COMMENTS
<i>Perognathus longimembris pacificus</i> Pacific little pocket mouse FE/SSC	Site-specific data not mapped	Site-specific data not mapped	30% of coastal riparian scrub	Preserve existing populations and additional potential habitat.	No	High/May be extirpated from San Diego County.
<i>Taxidea taxus</i> American badger --/SSC	Site-specific data not mapped	Site-specific data not mapped	61% of grassland and CSS habitats.	Preserve adequate amount of major populations plus additional important populations.	Insufficient data	Unknown/Dependent on other regional programs.
<i>Felis concolor</i> Mountain lion --/see text	68	No polygons	54% of oak, CSS, chaparral, and riparian habitats.	Preserve adequate amount of major populations and additional potential habitat.	Maybe	Moderate/Dependent on other regional programs.
<i>Odocoileus hemionus fuliginata</i> Southern mule deer --/game species	65	No polygons	54% of oak, CSS, chaparral, and riparian habitats.	Preserve adequate amount of major populations and additional potential habitat.	Maybe	Moderate/Dependent on other regional programs.

Table 5-6 (Continued)

**ADEQUACY OF PROTECTION AND DEGREE OF RISK FOR MSCP TARGET SPECIES  
WITHIN THE MULTIPLE HABITAT FOCUSED PLANNING AREA (FPA)**

- 1 % of points = percentage of point locations in the GIS database that are captured in this preserve scenario; "no points" indicates no known localities in the study area for this species; "site-specific data not mapped" indicates locations exist, but we don't have specific locations mapped.
- 2 % of polygons = percentage of polygons in the GIS database that are captured in this preserve scenario; "no polygons" indicates no known localities in the study area for this species; "site-specific data not mapped" indicates locations exist, but we don't have specific locations mapped.
- 3 % of major populations = percentage of major populations (as defined in Biological Standards and Guidelines) that are captured in this preserve scenario. Not all major populations are in the GIS database, i.e., if specific locality data are lacking. In these cases, the percentage of major populations preserved is determined or estimated from the percentage of associated habitat in the focused planning area (e.g., if 0% of southern foredunes are preserved, then it is assumed that 0% of coastal dunes milk vetch will be preserved).
- 4 Standards and Guidelines. Refer to the text and Appendix A-9 (Biological Standards and Guidelines) for a full discussion of preservation standards and identification/delimitation of major populations.
- 5 Risk = risk of impacts to populations within the MSCP study area; analysis assumes populations within FPA are protected. (Note - viability of species may still be at risk.)  
 Low = little or no risk because species is adequately protected within FPA or majority of population is on protected lands outside the FPA.  
 Moderate = species viability not ensured by FPA, but species would receive additional protection per federal and state wetland regulations, public ownership, and/or implementation of other regional conservation programs and habitat management.  
 High = species is not adequately protected.  
 Unknown = data insufficient to determine risk.
- 6 No occurrences documented in study area; number (if given) refers to percentage of appropriate habitat in preserve alternative.
- 7 Includes vernal pool complexes, and species points and polygons outside complexes (if present).

**Status (Federal/State)**

- FE = Federally endangered
- PE = Proposed for federal listing as endangered
- FT = Federally threatened
- PT = Proposed for federal listing as threatened
- C1 = Category 1 candidate for federal listing
- C2 = Category 2 candidate for federal listing
- C3 = Category 3 candidate for federal listing
- BEPA = Bald Eagle Protection Act
- CE = State endangered
- CR = State rare
- CT = State threatened
- SSC = State Species of Special Concern

Note: Shading indicates priority species (federally and state listed species, species proposed for listing, Category 1 candidate species, and NCCP target species).

Source: 1993 MSCP GIS database.

conserve 28 of the 48 target plant species per the Biological Standards and Guidelines; 12 of these are NCCP species:

**Adequately Protected Plants**

Shaw's agave (NCCP)	San Diego barrel cactus (NCCP)
San Diego ambrosia	Otay tarplant (NCCP)*
Del Mar manzanita*	Tecate tarplant
Dean's milk vetch (NCCP)	Heart-leaved pitcher sage
Coastal dunes milk vetch (NCCP)*	Gander's pitcher sage
Encinitas baccharis*	Nuttall's lotus
Dunn's mariposa lily*	Willow monardella (NCCP)*
Wart-stemmed ceanothus	San Diego goldenstar (NCCP)
Salt marsh bird's-beak*	Snake cholla (NCCP)
Del Mar Mesa sand aster (NCCP)*	Torrey pine
Variigated dudleya (NCCP)	Otay Mesa mint*
Sticky dudleya (NCCP)*	Small-leaved rose (NCCP)*
Palmer's ericameria	Gander's butterweed*
Coast wallflower	Parry's tetraococcus

\*Federal or state listed, category 1 candidate, or proposed for listing

Of the species that are not adequately protected, six are associated with chaparral (Otay manzanita, Lakeside ceanothus, short-leaved dudleya, and Mexican flannelbush) or gabbro or clay soils (San Diego thorn-mint, Dehesa beargrass), one is associated with Tecate cypress forest (Tecate cypress, the majority of which is in proposed open space), one is associated with maritime succulent scrub (Orcutt's bird's-beak), and six are vernal pool species that would receive some protection per federal wetland regulations (i.e., Orcutt's brodiaea, San Diego button-celery, little mousetail, prostrate navarretia, California Orcutt grass, and San Diego mesa mint). Although not adequately protected in this FPA, the vernal pool species (exclusive of little mousetail) are considered at low risk in the study area due to existing federal wetland regulations that offer additional protection.

Plant species considered at low risk in the study area (including the above-mentioned vernal pool species) include:

<b>Plants at Low Risk</b>	
Aphanisma (NCCP)	San Diego button-celery*
Orcutt's brodiaea	Prostrate navarretia*
Slender-pod jewelflower*	California Orcutt grass*
Tecate cypress	San Diego mesa mint*
Short-leaved dudleya*	Narrow-leaved nightshade

\*Federal or state listed, category 1 candidate, or proposed for listing

Aphanisma is a coastal sage scrub (NCCP) species. Three species (thread-leaved brodiaea, Orcutt's spineflower, and Tecate tarplant) have not been reported within the MSCP study area; however, an assessment of the amount of suitable habitat present for each species under this scenario indicates that two of these species (i.e., thread-leaved brodiaea and Orcutt's spineflower) would not be adequately conserved, whereas the other species (Tecate tarplant) would be adequately conserved, if present. It should be noted that thread-leaved brodiaea would receive some protection per federal wetland regulations. Finally, distributional data are insufficient to definitively assess the adequacy of this scenario for four species (aphanisma, slender-pod jewelflower, Mission Canyon bluecup, and narrow-leaved nightshade). However, based on the inclusion of known occurrences and an adequate amount of potential habitat, it appears that all species except Mission Canyon bluecup would likely be adequately preserved under this scenario.

The MH scenario would adequately conserve 24 of the 45 target animal species per the Biological Standards and Guidelines (Table 5-6):

**Adequately Protected Animals**

Salt marsh skipper	Light-footed clapper rail*
Thorne's hairstreak butterfly*	Western snowy plover*
Riverside fairy shrimp (NCCP)*	Mountain plover
San Diego horned lizard (NCCP)	Long-billed curlew
Orange-throated whiptail (NCCP)*	Elegant tern
California brown pelican*	California least tern*
Reddish egret	California gnatcatcher (NCCP)*
White-faced ibis	Least Bell's vireo*
Canada goose	California rufous-crowned sparrow (NCCP)
Bald eagle*	Belding's savannah sparrow*
Swainson's hawk*	Large-billed savannah sparrow
Ferruginous hawk	Tricolored blackbird (NCCP)

\* Federal or state listed, category 1 candidate, proposed for listing, or NCCP target species

The state listed and federal proposed endangered southwestern willow flycatcher is considered to be at low risk of future impacts under this scenario. As with the CSS scenario, the coastal cactus wren viability depends largely on the efforts of other regional programs. Six of the animal species listed above are NCCP species.

### 5.3.3 Biologically Preferred Scenario

The following resources were prioritized for inclusion within this scenario:

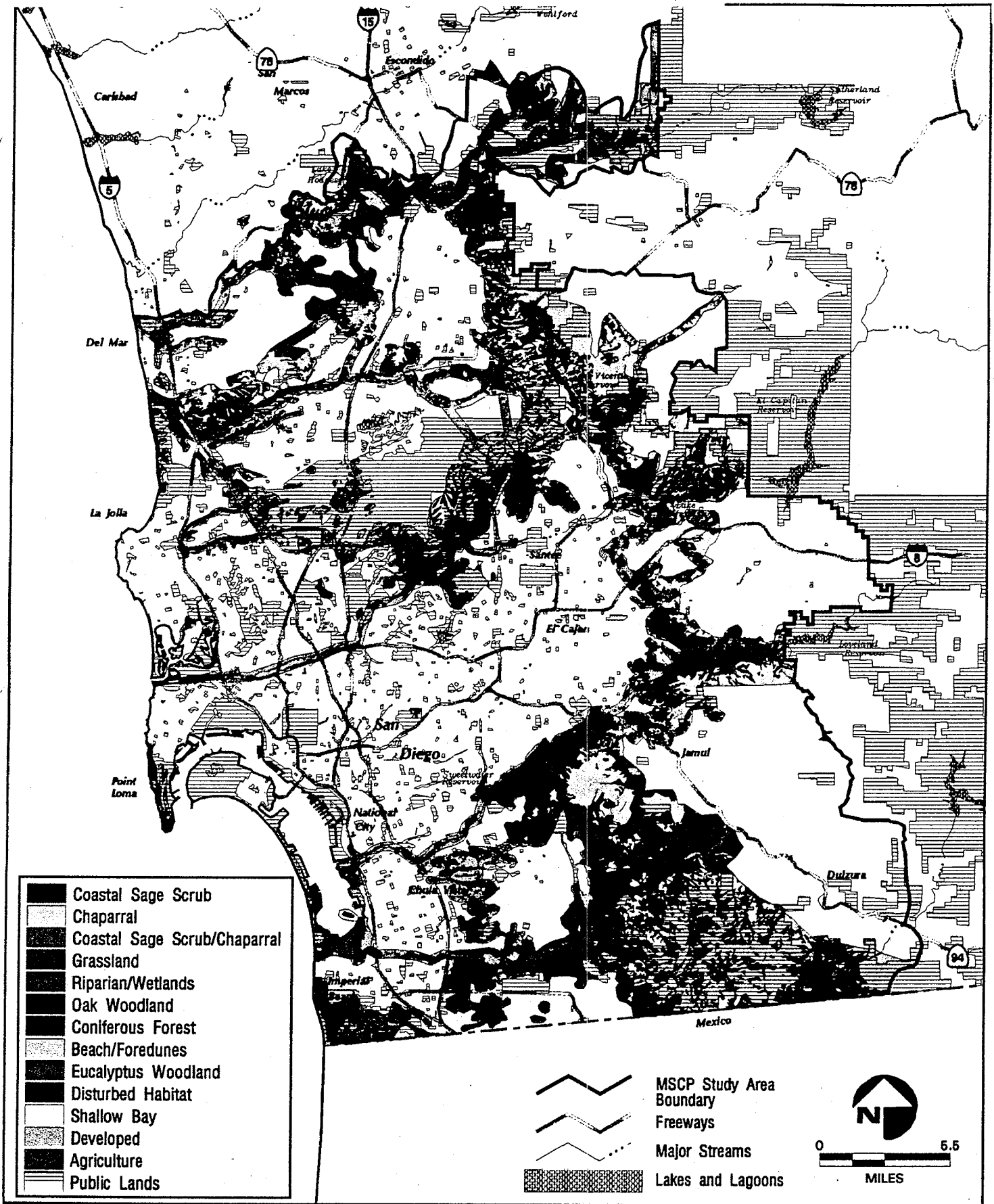
1. All criteria for the CSS and MH scenarios, plus the following additional criteria:
2. Additional areas that add to genetic diversity and long-term viability of selected target species (e.g., cactus wren, San Diego thorn-mint, Otay manzanita);
3. Linkages between coastal wetlands and inland habitats;
4. Larger core areas, as identified in Section 4.4;
5. Wider, shorter linkages (at least 2000 ft wide);
6. Linkages to habitat outside MSCP study area; and
7. Large blocks of public and private lands preserved or proposed for open space that also have biologically significant resources.

The lands supporting these resources are shown in Figure 5-3 and acreages tabulated in Table 5-7. This scenario occupies the majority of the core biological resource areas and linkages described in Section 4.4. The planning area for this scenario encompasses approximately 224,089 acres. Of this total, 185,738 acres are habitats and the rest is developed, disturbed, and agricultural areas. It is assumed that approximately 167,000 acres of habitat within the FPA would be preserved for biological resources.

#### Habitats

Approximately 44 percent of the habitat acres in the BP scenario are comprised of coastal sage scrub, although 72 percent of all the coastal sage scrub in the study area is included in this design. Approximately 86 percent of all Very High value lands and 64 percent of all High value lands in the study area are included in the BP design; over half of the habitats in this scenario are ranked Very High (Table 5-3).

The BP scenario includes 95 percent or greater of several rare and sensitive habitats, including saltpan, southern foredunes, southern coastal bluff scrub, southern coastal saltmarsh, and Tecate cypress forest, and over 92 percent of Torrey pine forest. Other rare and sensitive habitats that are less well represented include beach (47 percent), maritime succulent scrub (89 percent), and southern maritime chaparral (71 percent). Beach areas known to support target species such as least terns and snowy plovers are included in the design. Maritime succulent scrub and southern maritime chaparral habitats are small and



Biologically Preferred Focused Planning Area

FIGURE  
5-3

Table 5-7

**VEGETATION COMMUNITY ACRES WITHIN  
BIOLOGICALLY PREFERRED SCENARIO**

Vegetation Communities	Total MSCP Area	BP Scenario	Percent of Total MSCP
Beach	976	458	47%
Saltpan	235	233	99%
Southern Foredunes	185	179	97%
Southern Coastal Bluff Scrub	171	166	97%
Coastal Sage Scrub	113,735	82,023	72%
Maritime Succulent Scrub	1,990	1,773	89%
Chaparral	112,312	56,137	50%
Southern Maritime Chaparral	1,624	1,155	71%
CSS/Chaparral Scrub	1,457	1,221	84%
Grassland	28,323	16,253	57%
Southern Coastal Saltmarsh	1,753	1,674	95%
Freshwater Marsh	703	636	90%
Riparian Forest	1,269	988	78%
Oak Riparian Forest	5,444	2,800	51%
Riparian Woodland	751	681	91%
Riparian Scrub	5,537	4,160	75%
Oak Woodland	5,210	2,212	42%
Torrey Pine Forest	166	152	92%
Tecate Cypress Forest	5,711	5,711	100%
Eucalyptus Woodland	1,588	516	32%
Open Water	5,563	4,776	86%
Disturbed Wetlands	771	629	82%
Natural Flood Channel	1,040	897	86%
Shallow Bays	71	5	7%
Pacific Ocean	3	0	0%
Other *	871	302	35%
<i>Subtotal</i>	297,461	185,738	62%
Disturbed Habitat	20,941	7,466	36%
Agriculture	28,017	6,922	25%
Developed	219,497	23,963	11%
<i>Subtotal</i>	268,455	38,351	14%
<b>TOTAL</b>	<b>565,917</b>	<b>224,089</b>	<b>40%</b>

\* Disturbed Habitat, Agriculture, and Developed areas with habitat value.

Note: Numbers may not sum to total as shown, due to rounding.

Source: 1993 MSCP GIS database.

patchily distributed in the coastal region of the study area. Oak woodlands (42 percent) also may not be adequately represented. Adequate preservation of these habitats must rely on more detailed subarea planning, as accurate identification of the most important areas of these patchily distributed habitats for preservation is difficult on a regional scale.

Approximately half of all grassland and chaparral in the study area is included in the BP scenario. These two habitats, along with coastal sage scrub, have the greatest potential to support the greatest number of target species in the study area. However, species such as raptors which require large expanses of grassland may not be adequately represented. Subarea planning efforts should focus on preservation of native grasslands.

Like the CSS and MH scenarios, the BP scenario does not automatically include already constrained lands, such as wetlands, although it is assumed that wetlands will continue to be protected under state and federal regulations. This scenario also does not automatically include all public and private lands planned for open space (e.g., Tecalote Canyon, Lake Murray). Based on the criteria for inclusion in the focused planning area, these lands were of lower priority, but some of these almost certainly would be included in biological open space. The BP scenario, as currently configured, also does not contain lands within the City of San Diego jurisdiction that the City Planning Department (Ann Hix pers. comm.) considers important for preservation, e.g., selected linkages in the Future Urbanizing Area, selected approved open space on the Black Mountain Ranch property, portions of the delta area of South San Diego Bay, and native grasslands on west Otay Mesa. See Figure 4-9 for additional biologically important areas that should be included in a preserve design.

### **Target Species**

The BP scenario, by virtue of its larger core areas, wider, shorter linkages, and additional connections to areas outside the MSCP boundary, provides greater assurance of long-term viability for the target species and a wider diversity of target and non-target species than do the smaller CSS, PL, and MH scenarios. Table 5-8 summarizes the adequacy of protection of MSCP target species within the BP scenario as well as the degree of risk for each species.

The BP scenario would adequately conserve 34 of the 48 target plant species per the Biological Standards and Guidelines; 14 of these are NCCP species:

Table 5-8

ADEQUACY OF PROTECTION AND DEGREE OF RISK FOR MSCP TARGET SPECIES  
WITHIN THE BIOLOGICALLY PREFERRED FOCUSED PLANNING AREA (FPA)

SCIENTIFIC NAME COMMON NAME STATUS	% OF POINTS <sup>1</sup> IN FPA	% OF POLYGONS <sup>2</sup> IN FPA	% MAJOR POPULATIONS <sup>3</sup> IN FPA	STANDARDS AND GUIDELINES <sup>4</sup>	MEETS S&G	RISK <sup>5</sup> /COMMENTS
<i>Acanthomintha ilicifolia</i> San Diego thorn-mint PT/CE	67	57	95	Preserve adequate amount of major populations plus additional important populations.	Yes	Low
<i>Agave shawii</i> Shaw's agave C2/	100	No polygons	100	Preserve 100% of extant populations.	Yes	Low
<i>Ambrosia pumila</i> San Diego ambrosia C2/	90	44	85	Preserve 100% of major populations plus additional important populations.	Yes	Low
<i>Aphanisma blitoides</i> Aphanisma C2/	Site-specific data not mapped.	Site-specific data not mapped.	100	Preserve 100% of extant populations plus additional important populations.	Insufficient data	Low/All known populations and adequate amount of potential habitat included in FPA.
<i>Arctostaphylos glandulosa</i> var. <i>crassifolia</i> Del Mar manzanita PE/	97	89	94	Preserve adequate amount of major populations.	Yes	Low
<i>Arctostaphylos otayensis</i> Otay manzanita C2/	100	100	100	Preserve adequate amount of major populations plus additional important populations.	Yes	Low
<i>Astragalus deaneii</i> Dean's milk vetch C2/	100	100	100	Preserve 100% of extant populations plus additional important populations.	Yes	Low/Only 1 population documented in study area; this population adequately protected under this alternative.
<i>Astragalus tener</i> var. <i>titi</i> Coastal dunes milk vetch C1/CE	Site-specific data not mapped.	Site-specific data not mapped.	100	Preserve 100% of extant populations plus 100% of any new populations.	Yes	Low
<i>Baccharis vanessae</i> Encinitas baccharis PE/CE	79	33	90	Preserve adequate amount of major populations plus additional important populations.	Yes	Low

Table 5-8 (continued)

ADEQUACY OF PROTECTION AND DEGREE OF RISK FOR MSCP TARGET SPECIES  
WITHIN THE BIOLOGICALLY PREFERRED FOCUSED PLANNING AREA (FPA)

SCIENTIFIC NAME COMMON NAME STATUS	% OF POINTS <sup>1</sup> IN FPA	% OF POLYGONS <sup>2</sup> IN FPA	% MAJOR POPULATIONS <sup>3</sup> IN FPA	STANDARDS AND GUIDELINES <sup>4</sup>	MEETS S&G	RISK <sup>5</sup> /COMMENTS
<i>Brodiaea filifolia</i> Thread-leaved brodiaea C1/CE	No points	No polygons	6	Preserve 100% of extant populations plus additional important populations.	No	Moderate/would receive some protection per federal and state wetland regulations.
<i>Brodiaea orcuttii</i> Orcutt's brodiaea C2/	82	88	82.7	Preserve and manage 100% of vernal pool complexes that support this species.	No	Low/Would receive some protection per federal wetland regulations.
<i>Calochortus dumii</i> Dunn's mariposa lily C2/CR	100	100	100	Preserve 100% of extant populations plus additional important populations.	Yes	Low
<i>Caulanthus stenocarpus</i> Slender-pod jewelflower C3/CR	93	91	82.5	Preserve adequate amount of major populations plus additional important populations.	Insufficient data	Low/Majority of major populations and adequate amount of potential habitat included in FPA.
<i>Ceanothus cyaneus</i> Lakeside ceanothus C2/	86	0	75	Preserve adequate amount of major populations plus additional important populations.	Yes	Low
<i>Ceanothus verrucosus</i> Wart-stemmed ceanothus C2/	94	94	90	Preserve adequate amount of major populations plus additional important populations.	Yes	Low
<i>Chorizanthe orcuttiana</i> Orcutt's spineflower PE/CE	Site-specific data not mapped.	Site-specific data not mapped.	716	Preserve 100% of extant populations plus additional important populations.	No	High/Species, if present, would probably need the majority of available habitat for viability.
<i>Cordylanthus maritimus</i> ssp. <i>maritimus</i> Salt marsh bird's-beak FE/CE	100	100	100	Preserve 100% of extant populations plus 100% of any new populations.	Yes	Low
<i>Cordylanthus orcuttiana</i> Orcutt's bird's-beak C2/	100	100	100	Preserve adequate amount of major populations plus additional important populations.	Yes	Low
<i>Corethrogyne filaginifolia</i> var. <i>linifolia</i> Del Mar Mesa sand aster PT/	81	70	75	Preserve adequate amount of major populations plus additional important populations.	Yes	Low

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Table 5-8 (Continued)

ADEQUACY OF PROTECTION AND DEGREE OF RISK FOR MSCP TARGET SPECIES  
WITHIN THE BIOLOGICALLY PREFERRED FOCUSED PLANNING AREA (FPA)

SCIENTIFIC NAME COMMON NAME STATUS	% OF POINTS <sup>1</sup> IN FPA	% OF POLYGONS <sup>2</sup> IN FPA	% MAJOR POPULATIONS <sup>3</sup> IN FPA	STANDARDS AND GUIDELINES <sup>4</sup>	MEETS S&G	RISK <sup>5</sup> /COMMENTS
<i>Cupressus forbesii</i> Tecate cypress C2/	100	50	100	Preserve 100% of extant population on Otay Mountain above 1500 feet elevation.	Yes	Low
<i>Dudleya brevifolia</i> Short-leaved dudleya PE/CE	89	100	95	Preserve 100% of extant populations plus additional important populations.	No	Low/All but one isolated population south of Torrey Pines State Park is included in FPA.
<i>Dudleya variegata</i> Variegated dudleya C2/	94	94	87	Preserve adequate amount of major populations plus additional important populations.	Yes	Low
<i>Dudleya viscida</i> Sticky dudleya C1/	100	100	100	Preserve 100% of extant populations plus additional important populations.	Yes	Low/Only 1 population documented in study area; this population adequately protected under this alternative.
<i>Ericameria palmeri</i> ssp. <i>palmeri</i> Palmer's ericameria C2/	100	50	100	Preserve adequate amount of major populations plus additional important populations.	Yes	Low
<i>Eryngium aristulatum</i> var. <i>parishii</i> San Diego button-celery FE/CE	87	63	90/	Preserve 100% of vernal pool complexes and grasslands that support major populations plus additional important populations.	No	Low/would receive some protection per federal wetland regulations.
<i>Erysimum ammophilum</i> Coast wallflower C2/	67	No polygons	50	Preserve adequate amount of major populations plus additional important populations.	Yes	Low/taxonomic status uncertain; adequate habitat on Point Loma included in FPA.
<i>Ferocactus viridescens</i> San Diego barrel cactus C2/	92	100	92.5	Preserve adequate amount of major populations plus additional important populations.	Yes	Low
<i>Fremontodendron mexicanum</i> Mexican flannelbush C2/CR	100	No polygons	100	Preserve 100% of extant populations plus additional important populations.	Yes	Low

Table 5-8 (continued)

ADEQUACY OF PROTECTION AND DEGREE OF RISK FOR MSCP TARGET SPECIES  
WITHIN THE BIOLOGICALLY PREFERRED FOCUSED PLANNING AREA (FPA)

SCIENTIFIC NAME COMMON NAME STATUS	% OF POINTS <sup>1</sup> IN FPA	% OF POLYGONS <sup>2</sup> IN FPA	% MAJOR POPULATIONS <sup>3</sup> IN FPA	STANDARDS AND GUIDELINES <sup>4</sup>	MEETS S&G	RISK <sup>5</sup> /COMMENTS
<i>Githopsis diffusa</i> ssp. <i>flicaulis</i> Mission Canyon bluecup C2/	92 Site-specific data not mapped.	93 Site-specific data not mapped.	100	Preserve 100% of extant populations plus additional important populations.	Insufficient data	Low/Adequate potential habitat in FPA.
<i>Hemizonia conjungens</i> Olay tarplant C2/CE	96	93	96	Preserve adequate amount of major populations plus additional important populations.	Yes	Low
<i>Hemizonia floribunda</i> Tecate tarplant C2/	No points	No polygons	6	Preserve adequate amount of major populations plus additional important populations.	Yes	Low/Adequate potential habitat in FPA.
<i>Lepechinia cardiophylla</i> Heart-leaved pitcher sage C2/	100	No polygons	100	Preserve 100% of extant populations plus additional important populations.	Yes	Low
<i>Lepechinia ganderi</i> Gander's pitcher sage C2/	92	67	100	Preserve adequate amount of major populations plus additional important populations.	Yes	Low
<i>Lotus nuttallianus</i> Nuttall's lotus C2/	Site-specific data not mapped.	Site-specific data not mapped.	100	Preserve 100% of extant populations plus additional important populations.	Yes	Low
<i>Monardella linoidea</i> ssp. <i>viminea</i> Willowby monardella C2/CE	90	100	100	Preserve 100% of extant populations on Olay Mountain and Marron Valley plus additional important populations.	Yes	Low
<i>Muilla clevelandii</i> San Diego goldenstar C2/	90	100	81	Preserve adequate amount of major populations plus additional important populations.	Yes	Low
<i>Myosurus minimus</i> ssp. <i>apus</i> Little mouse-tail C2/	77	100	92 <sup>1</sup>	Preserve 100% of extant populations plus additional important populations.	No	Low/Would receive some protection per federal wetland regulations.
<i>Navarretia fossalis</i> Prostrate navarretia PT/	80	100	91 <sup>7</sup>	Preserve 100% of extant populations plus additional important populations.	No	Low/Would receive some protection per federal wetland regulations.

Table 5-8 (Continued)

ADEQUACY OF PROTECTION AND DEGREE OF RISK FOR MSCP TARGET SPECIES  
WITHIN THE BIOLOGICALLY PREFERRED FOCUSED PLANNING AREA (FPA)

SCIENTIFIC NAME COMMON NAME STATUS	% OF POINTS <sup>1</sup> IN FPA	% OF POLYGONS <sup>2</sup> IN FPA	% MAJOR POPULATIONS <sup>3</sup> IN FPA	STANDARDS AND GUIDELINES <sup>4</sup>	MEETS S&G	RISK <sup>5</sup> /COMMENTS
<i>Nolina inermis</i> Dehesa bear-grass C1/CE	85	85	67	Preserve a minimum of 90% of major populations.	No	Moderate/1 of 3 major populations (Sequan Peak) not included in FPA
<i>Opuntia parryi</i> var. <i>serpentina</i> Snake cholla C2/	72	75	96	Preserve 100% of selected populations and an adequate amount of major populations plus additional important populations	Yes	Low
<i>Orcuttia californica</i> California orcutt grass FE/CE	88	100	89 <sup>7</sup>	Preserve 100% of extant populations plus 100% of any new populations.	No	Low/Would receive some protection per federal wetland regulations.
<i>Pinus torreyana</i> Torrey pine C2/	75	No polygons	100	Preserve 100% of extant populations plus additional important populations.	Yes	Low
<i>Pogogyne abramsii</i> San Diego mesa mint FE/CE	74	100	84 <sup>7</sup>	Preserve 100% of extant populations plus additional important populations.	No	Low/Would receive some protection per federal wetland regulations.
<i>Pogogyne nudiuscula</i> Olaj Mesa mint FE/CE	99	100	100 <sup>7</sup>	Preserve 100% of extant populations plus 100% of any new populations.	Yes	Low
<i>Rosa minutifolia</i> Small-leaved rose --/CE	100	100	100	Preserve 100% of extant population(s).	Yes	Low/Only 1 population documented in study area; this population adequately protected under this alternative.
<i>Senecio ganderi</i> Gander's butterweed C2/CR	No points	100	100	Preserve 100% of extant populations plus additional important populations.	Yes	Low
<i>Solanum tenuilobatum</i> Narrow-leaved nightshade C2/	98	100	99	Preserve adequate amount of major populations plus additional important populations.	Insufficient data	Low/Majority of major populations and adequate amount of potential habitat included in FPA.
<i>Tetradococcus dioicus</i> Parry's tetradococcus C2/	69	88	>75	Preserve adequate amount of major populations plus additional important populations.	Yes	Low

Table 5-8 (continued)

ADEQUACY OF PROTECTION AND DEGREE OF RISK FOR MSCP TARGET SPECIES  
WITHIN THE BIOLOGICALLY PREFERRED FOCUSED PLANNING AREA (FPA)

SCIENTIFIC NAME COMMON NAME STATUS	% OF POINTS <sup>1</sup> IN FPA	% OF POLYGONS <sup>2</sup> IN FPA	% MAJOR POPULATIONS <sup>3</sup> IN FPA	STANDARDS AND GUIDELINES <sup>4</sup>	MEETS S&G	RISK <sup>5</sup> /COMMENTS
<b>ANIMALS</b> <i>Euphyes vestris harbisoni</i> Harbison's dun skipper PE	Site-specific data not mapped.	Site-specific data not mapped.	May occur in oak woodland riparian habitat north of San Pasqual Valley.	Preserve adequate amount of major populations.	Insufficient data	Unknown/Dependent on other regional plans.
<i>Panoquina errans</i> Salt marsh skipper C2	Site-specific data not mapped.	Site-specific data not mapped.	95% of saltmarsh	No net loss of existing occupied salt marsh habitat to retain 100% of populations.	Yes	Low/Likely to occupy coastal salt marshes in San Diego County (most on public lands).
<i>Lycæna hermes</i> Hermes copper butterfly C2	100	No polygons	100; 72% of CSS	Preserve adequate amount of major populations.	Insufficient data	Unknown/4 localities included in FPA.
<i>Mitoura thornei</i> Thorne's hairstreak butterfly PE	No points	100	100	Preserve adequate amount of major populations.	Yes	Low
<i>Euphydryas editha quino</i> Quino checkerspot butterfly C1/	100	No polygons	100% of historical localities.	Preserve adequate amount of potential habitat to allow for reintroduction.	Insufficient data	Unknown/Believed to be extirpated from MSCP study area.
<i>Sireptocephalus wooltoni</i> Riverside fairy shrimp FE/	33	No polygons	33 About 90% of vernal pool habitat	Preserve adequate amount of major populations plus additional potential habitat.	Yes	Low
<i>Bufo microscaphus californicus</i> Arroyo southwestern toad FE/SSC	Site-specific data not mapped.	Site-specific data not mapped.	68% of riparian habitats and freshwater marsh	Preserve adequate amount of major populations plus additional potential habitat.	Insufficient data	Unknown/Would receive some protection per federal and state wetland regulations.
<i>Rana aurora draytoni</i> California red-legged frog PE/SSC	Site-specific data not mapped.	Site-specific data not mapped.	66% of riparian habitats	Preserve adequate amount of potential habitat to allow for reintroduction.	Insufficient data	Unknown/Possibly extirpated from San Diego County; would receive some protection per federal and state wetland regulations.
<i>Clemmys marmorata pallida</i> Southwestern pond turtle C2/SSC	80	No polygons	68% of riparian habitats and freshwater marsh	Preserve adequate amount of major populations plus additional potential habitat.	Insufficient data	Unknown/would receive some protection per federal and state wetland regulations.
<i>Phrynosoma coronatum blainvilliei</i> San Diego horned lizard C2/	79	No polygons	62% of CSS and chaparral habitats and riparian scrub	Preserve adequate amount of major populations plus additional potential habitat.	Yes	Low

Table 5-8 (Continued)

ADEQUACY OF PROTECTION AND DEGREE OF RISK FOR MSCP TARGET SPECIES WITHIN THE BIOLOGICALLY PREFERRED FOCUSED PLANNING AREA (FPA)

SCIENTIFIC NAME COMMON NAME STATUS	POINTS <sup>1</sup> IN FPA	% OF POLYGONS <sup>2</sup> IN FPA	% MAJOR POPULATIONS <sup>3</sup> IN FPA	STANDARDS AND GUIDELINES <sup>4</sup>	MEETS S&G	RISKS/COMMENTS
<i>Cnemidophorus hyperythrus beldingi</i> Orange-throated whiptail C2/	82	No polygons	62% of CSS and chaparral habitats and riparian scrub	Preserve adequate amount of major populations plus additional potential habitat.	Yes	Low
<i>Pelecanus occidentalis californicus</i> California brown pelican FE/CE	No data	No data	80% of roosting habitat	Preserve adequate amount of roosting and foraging habitat.	Yes	Low
<i>Egretta rufescens</i> Reddish egret C2/	100	No polygons	100	Utilized habitat already protected.	Yes	Low
<i>Plegadis chihli</i> White-faced ibis C2/	100	No polygons	100	Preserve all of major populations and important roosting and foraging habitat.	Yes	Low
<i>Branta canadensis</i> Canada goose none	Site-specific data not mapped.	Site-specific data not mapped.	59% of marshes, open water, some ag.	Preserve adequate amounts of roosting and foraging habitats.	Yes	Moderate/Would receive some protection per federal and state wetland regulations.
<i>Haliaeetus leucocephalus</i> Bald eagle FT/CE	100	No polygons	100	Preserve primary wintering habitat.	Yes	Low
<i>Circus cyaneus</i> Northern harrier --/SSC	79	No polygons	69% of CSS, grassland, and marsh habitats	Preserve adequate amount of major populations plus additional roosting and foraging habitat.	Maybe	Moderate/Dependent on habitat management and other regional programs; would receive some protection per federal and state wetland regulations.
<i>Accipiter cooperii</i> Cooper's hawk --/SSC	83	No polygons	47% of oak habitats	Preserve adequate amount of major populations plus additional roosting and foraging habitat.	Maybe	Moderate/Larger patches of potential habitat included in FPA.
<i>Buteo swainsoni</i> Swainson's hawk --/CT	Site-specific data not mapped.	Site-specific data not mapped.	69% of grassland and CSS	Preserve primary wintering habitat.	Yes	Moderate/Dependent on other regional programs.
<i>Buteo regalis</i> Ferruginous hawk C2/	Site-specific data not mapped.	Site-specific data not mapped.	69% of grassland and CSS	Preserve primary wintering habitat.	Yes	Moderate/Dependent on other regional programs.
<i>Aquila chrysaetos</i> Golden eagle BEP/SSC	90 (nesting localities)	No polygons	90 - 69% of potential foraging habitat (grassland and CSS).	Preserve adequate amount of major populations plus additional roosting and foraging habitat.	Maybe	Low/Additional foraging habitat may be needed for certain nest sites.

Table 5-8 (continued)

ADEQUACY OF PROTECTION AND DEGREE OF RISK FOR MSCP TARGET SPECIES  
WITHIN THE BIOLOGICALLY PREFERRED FOCUSED PLANNING AREA (FPA)

SCIENTIFIC NAME COMMON NAME STATUS	% OF POINTS <sup>1</sup> IN FPA	% OF POLYGONS <sup>2</sup> IN FPA	% MAJOR POPULATIONS <sup>3</sup> IN FPA	STANDARDS AND GUIDELINES <sup>4</sup>	MEETS S&G	RISK <sup>5</sup> /COMMENTS
<i>Falco peregrinus anatum</i> American peregrine falcon FE/CE	0 (nesting localities)	No polygons	0 - only known nesting site is not in FPA.	Preserve existing populations and additional potential habitat.	No	High/Nest site management is primary issue for this species
<i>Rallus longirostris levipes</i> Light-footed clapper rail FE/CE	100	100	100	Preserve existing populations and additional potential habitat.	Yes	Low
<i>Charadrius alexandrinus nivosus</i> Western snowy plover FT/SSC	100	100	100	Preserve existing populations and additional potential habitat.	Yes	Low
<i>Charadrius montanus</i> Mountain plover C2/	Site-specific data not mapped.	Site-specific data not mapped.	100	Preserve adequate amount of primary use area.	Yes	Low
<i>Numenius americanus</i> Long-billed curlew C3/SSC	73	0	Primary wintering habitat is included in FPA.	Preserve adequate amount of primary use area.	Yes	Low
<i>Sterna elegans</i> Elegant tern C2/	100	No polygons	100	Preserve existing populations and sufficient foraging habitat.	Yes	Low
<i>Sterna arcticarum browni</i> California least tern FE/CE	No points	80	100	Preserve existing populations and sufficient foraging habitat.	Yes	Low
<i>Speotyto cunicularia hypugaea</i> Burrowing owl C2/SSC	78	No polygons	57% of grasslands	Preserve existing populations and sufficient foraging habitat.	Maybe	Moderate/Dependent on other regional programs.
<i>Empidonax traillii eximius</i> Southwestern willow flycatcher PE/CE	Site-specific data not mapped.	Site-specific data not mapped.	83% of riparian habitats	Preserve existing populations and sufficient potential habitat.	Yes	Low/Areas historically occupied included in FPA; would receive some protection per federal and state wetland regulations.
<i>Campylorhynchus brunneicapillus coxesi</i> Coastal cactus wren C3/SSC	92	No polygons	100	Preserve existing viable populations and create sufficient potential habitat.	Maybe	Moderate/Dependent on habitat management and other regional programs.
<i>Poliopila californica californica</i> California gnatcatcher FT/SSC	88	No polygons	100	Preserve core populations and additional important satellite populations.	Yes	Moderate/Dependent on other regional programs.

Table 5-8 (Continued)

ADEQUACY OF PROTECTION AND DEGREE OF RISK FOR MSCP TARGET SPECIES  
WITHIN THE BIOLOGICALLY PREFERRED FOCUSED PLANNING AREA (FPA)

SCIENTIFIC NAME COMMON NAME STATUS	% OF POINTS <sup>1</sup> IN FPA	% OF POLYGONS <sup>2</sup> IN FPA	% MAJOR POPULATIONS <sup>3</sup> IN FPA	STANDARDS AND GUIDELINES <sup>4</sup>	MEETS S&G	RISK <sup>5</sup> /COMMENTS
<i>Sialia mexicana</i> Western bluebird none	79	No polygons	47% of oak habitats	Preserve adequate amount of potential habitat.	Yes	Low/Large populations occur on public lands east of study area; dependent on other reforestation programs.
<i>Vireo bellii pusillus</i> Least Bell's vireo FE/CE	100	No polygons	100; 83% of riparian habitats.	Preserve existing populations and additional potential habitat.	Yes	Low
<i>Amphispiza ruficeps canescens</i> California rufous-crowned sparrow C2/	90	No polygons	72% of CSS	Preserve adequate amount of major populations plus additional important populations.	Yes	Low
<i>Passerculus sandwichensis beldingi</i> Belding's savannah sparrow C2/CE	100	No polygons	100	Preserve existing populations and additional potential habitat.	Yes	Low
<i>Passerculus sandwichensis rostratus</i> Large-billed savannah sparrow C2/	100	No polygons	100	Preserve adequate amount of major populations plus additional potential habitat.	Yes	Low
<i>Ammodramus savannarum</i> Grasshopper sparrow none	73	No polygons	57% of grassland	Preserve adequate amount of major populations and additional potential habitat.	Yes	Low
<i>Agelaius tricolor</i> Tricolored blackbird C2/	69	No polygons	77% of freshwater marsh and riparian scrub	Preserve existing major populations and additional potential habitat.	Yes	Low/Would receive some protection per federal and state wetland regulations.
<i>Plecotus townsendii</i> Townsend's western big-eared bat C2/SSC	Site-specific data not mapped.	Site-specific data not mapped.	The only known occupied area in MSCP study area is included in FPA.	Preserve adequate amount of major populations and additional potential habitat.	Insufficient data	Unknown
<i>Eumops perotis californicus</i> California mastiff-bat C2/SSC	Site-specific data not mapped.	Site-specific data not mapped.	Large portions of the 3 known occupied areas are included in FPA.	Preserve adequate amount of major populations and additional potential habitat.	Insufficient data	Unknown
<i>Perognathus longimembris pacificus</i> Pacific little pocket mouse FE/SSC	Site-specific data not mapped.	Site-specific data not mapped.	30% of coastal riparian scrub	Preserve existing populations and additional potential habitat.	No	High/May be extirpated from San Diego County.

Table 5-8 (continued)

ADEQUACY OF PROTECTION AND DEGREE OF RISK FOR MSCP TARGET SPECIES  
WITHIN THE BIOLOGICALLY PREFERRED FOCUSED PLANNING AREA (FPA)

SCIENTIFIC NAME COMMON NAME STATUS	% OF POINTS <sup>1</sup> IN FPA	% OF POLYGONS <sup>2</sup> IN FPA	% MAJOR POPULATIONS <sup>3</sup> IN FPA	STANDARDS AND GUIDELINES <sup>4</sup>	MEETS S&G	RISK <sup>5</sup> /COMMENTS
<i>Taxidea taxus</i> American badger --/SSC	Site-specific data not mapped.	Site-specific data not mapped.	69% of CSS and grassland	Preserve adequate amount of major populations plus additional important populations.	Insufficient data	Unknown/Dependent on other regional programs.
<i>Felis concolor</i> Mountain lion --/see text	74	No polygons	62% of CSS, oak, chaparral, and riparian habitats	Preserve adequate amount of major populations and additional potential habitat.	Maybe	Moderate/Dependent on other regional programs.
<i>Odocoileus hemionus fuliginata</i> Southern mule deer --/game species	69	No polygons	62% of CSS, oak, chaparral, and riparian habitats	Preserve adequate amount of major populations and additional potential habitat.	Maybe	Moderate/Dependent on other regional programs.

Table 5-8 (Continued)

**ADEQUACY OF PROTECTION AND DEGREE OF RISK FOR MSCP TARGET SPECIES  
WITHIN THE BIOLOGICALLY PREFERRED FOCUSED PLANNING AREA (FPA)**

- 1 % of points = percentage of point locations in the GIS database that are captured in this preserve scenario; "no points" indicates no known localities in the study area for this species; "site-specific data not mapped" indicates locations exist, but we don't have specific locations mapped.
  - 2 % of polygons = percentage of polygons in the GIS database that are captured in this preserve scenario; "no polygons" indicates no known localities in the study area for this species; "site-specific data not mapped" indicates locations exist, but we don't have specific locations mapped.
  - 3 % of major populations = percentage of major populations (as defined in Biological Standards and Guidelines) that are captured in this preserve scenario. Not all major populations are in the GIS database, i.e., if specific locality data are lacking. In these cases, the percentage of major populations preserved is determined or estimated from the percentage of associated habitat in the focused planning area (e.g., if 0% of southern foredunes are preserved, than it is assumed that 0% of coastal dunes milk vetch will be preserved).
  - 4 Standards and Guidelines. Refer to the text and Appendix A-9 (Biological Standards and Guidelines) for a full discussion of preservation standards and identification/delimitation of major populations.
  - 5 Risk = risk of impacts to populations within the MSCP study area; analysis assumes populations within FPA are protected. (Note - viability of species may still be at risk.)  
 Low = little or no risk because species is adequately protected within FPA or majority of population is on protected lands outside the FPA.  
 Moderate = species viability not ensured by FPA, but species would receive additional protection per federal and state wetland regulations, public ownership, and/or implementation of other regional conservation programs and habitat management.  
 High = species is not adequately protected.  
 Unknown = data insufficient to determine risk.
  - 6 No occurrences documented in study area; number (if given) refers to percentage of appropriate habitat in preserve alternative.
  - 7 Includes vernal pool complexes, and species points and polygons outside complexes (if present).
- Status (Federal/State)**  
 FE = Federally endangered  
 PE = Proposed for federal listing as endangered  
 FT = Federally threatened  
 PT = Proposed for federal listing as threatened  
 C1 = Category 1 candidate for federal listing  
 C2 = Category 2 candidate for federal listing  
 C3 = Category 3 candidate for federal listing  
 BEPA = Bald Eagle Protection Act  
 CE = State endangered  
 CR = State rare  
 CT = State threatened  
 SSC = State Species of Special Concern

Note: Shading indicates priority species (federally and state listed species, species proposed for listing, Category 1 candidate species, and NCCP target species).

Source: 1993 MSCP GIS database.

### Adequately Protected Plants

San Diego thorn-mint (NCCP)*	Palmer's ericameria
Shaw's agave (NCCP)	Coast wallflower
San Diego ambrosia (NCCP)	San Diego barrel cactus (NCCP)
Del Mar manzanita*	Mexican flannelbush*
Otay manzanita	Otay tarplant (NCCP)*
Dean's milk vetch (NCCP)	Tecate tarplant
Coastal dunes milk vetch*	Heart-leaved pitcher sage
Encinitas baccharis*	Gander's pitcher sage
Dunn's mariposa lily*	Nuttall's lotus
Lakeside ceanothus	Willow monardella (NCCP)*
Wart-stemmed ceanothus	San Diego goldenstar (NCCP)
Salt marsh bird's-beak*	Snake cholla (NCCP)
Orcutt's bird's-beak (NCCP)	Torrey pine
Del Mar Mesa sand aster (NCCP)*	Otay Mesa mint*
Tecate cypress	Small-leaved rose (NCCP)*
Variegated dudleya (NCCP)	Gander's butterweed*
Sticky dudleya (NCCP)*	Parry's tetracoccus

\*Federal or state listed, category 1 candidate, or proposed for listing

Eleven additional plant species are considered at low risk under this scenario; aphanisma is a NCCP species:

### Plants at Low Risk

Aphanisma (NCCP)	Little mousetail
Orcutt's brodiaea	Prostrate navarretia*
Slender-pod jewelflower*	California Orcutt grass*
Short-leaved dudleya*	San Diego mesa mint*
San Diego button-celery*	Narrow-leaved nightshade
Mission Canyon bluecup	

\*Federal or state listed, category 1 candidate, or proposed for listing

Dehesa beargrass is not considered adequately protected because one of the three major populations (Sequan Peak) is not included in this preserve scenario. Six vernal pool species (i.e., Orcutt's brodiaea, San Diego button-celery, little mousetail, prostrate navarretia, California Orcutt grass, and San Diego mesa mint) also are not adequately protected per the Standards and Guidelines (Appendix A-9), but would receive some protection per federal wetland regulations. An additional three species (thread-leaved brodiaea, Orcutt's spineflower, and Tecate tarplant) have not been reported within the MSCP study area; however, an assessment of the amount of suitable habitat present for each species under this scenario indicates that thread-leaved brodiaea and Tecate tarplant would probably be adequately protected, and Orcutt's spineflower would not be adequately protected, if present. Thread-leaved brodiaea would receive additional protection per

federal wetland regulations. Finally, distributional data are insufficient to definitively assess the adequacy of this scenario for four species (aphanisma, slender-pod jewelflower, Mission Canyon bluecup, and narrow-leaved nightshade). However, based on the inclusion of known occurrences and an adequate amount of potential habitat, it appears that all four species would be at low risk under this scenario.

The BP scenario would adequately conserve 27 of the 45 target animal species per the Biological Standards and Guidelines (Table 5-8); 5 of these are NCCP species:

Adequately Protected Animals

Salt marsh skipper	Mountain plover
Thorne's hairstreak butterfly*	Long-billed curlew
Riverside fairy shrimp (NCCP)*	Elegant tern
San Diego horned lizard (NCCP)	California least tern*
Orange-throated whiptail (NCCP)*	Southwestern willow flycatcher*
California brown pelican*	California gnatcatcher (NCCP)*
Reddish egret	Western bluebird
White-faced ibis	Least Bell's vireo*
Canada goose	California rufous-crowned sparrow
Bald eagle*	Belding's savannah sparrow*
Swainson's hawk*	Large-billed savannah sparrow
Ferruginous hawk	Grasshopper sparrow
Light-footed clapper rail*	Tricolored blackbird (NCCP)
Western snowy plover*	

\* Federal or state listed, category 1 candidate, proposed for listing, or NCCP target species

As for the MH scenario, additional animal species may be adequately conserved, depending on subsequent distribution studies and efforts of other regional conservation programs. The golden eagle may be considered at low risk if it can be demonstrated that sufficient foraging habitat is available for all nest sites included within the FPA.

Three animal species are not considered adequately conserved by any of the scenarios: red-legged frog, American peregrine falcon, and Pacific pocket mouse. The red-legged frog is believed to be extirpated from San Diego County; a combination of habitat enhancement and preservation along with re-introduction would be necessary to conserve this species in the area. Approximately 66 percent of this frog's potential habitat is within the BP scenario. Habitat loss of the other two coastally distributed species has diminished the viability of potential local populations. Only one breeding pair of peregrine falcons is known for the MSCP study area; however, the recovery goals for the California population of peregrine falcons have recently been achieved and the captive breeding program has been

discontinued. The San Diego County peregrine falcon population is presently not considered to be a significant component of the state-wide population. The Pacific pocket mouse is believed to be extirpated from San Diego County, and the potential for the remaining suitable habitat within the MSCP study area to support viable populations is considered low.

#### **5.3.4 Public Lands Scenario**

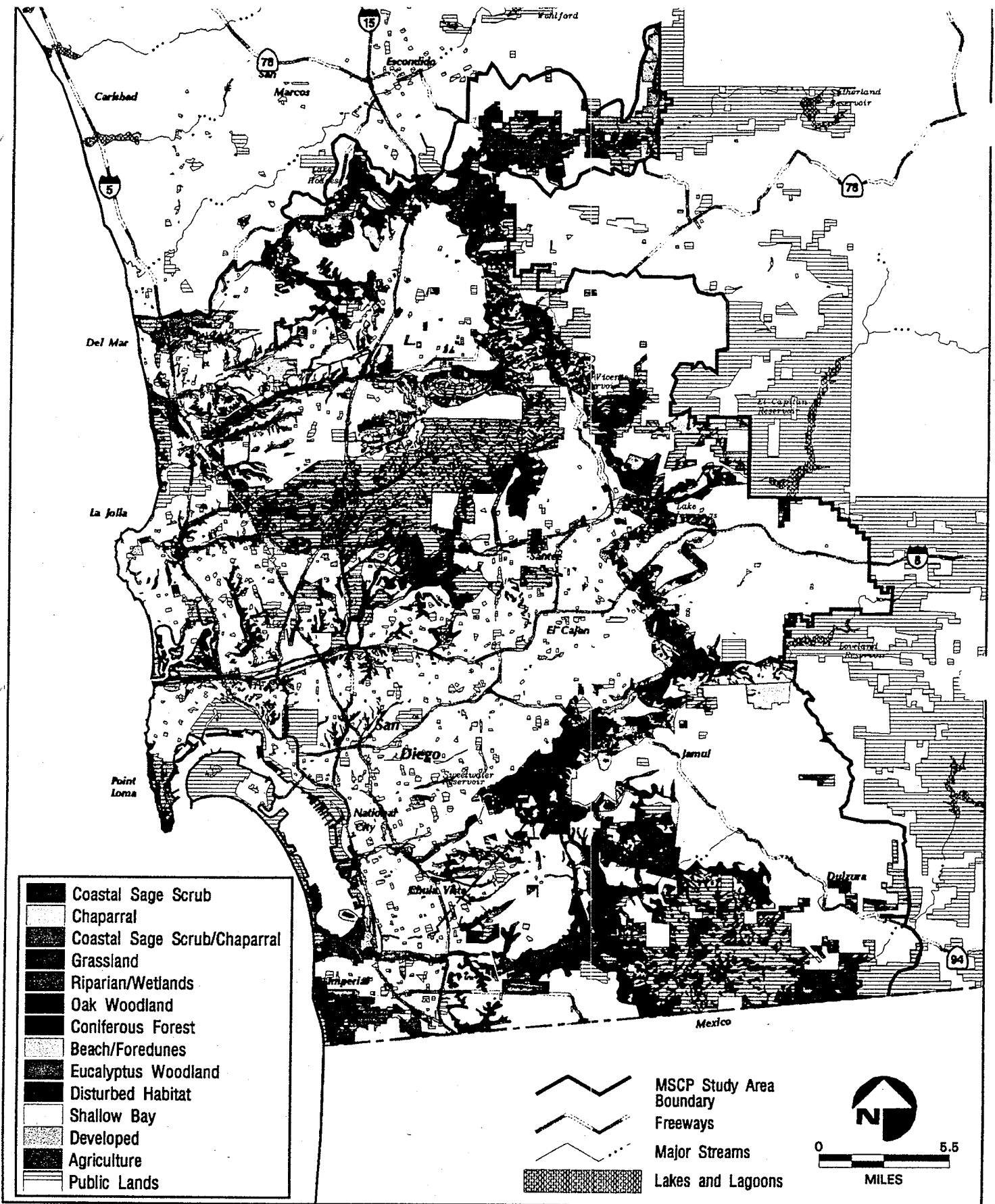
The Public Lands scenario includes:

1. All vacant publicly owned land (including military lands, city-owned lands, BLM lands, etc.)
2. All land designated as open space on an existing general or community plan;
3. All land committed to open space by private landowners on development or specific plans;
4. Linkages between these open space areas, based on the linkages shown for the CSS scenario (it is assumed that half of these areas would be preserved).

The lands supporting these resources are shown in Figure 5-4a and acreages tabulated in Table 5-9. The planning area for this scenario encompasses approximately 209,900 acres. Of this total, approximately 163,900 acres are habitats and the rest is developed, disturbed, and agricultural areas. It is assumed that approximately 147,000 acres of habitat within the FPA would be preserved for biological resources (100 percent of areas described in items 1, 2, and 3 above and 50 percent of areas in item 4) (Figure 5-4b).

#### **Habitats**

Approximately 39 percent of the habitat acres in the PL scenario are comprised of coastal sage scrub, while 50 percent of all the coastal sage scrub in the study area is included in this design. Approximately 61 percent of all Very High value lands and 46 percent of all High value lands in the study area are included in the PL design; a little over half of the habitats in this scenario are ranked Very High (Table 5-3).



**Public Lands Focused Planning Area**

FIGURE

**5-4a**

07270

Table 5-9

**VEGETATION COMMUNITY ACRES WITHIN THE  
PUBLIC LANDS SCENARIO**

Vegetation Communities	Total MSCP Area	PL Scenario	Percent of Total MSCP
Beach	1,206	773	64%
Saltpan	235	234	100%
Southern Foredunes	188	186	99%
Southern Coastal Bluff Scrub	198	176	89%
Coastal Sage Scrub	115,636	57,625	50%
Maritime Succulent Scrub	1,804	1,283	71%
Chaparral	110,191	47,718	43%
Southern Maritime Chaparral	1,777	1,323	74%
CSS/Chaparral Scrub	3,878	1,505	39%
Grassland	28,400	12,286	43%
Southern Coastal Saltmarsh	1,870	1,762	94%
Freshwater Marsh	817	609	75%
Riparian Forest	1,328	984	74%
Oak Riparian Forest	5,382	1,679	31%
Riparian Woodland	731	675	92%
Riparian Scrub	5,395	3,976	74%
Oak Woodland	5,622	1,482	26%
Torrey Pine Forest	169	158	93%
Tecate Cypress Forest	5,696	5,219	92%
Eucalyptus Woodland	1,631	355	22%
Open Water	5,726	4,670	82%
Disturbed Wetlands	928	748	81%
Natural Flood Channel	860	697	81%
Shallow Bays	9,581	312	3%
Pacific Ocean	4,888	0	0%
Other *	756	586	78%
<i>Subtotal</i>	<i>314,890</i>	<i>147,022</i>	<i>47%</i>
Disturbed Habitat	22,984	11,024	48%
Agriculture	28,594	6,846	24%
Developed	215,181	25,402	12%
<i>Subtotal</i>	<i>266,759</i>	<i>43,272</i>	<i>16%</i>
<b>TOTAL</b>	<b>581,649</b>	<b>190,294</b>	<b>33%</b>

\* Disturbed Habitat, Agriculture, and Developed areas with habitat value.

Note: Numbers may not sum to total as shown, due to rounding.

Source: 1994 MSCP GIS database.

07280



The PL scenario includes over 90 percent of several sensitive habitats, including saltpan, southern foredunes, southern coastal saltmarsh, riparian woodland, Torrey pine forest, and Tecate cypress forest. Other rare and sensitive habitats that are less well represented include beach (64 percent), maritime succulent scrub (71 percent), and southern maritime chaparral (74 percent). Maritime succulent scrub and southern maritime chaparral habitats are small and patchily distributed in the coastal region of the study area; approximately half of the total acreages of these two habitats occur on private lands. The great majority (>95 percent) supports sensitive species and/or functions as part of a larger mosaic of connected habitat. Therefore, the preservation percentages of these habitats are not considered sufficient to meet the Biological Standards and Guidelines.

Less than half of all grassland and chaparral in the study area are included in the PL scenario. These two habitats, along with coastal sage scrub, have the greatest potential to support the greatest number of target species in the study area. However, grassland occupies only 28,400 acres in the entire study area; half of this acreage is considered a relatively small amount, depending on individual species' habitat requirements (e.g., golden eagle), and native grasslands are severely reduced in extent. It is expected that preservation of larger percentages of these two habitats must rely on other regional conservation programs, especially the County's open space program. Similarly, oak woodlands are inadequately represented (26 percent) in this scenario, but occur in larger patches to the east of the MSCP study area.

In addition to those noted above, other potential short-comings of this design include:

1. Inadequate conservation of large core areas of coastal sage scrub;
2. Small and severely fragmented parcels vulnerable to edge effects, with little or no contribution to biological viability;
3. Few connections to habitat outside the MSCP area;
4. Insufficient linkages, especially since only half of the linkage areas within the FPA would be conserved;
6. Includes only half of the biological core areas and one-third of the necessary linkages;

7. Oak woodland, southern maritime chaparral, maritime succulent scrub, and grassland communities are not adequately represented.
8. Low representation of extreme inland areas of the study area.

This scenario does not automatically include already constrained lands, such as wetlands, although it is assumed that wetlands will continue to be protected under state and federal regulations.

### Target Species

Table 5-10 summarizes the adequacy of protection of MSCP target species within the PL scenario as well as the degree of risk for each species. The PL scenario would adequately conserve 8 of the 48 target plant species per the Biological Standards and Guidelines; 3 of these are NCCP species:

#### Adequately Protected Plants

Shaw's agave (NCCP)	San Diego barrel cactus (NCCP)
Del Mar manzanita*	Nuttall's lotus
Coastal dunes milk vetch*	Snake cholla (NCCP)
Coast wallflower	Torrey pine

\*Federal or state listed, category 1 candidate, or proposed for listing

An additional ten plant species are considered at low risk in the study area, including four vernal pool species and one wetland species which would receive some protection per federal wetland regulations:

#### Plants at Low Risk

San Diego ambrosia (NCCP)	Mexican flannelbush*
Aphanisma (NCCP)	Willow monardella (NCCP)*
Orcutt's brodiaea	California Orcutt grass*
Salt marsh bird's-beak*	San Diego mesa mint*
San Diego button-celery*	Narrow-leaved nightshade

\*Federal or state listed, category 1 candidate, or proposed for listing

Three of these species are NCCP species. Three species (thread-leaved brodiaea, Orcutt's spineflower, and Tecate tarplant) have not been reported within the MSCP study area; however, an assessment of the amount of suitable habitat present for each species under

ADEQUACY OF PROTECTION AND DEGREE OF RISK FOR MSCP TARGET SPECIES WITHIN THE PUBLIC LANDS FOCUSED PLANNING AREA (FPA)

SCIENTIFIC NAME COMMON NAME STATUS	% OF POINTS <sup>1</sup> IN FPA	% OF POLYGONS <sup>2</sup> IN FPA	% MAJOR POPULATIONS <sup>3</sup> IN FPA	STANDARDS AND GUIDELINES <sup>4</sup>	MEETS S&G	RISK <sup>5</sup> /COMMENTS
<b>PLANTS</b>						
<i>Acanthomintha tictitolia</i> San Diego thorn-mint C1/CE	63	50	49	Preserve adequate amount of major populations plus additional important populations.	No	High/2 of 5 major populations (Lake Hodges and El Capitan) are not included in FPA, and only 20% of an additional major population is preserved.
<i>Agave shawii</i> Shaw's agave C2	83	No polygons	100	Preserve 100% of extant populations.	Yes	Low
<i>Ambrosia pumila</i> San Diego ambrosia C2/	72	89	86	Preserve 100% of major populations plus additional important populations.	No	Low/100% of 1 major population and over 75% of the other major population are included in FPA.
<i>Aphanisma blitoides</i> Aphanisma C2/	Site-specific data not mapped	Site-specific data not mapped	100	Preserve 100% of extant populations plus additional important populations.	Insufficient data	Low/All known populations and adequate amount of potential habitat are included in FPA.
<i>Arctostaphylos glandulosa</i> var. <i>crassifolia</i> Del Mar manzanita PE/	88	85	98	Preserve adequate amount of major populations.	Yes	Low/100% of 2 of 4 major populations and over 90% of the remaining 2 major populations are included in the FPA.
<i>Arctostaphylos otayensis</i> Otay manzanita C2/	54	100	51.5	Preserve adequate amount of major populations plus additional important populations.	No	High/Less than 35% of 2 of 3 major populations is included in FPA.
<i>Astragalus deanei</i> Dean's milk vetch C2/	0	0	0	Preserve 100% of extant populations plus additional important populations.	No	High/Only 1 population documented in study area; this population is not included in FPA.
<i>Astragalus tener</i> var. <i>titi</i> Coastal dunes milk vetch C1/CE	Site-specific data not mapped	Site-specific data not mapped	99 <sup>6</sup>	Preserve 100% of extant populations plus 100% of any new populations.	Yes	Low/Species, if extant, should be encompassed within the southern foredune habitat that is preserved.
<i>Baccharis vanessae</i> Encinitas baccharis PE/CE	62	33	58	Preserve adequate amount of major populations plus additional important populations.	No	High/1 of 3 major populations (Poway) is not included in the FPA.

Table 5-10 (Continued)

ADEQUACY OF PROTECTION AND DEGREE OF RISK FOR MSCP TARGET SPECIES WITHIN THE PUBLIC LANDS FOCUSED PLANNING AREA (FPA)

SCIENTIFIC NAME COMMON NAME STATUS	% OF POINTS <sup>1</sup> IN FPA	% OF POLYGONS <sup>2</sup> IN FPA	% MAJOR POPULATIONS <sup>3</sup> IN FPA	STANDARDS AND GUIDELINES <sup>4</sup>	MEETS S&G	RISK <sup>5</sup> /COMMENTS
<i>Brodiaea filifolia</i> Thread-leaved brodiaea PT/CE	No points	No polygons	---	Preserve 100% of extant populations plus additional important populations.	No	Moderate/Would receive some protection per federal and state wetland regulations.
<i>Brodiaea orcuttii</i> Orcutt's brodiaea C2/	79	54	88 <sup>7</sup>	Preserve and manage 100% of vernal pool complexes that support this species.	No	Low/Would receive some protection per federal wetland regulations.
<i>Calochortus dunnii</i> Dunn's mariposa lily C2/CR	72	50	74	Preserve 100% of extant populations plus additional important populations.	No	Moderate/All major populations represented in FPA; however, large stands occur in 50% areas.
<i>Caulanthus stenocarpus</i> Slender-pod jewelflower C3/CR	58	47	46	Preserve adequate amount of major populations plus additional important populations.	Insufficient data	High/1 of 4 known populations is not included in FPA; 2 additional major populations occur in 50% areas.
<i>Ceanothus cyaneus</i> Lakeside ceanothus C2/	0	0	34 <sup>8</sup>	Preserve adequate amount of major populations plus additional important populations.	No	High/1 of 4 major populations is not included in FPA; 2 other major populations are inadequately preserved.
<i>Ceanothus verrucosus</i> Wart-stemmed ceanothus C2/	83	66	63	Preserve adequate amount of major populations plus additional important populations.	No	Moderate/Less than 55% of 3 of 4 major populations is included in FPA.
<i>Chorizanthe orcuttiana</i> Orcutt's spineflower PE/CE	Site-specific data not mapped	Site-specific data not mapped	74 <sup>6</sup>	Preserve 100% of extant populations plus additional important populations.	No	High/Species, if present, would probably need the majority of available habitat for viability.
<i>Cordylanthus maritimus</i> ssp. <i>maritimus</i> Salt marsh bird's-beak FE/CE	100	100	83 <sup>8</sup>	Preserve 100% of extant populations plus 100% of any new populations.	No	Low/Would receive additional protection per federal wetland regulations.
<i>Cordylanthus orcuttianus</i> Orcutt's bird's-beak C2/	50	50	50	Preserve adequate amount of major populations plus additional important populations.	No	Moderate/Portions of the major population (Otay River Valley) are not included in the FPA.
<i>Corethrogyne flaginifolia</i> var. <i>linifolia</i> Del Mar Mesa sand aster PT/	44	20	73	Preserve adequate amount of major populations plus additional important populations.	No	Moderate/Preserves 100% of 1 major population and about 45% of the other major population (Carmel Mtn. - Del Mar Mesa).

Table 5-10 (Continued)

ADEQUACY OF PROTECTION AND DEGREE OF RISK FOR MSCP TARGET SPECIES  
WITHIN THE PUBLIC LANDS FOCUSED PLANNING AREA (FPA)

SCIENTIFIC NAME COMMON NAME STATUS	% OF POINTS <sup>1</sup> IN FPA	% OF POLYGONS <sup>2</sup> IN FPA	% MAJOR POPULATIONS <sup>3</sup> IN FPA	STANDARDS AND GUIDELINES <sup>4</sup>	MEETS S&G	RISK <sup>5</sup> /COMMENTS
<i>Cupressus forbesii</i> Tecate cypress C2/	69	92	61	Preserve 100% of extant population on Otay Mountain above 1500 feet elevation.	No	Moderate/Although the majority of the population is within FPA, a large portion of this lies within a 50% area; may receive some protection per BLM policies.
<i>Dudleya brevifolia</i> Short-leaved dudleya PE/CE	44	100	62.5	Preserve 100% of extant populations plus additional important populations	No	High/1 of 5 extant populations is not included in FPA, and only 12.5% of an additional major population is preserved.
<i>Dudleya variegata</i> Variegated dudleya C2/	59	36	65	Preserve adequate amount of major populations plus additional important populations.	No	Moderate/5 of 11 major populations are inadequately preserved in FPA.
<i>Dudleya viscida</i> Sticky dudleya C1/	50	50	50	Preserve 100% of extant populations plus additional important populations.	No	Moderate/Only 1 population documented in study area; this population is in a 50% area.
<i>Ericameria palmeri</i> ssp. <i>palmeri</i> Palmer's ericameria C2/	63	50	49	Preserve adequate amount of major populations plus additional important populations.	No	Moderate/1 of 5 major populations is not in FPA; 2 others are in 50% areas.
<i>Eryngium aristulatum</i> var. <i>parishii</i> San Diego button-celery FE/CE	83	21	89.57	Preserve 100% of vernal pool complexes and grasslands that support major populations plus additional important populations.	No	Low/Would receive some protection per federal wetland regulations.
<i>Erysimum ammophilum</i> Coast wallflower C2/	100	No polygons	100	Preserve adequate amount of major populations plus additional important populations.	Yes	Low/Taxonomic status uncertain; adequate habitat on Point Loma included in FPA.
<i>Ferocactus viridescens</i> San Diego barrel cactus C2/	66	58	70	Preserve adequate amount of major populations plus additional important populations.	Yes	Low/All major populations represented in FPA.
<i>Fremontodendron mexicanum</i> Mexican flannelbush C2/CR	86	No polygons	75	Preserve 100% of extant populations plus additional important populations.	No	Low/Known population and some habitat for suspected population included in FPA.

Table 5-10 (Continued)

ADEQUACY OF PROTECTION AND DEGREE OF RISK FOR MSCP TARGET SPECIES  
WITHIN THE PUBLIC LANDS FOCUSED PLANNING AREA (FPA)

SCIENTIFIC NAME COMMON NAME STATUS	% OF POINTS <sup>1</sup> IN FPA	% OF POLYGONS <sup>2</sup> IN FPA	% MAJOR POPULATIONS <sup>3</sup> IN FPA	STANDARDS AND GUIDELINES <sup>4</sup>	MEETS S&G	RISK <sup>5</sup> /COMMENTS
<i>Githopsis diffusa</i> ssp. <i>filicaulis</i> Mission Canyon bluecup C2/	67	Site-specific data not mapped	25	Preserve 100% of extant populations plus additional important populations.	Insufficient data	High/Only 1 of 4 major populations (Silverwood Wildlife Sanctuary) is included in FPA.
<i>Hemizonia conijugens</i> Otay tarplant C2/CE	52	52	59	Preserve adequate amount of major populations plus additional important populations.	No	High/1 of 7 major populations is not included in FPA; 2 others are inadequately preserved.
<i>Hemizonia floribunda</i> Tecate tarplant C2/	No points	No polygons	---	Preserve adequate amount of major populations plus additional important populations.	No	Moderate/FPA does not include an adequate amount of chaparral in southeast portion of study area to support viable populations, if present.
<i>Lepechinia cardiophylla</i> Heart-leaved pitcher sage C2/	0	No polygons	0	Preserve 100% of extant populations plus additional important populations.	No	High/Only population in San Diego County is not in FPA.
<i>Lepechinia ganderi</i> Gander's pitcher sage C2/	70	50	62	Preserve adequate amount of major populations plus additional important populations.	No	Moderate/1 of 3 major populations (San Miguel Mtn.) is inadequately preserved.
<i>Lotus nuttallianus</i> Nuttall's lotus C2/	Site-specific data not mapped	Site-specific data not mapped	100	Preserve 100% of extant populations plus additional important populations.	Yes	Low
<i>Monardella linoidea</i> ssp. <i>viminea</i> Willow monardella C2/CE	91.5	100	94	Preserve 100% of extant populations on Otay Mountain and Marron Valley plus additional important populations.	No	Low/High inclusion (>85%) in FPA for all populations; however, portion of Santee-Sycamore Canyon population occurs in a 50% area.
<i>Muilla clevelandii</i> San Diego goldenstar C2/	54	20	54	Preserve adequate amount of major populations plus additional important populations.	No	Moderate/2 of 11 major populations are not in FPA, 3 others are inadequately preserved, and 3 occur wholly or partially in 50% areas.
<i>Myosurus minimus</i> ssp. <i>apus</i> Little mouse-tail C2/	65	33	75	Preserve 100% of extant populations plus additional important populations.	No	Moderate/Would receive some protection per federal wetland regulations.

Table 5-10 (Continued)

ADEQUACY OF PROTECTION AND DEGREE OF RISK FOR MSCP TARGET SPECIES  
WITHIN THE PUBLIC LANDS FOCUSED PLANNING AREA (FPA)

SCIENTIFIC NAME COMMON NAME STATUS	% OF POINTS <sup>1</sup> IN FPA	% OF POLYGONS <sup>2</sup> IN FPA	% MAJOR POPULATIONS <sup>3</sup> IN FPA	STANDARDS AND GUIDELINES <sup>4</sup>	MEETS S & G	RISK <sup>5</sup> /COMMENTS
<i>Navarretia fossalis</i> Prostrate navarretia PT/	46	0	25 <sup>7</sup>	Preserve 100% of extant populations plus additional important populations.	No	Moderate/Would receive some protection per federal wetland regulations.
<i>Nolina interrata</i> Dehesa bear-grass C1/CE	60	57	67.3	Preserve a minimum of 90% of major populations.	No	High/Portions of 3 major populations are included in FPA; however, 1 of these occurs entirely in a 50% area, and the other 2 occur partially in 50% areas.
<i>Opuntia parryi</i> var. <i>serpentina</i> Snake cholla C2/	80	75	87	Preserve 100% of selected populations and an adequate amount of major populations plus additional important populations.	Yes	Low/100% preservation of 4 of 5 major populations.
<i>Orcuttia californica</i> California orcutt grass FE/CE	88	100	86 <sup>7</sup>	Preserve 100% of extant populations plus 100% of any new populations.	No	Low/Would receive some protection per federal wetland regulations.
<i>Pinus torreyana</i> Torrey pine C2/	58	No polygons	100	Preserve 100% of extant populations plus additional important populations.	Yes	Low
<i>Pogogyne abramsii</i> San Diego mesa mint FE/CE	74	100	83 <sup>7</sup>	Preserve 100% of extant populations plus additional important populations.	No	Low/Would receive some protection per federal wetland regulations.
<i>Pogogyne nudiuscula</i> Otay Mesa mint FE/CE	75	50	74 <sup>7</sup>	Preserve 100% of extant populations plus 100% of any new populations.	No	Moderate/Would receive some protection per federal wetland regulations.
<i>Rosa minutifolia</i> Small-leaved rose --/CE	0	0	0	Preserve 100% of extant population(s).	No	High/None of extant populations are in FPA.
<i>Senecio grandieri</i> Gander's butterweed C2/CR	50	75	75	Preserve 100% of extant populations plus additional important populations.	No	Moderate/Both major populations are included in FPA; however, 1 of these (Sequan Peak) occurs in a 50% area.

Table 5-10 (Continued)

ADEQUACY OF PROTECTION AND DEGREE OF RISK FOR MSCP TARGET SPECIES  
WITHIN THE PUBLIC LANDS FOCUSED PLANNING AREA (FPA)

SCIENTIFIC NAME COMMON NAME STATUS	% OF POINTS <sup>1</sup> IN FPA	% OF POLYGONS <sup>2</sup> IN FPA	% MAJOR POPULATIONS <sup>3</sup> IN FPA	STANDARDS AND GUIDELINES <sup>4</sup>	MEETS S&G	RISK <sup>5</sup> /COMMENTS
<i>Solanum tenuilobatum</i> Narrow-leaved nightshade C2/	65	30	70	Preserve adequate amount of major populations plus additional important populations.	Insufficient data	Low/Approximately 70% of major populations are included in FPA.
<i>Tetracoccus dioicus</i> Parry's tetracoccus C2/	66	53	59.5	Preserve adequate amount of major populations plus additional important populations.	No	High/1 of 3 major populations (Ramona/Barona Valley) is not in FPA, and 1 other major population is inadequately preserved.
<b>ANIMALS</b>						
<i>Euphyes vestris harbisoni</i> Harbison's dun skipper PE		Site-specific data not mapped	May occur in oak woodland riparian habitat north of San Pascual Valley.	Preserve adequate amount of major populations.	Insufficient data	Unknown/Potential habitat not included in FPA; dependent on other regional plans.
<i>Panoquina errans</i> Salt marsh skipper C2		Site-specific data not mapped	94	No net loss of existing occupied salt marsh habitat to retain 100% of populations.	Yes	Low/Likely to occupy coastal salt marshes in San Diego County (most on public lands).
<i>Lycaena hermes</i> Hermes copper butterfly C2	33	No polygons	50% of CSS	Preserve adequate amount of major populations.	Insufficient data	Unknown/6 of 9 point localities not included in FPA.
<i>Mitoura thornae</i> Thorne's hairstreak butterfly PE		No points	92	Preserve adequate amount of major populations.	Yes	Low
<i>Euphydryas editha quino</i> Quino checkerspot butterfly C1/	100	No polygons	Portions of historical localities are within FPA.	Preserve adequate amount of potential habitat to allow for reintroduction.	Insufficient data	Unknown/Believed to be extirpated from MSCP study area.
<i>Streptocephalus woottoni</i> Riverside fairy shrimp FE/	67	No polygons	67 - About 79% of vernal pool habitat	Preserve adequate amount of major populations plus additional potential habitat.	Yes	Moderate
<i>Bufo microscaphus californicus</i> Arroyo southwestern toad FE/SSC		Site-specific data not mapped	58% of riparian habitats and freshwater marsh	Preserve adequate amount of major populations plus additional potential habitat.	Insufficient data	Unknown/Would receive some protection per federal and state wetland regulations.
<i>Rana aurora draytoni</i> California red-legged frog PE/SSC		Site-specific data not mapped	57% of riparian habitats	Preserve adequate amount of potential habitat to allow for reintroduction.	Insufficient data	Unknown/Possibly extirpated from San Diego County; would receive some protection per federal and state wetland regulations.

Table 5-10 (Continued)

ADEQUACY OF PROTECTION AND DEGREE OF RISK FOR MSCP TARGET SPECIES  
WITHIN THE PUBLIC LANDS FOCUSED PLANNING AREA (FPA)

SCIENTIFIC NAME COMMON NAME STATUS	% OF POINTS <sup>1</sup> IN FPA	% OF POLYGONS <sup>2</sup> IN FPA	% MAJOR POPULATIONS <sup>3</sup> IN FPA	STANDARDS AND GUIDELINES <sup>4</sup>	MEETS S&G	RISK <sup>5</sup> /COMMENTS
<i>Clemmys marmorata pallida</i> Southwestern pond turtle C2/SSC	80	No polygons	58% of riparian habitats and freshwater marsh	Preserve adequate amount of major populations plus additional potential habitat.	Insufficient data	Unknown/Would receive some protection per federal and state wetland regulations.
<i>Phrynosoma coronatum blainvilliei</i> San Diego horned lizard C2/	47	No polygons	48% of CSS and chaparral habitats and riparian scrub	Preserve adequate amount of major populations plus additional potential habitat.	Maybe	Moderate
<i>Cnemidophorus hyperythrus beldingi</i> Orange-throated whiptail C2/	50	No polygons	48% of CSS and chaparral habitats and riparian scrub	Preserve adequate amount of major populations plus additional potential habitat.	Maybe	Moderate
<i>Pelecanus occidentalis californicus</i> California brown pelican FE/CE	No site- specific data	No site-specific data	84% of potential roosting habitat	Preserve adequate amount of roosting and foraging habitat.	Yes	Low
<i>Egretta rufescens</i> Reddish egret C2/	100	No polygons	100	Utilized habitat already protected.	Yes	Low
<i>Plegadis chihui</i> White-faced ibis C2/	100	No polygons	100	Preserve all of major populations plus important roosting and foraging habitat.	Yes	Low
<i>Branta canadensis</i> Canada goose none	Site-specific data not mapped.	Site-specific data not mapped.	41% of marshes, open water, some ag.	Preserve adequate amounts of roosting and foraging habitats.	Yes	Moderate/Would receive some protection per federal and state wetland regulations.
<i>Haliaeetus leucocephalus</i> Bald eagle FT/CE	50	No polygons	100	Preserve primary wintering habitat.	Yes	Low
<i>Circus cyaneus</i> Northern harrier --/SSC	34	No polygons	48% of CSS, grassland, and marsh habitats.	Preserve adequate amount of major populations plus additional roosting and foraging habitat.	No	Moderate/Dependent on habitat management and other regional programs; would receive some protection per federal and state wetland regulations.
<i>Accipiter cooperii</i> Cooper's hawk --/SSC	48	No polygons	29% of oak habitats	Preserve adequate amount of major populations plus additional roosting and foraging habitat.	No	High/Larger patches of potential habitat not included in FPA.
<i>Buteo swainsoni</i> Swainson's hawk --/CT	Site-specific data not mapped	Site-specific data not mapped	48% of grassland and CSS.	Preserve primary wintering habitat.	Yes	Moderate/Dependent on other regional programs.

Table 5-10 (Continued)

ADEQUACY OF PROTECTION AND DEGREE OF RISK FOR MSCP TARGET SPECIES WITHIN THE PUBLIC LANDS FOCUSED PLANNING AREA (FPA)

SCIENTIFIC NAME COMMON NAME STATUS	% OF POINTS <sup>1</sup> IN FPA	% OF POLYGONS <sup>2</sup> IN FPA	% MAJOR POPULATIONS <sup>3</sup> IN FPA	STANDARDS AND GUIDELINES <sup>4</sup>	MEETS S&G	RISK <sup>5</sup> /COMMENTS
<i>Buteo regalis</i> Ferruginous hawk C2/	Site-specific data not mapped	Site-specific data not mapped	48% of grassland and CSS.	Preserve primary wintering habitat.	Yes	Moderate/Dependent on other regional programs.
<i>Aquila chrysaetos</i> Golden eagle BEPA/SSC	53 (nesting localities)	No polygons	53 - 48% of potential foraging habitat preserved (grassland and CSS).	Preserve adequate amount of major populations plus additional roosting and foraging habitat.	No	High
<i>Falco peregrinus anatum</i> American peregrine falcon FE/CE	0 (nesting localities)	No polygons	0 - only known nesting site is not in FPA.	Preserve existing populations and additional potential habitat.	No	High/Nest site management is primary issue for this species.
<i>Rallus longirostris levisipes</i> Light-footed clapper rail FE/CE	70	96	96	Preserve existing populations and additional potential habitat.	Yes	Low
<i>Charadrius alexandrinus rivosus</i> Western snowy plover FT/SSC	84	84	84	Preserve existing populations and additional potential habitat.	No	Moderate
<i>Charadrius montanus</i> Mountain plover C2/	Site-specific data not mapped	Site-specific data not mapped	50	Preserve adequate amount of primary use area.	No	Moderate
<i>Numenius americanus</i> Long-billed curlew C3/SSC	63	0	Primary wintering habitat is partially included in FPA.	Preserve adequate amount of primary use area.	No	Moderate
<i>Sterna elegans</i> Elegant tern C2/	100	No polygons	100	Preserve existing populations and sufficient foraging habitat.	Yes	Low
<i>Sterna antillarum brownii</i> California least tern FE/CE	No points	100	100	Preserve existing populations and sufficient foraging habitat.	Yes	Low
<i>Speotyto cunicularia hypugaea</i> Burrowing owl C2/SSC	31	No polygons	43% of grassland	Preserve existing populations and sufficient foraging habitat.	No	High
<i>Empidonax traillii eximius</i> Southwestern willow flycatcher PE/CE	Site-specific data not mapped	Site-specific data not mapped	81% of riparian habitats	Preserve existing populations and sufficient potential habitat.	Maybe	Low/Areas historically occupied included in FPA; would receive some protection per federal and state wetland regulations.

Table 5-10 (Continued)

ADEQUACY OF PROTECTION AND DEGREE OF RISK FOR MSCP TARGET SPECIES WITHIN THE PUBLIC LANDS FOCUSED PLANNING AREA (FPA)

SCIENTIFIC NAME COMMON NAME STATUS	% OF POINTS <sup>1</sup> IN FPA	% OF POLYGONS <sup>2</sup> IN FPA	% MAJOR POPULATIONS <sup>3</sup> IN FPA	STANDARDS AND GUIDELINES <sup>4</sup>	MEETS S&G	RISK <sup>5</sup> /COMMENTS
<i>Campylorhynchus brunneicapillus conest</i> Coastal cactus wren C3/SSC	70	No polygons	75% of major populations.	Preserve existing viable populations and create sufficient potential habitat.	Maybe	Moderate/Dependent on habitat management and other regional programs.
<i>Poliopila californica californica</i> California gnatcatcher FT/SSC	60	No polygons	60	Preserve core populations plus additional important satellite populations.	Maybe	Moderate/Dependent on other regional programs.
<i>Sialia mexicana</i> Western bluebird none	27	No polygons	29% of oak habitats	Preserve adequate amount of potential habitat.	No	Moderate/Large populations occur on public lands east of study area; dependent on other regional programs.
<i>Vireo bellii pusillus</i> Least Bell's vireo FE/CE	77	No polygons	81% of riparian habitats	Preserve existing populations and additional potential habitat.	No	Low
<i>Amphispiza ruficeps canescens</i> California rufous-crowned sparrow C2/	53	No polygons	50% of CSS	Preserve adequate amount of major populations plus additional important populations.	Maybe	Moderate
<i>Passerculus sandwichensis beltingi</i> Belting's savannah sparrow C2/CE	78	No polygons	94	Preserve existing populations and additional potential habitat.	No	Low
<i>Passerculus sandwichensis rostratus</i> Large-billed savannah sparrow C2/	63	No polygons	94	Preserve adequate amount of major populations plus additional potential habitat.	Yes	Low
<i>Ammodramus savannarum</i> Grasshopper sparrow none	31	No polygons	43% of grassland	Preserve adequate amount of major populations and additional potential habitat.	No	High/Dependent on other regional programs.
<i>Agelaius tricolor</i> Tricolored blackbird C2/	50	No polygons	74% of freshwater marsh and riparian scrub	Preserve existing major populations and additional potential habitat.	Maybe	Moderate/Would receive some protection per federal and state wetland regulations.
<i>Plecotus townsendii</i> Townsend's western big-eared bat C2/SSC	Site-specific data not mapped	Site-specific data not mapped	The only known occupied area in MSCP study area is partially included in FPA.	Preserve adequate amount of major populations and additional potential habitat.	Insufficient data	Unknown

Table 5-10 (Continued)

ADEQUACY OF PROTECTION AND DEGREE OF RISK FOR MSCP TARGET SPECIES  
WITHIN THE PUBLIC LANDS FOCUSED PLANNING AREA (FPA)

SCIENTIFIC NAME COMMON NAME STATUS	% OF POINTS <sup>1</sup> IN FPA	% OF POLYGONS <sup>2</sup> IN FPA	% MAJOR POPULATIONS <sup>3</sup> IN FPA	STANDARDS AND GUIDELINES <sup>4</sup>	MEETS S&G	RISK <sup>5</sup> /COMMENTS
<i>Eumops perotis californicus</i> California mastiff-bat C2/SSC	Site-specific data not mapped	Site-specific data not mapped	Large portions of the 3 known occupied areas are included in FPA	Preserve adequate amount of major populations and additional potential habitat.	Insufficient data	Unknown
<i>Perognathus longimembris pacificus</i> Pacific little pocket mouse FE/SSC	Site-specific data not mapped	Site-specific data not mapped	<20% of coastal riparian scrub	Preserve existing populations and additional potential habitat.	No	High/May be extirpated from San Diego County.
<i>Taxidea taxus</i> American badger --/SSC	Site-specific data not mapped	Site-specific data not mapped	48% of grassland and CSS habitats.	Preserve adequate amount of major populations plus additional important populations.	Insufficient data	Unknown/Dependent on other regional programs.
<i>Felis concolor</i> Mountain lion --/see text	5	No polygons	48% of oak, CSS, chaparral, and riparian habitats.	Preserve adequate amount of major populations and additional potential habitat.	No	High/Dependent on other regional programs.
<i>Odocoileus hemionus fuliginata</i> Southern mule deer --/game species	61	No polygons	48% of oak, CSS, chaparral, and riparian habitats.	Preserve adequate amount of major populations and additional potential habitat.	Maybe	Moderate/Dependent on other regional programs.

Table 5-10 (Continued)

**ADEQUACY OF PROTECTION AND DEGREE OF RISK FOR MSCP TARGET SPECIES  
WITHIN THE PUBLIC LANDS FOCUSED PLANNING AREA (FPA)**

- 1 % of points = percentage of point locations in the GIS database that are captured in this preserve scenario; "no points" indicates no known localities in the study area for this species; "site-specific data not mapped" indicates locations exist, but we don't have specific locations mapped.
- 2 % of polygons = percentage of polygons in the GIS database that are captured in this preserve scenario; "no polygons" indicates no known localities in the study area for this species; "site-specific data not mapped" indicates locations exist, but we don't have specific locations mapped.
- 3 % of major populations = percentage of major populations (as defined in Biological Standards and Guidelines) that are captured in this preserve scenario. Not all major populations are in the GIS database, i.e., if specific locality data are lacking. In these cases, the percentage of major populations preserved is determined or estimated from the percentage of associated habitat in the focused planning area (e.g., if 0% of southern foredunes are preserved, than it is assumed that 0% of coastal dunes milk vetch will be preserved).
- 4 Standards and Guidelines. Refer to the text and Appendix A-9 (Biological Standards and Guidelines) for a full discussion of preservation standards and identification/delimitation of major populations.
- 5 Risk = risk of impacts to populations within the MSCP study area; analysis assumes populations within FPA are protected. (Note - viability of species may still be at risk.) For the PL alternative, analysis assumes 100% protection/preservation in some areas and 50% protection/preservation in others (see Figure 5-4).  
Low = little or no risk because species is adequately protected within FPA or majority of population is on protected lands outside the FPA.  
Moderate = species viability not ensured by FPA, but species would receive additional protection per federal and state wetland regulations, public ownership, and/or implementation of other regional conservation programs and habitat management.  
High = species is not adequately protected.  
Unknown = data insufficient to determine risk.
- 6 No occurrences documented in study area; number (if given) refers to percentage of appropriate habitat in preserve alternative.
- 7 Includes vernal pool complexes, and species points and polygons outside complexes (if present).
- 8 Not all points/polygons included in MSCP GIS database.

Status (Federal/State)

- FE = Federally endangered
- PE = Proposed for federal listing as endangered
- FT = Federally threatened
- PT = Proposed for federal listing as threatened
- C1 = Category 1 candidate for federal listing
- C2 = Category 2 candidate for federal listing
- C3 = Category 3 candidate for federal listing
- BEPA = Bald Eagle Protection Act
- CE = State endangered
- CR = State rare
- CT = State threatened
- SSC = State Species of Special Concern

Note: Shading indicates priority species (federally and state listed species, species proposed for listing, Category 1 candidate species, and NCCP target species).  
Source: 1994 MSCP GIS database.

this scenario indicates that none of these species would be adequately protected, if present, although thread-leaved brodiaea would receive some protection per federal wetland regulations. Distributional data are insufficient to definitively assess the adequacy of this scenario for four species (aphanisma, slender-pod jewelflower, Mission Canyon bluecup, and narrow-leaved nightshade). Based on known occurrences and an assessment of potential habitat, it appears that none of these species would be adequately conserved under this scenario, although the risk factor is low for aphanisma and narrow-leaved nightshade.

The PL scenario would adequately conserve 14 of the 45 target animal species per the Biological Standards and Guidelines (Table 5-10):

Adequately Protected Animals

Salt marsh skipper	Bald eagle*
Thorne's hairstreak butterfly*	Swainson's hawk*
Riverside fairy shrimp (NCCP)*	Ferruginous hawk
California brown pelican*	Light-footed clapper rail*
Reddish egret	Elegant tern
White-faced ibis	California least tern*
Canada goose	Large-billed savannah sparrow

\*Federal or state listed, category 1 candidate, or proposed for listing

An additional three animal species are considered at low risk in the study area:

Animals at Low Risk

Southwestern willow flycatcher*	Belding's savannah sparrow*
Least Bell's vireo*	

\*Federal or state listed, category 1 candidate, or proposed for listing

Only one of the NCCP target species for the MSCP (Riverside fairy shrimp) is considered to be protected or at low risk under this scenario. The viability of most of these species is questionable because of the fragmented nature of the PL configuration, inadequate conservation of core areas for the gnatcatcher and cactus wren, and questionable adequacy of linkages (only half of the linkage areas are proposed for preservation).

**5.3.5 Comparison of Scenarios**

**Habitats**

Table 5-11 compares the four scenarios by percent of vegetation community preserved. The CSS focused planning area includes a total of 32 percent of the habitats within the

Table 5-11  
SUMMARY COMPARISON OF SCENARIOS BY VEGETATION COMMUNITY

Vegetation Communities	Total MSCP Area (acres)	CSS (% of total)	Meets S&G	MH (% of total)	Meets S&G	BP (% of total)	Meets S&G	PL (% of total)	Meets S&G	Standards for Conservation
Beach	1,206	3%	No	47%	Yes	47%	Yes	64%	Yes	Conserve where sensitive species present.
Saltpan	235	0%	No	99%	Yes	99%	Yes	100%	Yes	100% unless isolated, <50 ac, disturbed, and no sensitive species.
Southern Foredunes	188	0%	No	97%	Yes	97%	Yes	99%	Yes	Conserve according to species guidelines, especially gnatcatcher and cactus wren.
Southern Coastal Bluff Scrub	198	88%	No	97%	Yes	97%	Yes	89%	No	100% unless isolated, <50 ac, disturbed, and no sensitive species.
Coastal Sage Scrub	115,636	53%	Yes	64%	Yes	72%	Yes	50%	Maybe	Conserve according to species guidelines, especially gnatcatcher and cactus wren.
Maritime Succulent Scrub	1,804	81%	No	89%	No	89%	No	71%	No	100% unless isolated, <50 ac, disturbed, and no sensitive species.
Chaparral	110,191	13%	No	41%	Maybe	50%	Maybe	43%	Maybe	Conserve according to species guidelines and where serves as linkages, buffers.
Southern Maritime Chaparral	1,777	25%	No	70%	No	71%	No	74%	No	100% unless isolated, <50 ac, disturbed, and no sensitive species.
CSS/Chaparral Scrub	3,878	49%	Yes	82%	Yes	84%	Yes	39%	Maybe	Conserve according to species guidelines, especially gnatcatcher and cactus wren.
Grassland	28,400	23%	No	47%	Maybe	57%	Maybe	43%	No	Conserve according to species guidelines, focusing on larger patches and where serves as linkages, buffers.
Southern Coastal Saltmarsh	1,870	3%	No <sup>1</sup>	95%	Yes <sup>1</sup>	95%	Yes <sup>1</sup>	94%	Yes <sup>1</sup>	No net loss.
Freshwater Marsh	817	46%	No <sup>1</sup>	81%	No <sup>1</sup>	90%	Maybe <sup>1</sup>	75%	No <sup>1</sup>	No net loss.
Riparian Forest	1,328	35%	No <sup>1</sup>	66%	No <sup>1</sup>	78%	No <sup>1</sup>	74%	No <sup>1</sup>	No net loss.
Oak Riparian Forest	5,382	27%	No <sup>1</sup>	44%	No <sup>1</sup>	51%	No <sup>1</sup>	31%	No <sup>1</sup>	No net loss.
Riparian Woodland	731	43%	No <sup>1</sup>	77%	No <sup>1</sup>	91%	Maybe <sup>1</sup>	92%	Maybe <sup>1</sup>	No net loss.
Riparian Scrub	5,395	28%	No <sup>1</sup>	67%	No <sup>1</sup>	75%	No <sup>1</sup>	74%	No <sup>1</sup>	No net loss.
Oak Woodland	5,622	14%	No	28%	No	42%	No	26%	No	Conserve if important for wildlife, linkages, buffers.
Torrey Pine Forest	169	25%	No <sup>2</sup>	92%	Yes <sup>2</sup>	92%	Yes <sup>2</sup>	93%	Yes <sup>2</sup>	Conserve all above 1500 ft or if sensitive species are present.
Tecate Cypress Forest	5,696	4%	No <sup>2</sup>	99%	Yes <sup>2</sup>	100%	Yes <sup>2</sup>	92%	Yes <sup>2</sup>	NA
Eucalyptus Woodland	1,631	12%	NA	23%	NA	32%	NA	22%	NA	NA
Open Water	5,726	62%	No <sup>1</sup>	84%	No <sup>1</sup>	86%	No <sup>1</sup>	82%	No <sup>1</sup>	No net loss.
Disturbed Wetlands	928	42%	No <sup>1</sup>	70%	No <sup>1</sup>	82%	No <sup>1</sup>	81%	No <sup>1</sup>	No net loss.
Natural Flood Channel	860	63%	No <sup>1</sup>	83%	No <sup>1</sup>	86%	No <sup>1</sup>	81%	No <sup>1</sup>	No net loss.
Shallow Bays	9,581	0%	NA	7%	No <sup>1</sup>	7%	NA	3%	NA	NA
Pacific Ocean	4,888	0%	NA	0%	NA	0%	NA	0%	NA	NA
Other <sup>3</sup>	756	0%	NA	35%	NA	35%	NA	78%	NA	NA
Subtotal	314,890	32%		55%		62%		47%		

Table 5-11 (Continued)  
**SUMMARY COMPARISON OF SCENARIOS BY VEGETATION COMMUNITY**

Vegetation Communities	Total MSCP Area (acres)	CSS (% of total)	Meets S&G	MH (% of total)	Meets S&G	BP (% of total)	Meets S&G	PL (% of total)	Meets S&G	Standards for Conservation
Disturbed Habitat	22,984	17%	NA	31%	NA	36%	NA	48%	NA	NA
Agriculture	28,594	12%	NA	19%	NA	25%	NA	24%	NA	NA
Developed	215,181	4%	NA	8%	NA	11%	NA	12%	NA	NA
<i>Subtotal</i>	<i>266,759</i>	<i>6%</i>		<i>11%</i>		<i>14%</i>		<i>16%</i>		
<b>TOTAL</b>	<b>581,649</b>	<b>20%</b>		<b>34%</b>		<b>40%</b>		<b>33%</b>		

1 Would receive some protection per federal and state wetland guidelines.

2 Major portion of habitat is preserved or proposed for open space.

3 Disturbed, Agricultural, and Developed areas with habitat value.

study area; the PL focused planning area includes 47 percent of the habitats within the study area; the MH focused planning area includes 55 percent of the habitats within the study area; and the BP focused planning area includes 62 percent of the habitats within the study area. The MH and BP scenarios achieve more of the Metropolitan Wastewater Department's stated MSCP objectives (see also Table 5-1).

The CSS scenario satisfies the Biological Standards and Guidelines for coastal sage scrub and coastal sage/chaparral scrub. It conserves the majority of coastal bluff scrub and maritime succulent scrub, but does not meet the Standards and Guidelines for these two rare habitats. The majority of wetland habitats are not specifically included in the CSS scenario, but would be protected per state and federal regulations. Torrey pine forest and Tecate cypress forest are largely outside the CSS focused planning area but are in preserved and proposed open space, respectively.

The PL scenario satisfies the Biological Standards and Guidelines for six habitats: beach, saltpan, southern foredunes, saltmarsh, Torrey pine forest, and Tecate cypress forest. The PL FPA includes 50 percent of the coastal sage scrub in the study area, 43 percent of the chaparral, and 39 percent of CSS/chaparral, but much of this area is in small, isolated patches not considered viable. Therefore, the adequacy of protection of these habitat types is questionable. The PL scenario includes less maritime succulent scrub (71 percent) than the CSS scenario (81 percent) but more southern maritime chaparral (74 percent vs 25 percent). The PL scenario includes significantly greater wetland acreages, including saltmarsh, than the CSS scenario.

The MH and BP scenarios meet the Biological Standards and Guidelines for nine habitats: beach, saltpan, southern foredunes, southern coastal bluff scrub, coastal sage scrub, CSS/chaparral, saltmarsh, Torrey pine forest, and Tecate cypress forest. These two scenarios also include the majority of maritime succulent scrub (89 percent) but do not adequately conserve all target species or all important areas of this rare and diminishing habitat. Based on analysis of the known patches of maritime succulent scrub in the study area, it is estimated that 99 percent of maritime scrub habitat should be conserved per the Biological Standards and Guidelines. More, but not all, wetland acreage is included in these scenarios than in the CSS scenario, and 47 percent (MH) and 57 percent (BP) of the grassland in the study area is included in the focused planning areas. Because of the large acreage needs of many raptors and large mammals, this amount may be insufficient to support the foraging needs of all species, and also does not include adequate conservation

of some grassland plant species (e.g., San Diego thornmint in the MH scenario). Conservation of grassland and chaparral habitats, as well as oak woodlands, must rely largely on the cumulative efforts of the three subregional conservation programs in San Diego County.

One of the biological objectives of the MSCP is to maintain the full representation of vegetation communities in the study area, with a focus on habitats considered sensitive, rare, or declining. An analysis of vegetation community acreage as a percent of the total acreage of each focused planning area shows that coastal sage scrub comprises a relatively greater proportion of all of the focused planning areas than its current representation in the study area (coastal sage scrub comprises 37 percent of the habitat in the MSCP study area, 64 percent of the CSS scenario habitats, 45 percent of the MH scenario habitats, 44 percent of the BP scenario habitats, and 39 percent of the PL scenario habitats). Maritime succulent scrub is also better represented in three of the scenarios (2 percent for the CSS scenario habitats, 1 percent for the MH and BP scenario habitats) than as a percentage of the total study area habitats (<1 percent); maritime succulent scrub comprises <1 percent of the PL scenario habitats. Tecate cypress forest is better represented in the PL, MH, and BP scenarios (3 percent) and less well represented in the CSS scenario (<1 percent) than for the total study area habitats (2 percent). On the other hand, both chaparral and grassland are less well represented in the four scenarios (chaparral comprises 35 percent of the MSCP study area habitats, 16 percent of the CSS scenario habitats, 29 percent of the MH scenario habitats, 30 percent of the BP scenario habitats, and 32 percent of the PL scenario habitats; grassland comprises 9 percent of the MSCP study area habitats, and 7 percent, 8 percent, 8 percent, and 9 percent of the CSS, PL, MH, and BP scenario habitats, respectively). Oak woodland also is less well represented in all four scenarios ( $\leq 1$  percent) than under current conditions (2 percent). The majority of the other communities were represented in relatively the same proportions in the FPAs as for the total study area.

Table 5-12 shows the vegetation community acreage within each focused planning area by jurisdiction. The majority of habitat acreage in all four scenarios is within the County of San Diego, followed by the City of San Diego, Miramar, and cities of Poway, Santee, and Chula Vista;  $\leq 1$  percent of habitat is contributed under any scenario by the other jurisdictions (Table 5-13). None of the scenarios includes Lemon Grove, and only the PL scenario includes La Mesa. Habitats in unincorporated areas occupy 62 percent of the study area and comprise 55-63 percent of the focused planning areas. City of San Diego

Table 5-12

**VEGETATION COMMUNITY ACRES WITHIN  
EACH FOCUSED PLANNING AREA <sup>1</sup> BY JURISDICTION**

Vegetation Community	Total Acres	CSS	MH	BP	PL
<b>CHULA VISTA</b>					
Coastal Sage Scrub	2,116	371	450	1,466	1,457
Maritime Succulent Scrub	27	27	26	29	21
Grassland	1,340	97	399	505	447
Southern Coastal Salt Marsh	298	0	247	252	251
Freshwater Marsh	13	0	5	11	7
Riparian Forest	14	0	10	15	12
Riparian Scrub	192	82	164	183	148
Eucalyptus Woodland	15	<1	<1	<1	15
Open Water	95	1	43	61	67
Natural Flood Channel	45	15	33	46	43
Shallow Bays	1,182	0	5	5	129
Pacific Ocean	116	0	0	0	0
Disturbed Wetlands	20	1	3	10	16
Other Habitat <sup>2</sup>	139	0	21	21	139
<i>Subtotal</i>	<i>5,612</i>	<i>597</i>	<i>1,406</i>	<i>2,604</i>	<i>2,754</i>
Disturbed Habitat	1,000	63	258	520	468
Agriculture	1,978	90	222	227	468
Developed	14,459	176	515	3,489	1,802
<b>TOTAL</b>	<b>23,049</b>	<b>926</b>	<b>2,403</b>	<b>6,842</b>	<b>5,492</b>
<b>CORONADO</b>					
Beach	479	0	271	271	326
Saltpan	21	0	21	21	21
Southern Foredunes	86	0	87	87	86
Maritime Succulent Scrub	34	0	34	34	34
Grassland	122	0	122	122	122
Southern Coastal Salt Marsh	40	0	28	28	29
Freshwater Marsh	5	0	5	5	5
Eucalyptus Woodland	8	0	0	0	0
Open Water	202	0	24	24	199
Shallow Bays	3,736	0	0	0	9
Pacific Ocean	162	0	0	0	0
Other Habitat <sup>2</sup>	208	0	43	43	160
<i>Subtotal</i>	<i>5,104</i>	<i>0</i>	<i>635</i>	<i>635</i>	<i>992</i>
Disturbed Habitat	386	0	144	144	141
Developed	4,055	0	353	353	357
<b>TOTAL</b>	<b>9,545</b>	<b>0</b>	<b>1,132</b>	<b>1,133</b>	<b>1,490</b>

Table 5-12 (Continued)

**VEGETATION COMMUNITY ACRES WITHIN  
EACH FOCUSED PLANNING AREA <sup>1</sup> BY JURISDICTION**

Vegetation Community	Total Acres	CSS	MH	BP	PL
<b>DEL MAR</b>					
Beach	72	0	14	14	15
Southern Foredunes	1	0	1	1	1
Southern Coastal Bluff Scrub	2	0	2	2	2
Coastal Sage Scrub	8	0	0	0	8
Southern Maritime Chaparral	17	0	6	6	8
Southern Coastal Salt Marsh	61	0	62	62	52
Freshwater Marsh	6	0	6	6	6
Torrey Pine Forest	9	0	0	0	0
Open Water	52	0	53	53	39
Disturbed Wetlands	4	0	5	5	4
Other Habitat <sup>2</sup>	55	0	53	53	53
<i>Subtotal</i>	287	0	202	202	188
Disturbed Habitat	39	0	23	23	18
Developed	814	0	235	235	179
<b>TOTAL</b>	<b>1,140</b>	<b>0</b>	<b>460</b>	<b>460</b>	<b>384</b>
<b>EL CAJON</b>					
Coastal Sage Scrub	275	30	36	36	138
Chaparral	42	0	0	0	33
Grassland	118	0	0	0	83
Riparian Scrub	3	0	0	0	0
<i>Subtotal</i>	438	30	36	36	254
Disturbed Habitat	212	0	0	0	189
Agriculture	18	0	0	0	3
Developed	8,576	11	11	11	779
<b>TOTAL</b>	<b>9,243</b>	<b>41</b>	<b>47</b>	<b>47</b>	<b>1,225</b>
<b>ESCONDIDO</b>					
Coastal Sage Scrub	611	268	277	440	11
Chaparral	108	40	40	40	0
Grassland	21	2	5	7	3
Freshwater Marsh	1	2	2	2	0
Oak Riparian Forest	30	2	10	26	0
Riparian Scrub	26	1	1	3	0
Oak Woodland	40	19	19	30	0
<i>Subtotal</i>	837	333	353	548	14
Disturbed Habitat	21	7	7	10	4
Agriculture	51	<1	<1	24	0
Developed	694	83	94	195	24
<b>TOTAL</b>	<b>1,603</b>	<b>424</b>	<b>455</b>	<b>777</b>	<b>44</b>

Table 5-12 (Continued)

**VEGETATION COMMUNITY ACRES WITHIN  
EACH FOCUSED PLANNING AREA <sup>1</sup> BY JURISDICTION**

Vegetation Community	Total Acres	CSS	MH	BP	PL
<b>IMPERIAL BEACH</b>					
Beach	154	0	96	96	139
Saltpan	73	0	74	74	73
Southern Foredunes	89	0	86	86	89
Coastal Sage Scrub	28	0	31	31	28
Grassland	20	0	17	17	17
Southern Coastal Salt Marsh	442	0	438	438	442
Freshwater Marsh	5	0	4	4	5
Riparian Scrub	177	0	172	172	177
Open Water	98	0	93	93	87
Disturbed Wetlands	33	0	29	29	33
Other Habitat <sup>2</sup>	1	0	1	1	1
<i>Subtotal</i>	<i>1,120</i>	<i>0</i>	<i>1,042</i>	<i>1,042</i>	<i>1,090</i>
Disturbed Habitat	143	0	91	91	142
Developed	1,624	0	97	97	391
<b>TOTAL</b>	<b>2,887</b>	<b>0</b>	<b>1,230</b>	<b>1,230</b>	<b>1,623</b>
<b>LA MESA</b>					
Coastal Sage Scrub	189	0	0	0	1
Grassland	10	0	0	0	0
Riparian Scrub	2	0	0	0	0
Open Water	10	0	0	0	0
<i>Subtotal</i>	<i>212</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>1</i>
Disturbed Habitat	44	0	0	0	0
Developed	5,561	0	0	0	112
<b>TOTAL</b>	<b>5,817</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>114</b>
<b>LEMON GROVE</b>					
Eucalyptus Woodland	1	0	0	0	0
<i>Subtotal</i>	<i>1</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>
Disturbed Habitat	103	0	0	0	0
Agriculture	10	0	0	0	0
Developed	2,379	0	0	0	0
<b>TOTAL</b>	<b>2,493</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>NATIONAL CITY</b>					
Coastal Sage Scrub	11	0	0	0	0
Grassland	30	0	0	0	0
Southern Coastal Salt Marsh	48	0	5	5	45
Freshwater Marsh	2	0	0	2	2
Riparian Scrub	44	0	0	30	41

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Table 5-12 (Continued)

**VEGETATION COMMUNITY ACRES WITHIN  
EACH FOCUSED PLANNING AREA <sup>1</sup> BY JURISDICTION**

Vegetation Community	Total Acres	CSS	MH	BP	PL
<b>NATIONAL CITY (Cont'd)</b>					
Open Water	154	0	118	135	140
Shallow Bays	402	0	0	0	14
Pacific Ocean	636	0	0	0	0
Other Habitat <sup>2</sup>	3	0	0	0	0
<i>Subtotal</i>	<i>1,330</i>	<i>0</i>	<i>123</i>	<i>172</i>	<i>242</i>
Disturbed Habitat	44	0	0	14	27
Agriculture	4	0	0	0	0
Developed	4,488	0	0	208	504
<b>TOTAL</b>	<b>5,866</b>	<b>0</b>	<b>123</b>	<b>394</b>	<b>773</b>
<b>POWAY</b>					
Coastal Sage Scrub	7,056	6,008	6,159	6,167	5,784
Chaparral	5,011	1,854	4,343	4,343	3,462
Coastal Sage/Chaparral	70	84	85	85	62
Grassland	627	393	485	485	483
Freshwater Marsh	4	<1	<1	<1	0
Riparian Forest	8	7	7	7	8
Oak Riparian Forest	422	325	369	369	331
Riparian Scrub	115	39	46	46	59
Oak Woodland	167	110	139	139	126
Eucalyptus Woodland	33	27	28	28	28
Open Water	69	64	66	66	64
Natural Flood Channel	23	22	24	24	21
<i>Subtotal</i>	<i>13,606</i>	<i>8,933</i>	<i>11,751</i>	<i>11,759</i>	<i>10,429</i>
Disturbed Habitat	1,369	465	541	541	865
Agriculture	1,044	612	637	637	608
Developed	9,041	1,452	1,898	1,985	1,926
<b>TOTAL</b>	<b>25,060</b>	<b>11,463</b>	<b>14,829</b>	<b>14,923</b>	<b>13,827</b>
<b>SAN DIEGO</b>					
Beach	501	32	76	76	292
Saltpan	141	0	138	138	141
Southern Foredunes	12	0	6	6	10
Southern Coastal Bluff Scrub	196	151	164	164	174
Coastal Sage Scrub	22,244	13,995	16,329	17,441	15,026
Maritime Succulent Scrub	1,470	1,332	1,449	1,449	995
Chaparral	11,935	3,841	9,540	10,978	6,219
Southern Maritime Chaparral	1,689	398	1,121	1,147	1,313
Coastal Sage/Chaparral	170	17	44	45	125
Grassland	11,436	3,091	6,847	8,624	5,454

Table 5-12 (Continued)

VEGETATION COMMUNITY ACRES WITHIN  
EACH FOCUSED PLANNING AREA <sup>1</sup> BY JURISDICTION

Vegetation Community	Total Acres	CSS	MH	BP	PL
<b>SAN DIEGO (Cont'd)</b>					
Southern Coastal Salt Marsh	980	52	888	890	960
Freshwater Marsh	286	116	248	253	258
Riparian Forest	531	210	318	386	512
Oak Riparian Forest	260	180	277	282	215
Riparian Woodland	608	316	569	659	565
Riparian Scrub	3,080	654	2,173	2,497	2,404
Oak Woodland	287	219	295	295	221
Torrey Pine Forest	159	42	152	152	158
Eucalyptus Woodland	652	12	45	65	181
Open Water	1,999	618	1,462	1,523	1,670
Disturbed Wetlands	500	259	401	440	458
Natural Flood Channel	270	266	400	419	247
Shallow Bays	4,260	0	0	0	160
Pacific Ocean	3,974	0	<1	<1	0
Other Habitat <sup>2</sup>	443	<1	181	182	309
<i>Subtotal</i>	<i>68,084</i>	<i>25,801</i>	<i>43,123</i>	<i>48,111</i>	<i>38,067</i>
Disturbed Habitat	9,338	1,663	3,572	4,109	4,761
Agriculture	9,674	1,197	2,205	3,303	5,026
Developed	108,656	2,187	6,202	8,582	13,272
<b>TOTAL</b>	<b>195,752</b>	<b>30,848</b>	<b>55,102</b>	<b>64,105</b>	<b>61,126</b>
<b>SANTEE</b>					
Coastal Sage Scrub	2,788	1,577	1,679	2,000	1,480
Chaparral	814	190	273	482	280
Coastal Sage/Chaparral	47	25	51	51	20
Grassland	669	147	475	498	158
Freshwater Marsh	8	0	0	0	8
Riparian Forest	27	0	0	0	24
Oak Riparian Forest	40	30	41	41	26
Riparian Woodland	<1	0	0	0	0
Riparian Scrub	140	0	0	6	118
Oak Woodland	6	6	6	6	6
Eucalyptus Woodland	3	0	0	<1	0
Open Water	161	0	14	14	144
Disturbed Wetlands	32	0	<1	<1	29
Natural Flood Channel	39	0	0	0	36
Other Habitat <sup>2</sup>	9	0	0	0	0
<i>Subtotal</i>	<i>4,781</i>	<i>1,974</i>	<i>2,538</i>	<i>3,099</i>	<i>2,329</i>
Disturbed Habitat	515	1	10	12	286
Agriculture	12	0	0	0	0
Developed	5,208	28	147	215	428
<b>TOTAL</b>	<b>10,516</b>	<b>2,003</b>	<b>2,695</b>	<b>3,326</b>	<b>3,044</b>

Table 5-12 (Continued)

VEGETATION COMMUNITY ACRES WITHIN  
EACH FOCUSED PLANNING AREA <sup>1</sup> BY JURISDICTION

Vegetation Community	Total Acres	CSS	MH	BP	PL
<b>SOLANA BEACH</b>					
Developed	5	0	0	0	0
<b>UNINCORPORATED<sup>3</sup></b>					
Coastal Sage Scrub	76,624	38,279	48,389	54,442	41,091
Maritime Succulent Scrub	273	255	261	261	233
Chaparral	82,242	9,198	32,353	40,291	31,122
Southern Maritime Chaparral	70	1	1	1	5
Coastal Sage/Chaparral	3,137	591	1,009	1,041	1,098
Grassland	11,514	2,856	5,031	5,994	3,759
Freshwater Marsh	409	208	301	353	269
Riparian Forest	725	223	501	581	557
Oak Riparian Forest	4,579	909	1,692	2,082	1,388
Riparian Woodland	24	6	12	23	17
Riparian Scrub	1,593	754	1,139	1,222	1,055
Oak Woodland	5,118	392	1,010	1,743	1,260
Tecate Cypress Forest	5,696	211	5,632	5,711	5,253
Eucalyptus Woodland	889	155	290	423	149
Open Water	2,846	2,778	2,796	2,806	2,667
Disturbed Wetlands	337	61	101	145	225
Natural Flood Channel	471	356	404	408	381
Other Habitat <sup>2</sup>	84	<1	1	1	0
<i>Subtotal</i>	<i>196,630</i>	<i>57,232</i>	<i>100,924</i>	<i>117,528</i>	<i>90,527</i>
Disturbed Habitat	6,500	1,274	1,742	2,002	1,471
Agriculture	15,802	1,407	2,264	2,730	1,265
Developed	46,616	5,006	7,085	8,594	4,511
<b>TOTAL</b>	<b>265,548</b>	<b>64,920</b>	<b>112,014</b>	<b>130,852</b>	<b>97,774</b>
<b>MIRAMAR<sup>4</sup></b>					
Coastal Sage Scrub	3,685	--	--	--	3,678
Chaparral	10,039	--	--	--	10,025
Coastal Sage/Chaparral	454	--	--	--	451
Grassland	2,493	--	--	--	2,482
Freshwater Marsh	78	--	--	--	78
Riparian Forest	23	--	--	--	23
Oak Riparian Forest	51	--	--	--	51
Riparian Woodland	98	--	--	--	98
Riparian Scrub	23	--	--	--	23
Oak Woodland	6	--	--	--	6
Eucalyptus Woodland	29	--	--	--	29
Open Water	42	--	--	--	42

Table 5-12 (Continued)

VEGETATION COMMUNITY ACRES WITHIN  
EACH FOCUSED PLANNING AREA <sup>1</sup> BY JURISDICTION

Vegetation Community	Total Acres	CSS	MH	BP	PL
<b>MIRAMAR<sup>4</sup> (Cont'd)</b>					
Disturbed Wetlands	1	--	--	--	1
Natural Flood Channel	13	--	--	--	13
<i>Subtotal</i>	<i>17,036</i>	--	--	--	<i>17,001</i>
Disturbed Habitat	3,270	--	--	--	3,258
Developed	2,819	--	--	--	2,758
<b>TOTAL</b>	<b>23,125</b>	<b>--</b>	<b>--</b>	<b>--</b>	<b>23,017</b>
<b>TOTAL STUDY AREA</b>	<b>581,649</b>	<b>110,626</b>	<b>190,490</b>	<b>224,089</b>	<b>209,932</b>

Note: Numbers may not sum to totals as shown, due to rounding.

<sup>1</sup> Acreages are for the entire focused planning area for each scenario, assuming 100 percent preservation throughout the FPA, and include habitats, agriculture, and developed lands.

<sup>2</sup> Disturbed, agricultural, and developed areas with habitat value.

<sup>3</sup> Includes City of San Diego Lands around San Vicente Reservoir, Otay Lakes, and Marron Valley (approximately 7,120 acres).

<sup>4</sup> Acreages for Miramar are broken out separately for the total study area and the PL scenario but are included in City of San Diego acreages for the CSS, MH, and BP scenarios.

Source: 1994 MSCP GIS database for total study area and the PL scenario;  
1993 MSCP GIS database for the CSS, MH, and BP scenarios.

Table 5-13

COMPARISON OF HABITAT ACREAGE CONTRIBUTIONS TO EACH FOCUSED PLANNING AREA BY JURISDICTION

	% of Study Area Habitats	% of CSS Scenario Habitats	% of MH Scenario Habitats	% of BP Scenario Habitats	% of PL Scenario Habitats
Chula Vista	2	<1	<1	1	2
Coronado	2	0	<1	<1	<1
Del Mar	<1	0	<1	<1	<1
El Cajon	<1	<1	<1	<1	<1
Escondido	<1	<1	<1	<1	<1
Imperial Beach	<1	0	<1	<1	<1
La Mesa	<1	0	0	0	<1
Lemon Grove	<1	0	0	0	0
National City	<1	0	<1	<1	<1
Poway	4	9	7	6	6
San Diego	22	27	27	26	23
Santee	2	2	2	2	1
Unincorporated <sup>1</sup>	62	60	62	63	55
Miramar <sup>2</sup>	5	-	-	-	10

<sup>1</sup> Includes City of San Diego lands around San Vicente Reservoir, Otay Lakes, and Marron Valley (approximately 7120 acres).

<sup>2</sup> Miramar acres included in San Diego total for CSS, MH, and BP scenarios.

habitats occupy 22 percent of the study area and comprise 23-27 percent of the focused planning areas. Poway habitats occupy 4 percent of the study area and 6-9 percent of the focused planning areas (Table 5-13).

### **Core Areas and Linkages**

Table 5-14 evaluates the percentages of the core biological resource areas and linkages included in the four scenarios. The CSS scenario overall includes less than half of the core biological resource areas (43 percent). The CSS scenario includes 85 percent of core #3 (Point Loma) and more than half of an additional seven core areas. It includes little to none of five core areas and about 13 percent of the linkages. The MH scenario overall includes 74 percent of the core areas, including 90 percent of four cores and 75 percent or greater of five others. It includes 24 percent of the linkages. The BP scenario overall includes 84 percent of the core areas, including 90 percent of eight core areas and over 75 percent of six others. It includes 33 percent of the linkages, lacking three key linkages to the eastern portion of the county. The PL scenario overall includes 63 percent of the core areas, including 93 percent of Point Loma, San Dieguito Lagoon, and the Miramar vernal pools, and 75 percent or greater of three other core areas. The linkages in the PL scenario are similar to those in the CSS scenario, encompassing 16 percent of the key linkages identified for the study area.

### **Configuration and Preserve Design**

Several of the biological criteria for preserve planning area design address preserve configuration, including patch size, shape, edge-to-area-ratio, fragmentation, buffers, and proximity or connectivity to other preserve areas (Section 4.1.3 and NCCP Conservation Guidelines). As the lands around the proposed preserve areas in San Diego County will all be subject to future development of some sort, preserve designs that do not consider these factors may not be viable over the long term because of negative edge effects resulting from fire prevention requirements, predation by pets, noise, lights, etc.

In general, the western portions of all four preserve scenarios exhibit poorer preserve design than the eastern portions; this is largely a result of existing development constraints. The eastern portions generally exhibit larger contiguous blocks of habitat, thus minimizing the amount of convoluted boundary between the preserve lands and the developing lands, and consequently maximizing the self-sufficiency of the preserve. The PL scenario, and to

Table 5-14

**PERCENT OF CORE BIOLOGICAL RESOURCE  
AREAS AND LINKAGES WITHIN EACH SCENARIO**

Core Area <sup>1</sup>	Acreage <sup>2</sup>	Coastal Sage Scrub Scenario <sup>2,3</sup> (% of core)	Multiple Habitat Scenario <sup>2,3</sup> (% of core)	Biologically Preferred <sup>2,3</sup> (% of core)	Public Lands Scenario <sup>2,4</sup> (% of core)
1 Tijuana Estuary/River Valley	3,051	0	74	90	80
2 South San Diego Bay/ Silver Strand	2,317	0	90	90	75
3 Point Loma	710	85	90	90	93
4 Otay Lakes/Otay Mesa/ Otay River Valley	17,156	73	82	90	68
5 Otay Mountain/Marron Valley	28,216	10	83	90	79
6 Jamul Mountains	8,285	43	74	90	65
7 Sweetwater Reservoir/ San Miguel Mountain/ Sweetwater River	12,963	61	90	90	53
8 McGinty Mountain/Sequan Peak/ Dehesa	15,922	34	48	72	44
9 Lake Jennings/Wildcat Canyon/ El Cajon Mountain	9,830	45	64	85	64
10 Mission Trails/East Elliott/Santee/ Miramar	17,629	55	70	79	66
11 Central Poway/San Vicente Reservoir/ North Poway	27,849	51	75	83	47
12 Lake Hodges/San Pasqual Valley	26,104	59	70	84	55

Table 5-14 (Continued)  
**PERCENT OF CORE BIOLOGICAL RESOURCE  
 AREAS AND LINKAGES WITHIN EACH SCENARIO**

Core Area <sup>1</sup>	Acreage <sup>2</sup>	Coastal Sage Scrub Scenario <sup>2,3</sup> (% of core)	Multiple Habitat Scenario <sup>2,3</sup> (% of core)	Biologically Preferred <sup>2,3</sup> (% of core)	Public Lands Scenario <sup>2,4</sup> (% of core)
13 San Dieguito Lagoon	1,278	0	79	83	93
14 Los Peñasquitos Lagoon/ Del Mar Mesa/Peñasquitos Canyon	9,188	52	87	88	70
15 Vernal Pools, Miramar	8,289	5	56	62	93
16 Vernal Pools, Otay Mesa	885	67	90	90	33
Subtotal Cores <sup>5</sup>	189,670	43	74	84	63
Linkages	13,166	13	24	33	16
TOTAL	202,837	42	71	81	60

<sup>1</sup> See Figure 4-9 for map of core and linkage areas.  
<sup>2</sup> Excluding Disturbed Habitat, Agriculture, and Developed.  
<sup>3</sup> Assumes 90% preservation of habitats within the FPA.  
<sup>4</sup> Assumes 100% and 50% preservation of habitats within different areas of the FPA.  
<sup>5</sup> Percent of core for each scenario is based on actual acreage within individual core areas rather than percent of acreage within core areas.

a lesser extent the CSS scenario by virtue of its smaller overall acreage, exhibit poorer preserve design than the MH and BP scenarios. Much of the PL acreage is comprised of numerous small, isolated or peninsular blocks of habitat, especially in the remaining finger canyons and in proposed development areas within the City of San Diego and some of the smaller cities within the study area. Approximately 62 percent of polygons in the PL scenario are less than 50 acres; mean polygon size is 546 acres. While these areas contribute to the aesthetic value and human recreational aspects of the preserve system, and in some cases retain important habitat, their long-term value as biological reserves is questionable.

The MH and BP scenarios exhibit larger polygons or blocks of habitat, smaller edge-to-area ratios of preserve blocks, less fragmentation, greater buffer allowances, and greater connectivity to other preserve areas and areas outside the MSCP study area. Approximately 33 percent of MH polygons and 23 percent of BP polygons are less than 50 acres; mean polygon sizes for the MH and BP scenarios are 2543 acres and 2523 acres, respectively. The result is greater number of target species protected, greater biodiversity, and greater assurances that the region's conservation efforts will be effective and self-sustaining over the long term.

### **Target Species**

Table 5-15 compares all four preserve scenarios in terms of the adequacy of protection of the 93 MSCP target species. The CSS scenario is focused toward the conservation of the coastal sage scrub ecosystem; therefore, only upland species obligate to this specific vegetation community are likely to be adequately protected. A total of 13 target species are considered to be adequately protected and therefore would likely qualify for federal Section 10(a) permits or pre-listing agreements and state Section 2081 agreements under the CSS scenario: Dean's milk-vetch, sticky dudleya, Palmer's ericameria, coast wallflower, San Diego barrel cactus, small-leaved rose, California gnatcatcher, orange-throated whiptail, San Diego horned lizard, California rufous-crowned sparrow, reddish egret, white-faced ibis, and bald eagle. The coastal cactus wren may also qualify for a 10(a) permit if habitat restoration/creation programs are successful. Eight of these are NCCP species. An additional 13 species are considered at low risk and may qualify for 10a permits or pre-listing agreements if special management conditions are included.

Table 5-15  
**COMPARISON OF PROTECTION AND RISK FOR MSCP TARGET SPECIES  
 AMONG THE FPA SCENARIOS**

SCIENTIFIC NAME COMMON NAME STATUS	STANDARDS AND GUIDELINES <sup>1</sup>	MEETS STANDARDS AND GUIDELINES/RISK <sup>2</sup>	PL	
PLANTS	CSS	MH	BP	
<i>Acanthomintha ilicifolia</i> San Diego thom-mint C1/CE	Preserve adequate amount of major populations plus additional important populations.	No/Moderate	Yes/Low	No/High
<i>Agave shawii</i> Shaw's agave C2/	Preserve 100% of extant populations.	Yes/Low	Yes/Low	Yes/Low
<i>Ambrosia pumila</i> San Diego ambrosia C2/	Preserve 100% of major populations plus additional important populations.	Yes/Low	Yes/Low	No/Low
<i>Aphanisma bitroides</i> Aphanisma C2/	Preserve 100% of extant populations plus additional important populations.	Insufficient data/Low	Insufficient data/Low	Insufficient data/Low
<i>Arctostaphylos glandulosa</i> var. <i>crassifolia</i> Del Mar manzanita PE/	Preserve adequate amount of major populations.	Yes/Low	Yes/Low	Yes/Low
<i>Arctostaphylos otayensis</i> Otay manzanita C2/	Preserve adequate amount of major populations plus additional important populations.	No/Moderate	Yes/Low	No/High
<i>Astragalus deanei</i> Dean's milk vetch C2/	Preserve 100% of extant populations plus additional important populations.	Yes/Low	Yes/Low	No/High
<i>Astragalus tener</i> var. <i>titi</i> Coastal dunes milk vetch C1/CE	Preserve 100% of extant populations plus 100% of any new populations.	No/High	Yes/Low	Yes/Low
<i>Baccharis vanessae</i> Encinitas baccharis PE/CE	Preserve adequate amount of major populations plus additional important populations.	No/High	Yes/Low	No/High
<i>Brodiaea filifolia</i> Thread-leaved brodiaea PT/CE	Preserve 100% of extant populations plus additional important populations.	No/Moderate	No/Moderate	No/Moderate
<i>Brodiaea orcuttii</i> Orcutt's brodiaea C2/	Preserve and manage 100% of vernal pool complexes that support this species.	No/Low	No/Low	No/Low

Table 5-15 (Continued)  
 COMPARISON OF PROTECTION AND RISK FOR MSCP TARGET SPECIES  
 AMONG THE FPA SCENARIOS

SCIENTIFIC NAME COMMON NAME STATUS	STANDARDS AND GUIDELINES <sup>1</sup>		MEETS STANDARDS AND GUIDELINES/RISK <sup>2</sup>				
	CSS	MH	BP	PL			
<i>Calochortus dunnii</i> Dunn's mariposa lily C2/CR	Preserve 100% of extant populations plus additional important populations.	Yes/High	Yes/Low	No/Moderate			
<i>Caulanthus stenocarpus</i> Slender-pod jewelflower C3/CR	Preserve adequate amount of major populations plus additional important populations.	Insufficient data/Low	Insufficient data/Low	Insufficient data/High			
<i>Ceanothus cyaneus</i> Lakeside ceanothus C2/	Preserve adequate amount of major populations plus additional important populations.	No/High	Yes/Low	No/High			
<i>Ceanothus verrucosus</i> Wart-stemmed ceanothus C2/	Preserve adequate amount of major populations plus additional important populations.	No/High	Yes/Low	No/Moderate			
<i>Chorizanthe orcuttiana</i> Orcutt's spineflower PE/CE	Preserve 100% of extant populations plus additional important populations.	No/High	No/High	No/High			
<i>Cordylanthus maritimus</i> ssp. <i>maritimus</i> Salt marsh bird's-beak FE/CE	Preserve 100% of extant populations plus 100% of any new populations.	No/Low	Yes/Low	No/Low			
<i>Cordylanthus orcuttianus</i> Orcutt's bird's-beak C2/	Preserve adequate amount of major populations plus additional important populations.	No/High	Yes/Low	No/Moderate			
<i>Corethrogyne filaginifolia</i> var. <i>linifolia</i> Del Mar Mesa sand aster PT/	Preserve adequate amount of major populations plus additional important populations.	No/Moderate	Yes/Low	No/Moderate			
<i>Cupressus forbesii</i> Tecate cypress C2/	Preserve 100% of extant population on Otay Mountain above 1500 feet elevation.	No/Moderate	No/Low	No/Moderate			
<i>Dudleya brevifolia</i> Short-leaved dudleya PE/CE	Preserve 100% of extant populations plus additional important populations.	No/High	No/Low	No/High			
<i>Dudleya variegata</i> Variegated dudleya C2/	Preserve adequate amount of major populations plus additional important populations.	No/High	Yes/Low	No/Moderate			

Table 5-1b (Continued)

COMPARISON OF PROTECTION AND RISK FOR MSCP TARGET SPECIES  
AMONG THE FPA SCENARIOS

SCIENTIFIC NAME COMMON NAME STATUS	STANDARDS AND GUIDELINES <sup>1</sup>	CSS	MH	BP	PL
<i>Dudleya viscida</i> Sticky dudleya C1/	Preserve 100% of extant populations plus additional important populations.	Yes/Low	Yes/Low	Yes/Low	No/Moderate
<i>Ericameria palmeri</i> ssp. <i>palmeri</i> Palmer's ericameria C2/	Preserve adequate amount of major populations plus additional important populations.	Yes/Low	Yes/Low	Yes/Low	No/Moderate
<i>Eryngium aristulatum</i> var. <i>parishii</i> San Diego button-celery FE/CE	Preserve 100% of vernal pool complexes and grasslands that support major populations plus additional important populations.	No/Moderate	No/Low	No/Low	No/Low
<i>Erysimum ammophilum</i> Coast wallflower C2/	Preserve adequate amount of major populations plus additional important populations.	Yes/Low	Yes/Low	Yes/Low	Yes/Low
<i>Ferocactus viridescens</i> San Diego barrel cactus C2/	Preserve adequate amount of major populations plus additional important populations.	Yes/Low	Yes/Low	Yes/Low	Yes/Low
<i>Fremontodendron mexicanum</i> Mexican flamebush C2/CR	Preserve 100% of extant populations plus additional important populations.	No/High	No/High	Yes/Low	No/Low
<i>Githopsis diffusa</i> ssp. <i>filicaulis</i> Mission Canyon bluecup C2/	Preserve 100% of extant populations plus additional important populations.	Insufficient data/High	Insufficient data/High	Insufficient data/Low	Insufficient data/High
<i>Hemizonia conjugens</i> Otay tarplant C2/CE	Preserve adequate amount of major populations plus additional important populations.	No/High	Yes/Low	Yes/Low	No/High
<i>Hemizonia floribunda</i> Tecate tarplant C2/	Preserve adequate amount of major populations plus additional important populations.	No/High	Yes/Low	Yes/Low	No/Moderate
<i>Lepechinia cardiophylla</i> Heart-leaved pitcher sage C2/	Preserve 100% of extant populations plus additional important populations.	No/High	Yes/Low	Yes/Low	No/High

Table 5-15 (Continued)

COMPARISON OF PROTECTION AND RISK FOR MSCP TARGET SPECIES  
AMONG THE EPA SCENARIOS

SCIENTIFIC NAME COMMON NAME STATUS	STANDARDS AND GUIDELINES <sup>1</sup>	MEETS STANDARDS AND GUIDELINES/RISK <sup>2</sup>	CSS	MH	BP	PL
<i>Lepechinia ganderi</i> Gander's pitcher sage C2/	Preserve adequate amount of major populations plus additional important populations.	Yes/Low	No/High	Yes/Low	Yes/Low	No/Moderate
<i>Lotus nuttallianus</i> Nuttall's lotus C2/	Preserve 100% of extant populations plus additional important populations.	Yes/Low	No/Moderate	Yes/Low	Yes/Low	Yes/Low
<i>Monardella tinoides</i> ssp. <i>viminea</i> Willoway monardella C2/CE	Preserve 100% of extant populations on Olay Mountain and Marron Valley plus additional important populations.	Yes/Low	No/Moderate	Yes/Low	Yes/Low	No/Low
<i>Muilla clevelandii</i> San Diego goldensiar C2/	Preserve adequate amount of major populations plus additional important populations.	Yes/Low	No/High	Yes/Low	Yes/Low	No/Moderate
<i>Myosurus minimus</i> ssp. <i>apus</i> Little mousetail C2/	Preserve 100% of extant populations plus additional important populations.	No/Moderate	No/Moderate	No/Moderate	No/Low	No/Moderate
<i>Navarretia fossalis</i> Prostrate navarretia PT/	Preserve 100% of extant populations plus additional important populations.	No/Low	No/Moderate	No/Low	No/Low	No/Moderate
<i>Nolina interrata</i> Dehesa bear-grass C1/CE	Preserve a minimum of 90% of major populations.	No/Moderate	No/High	No/Moderate	No/Moderate	No/High
<i>Opuntia parryi</i> var. <i>serpentina</i> Snake cholla C2/	Preserve 100% of selected populations and an adequate amount of major populations plus additional important populations.	Yes/Low	No/Low	Yes/Low	Yes/Low	Yes/Low
<i>Orcuttia californica</i> California orcutt grass FE/CE	Preserve 100% of extant populations plus 100% of any new populations.	No/Low	No/Moderate	No/Low	No/Low	No/Low
<i>Pinus torreyana</i> Torrey pine C2/	Preserve 100% of extant populations plus additional important populations.	Yes/Low	No/Low	Yes/Low	Yes/Low	Yes/Low

Table 5-15 (continued)

COMPARISON OF PROTECTION AND RISK FOR MSCP TARGET SPECIES AMONG THE FPA SCENARIOS

SCIENTIFIC NAME COMMON NAME STATUS	STANDARDS AND GUIDELINES <sup>1</sup>	MEETS STANDARDS AND GUIDELINES/RISK <sup>2</sup>					
		CSS	MH	BP	PL		
<i>Pogogyne abramsii</i> San Diego mesa mint FE/CE	Preserve 100% of extant populations plus additional important populations.	No/Moderate	No/Low	No/Low	No/Low	No/Low	No/Low
<i>Pogogyne nudiuscula</i> Olaj Mesa mint FE/CE	Preserve 100% of extant populations plus 100% of any new populations.	No/Moderate	Yes/Low	Yes/Low	Yes/Low	No/Moderate	No/Moderate
<i>Rosa minutifolia</i> Small-leaved rose --/CE	Preserve 100% of extant population(s).	Yes/Low	Yes/Low	Yes/Low	Yes/Low	No/High	No/High
<i>Senecio ganderi</i> Gander's butterweed C2/CR	Preserve 100% of extant populations plus additional important populations.	No/Moderate	Yes/Low	Yes/Low	Yes/Low	No/Moderate	No/Moderate
<i>Solanum tenuilobatum</i> Narrow-leaved nightshade C2/	Preserve adequate amount of major populations plus additional important populations.	Insufficient data/High	Insufficient data/Low	Insufficient data/Low	Insufficient data/Low	Insufficient data/Low	Insufficient data/Low
<i>Tetracoccus parryi</i> Parry's tetracoccus C2/	Preserve adequate amount of major populations plus additional important populations.	No/High	Yes/Low	Yes/Low	Yes/Low	No/High	No/High
<b>ANIMALS</b>							
<i>Euphyes vestris harbisoni</i> Harbison's dun skipper PE	Preserve adequate amount of major populations	Insufficient data/Unknown	Insufficient data/Unknown	Insufficient data/Unknown	Insufficient data/Unknown	Insufficient data/Unknown	Insufficient data/Unknown
<i>Panoquina errans</i> Salt marsh skipper C2	No net loss of existing occupied salt marsh habitat to retain 100% of populations	No/Low	Yes/Low	Yes/Low	Yes/Low	Yes/Low	Yes/Low
<i>Lycaena hermes</i> Hermes copper butterfly C2	Preserve adequate amount of major populations	Insufficient data/Unknown	Insufficient data/Unknown	Insufficient data/Unknown	Insufficient data/Unknown	Insufficient data/Unknown	Insufficient data/Unknown
<i>Mitoura thornei</i> Thorne's hairstreak butterfly PE	Preserve adequate amount of major populations	No/Moderate	Yes/Low	Yes/Low	Yes/Low	Yes/Low	Yes/Low
<i>Euphydryas editha quino</i> Quino checkerspot butterfly C1/	Preserve adequate amount of potential habitat to allow for reintroduction	Insufficient data/Unknown	Insufficient data/Unknown	Insufficient data/Unknown	Insufficient data/Unknown	Insufficient data/Unknown	Insufficient data/Unknown

Table 5-15 (Continued)

COMPARISON OF PROTECTION AND RISK FOR MSCP TARGET SPECIES  
AMONG THE FPA SCENARIOS

SCIENTIFIC NAME COMMON NAME STATUS	STANDARDS AND GUIDELINES <sup>1</sup>	MEETS STANDARDS AND GUIDELINES/RISK <sup>2</sup>	CSS	MH	BP	PL
<i>Streptocephalus woofioni</i> Riverside fairy shrimp FE	Preserve adequate amount of major populations plus additional potential habitat	Yes/Low	No/Moderate	Yes/Low	Yes/Low	Yes/Moderate
<i>Bufo microscaphus californicus</i> Arroyo southwestern toad FE/SSC	Preserve adequate amount of major populations plus additional potential habitat	Insufficient data/Unknown	Insufficient data/Unknown	Insufficient data/Unknown	Insufficient data/Unknown	Insufficient data/Unknown
<i>Rana aurora draytoni</i> California red-legged frog PE/SSC	Preserve adequate amount of potential habitat to allow for reintroduction	Insufficient data/Unknown	Insufficient data/Unknown	Insufficient data/Unknown	Insufficient data/Unknown	Insufficient data/Unknown
<i>Clemmys marmorata pallida</i> Southwestern pond turtle C2/SSC	Preserve adequate amount of major populations plus additional potential habitat	Insufficient data/Unknown	Insufficient data/Unknown	Insufficient data/Unknown	Insufficient data/Unknown	Insufficient data/Unknown
<i>Phrynosoma cornutum blainvillei</i> San Diego horned lizard C2/	Preserve adequate amount of major populations plus additional potential habitat	Yes/Moderate	Yes/Moderate	Yes/Low	Yes/Low	Maybe/Moderate
<i>Cnemidophorus hyperythrus beldingi</i> Orange-throated whiptail C2/	Preserve adequate amount of major populations plus additional potential habitat	Yes/Moderate	Yes/Moderate	Yes/Low	Yes/Low	Maybe/Moderate
<i>Pelecanus occidentalis californicus</i> California brown pelican FE/CE	Preserve adequate amount of roosting and foraging habitat	No/Low	No/Low	Yes/Low	Yes/Low	Yes/Low
<i>Egretta rufescens</i> Reddish egret C2/	Utilized habitat already protected	Yes/Low	Yes/Low	Yes/Low	Yes/Low	Yes/Low
<i>Plegadis chihii</i> White-faced ibis C2/	Preserve all of major populations plus important roosting and foraging habitat	Yes/Low	Yes/Low	Yes/Low	Yes/Low	Yes/Low
<i>Branta canadensis</i> Canada goose none	Preserve adequate amounts of roosting and foraging habitats.	No/Moderate	No/Moderate	Yes/Moderate	Yes/Moderate	Yes/Moderate
<i>Haliaeetus leucocephalus</i> Bald eagle FT/CE	Preserve primary wintering habitat	Yes/Low	Yes/Low	Yes/Low	Yes/Low	Yes/Low
<i>Circus cyaneus</i> Northern harrier --/SSC	Preserve adequate amount of major populations plus additional roosting and foraging habitat	No/Moderate	No/Moderate	Maybe/Moderate	Maybe/Moderate	No/Moderate

Table 5-15 (continued)

COMPARISON OF PROTECTION AND RISK FOR MSCP TARGET SPECIES AMONG THE FPA SCENARIOS

SCIENTIFIC NAME COMMON NAME STATUS	STANDARDS AND GUIDELINES <sup>1</sup>	MEETS STANDARDS AND GUIDELINES/RISK <sup>2</sup>				
		CSS	MH	BP	PL	
<i>Accipiter cooperii</i> Cooper's hawk --/SSC	Preserve adequate amount of major populations plus additional roosting and foraging habitat	No/High	Maybe/Moderate	Maybe/Moderate	No/High	
<i>Buteo swainsoni</i> Swainson's hawk --/CT	Preserve primary wintering habitat	No/High	Yes/Moderate	Yes/Moderate	Yes/Moderate	
<i>Buteo regalis</i> Ferruginous hawk C2/	Preserve primary wintering habitat	No/High	Yes/Moderate	Yes/Moderate	Yes/Moderate	
<i>Aquila chrysaetos</i> Golden eagle BEP/SSC	Preserve adequate amount of major populations plus additional roosting and foraging habitat	No/High	Maybe/Moderate	Maybe/Low	No/High	
<i>Falco peregrinus anatum</i> American peregrine falcon FE/CE	Preserve existing populations and additional potential habitat	No/High	No/High	No/High	No/High	
<i>Rallus longirostris levisipes</i> Light-footed clapper rail FE/CE	Preserve existing populations and additional potential habitat	No/Low	Yes/Low	Yes/Low	Yes/Low	
<i>Charadrius alexandrinus nivosus</i> Western snowy plover FT/SSC	Preserve existing populations and additional potential habitat	No/Moderate	Yes/Low	Yes/Low	No/Moderate	
<i>Charadrius montanus</i> Mountain plover C2/	Preserve adequate amount of primary use area	No/High	Yes/Low	Yes/Low	No/Moderate	
<i>Numenius americanus</i> Long-billed curlew C3/SSC	Preserve adequate amount of primary use area	No/Moderate	Yes/Low	Yes/Low	No/Moderate	
<i>Sterna elegans</i> Elegant tern C2/	Preserve existing populations and sufficient foraging habitat	No/Low	Yes/Low	Yes/Low	Yes/Low	
<i>Sterna antillarum browni</i> California least tern FE/CE	Preserve existing populations and sufficient foraging habitat	No/Low	Yes/Low	Yes/Low	Yes/Low	
<i>Speotyto cunicularia hypugaea</i> Burrowing owl C2/SSC	Preserve existing populations and sufficient foraging habitat	No/High	Maybe/Moderate	Maybe/Moderate	No/High	
<i>Empidonax traillii eximius</i> Southwestern willow flycatcher PE/CE	Preserve existing populations and sufficient potential habitat	No/Moderate	Maybe/Low	Yes/Low	Maybe/Low	

Table 5-15 (Continued)

COMPARISON OF PROTECTION AND RISK FOR MSCP TARGET SPECIES AMONG THE FPA SCENARIOS

SCIENTIFIC NAME COMMON NAME STATUS	STANDARDS AND GUIDELINES <sup>1</sup>	MEETS STANDARDS AND GUIDELINES/RISK <sup>2</sup>	CSS	MH	BP	PL
<i>Campylorhynchus brunneicapillus couesi</i> Coastal cactus wren C3/SSC	Preserve existing viable populations and create sufficient potential habitat	Maybe/Moderate	Maybe/Moderate	Maybe/Moderate	Maybe/Moderate	Maybe/Moderate
<i>Poliopitula californica californica</i> California gnatcatcher FT/SSC	Preserve core populations plus additional important satellite populations	Yes/Moderate	Yes/Moderate	Yes/Moderate	Yes/Moderate	Maybe/Moderate
<i>Sialia mexicana</i> Western bluebird none	Preserve adequate amount of potential habitat	No/Moderate	No/Moderate	No/Moderate	Yes/Low	No/Moderate
<i>Vireo bellii pusillus</i> Least Bell's vireo FE/CE	Preserve existing populations and additional potential habitat	No/Low	No/Low	Yes/Low	Yes/Low	No/Low
<i>Aimophila ruficeps canescens</i> California rufous-crowned sparrow C2/	Preserve adequate amount of major populations plus additional important populations	Yes/Low	Yes/Low	Yes/Low	Yes/Low	Maybe/Moderate
<i>Passerculus sandwichensis beldingi</i> Belding's savannah sparrow C2/CE	Preserve existing populations and additional potential habitat	No/Low	No/Low	Yes/Low	Yes/Low	No/Low
<i>Passerculus sandwichensis rostratus</i> Large-billed savannah sparrow C2/	Preserve adequate amount of major populations plus additional important populations	No/Low	No/Low	Yes/Low	Yes/Low	Yes/Low
<i>Ammodramus savannarum</i> Grasshopper sparrow none	Preserve adequate amount of major populations and additional potential habitat	No/High	No/High	Maybe/Moderate	Yes/Low	No/High
<i>Agelaius tricolor</i> Tricolored blackbird C2/	Preserve existing major populations and additional potential habitat	No/Moderate	No/Moderate	Yes/Low	Yes/Low	Maybe/Moderate
<i>Plecotus townsendii</i> Townsend's western big-eared bat C2/SSC	Preserve adequate amount of major populations and additional potential habitat	Insufficient data/Unknown	Insufficient data/Unknown	Insufficient data/Unknown	Insufficient data/Unknown	Insufficient data/Unknown
<i>Eumops perotis californicus</i> California mastiff-bat C2/SSC	Preserve adequate amount of major populations and additional potential habitat	Insufficient data/Unknown	Insufficient data/Unknown	Insufficient data/Unknown	Insufficient data/Unknown	Insufficient data/Unknown
<i>Perognathus longimembris pacificus</i> Pacific little pocket mouse FE/SSC	Preserve existing populations and additional potential habitat	No/High	No/High	No/High	No/High	No/High

Table 5-15 (Continued)  
 COMPARISON OF PROTECTION AND RISK FOR MSCP TARGET SPECIES  
 AMONG THE FPA SCENARIOS

SCIENTIFIC NAME COMMON NAME STATUS	STANDARDS AND GUIDELINES <sup>1</sup>	CSS	MH	BP	PL
<i>Taxidea taxus</i> American badger --/SSC	Preserve adequate amount of major populations plus additional important populations.	Insufficient data/Unknown	Insufficient data/Unknown	Insufficient data/Unknown	Insufficient data/Unknown
<i>Felis concolor</i> Mountain lion --/see text	Preserve adequate amount of major populations and additional potential habitat	No/High	Maybe/Moderate	Maybe/Moderate	No/High
<i>Odocoileus hemionus fuliginata</i> Southern mule deer --/game species	Preserve adequate amount of major populations and additional potential habitat	No/High	Maybe/Moderate	Maybe/Moderate	Maybe/Moderate

**Table 5-15 (Continued)**  
**COMPARISON OF PROTECTION AND RISK FOR MSCP TARGET SPECIES**  
**AMONG THE FPA SCENARIOS**

- 1 Standards and Guidelines. Refer to the text and Appendix A-9 (Biological Standards and Guidelines) for a full discussion of preservation standards and identification/delimitation of major populations.
- 2 Risk = risk of impacts to populations within the MSCP study area; analysis assumes populations within FPA are protected. (Note - viability of species may still be at risk.)  
 Low = little or no risk because species is adequately protected within FPA or majority of population is on protected lands outside the FPA.  
 Moderate = species viability not ensured by FPA, but species would receive additional protection per federal and state wetland regulations, public ownership, and/or implementation of other regional conservation programs and habitat management.  
 High = species is not adequately protected.  
 Unknown = data insufficient to determine risk.

Status (Federal/State)

- FE = Federally endangered
- PE = Proposed for federal listing as endangered
- FT = Federally threatened
- PT = Proposed for federal listing as threatened
- C1 = Category 1 candidate for federal listing
- C2 = Category 2 candidate for federal listing
- C3 = Category 3 candidate for federal listing
- BEPA = Bald Eagle Protection Act
- CE = State endangered
- CR = State rare
- CT = State threatened
- SSC = State Species of Special Concern

Note: Shading indicates priority species (federally and state listed species, species proposed for listing, Category 1 candidate species, and NCCP target species).

The MH scenario attains more than half of the individual species-specific goals in the Biological Standards and Guidelines (Appendix A-9). A total of 52 target species are considered adequately protected and therefore would likely qualify for federal 10(a) permits or pre-listing agreements and state Section 2081 agreements under the MH scenario. Of these, 12 plants and 6 animals are NCCP species. Additional target species may qualify for federal 10(a) permits, pre-listing agreements, and state agreements if subsequent distributional studies confirm that major populations of these species are concordant with the MH scenario or at low risk of future impacts.

The BP scenario attains 66 percent of the individual species-specific goals in the Biological Standards and Guidelines. Approximately 61 of 93 target species are considered adequately protected and therefore would likely qualify for federal 10a permits or pre-listing agreements and state Section 2081 agreements under the BP scenario. Of these, 14 plants and 5 animals are NCCP species. As for the CSS and MH scenarios, additional target species may qualify based on subsequent distributional studies.

A total of 22 target species are considered adequately protected under the PL scenario and therefore would likely qualify for federal 10(a) permits or pre-listing agreements and state Section 2081 agreements. Of these, 3 plants and 1 animal are NCCP species. An additional 13 species are considered at low risk and may qualify for 10a permits or pre-listing agreements if special management conditions are included.

### **California Gnatcatcher Population Viability**

Population viability analyses can be used as a tool in comparing various preserve configurations. The California gnatcatcher metapopulation conserved by each FPA was simulated using the Ramas/space metapopulation simulation model to test long-term viability. Input parameters were consistent with simulations previously performed for the gnatcatcher population viability analysis (see Section 4.3 and Appendix A-7).

Table 5-16 compares the simulation results for each FPA. The four scenarios resulted in extinction probabilities between 6 percent and 10 percent over a 200-year period. The standard set by the USFWS for extinction probability is 5 percent over 200 years. The population trajectories during the 200-year period were similar for these four scenarios; the metapopulation for each of these four scenarios experienced a gradual decline during the first 50-75 years, then stabilized to a population size between 24 percent and 31 percent of

Table 5-16

**RESULTS OF CALIFORNIA GNATCATCHER METAPOPULATION SIMULATION  
MODEL FOR FOUR FOCUSED PLANNING AREA SCENARIOS**

Evaluation Parameter	Focused Planning Area Scenarios				
	Coastal Sage Scrub	Multiple Habitat	Biologically Preferred	Public Lands	Existing Conditions (study area)
No. of Gnatcatcher Populations Included in Model	27	31	33	35 <sup>1</sup>	38 <sup>1</sup>
No. of Documented Gnatcatcher Sighting Localities	1,285	1,424	1,560	1,114	1,883 <sup>2</sup>
Assumed Initial Metapopulation Size (pairs)	1,285	1,424	1,560	1,114	1,852 <sup>2</sup>
Assumed Carrying Capacity (K, pairs)	1,784	2,075	2,299	1,605	3,025
Overall Population Density at K (CSS acres per pair)	35.2	36.8	37.0	37.6	40.1
Proportion (%) of K within Transitional Climate Zone	39	44	45	42	31
Acreage of CSS Habitat <sup>3</sup>	62,859	76,308	85,017	60,413	121,318
<b>Simulation Model Results</b>					
Mean ( $\pm$ SEM) No. Pairs after 200 years <sup>4</sup>	456 (32)	605 (47)	712 (52)	379 (28)	1016 (95)
Extinction Probability (%) after 200 years <sup>5</sup>	7.7	6.7	6.3	9.7	3.0
Probability (%) of Metapopulation Being Reduced by 80% after 200 years <sup>5</sup>	49	45	42	53	40
Mean ( $\pm$ SEM) Number of Extant Populations after 200 years	16.7 (0.5)	18.6 (0.6)	21.8 (0.6)	17.7 (0.6)	24.8 (0.6)

<sup>1</sup> Three populations were assumed to be isolated from the remainder of the metapopulation.

<sup>2</sup> The assumed initial metapopulation size (1,852) is based on a 1993 simulation, and differs from the number of documented gnatcatcher sighting localities (1,883) because a few additional sightings were made subsequent to the simulation.

<sup>3</sup> Includes CSS, MSS, CSS/CH habitat types. 1993 GIS database used for CSS, MH, and BP scenarios; 1994 GIS database used for PL scenario and existing conditions.

<sup>4</sup> For all scenarios, the metapopulation gradually declined during the first 50-75 years and then stabilized around the final mean size.

<sup>5</sup> 95% Confidence Interval for probability is  $\pm 7.8\%$  for all simulations, based on Kolmogorov-Smirnov D Statistic and 300 iterations.

**Input parameters common to all scenarios (see Appendix A-7):**

Environmental Correlation =  $0.86 \exp(-d/500)$ ; r-values range from 0.86 to 0.78 for San Diego County.

Density-dependent migration = 0.5. Demographic stochasticity function active.

Percent Migration =  $0.46 \exp(-d/1.75)$ , with a maximum distance of 14 miles; this approximates Ogden's exponential dispersal model.

Model set for 200 year horizon and 300 replicate simulations.

Each population K estimated by assumed population densities within each climate zone and habitat acreage or 1.2 times known population size.

All scenarios assumed source-sink population dynamics; Rmax, CV of Rmax, and S varied by Climate zone: Maritime = 1.2, 30%, 0.55;

Maritime/Coastal = 1.2, 40%, 0.55; Coastal = 1.1, 30%, 0.55; Coastal/Transitional = 1.1, 40%, 0.55; Transitional = 1.05, 40%, 0.40.

the assumed habitat carrying capacity conserved, indicating that the metapopulation would remain extant for more than 200 years. The final mean metapopulation size after 200 years ranged from a mean of 379 pairs for the PL scenario to a mean of 712 pairs for the BP scenario. This compares to a mean of 1016 pairs for the entire study area, assuming no loss of habitat. The low, but stable population size is likely due to the relatively high annual variation in survival and reproduction that is characteristic of small songbirds. Gnatcatchers are highly susceptible to the vagaries of weather, predators, and catastrophic events such as fire.

This high variability in metapopulation size is further demonstrated by the high probability (42-53 percent) that the metapopulation would be reduced by 80 percent after 200 years. The number of populations remaining extant after 200 years varied from 16 to 22, with the larger core populations being the most resilient to local extinction. Large core populations act as source populations for the smaller and/or relatively marginal sink populations within dispersal distance from core populations. Small steppingstone populations probably enhance the connectivity between core populations (e.g., Black Mountain and Van Dam Peak between Lake Hodges and South Poway).

The PVA simulation model incorporates two levels of complexity in regard to connectivity. All populations with significant habitat linkages were considered connected, but the rate of exchange was dependent on a stochastic exponentially declining function based on distance between populations. Those populations separated by extensive urban development were considered isolated from one another. The known gnatcatcher distribution and sighting data of banded individuals and birds in transit suggest that the dispersal function is conservative with respect to connectivity between populations and likely underestimates the true dispersal capability of the gnatcatcher.

The PVA simulation results are based on the assumption that the basic input parameters are biologically realistic, yet sufficiently conservative for worst-case planning purposes. The input parameters used in the model may be too conservative (e.g.,  $R_{max}$ ), potentially resulting in unrealistic overestimates of metapopulation extinction and underestimating metapopulation size after 200 years. Conversely, the RAMAS/space model does not model some important metapopulation processes (e.g., catastrophic events) that may have important influences on metapopulation viability and long-term metapopulation size. Some of these potential deficiencies of the model will be addressed in an updated version of the model (R. Akçakaya pers. comm.)

The conservation of additional gnatcatcher populations in the North County MHCP study area, especially those considered to be core source populations, would increase the overall viability of the MSCP metapopulation and reduce the extinction probability to below the 5 percent standard. Additional analyses for the County as a whole are being conducted as part of the MHCP study (in prep.).

## **6.0 IMPLEMENTATION STRATEGIES**

### **6.1 INTRODUCTION**

This section describes strategies to implement two alternative scenarios of the focused planning area, the Coastal Sage Scrub (CSS) and the Multiple Habitat (MH) scenarios. These scenarios were selected by the MSCP Working Group in August 1993 for the purpose of conducting financial analysis and economic impact studies. This section also contains some descriptive data for the Biologically Preferred (BP) and the Public Land (PL) scenarios. However, only a limited financial analysis was conducted for these scenarios, and no economic impact studies were performed.

#### **6.1.1 The Process of Preserve Land Assembly**

The assembly of land for a regional preserve system under the alternative scenarios described in Section 5.1 would be accomplished by the following methods:

- For public lands, the agency holding title to habitat lands would voluntarily and permanently restrict uses of the land to those which are compatible with the protection or continued presence of plant and animal species of interest.
- For private lands, the owner would sell or dedicate to federal, state, or local government or a qualified conservation organization fee simple, or permanent conservation easement, or permanent open space easement in habitat lands.
- The agencies or organizations responsible for the management and maintenance of habitat lands would be identified.

This chapter describes alternative procedures for assembling the preserve land, the estimated amount of land that may be protected under each procedure, and the potential sources of funds for public acquisition and management and maintenance of habitat lands. The discussion is intended to be general, with an emphasis on demonstrating the potential capacities of various implementation strategies to protect habitat in the preserve planning area and the relationship between land use regulation and the need for public purchase of habitat lands. Numerical results included here and in the appendices are approximate and subject to change as additional information is obtained. Their purpose is to describe the

probable effect of undertaking certain strategies. They are not intended to be goals or thresholds for future action.

It is anticipated that, at completion, the preserve system will consist of a patchwork or a mosaic of ownerships. This is a necessary consequence of the fact that different methods of land assembly will be used at different times. For a large preserve system such as the MSCP, the patchwork of ownerships has several advantages. First, the cost of land acquisition is reduced; second, the cost of preserve management and maintenance can be shared among many agencies and organizations; and third, the participation of multiple parties in the acquisition and management of the preserve system would encourage a greater involvement and support by the general public. However, a patchwork of ownerships will require coordination of management responsibilities. (See Section 7.3.1 for discussion of management responsibilities.)

Habitat lands would be assembled in segments over time. The planning horizon for completing this process is 2015, which is the same horizon year used by SANDAG for the most recent series of forecasts of regional population, housing, and employment. However, depending on the rate of urbanization in the study area and the availability of acquisition funds, the assembly of habitat lands may require additional time. In the meantime, local jurisdictions would need to use interim measures to protect habitat lands, particularly in the preserve planning area. The interim protection measures are extensions of existing land use controls and review of proposed development projects.

The MSCP Subregional Plan would be supplemented by Subarea Plans, except where a local jurisdiction adopts the Subregional Plan as the Subarea Plan. The Subarea Plans would delineate public and private lands for potential inclusion in the preserve system, refining the recommended FPA to develop a preserve system adequate for resource agency approval. Specific habitat lands would be identified for public purchase, dedication, or voluntary restriction. Other habitat lands may be identified for on-site preservation when specific development plans are submitted to the local jurisdiction for approval.

Since the regional preserve system would be assembled incrementally, keeping accurate records of habitat conservation and take is an essential component of program implementation. The regional database created by the MSCP would be maintained and updated with information obtained during the subarea planning effort and later biological surveys. A preserve status report would be prepared annually, summarizing habitat

acquisitions, restorations, and takes and additions to or consumption of mitigation credits. Options and a process for identifying an institutional structure and responsibility for data collection and coordination of implementation actions are discussed in Section 7.0.

It is anticipated that nonprofit land conservation organizations would play an important role in the assembly of private habitat lands for the preserve system. Nonprofit organizations, such as The Nature Conservancy, Trust for Public Lands, and local land trusts, possess specialized knowledge in local land issues and tax planning, speed and flexibility to act on unique opportunities, and access to private financial and human resources. Participation of nonprofit organizations would be highly desirable in all phases of program implementation, including subarea planning, review of private development planning, and habitat acquisition and management. Procedures should be established in which nonprofit organizations may be reimbursed or directly funded for the planning, acquisition, and management activities undertaken for the benefit of the regional preserve system.

#### **6.1.2 Equity Issues of Allocating Program Costs**

There are many benefits of establishing a regional preserve system such as the MSCP. The principal benefits are:

- Protection of habitats of animal and plant species of concern.
- Recreational, visual, and open space benefits of habitat preservation.
- Providing a method of or reducing the cost of habitat mitigation for future development projects which impact the habitats of animal and plant species of concern.

The benefits accrue to many individuals and organizations. For planning purposes, the following groups of participants, or sectors, were identified by the MSCP Working Group:

- The federal and state governments, representing the interests of individuals and organizations outside the study area, including the society at large.

- Local governments with jurisdiction in the MSCP study area, representing the interests of individuals and organizations who reside in existing developments in the study area.
- Landowners and developers of private projects which require mitigation for habitat impacts.

To the extent that the cost of impact mitigation is passed forward to future residents, their interests parallel those of the private property owners and developers who supply new housing and other facilities. That is, if the cost of impact mitigation is reflected in housing and building prices, then both future residents and current landowners and developers would benefit from a reduced allocation of program costs to new development.

The total contribution of any sector to the regional preserve system may consist of a combination of 1) land dedication or restriction of uses to those compatible with habitat preservation and 2) acquisition of private habitat lands and dedication or restriction of use. There are two principal issues concerning the allocation of responsibilities to contribute habitat lands to the preserve system. First is the extent to which private landowners and developers would be required to protect habitat lands in the focused planning area, as mitigation for impacts to other habitats. Of necessity, important habitat lands not dedicated or otherwise voluntarily restricted to uses compatible with habitat preservation must be purchased. Second is the nature and extent of the mitigation requirement placed on the impact to habitat outside the focused planning area. In-kind mitigation or in-lieu mitigation fees collected from developments outside the planning area can supplement publicly funded habitat purchase inside the planning area.

These two issues may be addressed in many ways. Three alternative methods of program cost allocation were discussed by the MSCP Working Group:

1. Allocation Based on Historical Impact. The private sector would dedicate habitat lands to the preserve system in the same proportion as that represented by future, private-sector habitat consumption (i.e., between adoption of the MSCP Plan and buildout of the study area) to the cumulative, historical habitat consumption at buildout of the study area. The public sector would contribute or acquire the remaining habitat lands in the preserve system.

2. Equal Shares Allocation. The private sector would contribute one-third of habitat lands to the preserve system. The federal and state governments together and the local public sector would each contribute one-third to the preserve system.
3. Allocation Based on Existing Land Use Controls. The private sector would dedicate the same amount of habitat in the focused planning area as it would normally do so under existing land use controls. The public sector would contribute or acquire the remaining habitat lands in the preserve system.

As a variation to each of these approaches, in-kind mitigation or in-lieu mitigation fees collected from private development impacting habitats outside the preserve system may supplement public purchase of habitats inside the focused planning area. In particular, the following variation on the third approach has been reviewed by the MSCP Working Group:

4. Allocation based on existing land use controls, supplemented by mitigation fees. For reference, this will be called the Modified Land Use Controls alternative. Under this alternative, private landowners inside the focused planning area would dedicate the same amount of habitat to the preserve system as they would normally under existing land use controls. A landowner may dedicate a smaller amount, if the location or configuration of preserved habitat substantially restricts the development opportunity of the remaining parcel. In addition, private landowners and developers outside the focused planning area would mitigate impacts to habitats by acquiring habitat inside the focused planning area or paying fees to the local jurisdiction, which in turn acquires habitat inside the focused planning area. The total amount of on-site dedication and mitigation-based acquisition would not exceed the amount which would normally be required under existing land use controls. The public sector would contribute or acquire the remaining habitat lands in the preserve system.

For purposes of illustration, but not necessarily for recommendation, economic and financial analyses of the Modified Land Use Controls alternative were conducted for two of the alternative focused planning areas: the Coastal Sage Scrub scenario and the Multiple Habitats scenario. Land dedication and acquisition estimates were also derived for the Biologically Preferred and Public Lands scenarios, but economic and financial analyses were not conducted.

### **6.1.3 Estimated Acquisition Cost Under Cost Allocation Based on Modified Land Use Controls**

Under the Modified Land Use Controls alternative, habitat conservation would occur through a combination of on-site dedication, mitigation-based acquisition, and other public acquisition. On-site dedication is typically required by existing land use controls for steep slopes, floodplains, archaeological and historical sites, and presence of sensitive biological resources. Mitigation-based acquisition includes both in-kind mitigation and the portion of public acquisition funded by mitigation fees. Other public acquisition would be funded through federal and state grants and local government debt financing.

Estimated amounts of habitat lands contributed to the alternative preserve scenarios by the federal and state governments, local governments, and the private sector under the Modified Land Use Controls alternative are shown in Table 6-1. Total private sector contribution, including on-site dedication and mitigation-based acquisition, varies from 35 percent of the target preserve size under the PL scenario to 52 percent under the CSS scenario. Local governments' contribution ranges from 24 percent under the MH scenario to 31 percent under the PL scenario. The remainder would be contributed by federal and state governments.

Total estimated cost of habitat acquisition is \$96 million under the PL scenario, \$375 million under the CSS scenario, \$532 million under the MH scenario, and \$634 million under the BP scenario. Actual cost may vary from the estimate, depending on the amount and mix of habitat lands which are acquired and future changes in land prices. The cost estimates do not include purchase of Water Utilities Department lands (see Section 6.2.3 below). Acquisition is anticipated to take place between 1994 and 2015, with most of the purchases occurring by the year 2000 and bonds repaid in succeeding years.

The acquisition program would be funded from three principal sources: federal and state grants, local government debt financing, and private habitat mitigation. For purposes of this analysis, it is assumed that federal and state funds would be obtained as matching grants to the locally generated acquisition funds, or 50 percent of total acquisition funds. Locally, habitat mitigation would generate from 25 to 28 percent of total acquisition funds, and from 22 to 25 percent through local government debt financing. Total acquisition cost

Table 6-1

CITY OF SAN DIEGO MSCP  
ESTIMATED CONSERVATION OF HABITAT LANDS BY SECTOR FOR  
ALTERNATIVE FOCUSED PLANNING AREAS (ACRES)

	Coastal Sage Scrub Scenario	% of Preserved Habitat	Multiple Habitats Scenario	% of Preserved Habitat	Biologically Preferred Scenario	% of Preserved Habitat	Public Lands Scenario	% of Preserved Habitat
Habitat to be Preserved Onsite								
Federal/State	9,595	11%	37,678	26%	39,675	24%	48,522	33%
Local	19,420	23%	30,879	21%	35,074	21%	43,984	30%
Private	39,922	47%	55,940	38%	65,409	39%	50,816	34%
TOTAL	68,937	81%	124,497	85%	140,158	84%	143,322	97%
Habitat to be Acquired								
Federal/State	7,982	9%	11,320	8%	13,490	8%	2,036	1%
Local	3,546	4%	5,105	3%	6,180	4%	1,018	1%
Private (Mitigation or Fee)	4,436	5%	6,215	4%	7,310	4%	1,018	1%
TOTAL	15,963	19%	22,640	15%	26,980	16%	4,072	3%
Total Habitat to be Conserved								
Federal/State	17,576	21%	48,998	33%	53,165	32%	50,558	34%
Local	22,966	27%	35,984	24%	41,254	25%	45,002	31%
Private	44,358	52%	62,155	42%	72,719	44%	51,834	35%
TOTAL	84,900	100%	147,137	100%	167,138	100%	147,394	100%
Sources of Acquisition Funds								
Federal/State	\$187.6	50%	\$266.0	50%	\$317.0	50%	\$47.8	50%
Local	83.3	22%	120.0	23%	145.2	23%	23.9	25%
Private	104.2	28%	146.1	27%	171.8	27%	23.9	25%
TOTAL (\$Million)	\$375.1	100%	\$532.0	100%	\$634.0	100%	\$95.7	100%

Note: Figures may not add as shown due to rounding.

to be debt financed is \$24 million under the PL scenario, \$83 million under the CSS scenario, \$120 million under the MH scenario, and \$145 million under the BP scenario.

#### **6.1.4 Habitat Classes**

Currently, different kinds of habitats, or vegetation communities, are regulated differently by federal and state law and local ordinance. For the discussion of implementation strategies, four classes of habitats and vacant lands are identified.

**Class A** habitats include wetlands and other habitats protected by federal and state law, where no net loss of habitat is a stated policy goal. Wetland habitats are southern coastal saltmarsh, freshwater marsh, riparian forest, oak riparian forest, riparian woodland, riparian scrub, open water, disturbed wetlands, and natural flood channel. Also included are some of the upland habitats for which the Biological Standards and Guidelines recommend a standard of 100 percent preservation and which occur primarily on public lands: southern foredunes, southern coastal bluff scrub, Torrey pine forest, and Tecate cypress forest located above 1500 ft elevation. In addition, shallow bays, parts of the Pacific Ocean included in the Habitat Evaluation Model, and other habitats, such as vernal pools, which are shown in the model as primarily non-habitat uses, are included.

**Class B** habitats include habitats protected by federal or state laws, but which allow some take of the habitat. These are coastal sage scrub, CSS/chaparral scrub, and oak woodland. Also included are habitats for which the Biological Standards and Guidelines recommend a goal of 100 percent preservation, but which may require public acquisition to achieve the standard. These are maritime succulent scrub and southern maritime chaparral. Beach and saltpan, which are important for certain bird species, are also included.

**Class C** habitats are not currently protected by federal or state law, but are important components of the preserve system. Included are chaparral (excluding southern maritime chaparral) and native and non-native grassland. Some of these habitats are protected by local ordinance, e.g., native grassland and chaparral with sensitive species.

**Class D** habitats and vacant land have limited biological value for the preserve system, but they may be important as corridors or linkages or as potential sites for habitat restoration. Included in this class are eucalyptus woodland, disturbed habitat, and agricultural areas.

## **6.2 PUBLIC LAND**

### **6.2.1 Public Land and Habitat Value**

Approximately 29 percent (166,059 acres) of the MSCP study area is in public ownership (Section 3.3), and 68 percent of these lands (112,290 acres) have habitat (Table 6-2). Approximately 36 percent of the 314,890 acres of habitat in the MSCP study area is publicly owned, and 64 percent is privately owned. The cities in the MSCP study area, the County of San Diego, the City of San Diego Water Utilities Department, the Department of Defense, and the Bureau of Land Management together own 89 percent of public lands with habitat.

The potential for public land to contribute to the preserve system depends on a number of factors: the public agency that owns the land, the process and/or funding by which it was acquired, whether the land is encumbered with any deed or property use restriction, its use designation, and the habitat value of the property. With consideration of these factors, a significant portion of the preserve system may be assembled through the contribution of public land.

### **6.2.2 Availability of Public Land for Preserve Purposes**

Issue Paper #7 (Appendix C-1) provides guidelines for resolving issues of equity among public and private entities regarding the implementation of the MSCP. One issue is the use of public land in the preserve system. Because public lands are owned by different agencies for a variety of purposes, the following categories of public ownership were identified to aid in the analysis (see also Section 3.4):

Category I. Public lands within this category are already protected for habitat preservation. These are existing preserves or lands held primarily for open space or preservation purposes.

Category II. Public lands in this category are designated as open space in the applicable general or community plan, but have not been permanently protected as habitat. Inclusion of these lands within the preserve system would depend on their habitat value and compatibility with planned uses.

Table 6-2

**PUBLIC OWNERSHIP OF HABITAT LANDS  
IN MSCP STUDY AREA**

<b>Agency</b>	<b>Acres with Habitat</b>	<b>Percent of All Publicly Owned Habitat</b>
<b>Federal</b>		
Military	19,883	18%
Bureau of Land Management	24,317	22%
National Forest	158	<1%
Indian Reservation	632	<1%
Other Federal	1,058	1%
<b>State</b>	<b>6,856</b>	<b>6%</b>
<b>Local</b>		
County of San Diego	9,003	8%
Cities	30,591	27%
City of San Diego Water Utilities	16,379	15%
School Districts	580	<1%
Special Districts	2,834	3%
<b>Total Public</b>	<b>112,290</b>	<b>100 %</b>
<b>Total Private</b>	<b>202,600</b>	
<b>Total</b>	<b>314,890</b>	

Source: Ogden, SourcePoint 1994 MSCP GIS database.

Note: Figures may not add as shown due to rounding.

Category III. Public lands in this category are designated for agricultural, residential, or urban uses, including public development projects, such as transit centers or civic projects.

Publicly owned habitat lands to be included in the preserve system should come first from Categories I and II, because these lands are either within an existing preserve or designated for open space purposes (Table 6-3). Of the 112,290 acres of publicly owned habitat lands, 77,536 acres (69 percent) are located in existing preserves or designated for open space. Including portions of these lands into a preserve system would be consistent with the intended use of the property. Within Category III lands, proposed public development projects should be sited to the maximum extent possible on areas of no habitat or lower quality habitat.

**Table 6-3**  
**PUBLICLY OWNED HABITAT DESIGNATED AS**  
**PRESERVE OR OPEN SPACE**

Category	Federal/State (Acres)	Local (Acres)	Total (Acres)
I. Preserves	3,236	15,759	18,994
II. Open Space	29,749	28,793	58,542
<b>Total</b>	<b>32,985</b>	<b>44,552</b>	<b>77,536</b>

Source: Ogden, SourcePoint 1994 MSCP GIS database. See also Appendix B-2.  
Note: Figures may not add as shown due to rounding.

### 6.2.3 Public Ownership in Alternative Focused Planning Areas

Table 6-4 shows the acres of federal/state and local agency-owned habitats included in the alternative focused planning areas. Figures 6-1, 6-2, 6-3, and 6-4 show the locations of public ownerships by agency in the four FPAs. This section summarizes the major properties in public ownership.

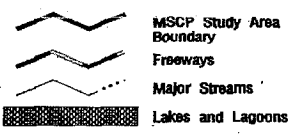
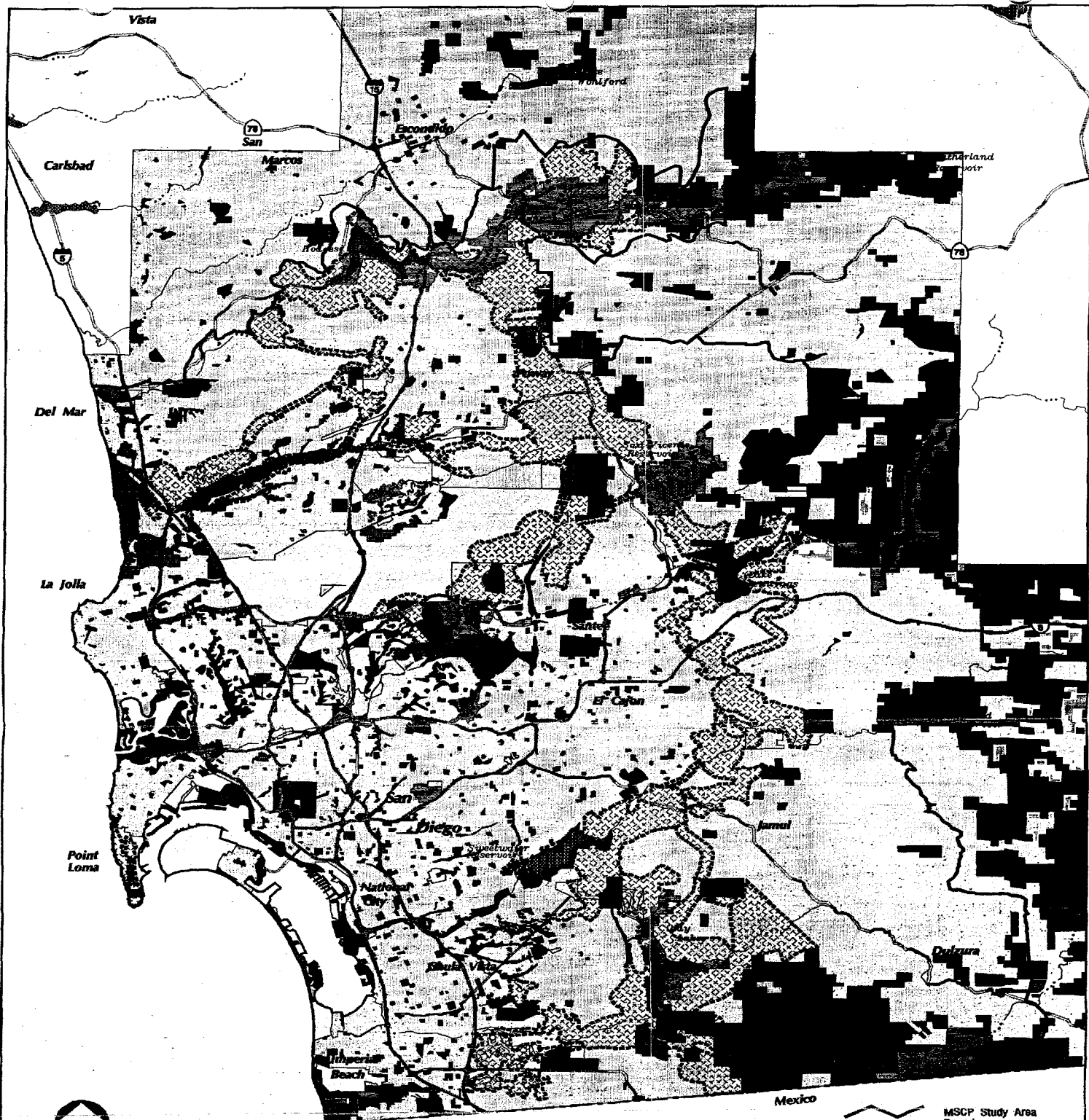
Table 6-4

**PUBLICLY OWNED HABITAT IN ALTERNATIVE  
FOCUSED PLANNING AREAS**

Category	Agency	CSS (Acres)	MH (Acres)	BP (Acres)	PL Acres)
I. Preserves	Federal/State	647	3,101	3,239	3,174
	Local	9,121	13,939	14,511	15,567
II. Open Space	Federal/State	4,539	24,275	25,352	28,835
	Local	7,048	10,523	13,916	16,845
IIIA. Constrained Land	Federal/State	3,478	7,374	7,985	11,138
	Local	2,902	5,558	5,991	7,818
IIIB-D. Planned Urban	Federal/State	931	2,938	3,109	5,375
	Local	1,349	2,349	2,505	3,754
Total Federal/State		9,595	37,688	39,685	48,522
Total Local		20,420	32,369	36,923	43,984
Total Public		30,015	70,057	76,608	92,506
% of FPA Habitats Publicly Owned <sup>1</sup>		32%	43%	41%	56%
% of Total MSCP Public Habitat		31%	72%	78%	82%

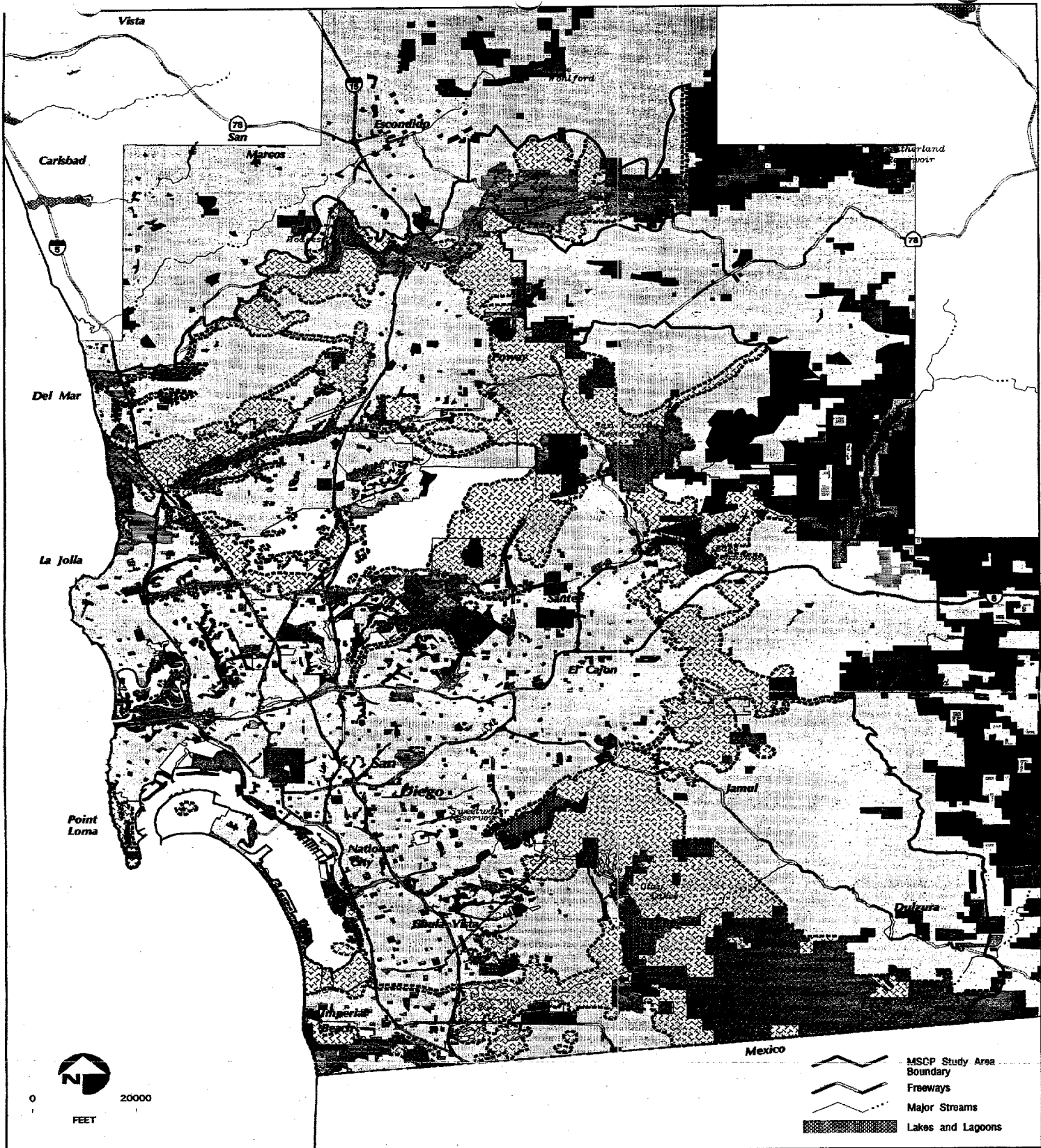
Source: Ogden, SourcePoint. 1994 MSCP GIS database for the PL scenario; 1993 MSCP GIS database for the CSS, MH, and BP scenarios.

<sup>1</sup>The CSS, MH, BP and PL scenarios are 94,900 acres, 162,000 acres, 185,700 acres, and 163,900 acres, respectively (Section 5.0).



- |                                   |  |  |          |
|-----------------------------------|--|--|----------|
| City Owned                        | Special Districts - Port, Sewer, Water, Fire | National Forest                        | Preserve |
| City of San Diego Water Utilities | State of California                          | US Bureau of Land Management           |          |
| County of San Diego               | Military                                     | Other Federal Lands - Post Office, GSA |          |
| School District                   | Indian Reservations                          | Private                                |          |

Source: SANDAG 1990 Public Ownership Coverage



- |                                   |  |  |          |
|-----------------------------------|--|--|----------|
| City Owned                        | Special Districts - Port, Sewer, Water, Fire | National Forest                        | Preserve |
| City of San Diego Water Utilities | State of California                          | US Bureau of Land Management           |          |
| County of San Diego               | Military                                     | Other Federal Lands - Post Office, GSA |          |
| School District                   | Indian Reservations                          | Private                                |          |

Source: SANDAG 1990 Public Ownership Coverage



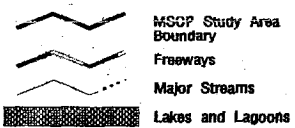
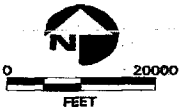
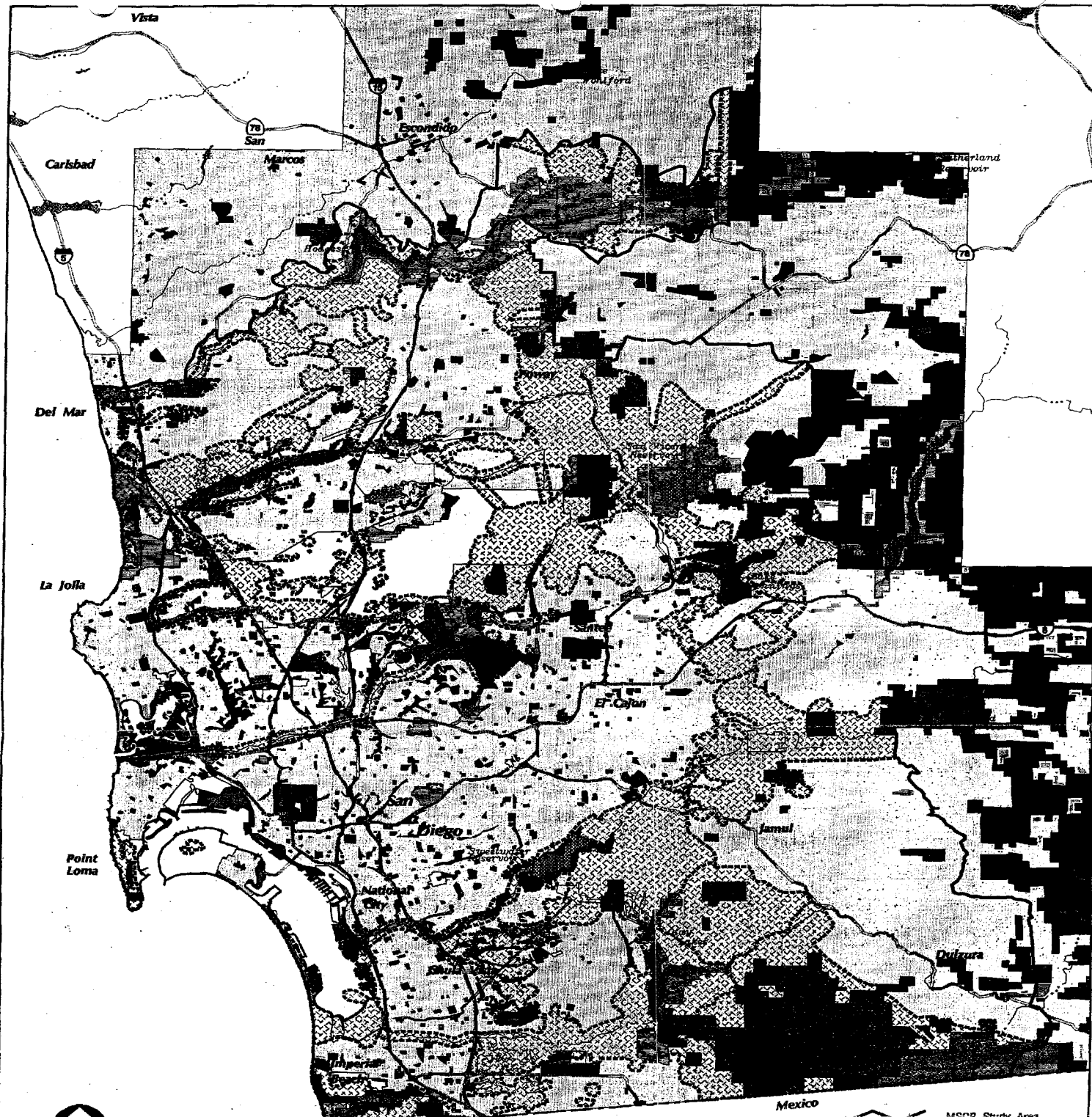
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Public Ownership within the Multiple Habitat Focused Planning Area

FIGURE

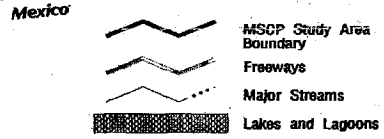
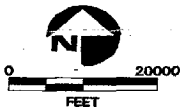
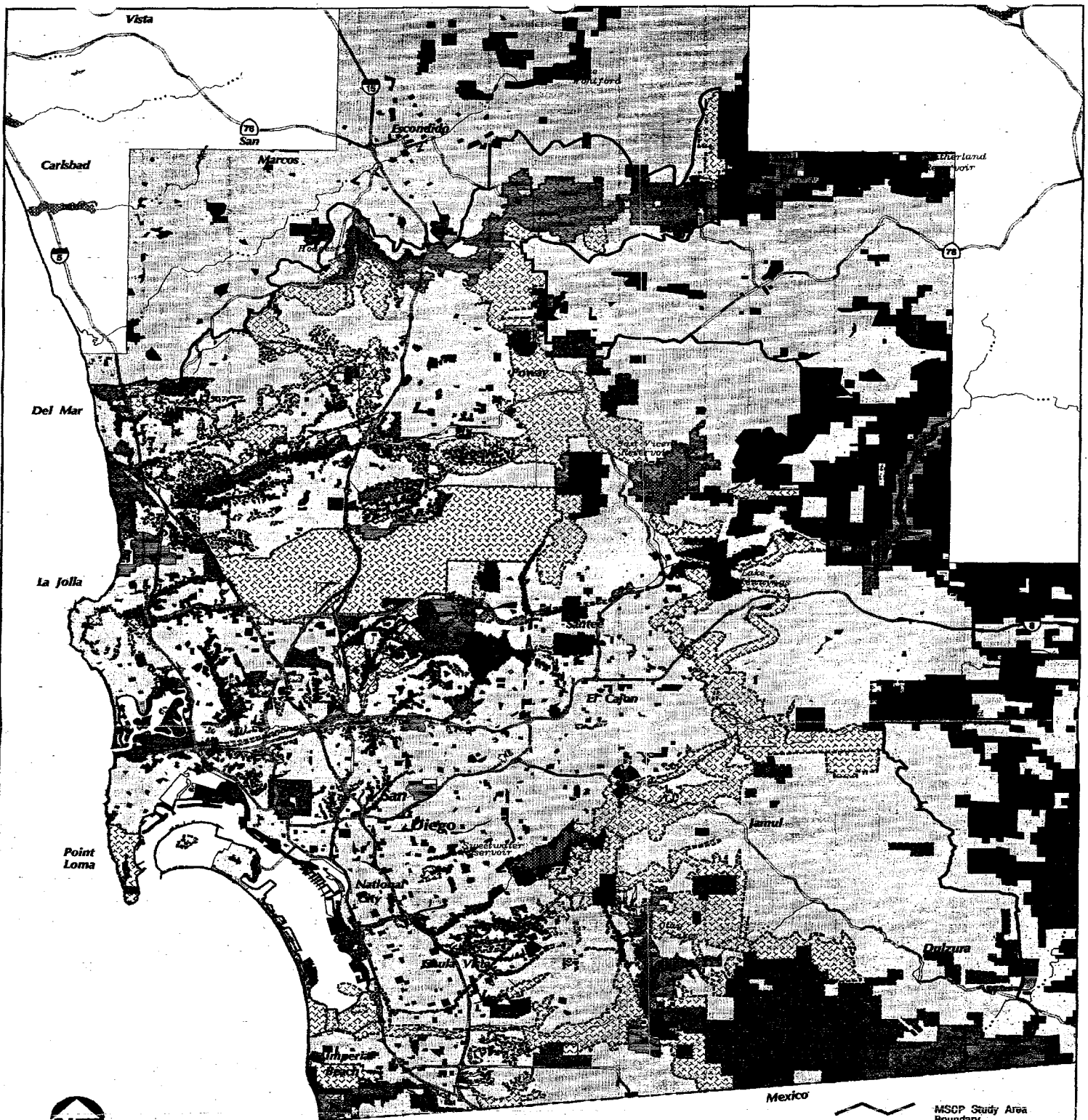
6-2

6-15



City Owned	Special Districts - Port, Sewer, Water, Fire	National Forest	Preserve
City of San Diego Water Utilities	State of California	US Bureau of Land Management	
County of San Diego	Military	Other Federal Lands - Post Office, GSA	
School District	Indian Reservations	Private	

Source: SANDAG 1990 Public Ownership Coverage



City Owned	Special Districts - Port, Sewer, Water, Fire	National Forest	Preserve
City of San Diego Water Utilities	State of California	US Bureau of Land Management	
County of San Diego	Military	Other Federal Lands - Post Office, GSA	
School District	Indian Reservations	Private	

Source: SANDAG 1990 Public Ownership Coverage

**OGDEN**

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Public Ownership within the Public Lands Focused Planning Area

FIGURE

**6-4**